K.L.W.

State of Hawaii
Department of Land and Natural Resources
Division of Fish and Game

WILDLIFE BRANCH

A REPORT ON A TRIP

TO

KURE WILDLIFE REFUGE

May 25 to 30, 1973

by

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June 15, 1973

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INTRODUCTION:

Purpose of Trip

In a letter dated 14 May 1973, Captain C. S. Marple, Chief of Engineering Division, 14th U. S. Coast Guard District, requested assistance of the Division of Fish and Game in mitigation of sea bird losses during antenna radial clearing work to be done at Kure Atoll between May 25 and June 12, 1973.

Since the U. S. Coast Guard has license to maintain and operate a loran station on Green Island, Kure Atoll, and provisions are made for wildlife protection on that Island, it was agreed that a representative of the Division of Fish and Game should be on the site during the antenna radial clearing operation. Therefore, the author of this report was assigned this task as the primary objective of the Kure Island trip made between May 25 and May 30.

The previous inspection trip made to Kure Atoll by Division personnel was in April 1969 by Ronald L. Walker, District Wildlife Biologist. His report included survey information on seabirds, Hawaiian monk seals, vegetation, rat populations, and an analysis of potential problems between Coast Guard activities and the wildlife found there. Secondary objectives of this author's trip were to obtain comparative information to Walker's 1969 findings, which include the following:

1. Census all species of birds at Kure Atoll with notes on the breeding cycles of each species.

2. Census the Hawaiian Monk Seal populations on Green Island and the off-shore sand islets, classifying them by age class and sex.

3. Map out the extent of Verbesina euceloides infestation on Green Island and record data on the occurrence of other plant species found on that island.

4. Estimate the population level of the Polynesian Rat and record the effects if any on seabirds and their nests.

5. Check on the condition of Kure Wildlife Refuge signs for needed repairs and/or replacements.

6. Check on the activities of Coast Guard Loran personnel relative to the well being of wildlife species at Kure Atoll.

7. Report findings on the above.

Itinerary

The author departed Thursday, 24 May 1973 from Hikam Air Force Base aboard M.A.C. flight C-031H (Capitol Airlines) at 7:15 A.M., and arrived at Midway Island at 9:00 Midway time. After a one night lay-over the author departed Midway at 11:30 A.M. via U.S. Navy HU-16 "Albatross" and arrived at Green Island, Kure Atoll at approximately 12:00 noon (11:00 Kure time).

The departure was Wednesday, 30 May 1973 on a U.S. Navy H-46 helicopter from Kure Atoll to Midway at approximately 11:00 A.M. Kure time. Arrival at Midway was 12:45 Midway time. The author spent one nights lay-over at Midway and departed for Hikam Air Force Base, Oahu on M.A.C. flight C-032 (Capitol Airlines) at 10:45 A.M. Thursday May 31 and arrived at Honolulu at 2:35 P.M.

ACTIVITIES AND OBSERVATIONS:

Antenna Radial Clearing and Mitigation of Seabird Losses

The Commanding Officer, Lt. Bryant M. Nodine, assigned to Kure Island Loran Station approximately three months before my visit, briefed me on the nature of the tower maintenance job to be done. He indicated to me that in previous correspondence, recommendations had been made to carry out antenna maintenance work during November, when seabird activity on Kure Island is at a minimum. However, the contract has been let and actual de-energizing and replacement of the antenna elements are scheduled for the period between 12 June and 8 July 1973. The current work entailed the clearing of twenty-four lanes approximately 10 feet by 400 feet, radiating out from the base of the 625 foot tower. Many of the previously cleared lanes had become overgrown with Beach Naupaka, Scaevola taccada, and needed to be re-cleared to facilitate antenna cable replacement work.

Some clearing had already been done within the antenna field by Coast Guard personnel approximately 6 months prior to my visit. Minor losses of Red-tailed Tropic Birds occurred during that operation. Some 30 adult birds were found dead as a result of that operation.

Commanding Officer Nodine and I set up procedures to be followed during the lane clearing operation. The procedures used were as follows:

1. Areas of nesting seabirds vulnerable to heavy equipment were surveyed and mapped. These areas included bare ground and land infested with verbesina which are used by Wedge-tailed Shearwaters, Laysan Albatross, Brown Boobies, and Masked Boobies for nesting. Also affected were areas of recently cleared scaevola which were occupied by nesting Sooty Terns and Common Noddies. These sites were marked with stakes and double white flag strips and were to be hand cut by chain saw and machette where necessary.

2. Each lane was walked. Adult birds incubating eggs were marked with single white flag strips to indicate their presence to the bulldozer operator. The operator and a "spotter" were to go around these

marked sites and leave them for hand cutting. Red-tailed Tropic Birds within dense scaevola and a few Red-footed Boobies which nested upon the shrubs were involved in this work.

3. Trails were flagged through clearings occupied by Wedge-tailed Shearwater burrows, so that foot traffic through these sites would be restricted to one path. This was done to reduce the number of burrows caved in by walking personnel.

4. An estimate of the number of birds nesting within each of the 24 radial strips was made to assess the potential loss which might occur during the antenna cable contract job.

5. Lane clearing was to be supervised by the Commanding Officer and myself. At least one "spotter" was to keep ahead of the bulldozer to warn the operator of bird nests in danger and to move albatross chicks out of the path.

A survey marking crew, consisting of myself and four Coast Guard personnel walked each of the radial strips, and marked each danger zone and individual nest with white flagging. A population estimate of each species within the strip was made for each radial. Lt. Nodine worked as spotter for the bulldozer operator and supervised four hand cutters who used chain saws and machettes. Complete marking and survey was accomplished on Saturday, May 26. Clearing and cutting of scaevola was completed in two days. There was negligible loss of seabirds or eggs as a result of the lane clearing operation. The maximum and minimum of each species within the antenna field which may be affected by the cable replacement operation are shown in the table below:

Species	Estimated Maximum Potential Loss (Birds and/or eggs within 24 10'x400' Radial lanes)	Estimated Minimum Potential Loss* (Birds and/or eggs within 24 10'x400' Radial lanes)
Laysan Albatross	75 chickes	0-5 chicks
Black-footed Albatross	Not affected	0
Red-footed Booby	10 nests, 10 eggs	0-2 eggs
Masked Booby	50 nests, 100 eggs	5-10 eggs or chicks
Brown Booby	25 nests, 50 eggs	2-5 eggs or chicks
Red-tailed Tropicbird	50 nests, 50 eggs	5 eggs
Fairy Tern	Not affected	0
Sooty Tern	3,500 nests and eggs	350 eggs
Common Noddy	50 nests, 50 eggs	5 eggs
Wedge-tail Shearwater	250 adults and eggs	25 adults or eggs
Christmas Isl. Shearwater	unknown	unknown
Great Frigatebird	Not affected	0
Estimated Totals	4,000 adults, chicks, and eggs	400 adults, chicks and eggs

*Estimated loss using extreme caution during the cable replacement contract job.

Seabird Survey

A subjective estimate of seabird numbers occuring on Green Island was made on May 28, 1973 and recorded on a standard census sheet according to age classifications (see Appendix II). A more thorough reconnaissance of the seabird population was made on the northern end of Green Island, since the antenna lane clearing work afforded the opportunity to survey this area more intensively.

The author had little previous information to compare with, but some notes on nesting site changes by some seabirds were noted. Sooty terns and Common Noddies have apparently taken advantage of recently cleared areas for nesting, as was noted within the antenna field. Previously, without these cleared areas, the terns used the beach areas and the runway aprons more extensively for nesting. Nesting preference and availability of preferred sites are likely reasons for the move inland from the beaches. Figures 1 and 2 show seabird nesting distribution. The following are notes on individual species observations:

(Laysan Albatross) - Diomeda immutablis

The most common albatross on Kure Atoll. Adults and nearly full-grown chicks were found well distributed throughout the Island's interior and a few were seen on protected beach areas. Overgrown scaevola appeared to be a hinderance to them, as many had difficulty landing or taking off because of the dense growth. Most of the chicks had grown complete primaries and secondaries but had not yet begun to fly. Downy feathers remained on the body and head areas of most.

(Black-footed Albatross) - Diomeda nigripes

Many full grown chicks were seen along the beaches; more commonly on the north, east, and south sides of the island. Fewer adults of this species were seen than of the Laysan Albatross. Chicks were at about the same stage of development as found in the Laysan Albatross.

(Christmas Island Shearwater) - Puffinus nativitatus

No adults or young of this species were seen, although they probably exist. All of the burrows inspected were inhabited by Wedge-tailed shearwaters.

(Wedge-tailed Shearwater) - Puffinus pacificus

Adults occupied many of the burrows within the antenna field. Colonies were most heavily populated in the clear sandy areas. Many burrow sites infested with verbesina were abandoned, probably because of the interference with take-off and landing. Eggs were discovered in some of the burrows inspected, but most were without eggs yet. Many of the burrows were greater than four feet deep and could not be inspected, but presence of fresh tracks and clean entrances indicated occupancy.

(Bonin Island Petrel) - Pterodroma hypoleuca
No adults or young of this species were encountered, although Walker observed them in 1969. They probably still exist and were missed during the search of burrows. No night-time survey was made.

(Red-tailed Tropicbird) - Phaethon rubricauda
Adult tropicbirds were very common. Most of them were incubating eggs at the edges of dense scaevola, others were found in the middle of dense scaevola thickets. Large numbers of adults were seen in flight during the day. No chicks had yet hatched.

(Masked Booby) - Sula dactylatra
Probably the second most common booby on Kure Atoll. An estimated 600 adults were seen. Most of these were either incubating eggs or tending young chicks. This species was most abundant in the open clearings within the antenna field.

(Brown Booby) - Sula leucogaster
The least common of the boobies on Kure. All adults on nests were incubating eggs or with recently hatched chicks. This species was most common within the antenna field clearings. Many of those seen were banded.

(Red-footed Booby) - Sula sula
This is the most common booby on Kure Atoll. Adults were incubating eggs or tending downy young in three major colonies. The colonies in the central part of the island near the radar reflector tower and near the southern end of the island appeared to be somewhat enlarged from that area recorded by Walker in 1969.

(Great Frigatebird) - Fregata minor
Adults and immature birds were common at three roosting sites, generally adjacent to red-footed booby colonies. Fully fledged immature birds were common. Two nests inspected at the northernmost colony contained eggs which were in the process of "pipping". Large concentrations were seen aloft in the evenings.

(Sooty Tern) - Sterna fuscata
Large concentrations of adults were incubating eggs in recently cleared scaevola around the perimeter of the antenna field. Most nests were at densities of 40+ per 100 square feet. Some non-nesting adults were seen roosting under the edge of scaevola on the northern beach. This is the most common bird on Kure in May. An egg, accidentally damaged, revealed an embryo in development about one half of the way to hatching.

(Grey-backed Tern) - Sterna lunata
Though these have been reported on Kure previously, none were seen during this trip despite a concerted effort to spot them among the sooty terns.

(Common Noddy) - Anous stolidus
Adults were commonly seen incubating eggs and roosting under scaevola at the edge of the aircraft runway. Some nests were located in the recently cleared antenna field. Adults not incubating eggs were seen resting in groups 25 to 50 individuals along the beaches, especially on the lagoon side of the island. Some Noddys were noted incubating eggs on the major sand islet south of Green Island. Most of these nests appeared to be vulnerable to high surf, as no vegetation exists on this islet anymore.

(Hawaiian Noddy) - Anous minuta
Though this species was seen on Midway Island, and have been seen on Kure before, none was seen at all during this trip. Apparently there are insufficient trees or caves for this species to nest on on Kure.

(Fairy Tern) - Gygis alba
This species is not common on Kure. Adults were seen in flight over most parts of Green Island and a few downy chicks were noted in the ironwood trees near the headquarters building.

Shorebirds: (Ruddy Turnstone) - Arenaria interpres
Four adult turnstone were observed on the shoreline facing the lagoon.

Passerine birds - over a year ago, Kure Island personnel brought a half dozen canarys to Kure from Midway. I saw three adults and a nest near the headquarters building. Two nearly full fledged young died during my visit as a windstorm broke the nest and they fell out.

Polynesian Rat
(Rattus exulans hawaiiensis)

The rat population on Green Island could be classified as "moderately high". Adults were commonly seen in the clearings between scaevola patches throughout the island. On two occasions they were seen along the scaevola edge on the beaches. No evidence of rat predation upon adult seabirds, their chicks or eggs was found. Since there are many birds nesting on the island at this time of year, predation on eggs of the burrowing birds is probably greatest, and hence less observable than at times when most chicks have hatched. The absence of Bonin Island Petrel could be partially attributable to rat predation, though there appears to be little loss of other burrow nesting birds to predation.

No concerted effort has been made by Coast Guard personnel to poison rats in recent months. They appear to be only a minor problem in and around the buildings, and those that enter are usually trapped.

Hawaiian Monk Seal
(Monachus schauinslandi)

Three surveys of the Hawaiian Monk Seal were made on Green Island and two on the sand islets during the course of the trip. A summary of the results are shown below:

Aerial and Ground Censuses of Hawaiian Monk Seal, Kure Atoll

Date	Location	Time	Adult Males	Adult Females	Adult Unclassed	Pups	TOTALS	Type of Census
5/25/73	Green Isl.	11:00			4		4	Aerial
	Sand Isl.	11:00			11	1	12	Aerial
5/25/73	TOTALS				15	1	16	Aerial
5/27/73	Green Isl.	16:45	2	2			4	Ground
5/28/73	Green Isl.	10:00	3	3			6	Ground
	Sand Isl.	14:00	6	3	2	1	12	Ground
5/28/73	TOTALS		9	6	2	1	18	Ground

As has been found in the past, the seal populations on the Sand islets outnumber those on Green Island. Surveys on Green Island may not be accurate however, since the seals often haul up onto the beach and sleep under the scaevola. One seal was found approximately 30 feet inside the vegetation line well concealed under the scaevola. Tracks left on the beach from seals hauling to and from the vegetation were so numerous as to make it impractical to track each one into the scaevola to check them out.

Observations of apparent territorial or breeding behavior were recorded on two occasions:

1. On Green Island, a male kept moving in on a female on the beach. The female kept retreating and would occasionally bite the male when he got too close, then move away.

2. On the major sand islet, a large male, apparently the mate of the female next to him, would carge at other males who approached. Fights between the males were violent enough to break the skin of one of them. While the mate of the female was fighting two other adult males, a young male moved in on her, but she moved away from him. These observations are contrary to Kramers (1971) remarks that monk seals do not form harems or breeding territories. The observations made were of females without pups and appeared to be related to sexual behavior. Seals encountered on the beaches were usually found in heterosexual pairs.

Only one pup was seen during the surveys made. It weighed between 40-50 pounds, and had an unusual white patch on its abdomen. Coast Guard personnel reported having seen 48 seals on the Sand Islets a few weeks before my arrival. They remarked that there were not too many pups this year; not more than six were seen at any one time.

The presence and activities of Coast Guard personnel does not seem to be an important factor in the shortage of seals seen on Green Island. The seals are rather unaffected by the occasional passer-by on the beach, and has to be physically molested before they head for the water.

Flies appear to be bothersome to the seals. Adult seals on Green Island were pestered about the eyes while sleeping in the scaevola. The apparent absence of flies on the sand islets may be one reason the seals prefer that locality for resting. It was noted that the seals prefer the south side of Green Island which is only a short distance to the reef. Most feeding probably occurs outside the reef, hence fewer seals may loaf on the lagoon side of the island, because it is closer to feeding areas.

The apparent dwindling population of seals on Kure Atoll according to my census figures may be attributable to seasonal movements in their life history. Kramer (1971) states that,..."The seals appear to be most numerous on land during the winter months..." This concurs with information learned from the Coast Guard personnel on Kure.

Vegetation

A checklist of plants observed during the author's visit to Kure Atoll may be found in the Appendix of this report.

Three new species of plants were recorded on Green Island during this trip. They are: Paspalum fimbriatum, found in sparse clumps along the antenna tower road; Rhoeo spathacea, a cultivated plant near the headquarters building; an unidentified grass species was collected along the runway in small clumps. (This will be sent to an authority for identification).

Little change was noted in vegetation dominance since the previous report period (Walker 1969), except that the Scaevola taccada has vigorously overgrown some of the previously cleared areas within the tower field and along the edge of the aircraft runway. All of the "albatross lanes" once described, crossing from the runway to the beach on the south side of the island, have become overgrown with scaevola except for three of them.

Verbesina enceloides appears not to have spread noticeably from the area described previously. Competition for the bare areas appears to be won out by the scaevola. The verbesina was in a dormant stage during my visit. Very little of it was green or had flowers. Plants were dried up and bore profuse seed. Most plants were mature and well over three feet high making thick stands, especially in the area close to the antenna tower. Most seabirds avoid thick stands of verbesina and favor the few sandy patches for their nest sites. A map of the Verbesina distribution on Green Island can be found in figures 1 and 2.

Several new ironwood seedlings were noted off the edge of the airfield.

Wildlife Refuge Signs

A check was made of all Kure Wildlife Refuge signs. Both main signs located at the aircraft boarding area and near the pier were in good condition. Wood posts and backing may need maintenance in a year or two, as they are becoming weathered. The small signs are still in satisfactory condition.

Coast Guard Activities Relative to Wildlife

The Commanding Officer and men stationed at the Kure Loran Station all seem to be aware of the need for protecting the wildlife on the island. Most of the personnel expressed concern for the nesting seabirds during the tower maintenance project.

Disturbance to the seals and birds by the men stationed on Kure does not seem to be much of a problem. Men on daily walks generally avoid the seals. This was apparent by the relative tameness of the animals I saw, and their indifferent attitude to humans.

Only two of the three dogs previously reported, "Honey" and "Bridget" remain on Kure. "Bishop" died over a year ago. The two dogs confine themselves pretty much to the quarters, though they occasionally follow the men on beach walks. These dogs do not seem to be a problem.

The personnel stationed at Kure generally make two or three trips weekly to the small sand islets by means of outboard motorboat to collect glass balls. This activity is apparently not bothersome to the seals, as they were completely indifferent to our visit there, except when physically prodded to determine their sex. At times, the Navy helicopter which brings supplies to Kure twice weekly lands on the major sand islet for glass balls. One such trip resulted in a downed helicopter that had to be abandoned. Its remains still exist there. This aircraft activity on the small islet, though probably infrequent, is undoubtedly detrimental to the seals, and should be prohibited in the future.

Though driving on the beaches except in emergencies is apparently the rule, it does occur occasionally. A large go-cart type vehicle, not in use while I was there, is apparently driven on the beaches. This should definitely be discouraged. There appears to be no justifiable reason to drive on the beaches except for extreme emergencies or to launch boats at the pier.

No sea turtles were seen during my visit, but station personnel reported having seen them on the beach and in the water on occasion.

Copies of photographs taken on this trip are not included in this report because of budgetary limitations. Photos may be borrowed from the writers personal file if desired.

RECOMMENDATIONS:

1. Prior to the commencement of the contract work on the antenna system, procedures should be set up whereby minimum damage to the seabird nests will occur. All contract personnel should be briefed on the protection of wildlife and the procedures to follow. Lanes through the sooty tern and wedge-tail shearwater nesting areas should be flagged, approximately one foot wide. All personnel should keep foot traffic on these lanes whenever possible. Use of motor vehicles within the antenna field should be kept to a minimum. An estimate of the number of eggs, chicks, and adults affected by the cable replacement should be documented.

2. A standard procedure should be established to schedule all future tower maintenance work or clearing operations for the non-nesting season (October-November), to lessen the disturbance to the seabirds.

3. A memorandum should be drafted to the Coast Guard, informing them of Regulation No. 4. Before any major construction or clearing operations are undertaken, the Department of Land and Natural Resources and the Division of Fish and Game should be consulted.

4. It would be invaluable to re-emphasize the need for each new Commanding Officer to meet with a representative of the Division to be briefed on the wildlife at Kure. Understanding and cooperation by the C.O. is the most effective means of control.

5. All motor vehicles should be strictly prohibited from the beaches except for boat launching at the pier and for extreme emergencies. The go cart should not be used on the beach at any time.

6. Aircraft should be prohibited from landing on any of the beaches or sand islets at Kure Atoll except for emergency rescue purposes.

7. The off-shore fuel oil pipe delivery system should be carefully checked before use to avoid spills which could be hazardous to wildlife if a leak were to occur. (This pipeline is used infrequently and could be subject to leakage).

8. Strict rules against the import of any exotic animals should be established. Though the recently established canarys are of esthetic value to the men stationed on Kure Island, they are not native and should not have been released. Whether canarys can survive in large numbers on Kure is questionable, but they should not be allowed to increase because of the possibility of their being disease vectors.

9. Regular checks should be made at Kure Atoll at least every two years to monitor the wildlife populations and evaluate refuge problems.

Respectfully submitted,

Thomas C. Telfer

THOMAS C. TELFER
Wildlife Biologist

June 15, 1973

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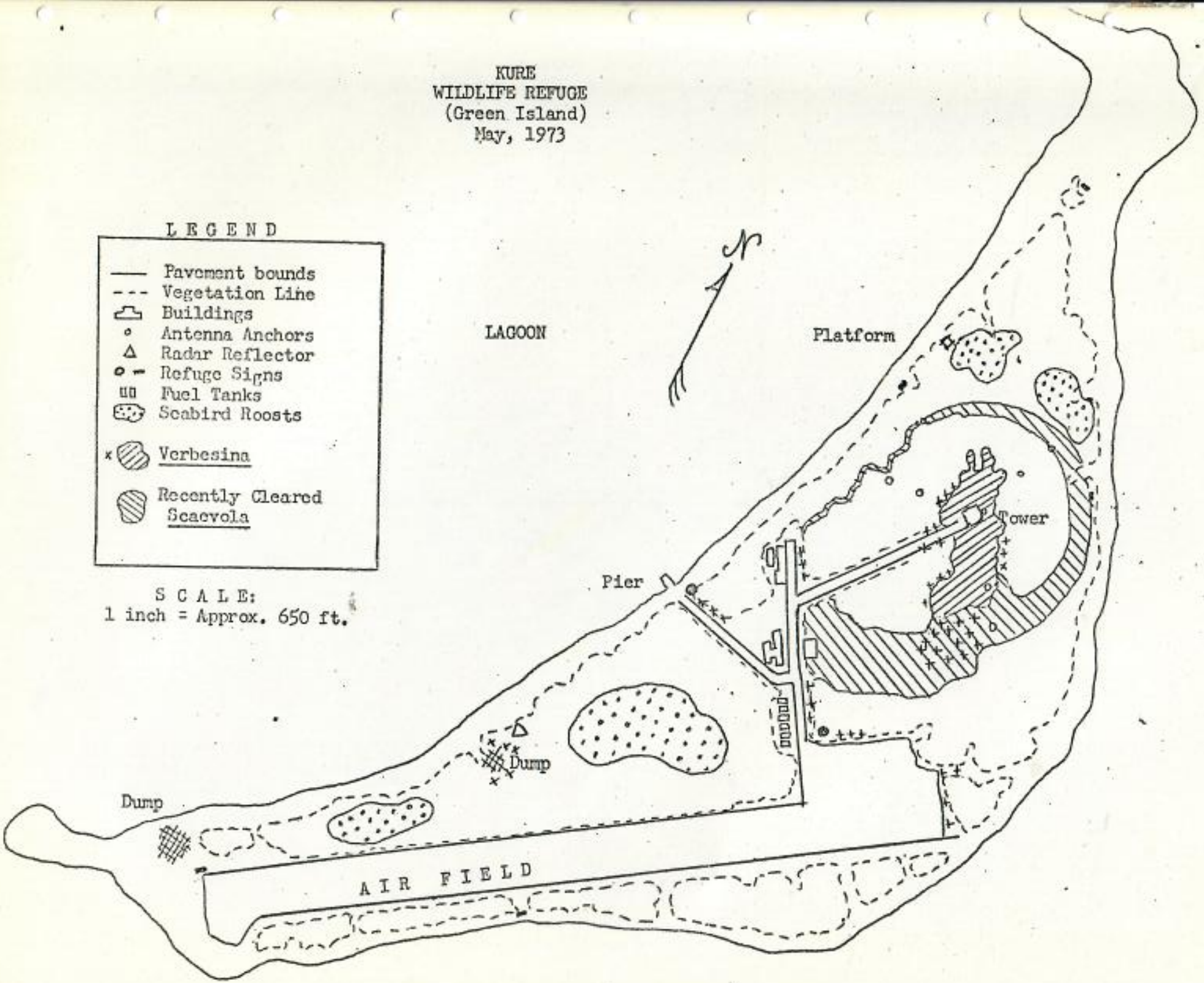
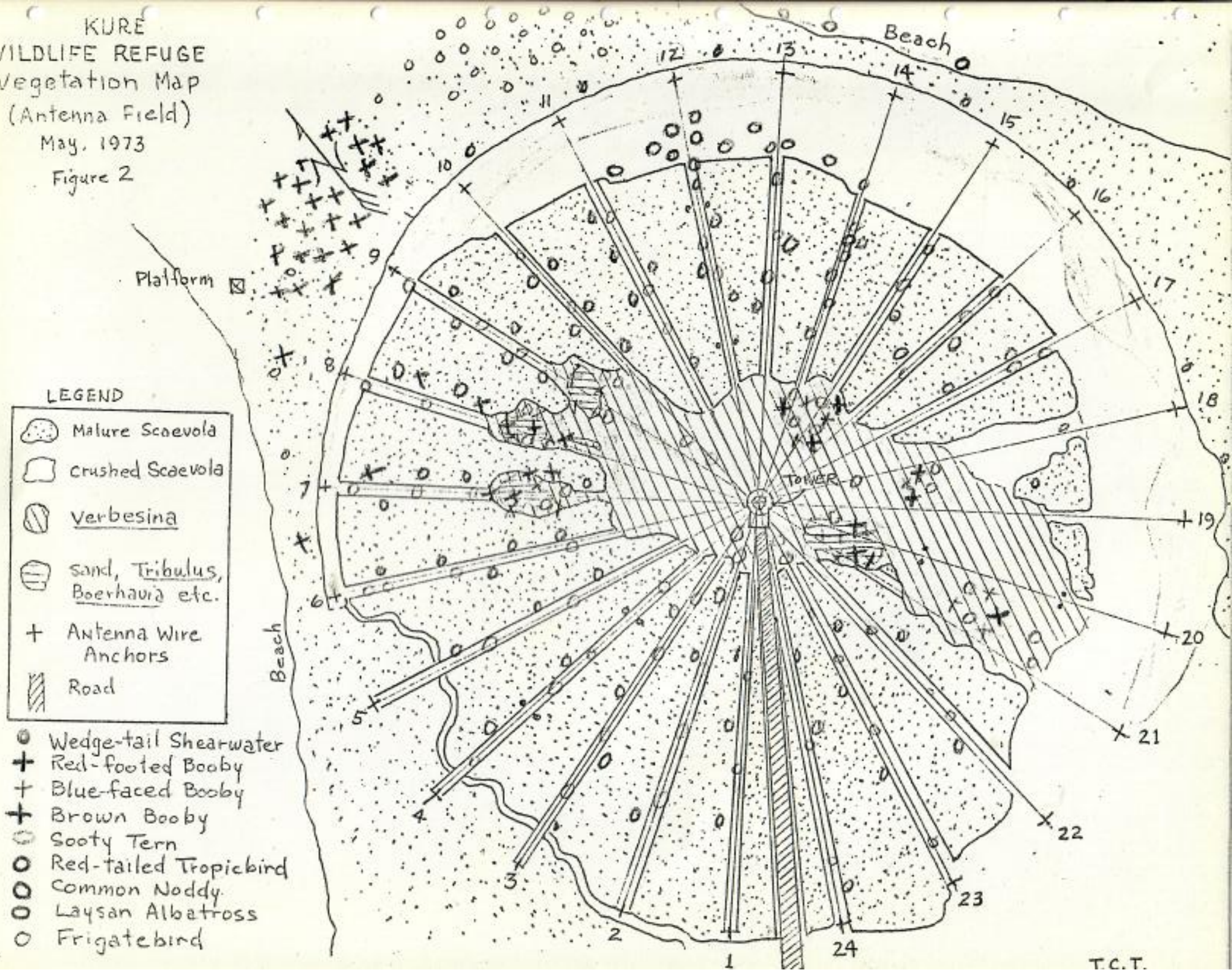

KURE
WILDLIFE REFUGE
(Green Island)
May, 1973
LEGEND
Pavement bounds
Vegetation Line
Buildings
Antenna Anchors
Radar Reflector
Refuge Signs
Fuel Tanks
Seabird Roosts
Verbesina
Recently Cleared Scaevola
SCALE:
1 inch = Approx. 650 ft.
LAGOON
Platform
Tower
Pier
Dump
Dump
AIR FIELD

Figure 1

KURE
WILDLIFE REFUGE
Vegetation Map
(Antenna Field)
May, 1973
Figure 2



T.C.T.

Appendix I

ESTIMATED NUMBERS OF SEABIRDS ON ANTENNA RADIAL STRIPS*

Radial No.	Numbers of Each Species Encountered**
1.	L. Alb - 6.
2.	RTTB - 1, L.Alb. - 2.
3.	RTTB - 2, L.Alb. - 1.
4.	RTTB - 4, L.Alb. - 2.
5.	WTSW - 8, RTTB - 2
6.	RTTB - 3.
7.	WTSW - 50, RTTB - 2, BB - 2, CB -4, L.Alb. -2
8.	WTSW - 15, RTTB - 3, BB -10, CB-15, RFB - 2, ST -25, L.Alb. - 6.
9.	WTSW - 30, RTTB - 3, BB - 2, CB- 8, L.Alb.-5, ST -40.
10.	L.Alb.- 5, CB - 1, ST - 400.
11.	L. Alb. -3, RTTB - 1, ST - 300.
12.	L. Alb. -2, CN - 30, ST - 350.
13.	WTSW - 15, RTTB - 4, CB - 5, BB - 2, CN - 5, L.Alb.-3, ST -200.
14.	WTSW - 20, CB - 6, BB - 2, CN - 1, L.Alb. - 8, ST - 300.
15.	RTTB - 2, CB - 5, BB - 6, ST - 250, L. Alb. - 3.
16.	RTTB - 4, CB - 2, L.Alb. - 1, ST - 250.
17.	WTSW - 10, CB - 6, BB - 2, L.Alb. - 9, ST - 600.
18.	L.Alb. - 5, CB - 2, ST - 150.
19.	WTSW - 10, L.Alb. - 1, ST - 300.
20.	WTSW - 25, CB - 15, BB - 5, L.Alb. - 20, ST - 400.
21.	WTSW - 20, CB - 18, BB - 6, L.Alb. - 3, ST - 75.
22.	WTSW - 25, CB - 6, L.Alb. - 8.
23.	WTSW - 15, RTTB - 3, L.Alb. - 7.
24.	RTTB - 4, L.Alb. 5.

* Numbers estimated include adults only, except for Wedge-tailed Shearwaters which were estimated by the number of occupied burrows. These figures do not take into account eggs in nests of boobies, tropic birds and terns.

** Species listed in this table are abbreviated as follows:

L.Alb. = Laysan Albatross
RTTB = Red-Tailed Tropicbird
WTSW = Wedge-Tailed Shearwater
RFB = Red-Footed Booby
CB = Common or Masked Booby
BB = Brown Booby
ST = Sooty Tern
CN = Common Noddy

Appendix II

LEEWARD ISLANDS BIRD FIELD OBSERVATION FORM NUMBER _____

Date: 28, May 1973 Area: Kure Atoll, Green Island

Time: From 0800 To 14:00 Location: Entire Island

Weather: Cloudy with light rain showers / wind approx 10 m.p.h.

Species	Adults	Immatures	Chicks	Eggs	Nests	Banded Chicks	Banded Adults	Total Population	Comments
Laysan Albatross	400	-	1,100	-	1,100			1,500	
Black-footed Albatross	50	-	300	-	300			350	
Wedge-tailed Shearwater	800	-	-	500	800			800	
Christmas I. Shearwater	-	-	-	-	-			?	Not Seen
Bonin I. Petrel	-	-	-	-	-			?	Not Seen
Bulwer's Petrel	-	-	-	-	-			?	Not Seen
Sooty Storm Petrel	-	-	-	-	-			-	Not Seen
Red-tailed Tropicbird	1,100	-	-	600	600			1,100	
White-tailed Tropicbird	-	-	-	-	-			-	
Masked Booby	600	-	50	800	400			650	
Brown Booby	250	-	25	300	175			275	
Red-footed Booby	600	100	100	200	400			800	
Great Frigatebird	300	100	-	200	200			400	
Golden Plover	-	-	-	-	-			0	
Ruddy Turnstone	4	-	-	-	-			4	
Wandering Tattler	-	-	-	-	-			0	
Sanderling	-	-	-	-	-			0	
Bristle-thighed Curlew	-	-	-	-	-			0	
Sooty Tern	25000	-	-	15000	15000			25000	
Gray-backed Tern	-	-	-	-	-			?	Not Seen
Brown-winged Tern	-	-	-	-	-			0	
Common Noddy	2,000	-	-	1500	1,500			2,000	
Hawaiian Noddy	-	-	-	-	-			?	Not Seen
Blue-gray Noddy	-	-	-	-	-			0	
Fairy Tern	150	-	50	-	50			200	
Laysan Teal	-	-	-	-	-			0	
Laysan Finch	-	-	-	-	-			0	
Nihoa Millerbird	-	-	-	-	-			0	
Canary	7	-	2	?	1				2 chicks died in wind storm

Discussion: Though grey-backed terns, Christmas Isl. Shearwater, Bonin Island Petrel, and Hawaiian Noddys have been reported on Kure, I saw none during the week I was there. No night-time survey was made. Sooty terns made use of recently cleared scaevola for nesting around the perimeter of the transmitter tower.

Observer Thomas G. Telfer

Appendix III

LEEWARD ISLANDS PLANT CHECKLIST

Dates 25 May - 30 May, 1973

Observer T. C. Telfer

PLANTS	Nihoa	Necker	FF-Tern	FF-Trig	FF-Skate	FF-Whale	FF-Bare	FF-East	FF-Mullet	FF-Round	FF-Shark	FF-Gin	FF-L. Gin	FF-La. Per.	Gardiner	Laysan	Lisianski	PH-S.E.	PH-North	PH-S.-North	PH-Bird	PH-Plane	PH-Sand	PH-Grass	PH-Seal	PH-Kittery	Midway	Kure
AIZOACEAE, Akulikuli																												
Sesuvium portulacastrum																												
AMARANTHACEAE, Pigweed																												
Amaranthus viridis																												
Achyranthes splendens #																												
APOCYNACEAE, Periwinkle																												
*Nerium oleander																												X
BORAGINACEAE, Borage																												
Heliotropium curassavicum																												
Messerschmidia argentea																												
CAPPARIDACEAE, Caper																												
Capparis sandwichiana #																												
CARYOPHYLLACEAE, Pink																												
*Spergularia marina																												
CASUARINACEAE, Ironwood																												
Casuarina equisetfolia																												
CHENOPODIACEAE, Goosefoot																												
Chenopodium oahuense #																												
**Atriplex muelleri																												
COMPOSITAE, Composite																												
Lipochaeta integrifolia #																												
Pluchea indica																												
*Conyza bonariensis																												X
*Emilia javanica																												X
*Gnaphalium sandwicensium																												?
*Relianthus annus																												?
*Sonchus oleraceus																												X
*Verbesina encelioides																												X
**Pluchea odorata																												
CONVOLVULACEAE, M. Glory																												
Ipomoea indica																												X
Ipomoea pes-caprae																												
CRUCIFERAE, Mustard																												
Lepidium o-waihiense #																												X
CUCURBITACEAE, Squash																												
Sicyos hispidus #																												
Sicyos microcarpus #																												
Sicyos sp. #																												
CYPERACEAE, Sedge																												
Cyperus pennatiformis #																												
Fimbristylis cymosa																												
*Cyperus rotundus																												?
Cyperus laevigatus																												

Endemic to Hawaii

SOURCES:

1. LAMOUREUX, CHARLES H. The Flora and vegetation of Laysan Island. ATOLL RESEARCH BULLETIN No. 97 - 1963
2. ---------- Vascular Plants of Tern Island, French Frigate Shoal. 1961.
3. ---------- Notes on the plants of Kure Atoll. 1961.

LEEWARD ISLANDS PLANT CHECKLIST

Dates 25 May - 30 May 1973

T. C. Telfer

PLANTS	Nihoa	Necker	FF-Tern	FF-Trig	FF-Skate	FF-Whale	FF-Bare	FF-East	FF-Hullet	FF-Round	FF-Shark	FF-Gin	FF-L.Gin	FF-La. Per.	Gardiner	Laysan	Lisianski	PH-S.E.	PH-North	PH-S.-North	PH-Bird	PH-Plane	PH-Sand	PH-Grass	PH-Seal	PH-Kittery	Midway	Kure
EUPHORBIACEAE, Spurge																												
*Codiaeum sp.																												
*Euphorbia glomerifera																												
GOODENIACEAE, Goodenia																												
Scaevola taccada																												X
Scaevola frutescens																												
GRAMINEAE, Grass																												
Cenchrus agrimonioides #																												X
Cynodon dactylon																												X
Eragrostis variabilis #																												X
Lepturus repens																												X
Sporobolus virginicus																												
*Cenchrus echinatus																												X
*Chloris inflata																												X
*Chloris virgata																												X
*Digitaria sanguinalis																												X
*Eleusine indica																												X
*Eragrostis amabilis																												X
*Eratrostis whitneyi																												X
*Setaria verticillata																												X
HYDROPHYLLACEAE, W-leaf																												
Nama sandwicensis #																												
LABIATAE, Mint																												
Phyllostegia variabilis #																												
MALVACEAE, Mallow																												
Hibiscus tiliaceus																												
*Thespesia populnea																												X
MORACEAE, Fig																												
**Ficus sp.																												
NYCTAGINACEAE, 4:00																												
Boerhavia diffusa																												X
PALMAE, Palm																												
Cocos nuficera																												X
Pritchardia #																												
POLYGONACEAE, B.Wheat																												
**Coccoloba uvifera																												
PORTULACACEAE, Purslane																												
Portulaca lutea																												
Portulaca oleracea																												
SANTALACEAE, Sandalwood																												
Santalum cuneatum #																												
SOLANACEAE, Nightshade																												
Nicotiana tabacum																												
Solanum nelsoni #																												X
Solanum nodiflorum																												X
*Solanum nigrum																												X
TERMINALIACEAE, Kamani																												
*Terminalia catappa																												X
ZYGOPHYLLACEAE, Caltrop																												
Tribulus cistoides																												X

Basic list from Laysan Island