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DISTRIBUTION OF GULLS--SOME FURTHER CONSIDERATIONS

By Dean Amadon

(American Museum of Natural History)

In THE ELEPAIO (January, 1965) Professor Hubert Frings discusses possible reasons for the absence of gulls on Pacific islands. Actually, his discussion is largely restricted to tropical islands, for there is no shortage of gulls on many non-tropical Pacific islands such as the Pribilofs, Japan, and New Zealand. The general absence of gulls from tropical waters and islands is well known and has often been mentioned. There are, of course, a few exceptions, such as the Laughing Gull (Larus atricilla), whose breeding range extends into the West Indies. But most of the gulls of tropical latitudes, whether nesting or wintering, are found in areas of cool rather than warm waters. This is the case, for example, with the two species endemic to the Galapagos Islands. These islands, though lying on the equator are washed by the cool Peruvian Current and even boast a penguin.

Professor Frings considers two possible reasons for the general absence of gulls on tropical islands: first, that they are unable to exploit available food resources; second, that they are not well adapted to excrete excess salt by means of nasal salt glands, in the manner of petrels. He is inclined to dismiss the first alternative because "gulls are marvellously adaptable birds and it would certainly seem that some time in the distant past gulls could have arrived in not too poor condition and modified their habits" (to the extent necessary to utilize available food). He then discusses at greater length the problem of excreting salt and considers this a more likely explanation.

To me the reverse seems much more probable. Granted that gulls may not be specialized as regards salt excretion, the fact remains that one does not have to look far to find gulls that nest on little rocky isles where there is usually no fresh water. Others such as Franklin's Gull (Larus pipixcan) and the Kittiwakes (Rissa) spend weeks on the high seas, perhaps only coming to some reef or floating debris to roost. Terns and jaegers, close relatives of the gulls, show even clearer examples of prolonged and, in some species, lifelong existence away from fresh water. It is possible that gulls and terns ingest less salt water when feeding than do petrels and hence find salt excretion to be less of a physiological problem.

Let us now consider the question of food. Is it not likely that tropical seas are poor in the sorts of food usually required by the gulls for their essentially scavenging existence? On the other hand, the terns, first cousins of the gulls, are adapted for life on tropical offshore seas and such species as the Sooty Tern (Sterna fuscata) and the noddies (Anous) occur in huge colonies. It is possible, therefore, that the terns represent an early adaptation in this group of birds for life in tropical waters. The fact that some terns are found in temperate and even polar seas does not necessarily disprove this. Recently while enroute from California

to the Galápagos, we cruised through tropical or subtropical waters two or three hundred miles offshore. The occasional gull that still appeared, almost plodded after the ship, especially when the air was calm. On the other hand, when a pair or small flock of Sooty Terns flashed by they seemed much more in their element.

As noted above, the Galápagos Islands are not typically tropical. Is it nevertheless probably significant that one of the two native gulls, the beautiful Fork-tailed Gull (Creagrus furcatus) is much like a large tern in shape and of very buoyant flight? It is further unusual if not unique in its family in that it is nocturnal, feeding on squids as they come to the surface at night. This suggests that its ancestor found a paucity of the usual fare of gulls when it arrived. The second Galápagos species, the Lava or Sooty Gull (Larus fuliginosus), is to be sure a typical scavenging species. But it occurs in much smaller numbers than does the Fork-tailed Gull. The herds of sea lions and marine iguanas found on the Galápagos provide scavenging opportunities; these animals are not, of course, a usual feature of equatorial isles.

It may also be noted that tropical islands have, in addition to terns, other fish-eating and scavenging seabirds that would or do compete with gulls. The frigatebirds come to mind immediately, but tropic birds, boobies, and even, in some areas, albatrosses and shearwaters are also potential competitors.

It seems likely, therefore, that the rarity or absence of gulls on tropical oceanic islands indicates that gulls are not well adapted to such an environment, or at least that they are less well adapted than the many seabirds already present.

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DISTRIBUTION OF GULLS--STILL FURTHER CONSIDERATIONS

By Hubert Frings
(University of Hawaii)

My main purpose in writing the piece on gulls was to spark thought and discussion, so I am happy that Amadon has contributed his paper to THE ELEPAIO. I do, however, wish to correct two misapprehensions that apparently were possible from my article and to comment on Amadon's idea.

In using Bryan's article in THE ELEPAIO (May, 1964) as a starting point, I assumed that his area of reference would be followed--that is, "oceanic Pacific islands." Unfortunately, I omitted the word, oceanic, from my paper; I thought that was implied. Thus, the Pribilofs, Japan, etc. are not involved in this discussion; I am aware that gulls are found on these essentially continental islands. I would also regard the West Indies as close enough to continents to exclude them from the discussion.

The Galápagos Islands represent exceptions in so much that the situation there, it seems to me, does not negate the essential correctness of Bryan's original assertion. Furthermore, as Amadon points out, the gulls of the Galápagos are rather specialized. Gulls do have functional nasal glands, but their degree of activity varies greatly from species to species, as Schmidt-Nielsen has shown. Some strongly marine species have much more efficient nasal glands than do continental species. There is no reason, therefore, why we could not assume that the Galápagos gulls have highly efficient nasal glands, or that they find fresh water on such large islands. I do not know enough about their physiology or habits to comment further.

A second possible misapprehension in Amadon's paper, which again may be my fault, is indicated by his statement that I am "inclined to dismiss" the problems involved in food and feeding. This is much stronger than I meant my actual statement to be. It was: "Yet, I am not convinced that this is right." I did devote three

paragraphs to discussing food as a factor in the problem, pointing out the importance of the scavenging habits of gulls. Furthermore, in the concluding paragraph of the article, I stated:

"At any rate, these are two possible answers, it seems to me, to the question . . . We need not believe that one reason only is responsible, nor that there may not be other factors as yet unknown."

The "two possible answers" refer to: first, the feeding, and second, the nasal gland hypotheses. I would like to make clear here that I by no means dismiss the feeding explanation in favor of the nasal gland idea only.

I guess I should confess that the article had two purposes--to try to excite some thought on the problem, and to present information about the nasal glands. Perhaps my ruse in using the gull problem as a "peg" on which to hang a discussion of the function of the nasal glands was too transparent, but I still feel that the nasal gland hypothesis deserves thought.

A further word is necessary on the function of the nasal glands. They do not have, as their primary function the elimination of excess salt taken in during feeding. They are actually the means whereby sea birds can drink sea water--voluntarily, if you like--and rectify it into a smaller amount of fresh water. The difference between terns and gulls--keeping in mind constantly how little information we still have--is that the nasal glands of terns generally excrete sodium chloride solutions of such concentrations that sizeable excesses of fresh water are left, while those of gulls excrete lower concentrations. So terns can continuously drink sea water, while gulls may not be able to do so. Gulls certainly can, for short times or with small salt loads (such as in brackish water), survive while taking in salt solutions, but their nasal glands seem not to be designed for heavy-duty operation.

My thesis, therefore, is that the factor of safety for gulls in this regard is too low to assure their survival in trips from continents to truly oceanic islands. If they do arrive, they are in poor physical condition, essentially like shipwrecked mariners who have spent a long time in a boat with little or no fresh water. Under such circumstances, any other problems, such as those arising in regard to food, would be accentuated.

The note in Amadon's paper about how gulls following his ship near the Galápagos "almost plodded after the ship," may show not that the birds were hungry, for hunger as often as not increases activity, but that they were suffering from salt imbalance. At least, neither he nor I know the real pathology of the syndrome observed. This emphasizes my final statement in the original article:

"Our knowledge of the basic life habits and physiology of marine birds is so rudimentary that we may be said to know almost nothing."

Compared with what we know about insect physiology, not to mention mammalian physiology, our knowledge of that of birds in general, and even more so of sea birds, seems spotty and superficial.

The last paragraph of Amadon's paper neatly restates the problem. Obviously, gulls are not well adapted to live on tropical oceanic islands. The question is: Why? I do not underestimate the importance of feeding habits and competition with already established species during the critical period after arrival, and take this opportunity to restate my position on this. I do feel, however, that other physiological factors may be--in fact are--involved, of which nasal gland function may be one. Lacking critical experiments and exact knowledge, the question makes for interesting and provocative discussion.

Some time ago, we were involved in research on the way in which high intensity sounds destroy tissues or kill animals, and found that there are, in sound fields, a number of potentially harmful energy forms. All these destructive factors are in action at once, and the specific one that oversteps the bounds, in any given case, is irrelevant. So it is with the possible inhospitable factors pressing upon a vagrant gull arriving on an oceanic island after a long over-seas flight. It has a whole series of potentially lethal pressures to survive at once. Which of these trips it up may be merely a matter--as a Civil War general is credited with saying--of which one "gets there the firstest with the mostest."*

*I know historians insist that the worthy Confederate general was too educated to say such a thing. Too bad. It states an important concept crisply, in pungent, even flamboyant, English.

FOR JUNIOR MEMBERS:

This month's bird is the bald eagle, our national bird. It is recognized at once by its white head and tail and a yellow bill. Its wings are stretched out, and the bird soars as though it is floating through the air. The immature bird has a dark bill and a dusky head and tail. It also shows whitish wing-linings and breast. Probably three years are required to attain adult plumage.

The greater part of its food is fish. It often dives for a fish, but it feeds mostly on dead ones along the shore. Another source of its food is the osprey--forcing the osprey to drop its catch, then swiftly seizing the fish before it reaches the water.

It builds a nest of a bulky platform of sticks in tall trees and on cliffs, and lays two or three dull white eggs.

Unfortunately this stately bird is becoming rare. Though it is protected by federal law, some are still being shot by men who are ignorant of the law and/or who are selfishly enjoying a kill of such a magnificent bird. It is still commonly found in Alaska, along the west coast of Florida, and in the Chesapeake-Potomac area near Washington. During the last few decades there is a decided decrease of the bald eagle population in Florida. The following two reasons are given for the decrease:

(1) The destruction of the nesting trees to make room for the expanding population. An established pair returns to the same nesting site year after year. (2) The air-spraying of DDT and the indiscriminate using of pesticides and insecticides. Though this bird is long-lived, it is not rearing enough young to replace the annual mortality, because some of the birds become sterile from eating the poisoned fish.

The fate of our national bird depends upon you. You must be vigilant and protect the bird from becoming extinct. You must jealously prevent men from thoughtlessly and selfishly disrupting the delicate ecological balance.

Letter from Steve West, New Mexico, March 31, 1965:

...The House Finch has already started nesting and the Great Horned Owls should have started a long time ago. In December a couple of friends and I went to 6-mile Dam bird watching. We saw a total of 17 Great Horned Owl! For this area it was pretty good.

I hope to start taking bird pictures from a blind soon...I hope to get some Shoveler pictures from Harroun Lake. On every weekend count for the past 3 or 4 weeks we have gotten at least 100 Shovelers. Also at Harroun Lake we have found 3 Harlequin Ducks! They are very rare in this state....

I was at the Park last Saturday and saw 2 Golden Eagles. I usually see at least one every time I go there. One time I saw 5...The Golden Eagle is probably declining and it needs help fast before it gets into the fix that the Bald Eagle is in....

On the same day that we saw the Harlequin Ducks at Harroun Lake, we also saw

about 30 quail. They were Scaled Quail. I noticed that they were acting unusually. Usually when a car is coming, they will run across the road fast, then quickly disappear. The quail we saw were walking and didn't seem to be in any hurry. By the time they were about 3 feet off the road we had pulled up beside them. Most of the quail were just standing, although a few were walking slowly, but one was hopping! I looked at it and saw that its left leg was hanging by a small shred. I jumped out hoping to catch the bird and give it to the State Bird Farm, so that they would be able to help it. What I didn't realize was that its leg was hurt, but its wings were fine. I walked back to the car, when I saw that they had all flown away. I sat down and got to thinking about it. The whole flock stayed and waited for the injured quail to cross the road. Then when I got out of the car, they all left, including the injured one. They sure must have companionship to do that. I doubt that the injured quail lives much longer and will probably fall prey to a feral cat or may be a Sharp-shinned or Cooper's Hawk. At least the quail lived longer with the flock, because they stayed together and would help to save the injured individuals. The more I study animals the more I realize that they are as much like people...I will always remember this injured quail and its flock....

FIELD NOTES:

Are you watching the plover? Aren't they handsome? Some of them are completely black and gold except for the white strip of feathers dividing the two colors. As of April 20, most of the birds are still here, though they are anxiously flocking to fly to Alaska and less aggressive about protecting the feeding ground. If you are watching these birds, please share your experiences with other members by writing to me.

July's bird is Swallow-tailed Kite. Please study about this bird and write to me.

Unoyo Kojima
725-A 8th Ave, Honolulu, Hawaii, 96816

BIRD-WATCHING ON THE GARDEN ISLAND

By Paul & Helen Scheffer

Paul and Helen Scheffer and Pete and Margo Holt had a very delightful bird-watching holiday on Kauai during the period March 19th to 22nd. Twenty-five species of birds were either spotted or identified by song. Tape recordings were made of many of the bird songs for more positive identification and later enjoyment.

A bright warm sun provided ideal bird-spotting weather during 300 miles of highway and back-road driving from Haena Point around the island's coastal area to the Barking Sands and mauka to Kalalau Lookout in Kokee Park. The trip also included a five-mile hike through intermittent ground-fog along the Na Pali border of Alakai Swamp.

The following bird observations were made:

Indian Myna - numerous and noisy around the villages and lowland areas; several seen riding the back of cattle in the pastures.

House Sparrow - also "plenty".

Golden Plover - seen in beautiful breeding plumage at Lihue Airport and on golf club fairways and large lawn areas.

Western Meadowlark - the singing of two or three of these birds in some pasture areas near the Kilauea Lighthouse almost made the Scheffers homesick!

Hwa-mei (Chinese Thrush) - numerous in all the brushlands and wooded areas of Coastal Kauai; also heard along the road to Kokee. This bird is difficult to spot in the dense foliage, but its melodious song was heard at almost every stop.

Kauai Thrush - tentative identification made from recording of one bird song near

Kalalau Lookout.

White-eye - chirping about at almost every stop in the Coastal area.

Cardinal - common in the Kiawe thickets of the drier sections of the island; readily heard outside motel windows just before time to wake up!

Jungle Fowl - cock-crowing in Kokee Camp area common enough to give the entire area a backyard-at-sunrise ring. Jungle Fowl reported to be generally cross-bred with game cocks.

Mockingbird - several heard at Waimea.

Ring-necked Pheasant - cocks heard crowing at Puu Ka Pele.

Feral Pigeon - flocks seen on the wing in Hanapepe Valley and Kokee area.

Apapane - several flocks of Apapane seen twittering through tops of Ohia trees and feeding on the blossoms at the Kalalau Lookout.

Iiwi - three birds seen and two others heard in the Alakai Swamp gave us a real thrill!

Amakihi - several seen in tall Ohia at Kalalau Lookout.

Elepaio - these birds scolded us almost continuously throughout the hike along the edge of Alakai Swamp.

Sooty Tern - fifteen seen in the canefield drains in the Mana area.

Black-crowned Night Heron - three birds seen around the above canefield ditches.

Hawaiian Duck - two seen over Koloa canefields, two in Hanalei Valley and one on the Kilauea River.

Common Gallinule - one spotted on the Hanalei River.

American Coot - several seen in drain ditch near Kilauea.

Red-footed Booby - a colony of several hundred nesting birds at the Kilauea Lighthouse and offshore island, showed not the slightest interest in us.

Great Frigatebird - one soared directly over us at Kilauea Lighthouse.

White-tailed Tropicbird - three birds made a beautiful flight display for us at Opaekaa Falls.

FIELD NOTES:

ATTRACTING BIRDS

The Short-eared Owl (Pueo) and the Hawaiian Hawk (Io) are easily encouraged to come within a few yards of the observer in mid-day through the use of the "wounded animal" distress call. This call can be simulated by pressing the open lips firmly against the forefinger knuckle and sucking. The result is a series of long, drawn out, high-pitched squeeking sounds that attract these predatory birds as would a wounded small animal. By shortening the length of the note and slightly raising its pitch, almost any nesting bird can be brought in momentarily for closer observation. The Elepaio and Mejiro are curious enough about this sound to flutter about in front of the observer at any season of the year.

Paul & Helen Scheffer

HAWAIIAN THRUSH

The Hawaiian Thrush (Omao) appears to be the most common native bird in numbers and song in the 1500 to 3500 foot elevation belt through the Hilo and Waiakea Forest Reserves on the lower slopes of Mauna Kea, mauka from Hilo, on the Big Island. The birds were observed to be in constant movement through the tops of the tall Ohialehua trees and in almost continuous song. The birds commonly moved about in pairs. Their song could be heard well into the evening dusk. This incidental observation was made on April 16, 1965.

Paul M. Scheffer

In order to reduce the cost of publication, the annual and five-year indexes will be mailed to the members only upon request. If you are interested in receiving either one of the indexes, please send in your request before July to Kojima, 725-A 8th Ave, Hon.

FIELD NOTES on NENE from Ronald L. Walker - March 20, 1965.

1. One nene which was reared at the Pohakuloa project on the Island of Hawaii and subsequently taken to Haleakala crater on Maui, returned to the Big Island with an English bird also released on Maui. This pair showed up frequently at the pens at Pohakuloa before settling down at Volcanoes National Park where they successfully hatched two out of three eggs.

2. Observations during the breeding season included a wild bird mated with a released bird at the Keahou area near the National Park on Hawaii and three wild birds at the Hualalai sanctuary.

3. The production at the Pohakuloa rearing project totaled 41 goslings, compared to 38 produced last year. Of these six plus 24 from last years crop were released at Keahou on Hawaii. The rest of the 1965 production is slated for release at Keahou II on Hualalai.

4. On Maui few sightings have been made of birds released over the past two years. In view of the wide movement of these birds between the crater and the pasture lands of Kula, it is possible that they have moved out of the crater entirely perhaps down Kaupo or Koolau gaps.

CATTLE EGRETS

BAD NEWS! There's no cattle egret at the Honolulu Zoo. March of last year the egrets were still nesting there, but today, April 11, 1965, there is none. What happened? Can it be insecticides? Pesticides? Please let us know, and if possible, let us help bring back the birds again.

GOOD NEWS! At the March, 1965, board meeting, Mike Ord shared the good news that a cattle egret was reported from Kanaha Pond, Maui. Since there is no record of introducing cattle egrets on Maui and since they are excellent flyers, this Maui bird must have found its own way to Maui from Oahu, a distance of about 100 miles over water. Those of you on Maui, please share your field notes with other members by writing to Kojima, 725-A 8th Ave, Honolulu, Hawaii, 96816.

THE CONDOR, Volume 67, No. 1, Jan-Feb, 1965, page 89: The Cattle Egret Reaches the West Coast of the United States by R.G. McCaskie, Tahoe City, Calif., May 3, 1964.

On March 7, 1964, two immature Cattle Egrets (Bubulcus ibis) were found feeding with cattle at Imperial Beach, San Diego County, California. The writer feels "that the Cattle Egret most likely reached California by ranging up the west coast of Mexico from Panama and not by flying across the arid southwestern deserts from coastal Texas. It is possible that the Cattle Egret will soon be found to be of regular occurrence in suitable areas along the west coast of North America."

Unoyo Kojima

Field Trip, Ulupau Head, April 11, 1965.

April 11, 1965, field trip reported as follows:

Participants: 9 members, 2 visitors.

<u>Location</u>	<u>Birds Observed</u>
Pali reservoir:	2 gallinule, 1 shama thrush, leiiothrix.
Ulupau Head:	700 red-footed booby, 2 brown booby, 9 frigate birds, 3 N.A. cardinal, 4 Brazilian cardinal, 100 ricebird, 5 Hawaiian noddy.
Moku Manu:	300 red-footed booby, 36 brown booby (nesting), 4 grey-backed tern, 200 frigate bird (some with red gular pouch), 5,000 common noddy, 50,000 sooty tern, 200 Hawaiian noddy, 1 black-crowned night heron.

At least five golden plover were sighted on the drive to Ulupau Head.

Two turtles and a hammerhead shark were also seen in the waters below Ulupau Head.

Sheila Conant

LETTERS:

From Grenville Hatch, La Jolla, California, Feb. 2, 1965.

...Last week we found a flock of Western Bluebirds, and I was pleased as punch to locate a snipe in the meadow with--of all things, a stream running through it. There were also numbers of Snowy Egrets, lovely creatures, enjoying the water and the surrounding fields....

My humming birds have disappeared, and I am perplexed. I think they are nesting, but why don't they come for food? And I have no idea where they have gone to nest....
March 31, 1965:

...Certainly the birds know it is spring. Most of the cormorants have disappeared from the cliffs where they roost and perch in hundreds during the winter, and some of the remaining ones are decorated with the soft little plumes on their heads. I am trying to keep a close watch on the area to see whether any of them do nest there. The books say they do, but so far I have failed to find any evidence of it.

Orioles are reputed to be back, but none have appeared at the syrup bottle as yet, and the little white-crowned sparrows are still with me, enjoying their newest dish, which I have recently learned to make for them. It is corn meal mush, with a little bit of sugar, and much bacon fat added to it; when sliced and put on the wall outside my window they patronize it heavily, and are even becoming a little less shy in their feeding habits. The linnets, other sparrows and doves also eat it, but it is mainly the dish for the white-crowns!

From Ethel M. Matheson, Washington, D.C., Jan. 17, 1965.

...I see very few birds around here now, besides the greedy starlings, which crowd down for bread crumbs. Later a pair of towhees or cardinal, will come in to pick up a few left over bits; also juncos, jays, and occasional white-throated sparrow. When I was out walking the other day, I heard an unusual song and saw a red bird in the top of a tall tree. No field glasses with me, but it couldn't have been a cardinal (no crest) and I think it was a summer tanager (as I saw no black)....

From Robert H. Cooper, Muncie, Indiana, April 2, 1965.

...Our migrating birds are returning by the thousands. There are literally thousands of red-wing blackbirds, bronze grackles, and cowbirds returning in huge numbers--enough to cause people to shoot at them in order to keep them from flocking in their trees. We are sorry for this and we realize that it is illegal but it seems to be impossible to stop it. At our home, which is in the country, we have a number of meadowlarks that have come in and a number of red-wing blackbirds and bronze grackles. These will nest on our ground. Last year we had a woodcock nest east of our house. I got some good pictures of the eggs and the parent bird on the nest. Of course, I did not get the youngsters. They were out and gone before I realized it, since they are precocious little birds. We try to keep a record of the nesting red-wings during the spring and do the banding of the nestlings. There is a great deal of mortality among them at the very first. We have a number of horned larks that stay with us all year and then nest in the locality. The Bobolinks nest on our ground also. We had a number of tree sparrows at our bird feeder within the last few weeks and they have been beautiful and interesting to watch. The Kentucky Cardinals are beginning to sing their spring songs and we hope that they will nest in our evergreens....

The mynah was introduced from India by Dr. William Hillebrand in 1865, exactly 100 years ago. Let us celebrate the centennial by devoting the entire August or September issue of THE ELEPAIO to the mynah. Have you started on your article on

the mynah? We need your help to make this a worthwhile undertaking, so please send in any suggestions or articles to Kojima, 725-A 8th Ave, Honolulu, Hawaii, 96816.

THANKS ARE DUE!

All unknown to most of us is the work of two members of our society who have been content to give service for years - with no need for recognition. Both used to be active members on trails, and at holding offices helpfully, but pressure of other tasks finally cut them off from all except editing THE ELEPAIO. Now you know who they are: Euphie Shields and Charlotta Hoskins. Both are librarians. Euphie is Assistant Librarian at the University of Hawaii; Charlotta is Librarian of the Hawaiian Sugar Planters' Experiment Station.

Now we shall lose one of the editors. Euphie is retiring and leaving Hawaii. Careful editing takes time, skill and knowledge; another phase of the task is finding appropriate material. This most of us do not realize.

MAHALO and ALOHA from all of us.

Margaret Titcomb

ALOHA to our new members:

Meriam N. Davis, Box 65, Kaunakakai, Molokai, 96748

Mrs. Thelma H. Hadley, Lihue, Kauai, 96766

Mrs. Mollie Spicer, 1511 Nuuanu Avenue, Prince 44, Honolulu, Hawaii, 96814

If you are interested in receiving either one of the indexes, please send in your request before JULY to Kojima, 725-A 8th Ave, Honolulu, Hawaii, 96816.

JUNE ACTIVITIES:

June 20 - Field trip. To Kuapa and Paiko Lagoon. Meet at 8:00 am, Library of Hawaii, Punchbowl St.

~~Meet at the Library of Hawaii at 8:00 a.m. Leader: W.M. Ord, telephone: 587-328.~~

June 14 - Board meeting at the Honolulu Aquarium Auditorium at 7:30 p.m. Members are always welcome.

June 21 - General meeting at the Honolulu Aquarium Auditorium at 7:30 p.m. Mr. David Fellows will speak on Animals of the reef and Mr. Paul M. Scheffer will play Songs of Brazilian birds.

HAWAII AUDUBON SOCIETY EXECUTIVE BOARD:

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