

U. S. FISH AND WILDLIFE SERVICE
TRIP REPORTS FOR THE HAWAIIAN
ISLANDS NATIONAL WILDLIFE REFUGE

compiled by
George H. Balazs

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A total of 186 birds of 9 species was banded on Trig Island (Table 2).

JUNE 1966

AMERSON
POBSP - S.I.Other Islands

La Percuse Pinnacle, Gin Island and Little Gin Island were not visited due to high winds and rough lagoon conditions. Neither Round Island nor Mullet Island were visited on this trip due to time involved, lagoon conditions and low gasoline. A new sandbar northwest of Trig Island was observed both from the lagoon and the air. Several seals were present on this sandbar.

MAMMALS

No rats or mice were seen on any of the islands at FFS. The Coast Guard personnel reported that they had not observed any on Tern Island.

Hawaiian Monk Seals were present on all islands visited in the atoll. Population estimates for each island are given in Table 9. No seals were tagged during this trip. One tagged seal, Number 172 was observed on Whale Island by Jeff Tordoff on 3 July. This seal was tagged by POBSP personnel on East Island, FFS on 24 August 1965. No other tagged seals were found.

Table 9. Hawaiian Monk Seal Population, FFS, June 1966

<u>Island</u>	<u>Adults</u>	<u>Subadults</u>	<u>Pups</u>
Tern	1	3	0
East	2-5 daily	2-10 daily	1
Whale	2-10 daily	2-10 daily	1
Trig	2-3 daily	2-7 daily	1

REPTILES

Several Geckos were seen on Tern Island, however, none were collected. No Geckos were observed on any of the other islands in the atoll.

Sea Turtles were observed on all of the islands visited except Tern Island, and there they were seen in the waters around it. The Coast Guard personnel reported that occasionally female turtles lay their eggs on Tern Island. Evidence of this was seen by POBSP personnel near the southeast beach area.

Three turtles were tagged on the left front flipper, using tags furnished by Mr. Eugene Kridler, U.S. Fish and Wildlife Service, Honolulu, Hawaii. The tag data for these are as follows:

<u>USFW Tag No.</u>	<u>Sex</u>	<u>Measurements</u>	<u>Location</u>	<u>Date</u>	<u>Comments</u>
110	M	38 x 38	East I.	06-12-66	On beach
111	F	36 x 37	East I.	06-18-66	Laying eggs
112	F	41 x 39	East I.	06-20-66	Laying eggs

Numerous females were observed laying eggs on East, Whale and Trig

Islands. Egg-laying only occurred at night, however some were just finishing at sun-up or shortly after. As was observed in August of 1965, egg-laying seemed to be usually restricted to a 50 foot strip of vegetation around each island. Certain areas were also more frequently used for sun-basking and egg-laying (Figures 8, 9, and 10). No hatchling turtles were observed.

Although not many turtles were tagged, it is thought that the turtle population on FFS was quite high in June of 1966 as was first suggested in the August 1965 FFS Report. From five to 24 turtles were observed each day on East, Trig and Whale Islands and five or more females usually laid eggs nightly on the above islands.

One turtle, bearing U.S.F.W. Tag No. 96, was observed on Whale Island on June 10. This turtle was tagged by Fish and Wildlife personnel on Trig Island, FFS on March 22, 1966.

ARTHIPODS

Ticks were found on East, Trig, Whale, and Tern Islands. Table 10 lists the species found on each island and the hosts for each. Ornithodoros capensis were very common at night on East Island but were hard to find on the other islands. No attached Ixodes laysanensis were found on any hosts.

Three collections of live ticks were made as follows:

<u>Host</u>	<u>No. Jars</u>	<u>No. Ticks</u>	<u>Species</u>
Sooty Tern	2	400	<u>Ornithodoros capensis</u>
Dog	1	1+ egg mass	<u>Rhipicephalus sanguineus</u>

Chiggers attacked both POBSP personnel on East and Whale Islands. Specimens were collected for identification. None could be found on bird hosts, however.

PLANTS

No terrestrial plants were collected, however vegetation photographs were taken on each island visited. Two marine algae collections, including several species, were taken offshore of East Island.

SERA SAMPLES

A total of 141 sera samples was taken from six species of seabirds on Whale and Trig Islands. These included the following: Wedge-tailed Shearwater, Blue-faced Booby, Red-footed Booby, Great Frigatebird, Sooty Tern, and Noddy Tern.

SUMMARY

Tern, East, Whale, and Trig Islands were surveyed for birds and other vertebrates. A total of 21 bird species was recorded from the atoll, none of which were new records. Of the 15 species of living seabirds observed 12 were breeding. A total of 11,977 birds of 15 species was banded. A total of 1,271 band returns were taken, with 1,206 of these being originally from FFS and 65 from elsewhere. Population estimates and breeding status of the avifauna on each island in the atoll was discussed.

FRENCH FRIGATE SHOAL

East Island

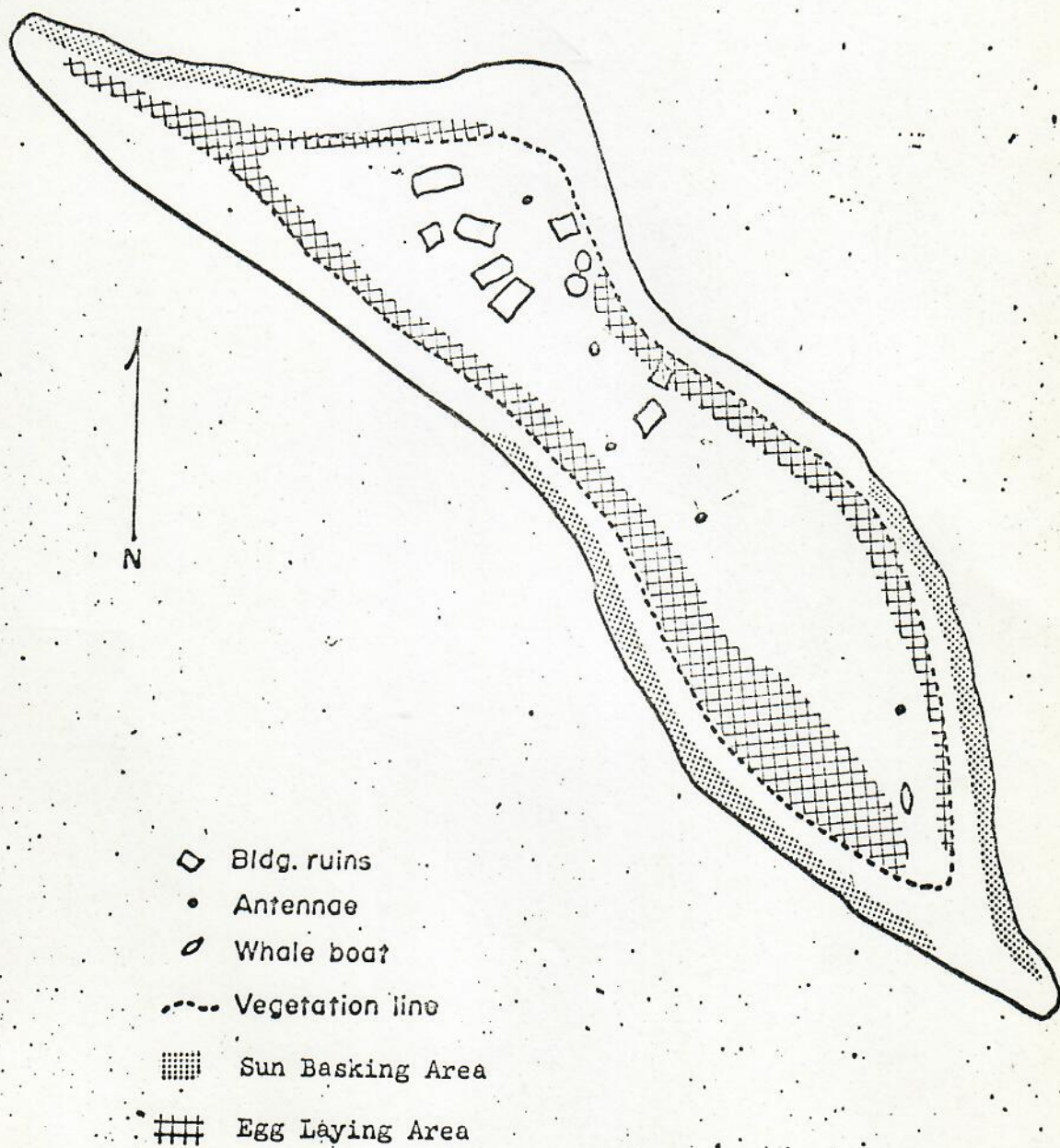



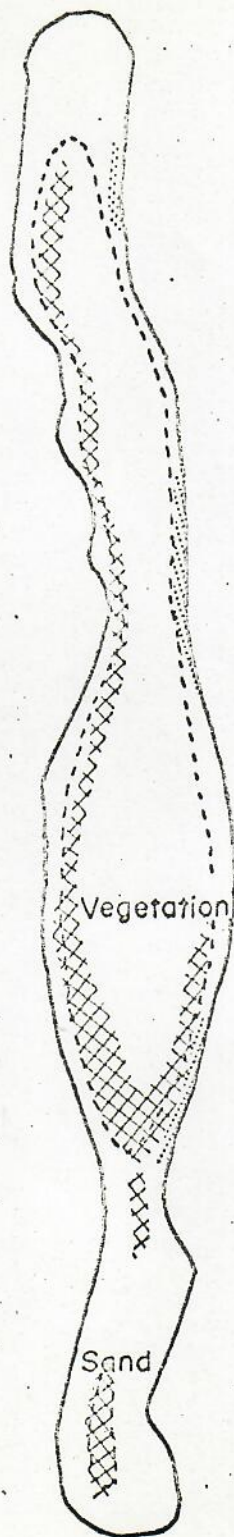


FIGURE 8. Sea Turtle areas, East Island, FFS, June 1966.

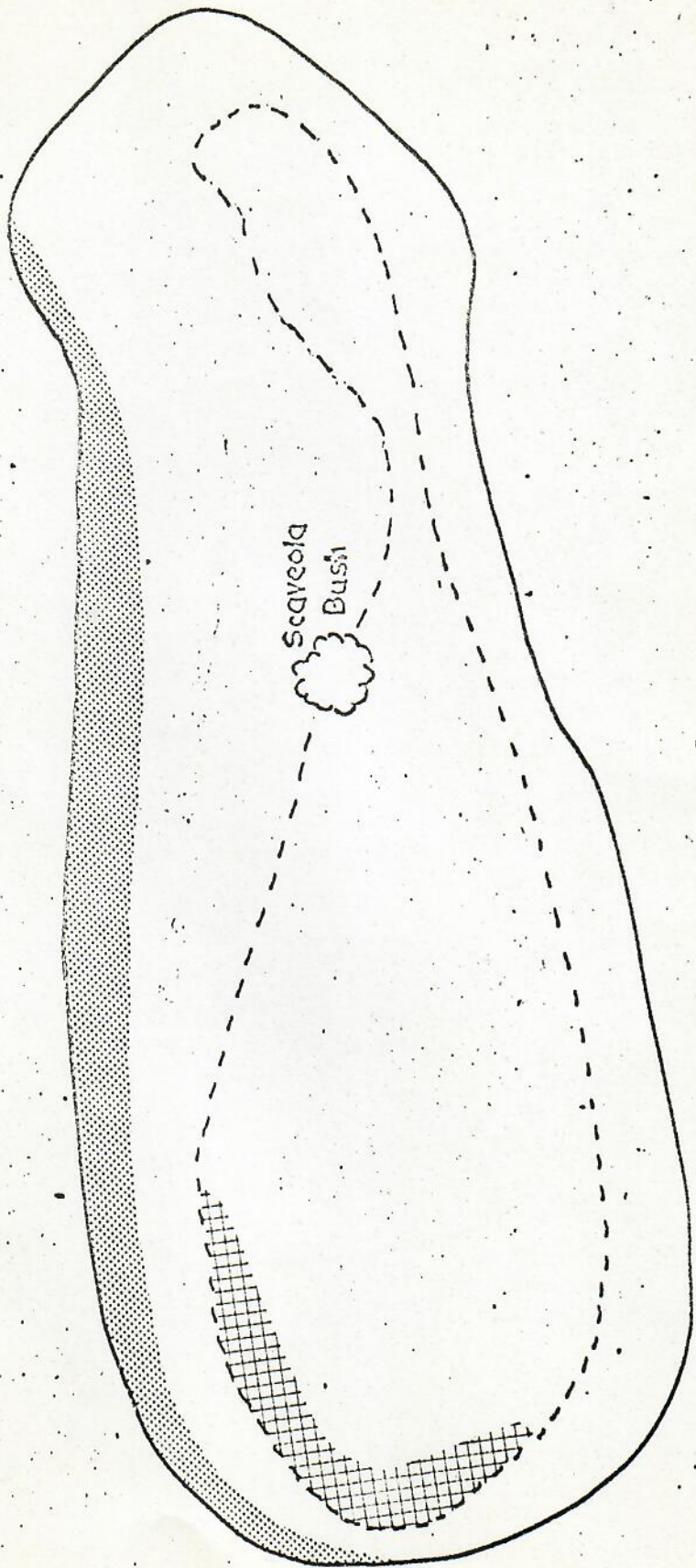
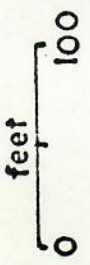
FRENCH FRIGATE SHOAL

Whale-Skate Island

 Sun Basking Area Egg Laying Area Vegetation Line

feet
0 500





Trig Island
 FRENCH FRIGATE SHOAL

- ▣ Sun Basking Area
- ▣ Egg Laying Area
- - - Vegetation Line

mother. Neither was ever seen away from one area of the beach on the eastern tip of the island.

Reptiles

Morning Gecko

This lizard was present on Tern Island, but was not seen anywhere else in the atoll. About ten specimens were collected.

Pacific Green Sea Turtle

Table 5 gives the adult population counts for the entire survey period. In addition, hatchlings were seen on the four islands visited. More were seen on Tern than on the other islands; but this is not considered an indication that there is a larger population there due to the fact that the hatchlings are attracted to light and tend to concentrate around the buildings thus being more obvious than on the uninhabited islands. The highest count of hatchlings was on Tern Island when over 75 were congregated under one of the lights on the barracks building.

Although more than ten females were seen digging on the beaches of various islands, none were actually observed laying. On 29 August several fresh eggs were found at the high tide line the day after a full moon tide.

Only one turtle was tagged. Tag no. 113 was affixed to the proximal right front flipper of a female measuring 42.5 by 37.5" (dorsal keel). This same female was seen on East Island two nights preceding and several nights after tagging (on 8/23).

Table 5. Population statistics of Adult Pacific Green Sea Turtles
on French Frigate Shoals, August 1966

August 13	3 Females, 2 Males	Trig I.	1530
	27 adults	"	2230
August 15	2 adults	Whale I.	
August 17	1 (age ?) <u>ca.</u> 2' long	Whale I. (offshore?)	
August 18	1 female (preparing to lay)	East I.	night
August 20	1 female on beach	East I.	
August 21	3 female (preparing to lay)	East I.	night
August 22	1 female (no hind legs)	East I.	
August 23	1 female (basking)	East I.	
August 27	1 female (tag affixed)	East I.	night
September 5	1 female, 1 male	Trig.	basking

Graph 4:

Hawaiian Monk Seal counts at French Frigate Shoals, August-September 1966

total adults

= Adults

= YEARLINGS

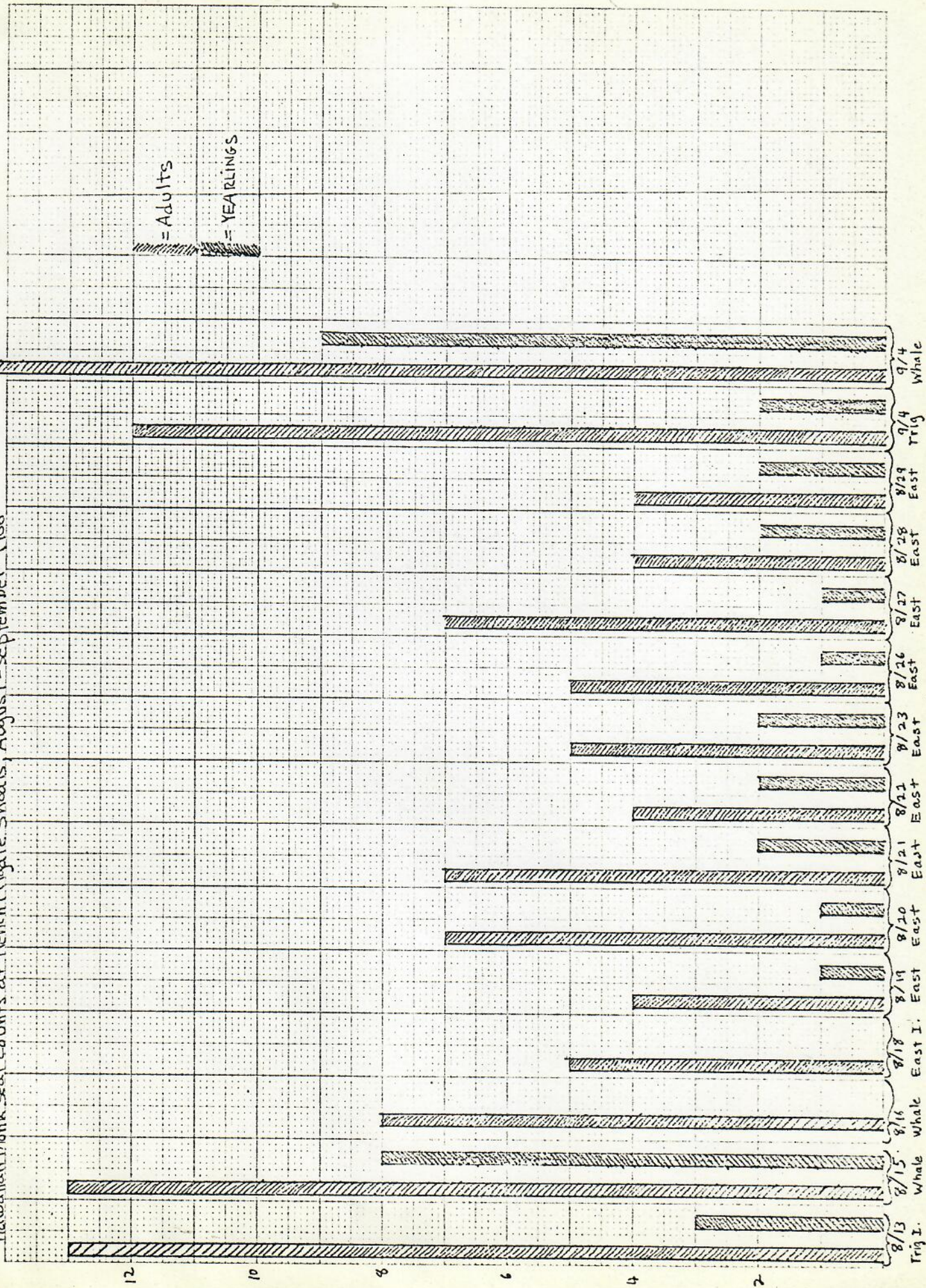


TABLE 11. Hawaiian Monk Seal Population Estimates, FFS, May-June 1967

Island	Adults	Subadults	Pups
Tern	1	2	0
East	10±	5±	0
Whale-Skate	15±	10±	2
Trig	10±	5±	1
Round	3	0	3
Gin	1	3	0
Little Gin	2	4	0
Bare	1	0	0
Near	1	0	0
Totals	44±	29±	6

TABLE 12. Sea Turtle Population Estimates, FFS, May-June 1967

Island	Adults	Subadults	Egg Laying
Tern	3	0	Some sites observed
East	20 to 60 daily	1	5 to 21 per night
Whale-Skate	20 to 45 daily	3	5 to 10 per night
Trig	10 to 25 daily	0	5± per night
Gin	5	0	No sites observed
Little Gin	3	0	No sites observed

Thirty-four adult turtles (9♂, 25♀♀) were tagged during the last week of the survey. Data for these are presented in part 1 of Appendix C. Six previously tagged turtles were recaptured and these data are presented in part 2 of Appendix C. Of particular significance are two recaptures which show that turtles do move within the Leeward Hawaiian Islands. One was originally tagged at Pearl and Hermes Reef, while the other was originally tagged at Laysan Island. Both were tagged in the fall (non-laying). The female tagged on Laysan was laying at FFS.

ARTHROPODS

Ticks were found on East, Whale-Skate, Trig, and Tern Islands. Ornithodores capensis were very common on East, Whale-Skate, and Trig Islands, especially in the Sooty Tern and Brown Noddy colonies. Ixodes laysanensis were found only at Whale-Skate Island on Blue-faced Booby chicks, Brown Noddy chicks and adult Gray-backed Terns. Two specimens of I. laysanensis and two of O. capensis were collected. Specimens of Rhipicephalus sanguineus, the brown dog tick, were again seen on the dogs at Tern Island.

SHARK ISLAND

This small sand island, located at the north tip of the atoll, was not visited.

OTHER ISLANDS

Three unnamed sandy islets are now present at FFS, all of which have been observed before. One small sand islet is located just north of Gin Island, and is present on H.O. Chart 4171. Another, also shown on H.O. Chart 4171, is just northwest of Trig Island. Still another, not on H.O. Chart 4171 but present in 1965, is located about 300 yards west of East Island. All of these islets are awash at high tide.

Brown Noddies were observed roosting on all of these islets. Hawaiian Monk seals also used these for basking.

MAMMALS

No rats or mice were seen on any of the islands at FFS. Three adult dogs (1♂, 2♀♀) are present on Tern Island. One of the females gave birth to eight pups during June.

Hawaiian Monk Seals were present on all islands visited at FFS. Population estimates for each island are given in Table 11. No seals were tagged during this trip; however, 12 previously tagged seals were observed and their tags recorded. These are all from FFS and are listed in Appendix B.

Several porpoise were observed outside the reef as the ships approached FFS on the morning of 25 May. None were seen inside of the lagoon.

REPTILES

Many Geckos were seen on Tern Island. One specimen was seen on East Island, the first to be recorded from this islet.

Sea Turtles were observed on almost all islands visited, including Tern Island. Population estimates for each island are presented in Table 12. Since tag pliers were not available until the last week of the survey, the turtle population was not disturbed except to paint females that were laying. This was only done as time permitted however. Even so, many of those that were painted were present in the daytime; however, there was undoubtedly a large daily turnover in the population.

Egg laying was observed every night during the survey, with the number ranging from 5 to 21 per night (depending on the island). Egg laying appeared to increase throughout June.

APPENDIX C. Part 1 - Sea Turtle Tag Data, French Frigate Shoals,
May-June 1967

<u>HG & F Tag No.</u>	<u>Sex</u>	<u>Measurements</u> *	<u>Location</u>	<u>Date</u>	<u>Remarks</u>
601	F	38 x 35	Whale-Skate I.	06-18-67	On Beach
602	F	33 x 32	"	"	"
603	F	38 x 35.5	"	"	"
604	F	37 x 35	"	"	"
605	F	37 x 35	"	"	"
606	M	35 x 33	"	"	"
607	F	35.5 x 33	"	"	"
608	F	38 x 34.5	"	"	"
609	M	36 x 34	"	"	"
610	F	38 x 34.5	"	"	"
611	F	37 x 38	"	"	"
612	F	39.5 x 37	"	"	"
613	F	41 x 40	"	"	"
614	F	38 x 34	"	"	"
615	F	39 x 36	"	"	"
616	M	35 x 33.5	"	"	"
617	M	32 x 30.5	"	"	"
618	F	39 x 36	"	"	"
619	F	39.5 x 36	"	"	"
620	F	38.5 x 35	"	"	"
621	F	39 x 34.5	"	"	"
622	F	38.5 x 26	"	"	Post laying
623	F	39 x 36	"	06-19-67	On beach
624	M	35 x 32	"	"	"
625	F	39 x 38	"	"	"
626	F	41.5 x 39	"	"	"
627	F	35.5 x 33	"	"	"
628	F	38 x 38	"	"	"
629	M	33.5 x ?	"	"	"
630	F	38 x 36.5	"	"	"
631	M	34 x 32	Trig I.	06-20-67	"
632	M	35 x 34	"	"	"
633	F	36 x 33.5	"	"	"
634	M	34 x 33	"	"	"

*Length x width, in inches.

Need part 2
Appendix C

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LEEWARD ISLAND SURVEY NUMBER 20

FRENCH FRIGATE SHOALS

May-June 1967

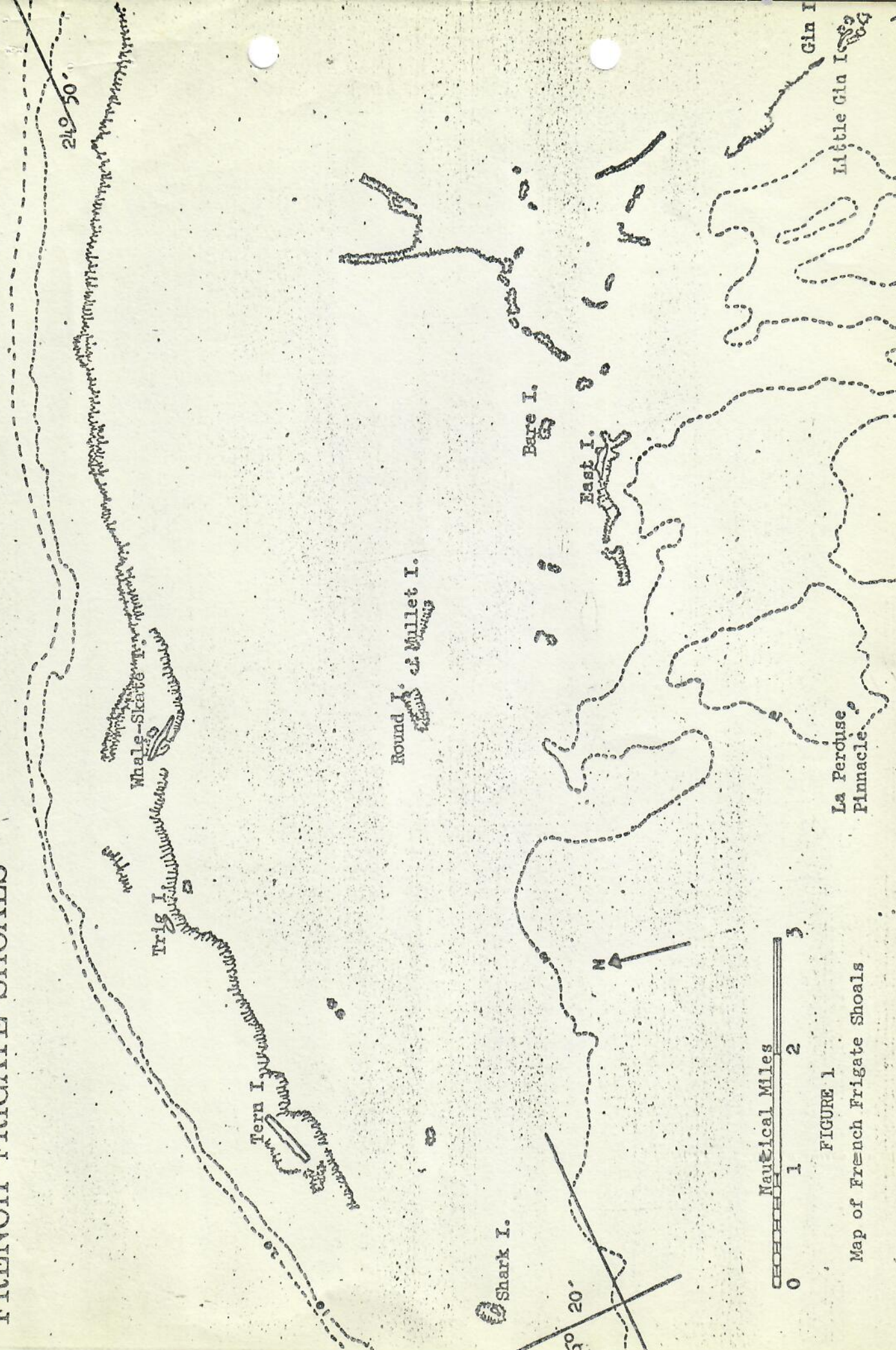
Prepared by

A. Binion Amerson, Jr.

FRENCH FRIGATE SHOALS

166° 10'

249 50'



Nautical Miles
0 1 2 3

FIGURE 1
Map of French Frigate Shoals

INTRODUCTION

This report summarizes the observations made on Leeward Survey Number 20 by A. Binion Amerson, Jr. (Biologist-in-Charge) and T. James Lewis of the Pacific Ocean Biological Survey Program, Smithsonian Institution during the period 25 May to 22 June 1967 at French Frigate Shoals, Leeward Hawaiian Islands (referred to hereafter as FFS).

The primary objective on this trip was to survey the vertebrate populations on all the major islands in the atoll. Secondary objectives included: (a) banding of major bird species; (b) obtaining band returns from previously banded birds; (c) recording of orange-tagged or painted birds; (d) sera collecting; (e) tick and ectoparasite collecting; (f) accidental species collecting; (g) turtle tagging; (h) recording of tagged seals; (i) vegetation survey; and (j) photographing of plants and animals.

Transportation to FFS was provided by the LT 2081 (accompanied by LT 2086 and LT 2087) which left Honolulu on the afternoon of 23 May and arrived at FFS on the morning of 25 May 1967. Transportation back to Honolulu was furnished by a U.S. Coast Guard plane from Barber's Point, Oahu, on 22 June 1967.

ACKNOWLEDGMENTS

Special thanks are extended to Lt. (jg) Jack E. Rader, Jr., Commanding Officer, and the entire crew of the FFS Coast Guard LORAN Station for their full cooperation and support during this field operation. Acknowledgment is also given to Mr. Eugene Kridler, U.S. Fish and Wildlife Service, Honolulu, who provided U.S.F. & W. turtle tags, and who provided consultation prior to the trip.

Note credit given the Bureau for permitting them to enter the refuge for their studies.

GENERAL OPERATIONS

French Frigate Shoals is located approximately 480 miles northwest of Honolulu at 23°50' N. and 166°10' W. This crescent-shaped atoll is about 17 miles from tip to tip and is composed of 15 or so islands; nine of which are high enough to provide nesting sites for seabirds; the remaining six or so are awash (or nearly so) at high tide. That portion of FFS visited this trip is shown in Figure 1.

Upon arriving at FFS (midmorning) the ship anchored very close to the buoy marking the entrance to the channel leading to Tern Island. The other two ships anchored nearby. Field equipment was loaded into two 15-man rubber assault craft for transfer to Tern Island, the location of the U.S. Coast Guard LORAN Station. Other POBSP personnel (including R. DeLong, D. Burckhalter, F. C. Thompson, and R. Tuxson) assisted in the offloading and all went onto Tern Island for a short visit. The U.S.C.G.

plane from Honolulu arrived about the same time bringing Dennis Stadel who was to join DeLong's crew. After taking a few photographs and eating lunch, the other POBSP personnel returned to the ships, all of which left immediately for a survey of the Leeward Hawaiian Islands west of FFS.

A storage area in the boathouse was provided by the Coast Guard Station for all equipment (including that already on FFS). While on Tern Island room and board (a charge was made for the latter) was provided by the C.G. Station. Gasoline for the outboard and water for drinking was also provided by the C.G. Station. The 15-man rubber craft, powered by a Mercury 9-1/2 h.p. outboard, was used for transportation between the various islands in the atoll. Food consisted of standard canned and packaged food.

All field equipment (except that brought back to Honolulu) was inventoried and stored on Tern Island in the old ham shack (northeast end of the island) at the termination of the field trip. Copies of the inventory are in the Honolulu and Washington offices, as well as on Tern Island.

All islands in the atoll were visited, with the exception of Disappearing and Shark. LaPerouse Pinnacle, Bare Island, and Mullet Island were observed from fairly close range. The following itinerary shows the arrival and departure date and time for each island visited during the entire trip.

ITINERARY

<u>LOCALITY</u>	<u>DATE</u>	<u>TIME</u>
Leave Honolulu (via LT 2081)	23 May 1967	1430
Arrive Tern Island, French Frigate Shoals	25 "	1100
Leave Tern Island	26 "	1300
Arrive East Island	26 "	1430
Leave East Island	31 "	0900
Arrive Tern Island	31 "	1020
Leave Tern Island	2 June	1400
Visit Trig Island	2 "	1430-1500
Arrive Whale-Skate Island	2 "	1600
Leave Whale-Skate Island	7 "	1000
Arrive Tern Island	7 "	1045
Leave Tern Island	8 "	1500
Arrive Trig Island	8 "	1530
Leave Trig Island	9 "	1000
Visit Tern Island	9 "	1030-1300
Visit Little Gin Island	9 "	1600-1630
Visit Gin Island	9 "	1645-1715
Arrive East Island	9 "	1800
Visit LaPerouse Pinnacle	12 "	0900-1200
Leave East Island	13 "	0900
Visit Round Island	13 "	1000-1030

<u>Locality</u>	<u>Date</u>	<u>Time</u>
Arrive Tern Island	13 June 1967	1130
Leave Tern Island	15 "	1600
Arrive Whale-Skate Island	15 "	1700
Visit Tern Island	18 "	1000-1500
Leave Whale-Skate Island	19 "	1700
Arrive Trig Island	19 "	1800
Leave Trig Island	20 "	0900
Arrive Tern Island	20 "	1000
Leave Tern Island (via USCG Plane)	22 "	1300
Arrive Honolulu (Barber's Point)	22 "	1630

AVIFAUNA

GENERAL AVIFAUNA

A total of 27 bird species was recorded from French Frigate Shoals during the period from 25 May to 22 June 1967. These include 20 seabird species, five shorebird species, one owl, and one finch. Table 1 presents the status of each species on each island in the atoll. Three of the 27 species are new records for FFS, including: White-tailed Tropicbird (sight record), Cattle Egret (collected), and Short-eared Owl (pellet record). Of the 20 seabird species present, 16 were breeding.

Thirteen bird specimens were collected from FFS during this trip. These included three each of Sooty Terns, Brown Noddies, and Gray-backed Terns, and one each of Bonin Petrel, Blue-gray Noddy, Sanderling, and Cattle Egret.

BANDING AND RECAPTURE

A total of 13,956 birds of 13 species was banded. The banding total for each species and age class for each island is presented in Table 2. A total of 2,534 band returns and recoveries from 17 species was obtained. Table 3 shows that of these 2,534 retraps, 2,468 (97.4 percent) were originally banded at FFS, while 66 (2.6 percent) were banded elsewhere (10 islands). The banding and retrap data for the interisland birds are presented in Appendix A.

Of the 66 band returns from elsewhere, 30 (46.2 percent) were originally banded at Johnston Atoll. Only seven of these Johnston birds were wearing leg streamers. Two additional birds wearing orange leg streamers were observed but not captured. These include an adult Brown Booby (LaPerouse Pinnacle, 12 June 1967) and an adult female Great Frigatebird (Trig Island, 19 June 1967).

Several of the interisland birds had been to other islands prior to being recaptured at FFS. Also, several FFS birds had been to other islands and returned. Of the 66 birds listed as interisland (Appendix A), only two have unknown banding locations. Both are non-POBSP banded birds.

No painted birds from other trips or islands were recorded. All large birds banded or retrapped were painted with a red breast stripe. All interisland birds were recaptured and released alive.

TABLE 1. Status of French Frigate Shoals Avifauna, May-June 1967.

Species	Little			Round	Tern	Trig	Whale	La	Bare	Near
	East	Gin	Gin				Skate	Perouse		
Laysan Albatross	B	-	-	-	B	B	B	-	-	-
Black-footed Albatross	B	-	B	-	-	B	B	-	-	-
Wedge-tailed Shearwater	B	-	-	-	B	B	B	?	-	-
Christmas Shearwater	-	-	-	-	-	B	F	?	-	-
Bonin Petrel	-	-	-	-	B	-	-	-	-	-
Bulwer's Petrel	-	-	-	-	P	-	P	?	-	-
Sooty Storm Petrel	-	-	-	-	-	-	B	?	-	-
White-tailed Tropicbird	-	-	-	-	F	-	-	?	-	-
Red-tailed Tropicbird	B	-	-	-	B	B	B	P	-	-
Blue-faced Booby	B	B	B	B	F	B	B	P	-	-
Brown Booby	P	-	-	-	-	-	P	B	-	-
Red-footed Booby	B	-	-	-	F	B	B	-	-	-
Great Frigatebird	P	-	-	-	P	P	B	P	-	-
Cattle Egret	-	-	-	-	P	-	-	-	-	-
Golden Plover	P	P	P	-	P	P	P	P	-	-
Ruddy Turnstone	P	P	P	-	P	P	P	P	-	-
Wandering Tattler	P	-	-	-	P	P	P	-	-	-
Sanderling	P	-	-	-	P	P	P	-	-	-
Bristle-thighed Curlew	-	-	-	-	P	P	P	-	-	-
Sooty Tern	B	-	-	-	F	B	B	-	-	-
Gray-backed Tern	F	-	-	-	F	B	B	B	-	-
Brown Noddy	B	P	B	-	F	B	B	B	P	P
Black Noddy	P	F	P	-	P	P	P	P	-	-
Blue-gray Noddy	-	-	-	-	F	-	-	B	-	-
White Tern	F	-	-	-	B	F	F	B	-	-
Short-eared Owl	-	-	-	-	-	P	-	-	-	-
Nihoa Finch	-	-	-	-	P	-	P	-	-	-

B = Breeding

P = Present

F = Flying Over

TABLE 2. Band Summary for French Frigate Shoals, May-June 1967

	Age-Sex		East	Gin	Little Gin	Tern	Trig	Whale Skate	Sub- Total	Total
LA	L	U	100				3		103	103
BFA	L	U	300				34	100	434	434
WTS	A	U	100			6			106	106
RTTB	A	U	36			52	5	7	100	
	N	U	13			23		3	39	139
BFB	A	F	10				30	25	65	
	A	M	5				35	19	59	
	A	U	4				5	8	17	
	SA	U	9				1	4	14	
	I	U					0	0	0	
	N	U	4	16	6		62	129	217	372
BB	A	F						2	2	2
RFB	A	U	31				40	18	89	
	SA	U	34				10	41	85	
	I	U	80				8	14	102	
	L	U					1		1	
	N	U	40				43	10	93	370
GF	A	F	200				16	121	337	
	A	M	16				5	99	120	
	SA	F	15					3	18	
	SA	M	8					5	13	
	SA	U	1						1	
	I	U	47				13	185	245	
	U	U						3	3	737
ST	A	U	2000						2000	
	L	U	5000				500	1000	6500	8500
GBT	A	U					2	101	103	
	L	U					5	86	91	194
Br N	A	U	600				200	700	1500	
	L	U	300				100	600	1000	2500
Bl N	A	U						500	500	500
W T	A	U				1			1	1
Unknown								1	1	1
TOTALS			8,952	16	6	82	1,118	3,784	13,956	13,956

TABLE 3. Band Returns, French Frigate Shoals, May-June 1967

Species	French Frigate Shoals	Sand Island Johnston	Oahu	Kauai	Necker	Laysan	Lisianski	Pearl & Hermes Reef	Midway	Kure	Wake	???	Total Interisland	Total Retrapped
Laysan Albatross	6												0	6
Black-footed Albatross	1												0	1
Wedge-tailed Shearwater	141	1											1	142
Christmas Shearwater	5												0	5
Bonin Petrel	1												0	1
Bulwer's Petrel	1												0	1
Red-tailed Tropicbird	38												0	38
Blue-faced Booby	512	1						1		1			4	516
Red-footed Booby	275	20	3	2		7	2		3	2		1	41	316
Great Frigatebird	127	1				1							4	131
Ruddy Turnstone	0												1	1
Sooty Tern	834	4	1			2							8	842
Gray-backed Tern	1								1				0	1
Brown Noddy	386	3											4	390
Black Noddy	139	1			1		1						3	142
White Tern	1												0	1
Totals	2,468	31	4	2	1	10	3	1	4	6	2	2	66	2,534

ISLAND ACCOUNTS

7

TERN ISLAND

Tern Island, on which the U.S. Coast Guard LORAN Station is located, was again used as a base of operations. Six visits were made to this island as follows: May 25-26, 31-June 2, June 7-8, 9, 3-15, 18, and 20-22. Sleeping quarters (C.G. barracks) and an equipment storage area (in the boathouse) were provided by the Coast Guard station.

Twenty-two species of birds were recorded from Tern Island during this trip (Tables 1 and 4). Five of these species were nesting. Six of them were observed either flying over the island or just offshore. Laysan Albatross chicks (just learning to fly) were found mainly on the southernmost side of the runway, especially between the LORAN building and the northeast point. Very few chicks were found on the northwest side of the runway. Red-tailed Tropicbirds were nesting under most large vegetation on both sides of the runway. One nestling fledged during late June. The last of the Bonin Petrel chicks remained in the colony east of the antenna field; the bulk of the population had undoubtedly left earlier. White Terns were nesting in the large Messerschmidia bush by the basketball court, on the base of a gasoline storage tank, on two of the concrete posts by the rubber water tank, on the Coast and Geodetic marker post next to the shop building, on a board outside of the old quonset hut, on a rockpile on the seaward side of the runway, and on one of the wooden posts near the boat dock. Wedge-tailed Shearwaters occupied burrows on both sides of the runway, with eggs appearing late in June.

An adult White-tailed Tropicbird was seen flying west over Tern Island on 26 May and 1 June. These ^{two} sightings constitute a new species record for the atoll. An adult Cattle Egret was collected on 20 June and not only constitutes a new species and specimen record for FFS, but for the Leeward Hawaiian Islands as well. Coast Guard personnel indicated that the Cattle Egret first appeared at Tern Island on 16 June. When collected its stomach was filled to capacity with crickets and a few grasshoppers.

The March-introduced Nihoa Finch population was estimated to be 25. These landbirds were in pairs and small groups. They frequented the entire island, but mainly stayed in vegetated areas. They seemed to be constantly in search of seed. Water also seemed a problem, for some were generally around the 55-gallon metal drums next to the house-trailer; which catch rainwater. No other ^{one} semi-permanent fresh water catchment exists on the island.

A total of 82 birds of three species was banded on Tern Island (see Table 2).

TABLE 4. Bird Population Estimates, Tern Island, FFS, May-June 1967.

Species	Adult Population	Number of Young	Number of Eggs	Remarks
Laysan Albatross	5-10	45	0	Young practicing flight by late June.
Wedge-tailed Shearwater	50	0	10	Eggs laid late June.
Bonin Petrel	3	3	0	Young almost fledged by late June.
Bulwer's Petrel	1	0	0	One seen frequently at night near barracks.
White-tailed Tropicbird	-	-	-	Observed flying over island 26 May and 1 June:
Red-tailed Tropicbird	100	30	15	Fresh eggs to fledglings present.
Blue-faced Booby	-	-	-	Observed offshore.
Red-footed Booby	-	-	-	Observed offshore.
Great Frigatebird	1	-	-	One occasionally roosted at northeast end.
Cattle Egret	1	-	-	Arrived 16 June, collected 20 June.
Golden Plover	25	-	-	Population showed slight increase late June.
Ruddy Turnstone	10	-	-	Population fairly constant.
Wandering Tattler	3	-	-	Population fairly constant.
Sanderling	2	-	-	Population fairly constant.
Bristle-thighed Curlew	3	-	-	Population fairly constant.
Sooty Tern	-	-	-	Observed flying over island and offshore.
Gray-backed Tern	-	-	-	Observed flying over island and offshore.
Brown Noddy	-	-	-	Observed flying over island and offshore.
Black Noddy	1	-	-	One roosted nightly in <u>Casuarina</u> .
Blue-gray Noddy	1	-	-	Observed flying low near barracks.
White Tern	75	6	3	Fresh eggs to fledglings present.
Nihoa Finch	25	0	0	Present in pairs and small groups.
Totals	311	84	28	

EAST ISLAND

East Island was visited twice during the FFS survey as follows: 26-31 May and 9-13 June. Camp was set up, as in previous years, on the sandy area adjacent to the vegetation at the northwest end of the island.

Seventeen bird species were recorded from East Island (see Table 1), eight of which were nesting. Table 5 presents the population and status of the avifauna on East Island.

TABLE 5. Bird Population Estimates, East Island, FFS, May-June 1967.

Species	Adult Population	Number of Young	Number of Eggs	Remarks
Laysan Albatross	25	200	0	Young prefledging late June.
Black-footed Albatross	50	500	0	Young almost fledged late June.
Wedge-tailed Shearwater	5,000	0	1,000	Eggs laid beginning mid-June.
Red-tailed Tropicbird	50	15	5	Fresh eggs to fledglings.
Blue-faced Booby	28	5	2	Eggs to large downy young.
Brown Booby	1	0	0	Occasionally roosted on northwest beach.
Red-footed Booby	350	45	13	Eggs to large downy chicks.
Great Frigatebird	375	0	0	Roosting population only.
Golden Plover	10	-	-	Frequented beaches and vegetated areas.
Ruddy Turnstone	30	-	-	Frequented beaches.
Wandering Tattler	5	-	-	Frequented beaches.
Sanderling	3	-	-	Frequented beaches.
Sooty Tern	200,000	50,000	10,000	Fresh eggs to fledglings, mid-June.
Gray-backed Tern	2	0	0	Adults flew over (low) occasionally.
Brown Noddy	5,000	300	200	Courtship, fresh eggs to fledglings.
Black Noddy	1-5	0	0	Occasional daytime visitor.
White Tern	1-5	0	0	Occasional daytime visitor.
Totals	210,939	51,065	11,220	

The adult Sooty Tern population was estimated at 200,000. Besides being the largest population in recent years, the colony was also having excellent nesting success. While parts of the colony had fresh eggs, other parts contained fledglings. This species utilized almost the entire vegetated area of East Island. Female sea turtles were again destroying Sooty eggs and small chicks in the vegetated areas in which they laid their eggs.

The Brown Noddy nesting cycle was well ahead of the 1966 cycle, for approximately 500 nests were present as compared with 28 in June of 1966. A high percentage of the population was banded (adults 600 new bands, 285 returns; chicks 300 banded). One orange-streamered adult banded at Sand-Johnston was found nesting (on an egg).

The Blue-faced Booby population showed an increase in population and nesting over that in 1966 and 1965. Nine nests were present; however, two were destroyed by turtles. The nesting population of Red-footed Boobies was about 120, while about three times that number were roosting birds only. The Great Frigatebird population was composed of roosting birds only, most of which probably came from the nesting colony on Whale-Skate Island.

None of the Nihoa Finchs, introduced in March 1967, were seen. This species probably was driven off by: (1) a lack of food (seed); (2) no fresh water; and (3) the abundance of seabirds (namely Sooty Terns) which occupied almost all of the island.

A total of 8,952 birds of nine species was banded on East Island (see Table 2.).

WHALE-SKATE ISLAND

Whale-Skate Island was visited twice: once between June 2 and 7, and again between June 15 and 19. Camp, as in 1965 and 1966, was set up on the sandy portion toward the southeast end of the island.

Twenty-two bird species, 11 of which were breeding, were recorded from Whale-Skate Island (Table 1). The population estimates of each species is given in Table 6. As in 1965 and 1966, a very large population of adult and subadult Black Noddies roosted on the island at night. Most of the Brown Noddy population, as on East Island, were nesting. In all, 700 nesting adults of this species were banded, while 89 were returned, and 600 nestlings were banded.

The Great Frigatebird population was about the same as in 1965 and 1966, with the cycle being similar also. The Sooty Tern population, although about the same size as in 1965 and 1966, was having a high nesting success similar to that on East Island. One thousand almost fledged Sooty Tern chicks were banded. One almost fledged Sooty Storm Petrel "local" was handled.

The Red-footed Booby and Blue-faced Booby populations and nesting status were similar to that in 1965 and 1966. Pair bonds in both species were recorded.

Although no Nihoa Finches were introduced onto this island, one was seen on 2 June. It was being chased by a female Great Frigatebird, but escaped into a bush.

A total of 3,784 birds of 10 species was banded on Whale-Skate Island during the trip (see Table 2).

TABLE 6. Bird Population Estimates, Whale-Skate Island, FFS, May-June 1967

Species	Adult Population	Number of Young	Number of Eggs	Remarks
Laysan Albatross	20	75	0	Young prefledging late June.
Black-footed Albatross	30	300	0	Young fledging late June.
Wedge-tailed Shearwater	2,000	0	200	Eggs laid late June.
Christmas Shearwater	1	0	0	Seen flying frequently at dusk, but not on ground.
Bulwer's Petrel	2	0	0	Two adults handled.
Sooty Storm Petrel	0	1	0	One fledgling handled.
Red-tailed Tropicbird	15	3	3	Fresh eggs to medium-size young.
Blue-faced Booby	475	135	5	Eggs to large downy young, 1 fledgling.
Brown Booby	2	0	0	Occasional roosting bird at night.
Red-footed Booby	100	12	2	Eggs to large downy young, 1 fledgling.
Great Frigatebird	500	120	25	Eggs to medium size young.
Golden Plover	10	-	-	On beaches and vegetated areas.
Ruddy Turnstone	15	-	-	Beaches only.
Wandering Tattler	2	-	-	Beaches only.
Sanderling	1	-	-	Beaches and vegetated area.
Sooty Tern	3,000	1,200	100	Eggs to fledglings.
Gray-backed Tern	300	100	20	Eggs to fledglings.
Brown Noddy	3,000	650	200	Eggs to fledglings.
Black Noddy	5,000	0	0	Roosting population only.
White Tern	2	0	0	Occasional visitor.
Nihoa Finch	1	0	0	1 seen being chased by ♀ Great Frigatebird.
Totals	14,478	2,596	555	

TRIG ISLAND

Trig Island was visited three times: June 2, 8-9, and 19-20. Camp was set up on the last two visits on the north beach. A lean-to made from the tent fly was utilized instead of the full tent. Nineteen bird species, ten of which were breeding, were recorded during June (Table 1). The population estimates for these species are presented in Table 7.

As on East and Whale-Skate Islands, both the Sooty Tern and Brown Noddy populations were having a high nesting success on Trig Island. The Messerschmidia bushes on the east portion of the island are now waist high (or higher). This vegetation supports a large roosting population of Black Noddies, Great Frigatebirds, and Red-footed Boobies. The latter species is now nesting extensively in this vegetation. As in 1965 and 1966, Trig Island was found to be the only island in the atoll on which Christmas Shearwater were nesting.

A fresh pellet from a Short-eared Owl was picked up from under a low Scaevola bush at Trig Island on 8 June. The pellet contained bones and feathers of an immature Sooty Tern. The owl was not seen although all roosting sites on Trig Island, as well as on Tern and East, were examined during both night and day time.

A total of 1,118 birds of nine species was banded on Trig Island during May-June 1967 (Table 2).

TABLE 7. Bird Population Estimates, Trig Island, FFS, May-June 1967

Species	Adult Population	Number of Young	Number of Eggs	Remarks
Laysan Albatross	2	10	0	Young almost fledged late June.
Black-footed Albatross	10	34	0	Young fledging late June.
Wedge-tailed Shearwater	300	0	50+	Eggs laid late June.
Christmas Shearwater	20	2	2	Eggs to medium-sized young.
Red-tailed Tropicbird	10	0	5	Eggs only.
Blue-faced Booby	150	65	2	Eggs to large-size young.
Red-footed Booby	200	50	3	Eggs to very large young.
Great Frigatebird	300	0	0	Roosting population only.
Golden Plover	5	-	-	Beaches and vegetated areas.
Ruddy Turnstone	5	-	-	Beaches only.
Wandering Tattler	2	-	-	Beaches only.
Sanderling	1	0	0	Beaches only.
Bristle-thighed Curlew	1	-	-	Beaches and vegetated areas.
Sooty Tern	1,500	700	0	Young almost fledged.
Gray-backed Tern	15	5	3	Eggs to Fledglings.
Brown Noddy	500	100	75	Eggs to fledglings.
Black Noddy	3,000	0	0	Roosting population only.
White Tern	2	0	0	Occasional visitor.
Short-eared Owl	1	-	-	Fresh Pellet (Sooty Tern chick feathers and bones) found on 1 June.
Totals	6,024	966	140	

LA PEROUSE PINNACLE

La Perouse Pinnacle was visited on 12 June, when about two hours were spent circling the two rocks in the rubber craft. Although landing on either rock was possible since the seas were calm, no landing was made due to safety factors. The 11 bird species observed are listed in Table 1 and their population estimates are presented in Table 8. Five additional

species, present on the atoll but not observed while circling the rocks, may occur on La Perouse Pinnacle. These are also listed in Table 1.

An adult orange-streamered Brown Booby was observed, but attempts to collect it failed. Several Blue-gray Noddies were observed, one of which was collected. One was thought to be a young bird which had recently fledged, due to its action and plumage. Although a large number of Black Noddies were roosting on La Perouse (mainly on the small rock), no nests were observed.

TABLE 8. Bird Population Estimates, La Perouse Pinnacle, FFS, May-June 1967

Species	Adult Population	Number of Young	Number of Eggs	Remarks
Red-tailed Tropicbird	2 seen	?	?	Flying around, 1 alighted on side of cliff.
Blue-faced Booby	10	?	?	Few adults seen on top.
Brown Booby	100 ⁺	25 ⁺	?	Medium to large nestlings seen.
Great Frigatebird	50 ⁺	?	?	Appeared to be roosting only.
Golden Plover	2	-	-	On little rock.
Ruddy Turnstone	5	-	-	On little rock.
Gray-backed Tern	300	50 ⁺	?	Colony located on north ledge
Brown Noddy	500	100 ⁺	?	Small young to fledglings seen
Black Noddy	2,000	0	?	Roosting, mainly on little rock.
Blue-gray Noddy	5	1	?	Low crevices on north side.
White Tern	3,000	500 ⁺	present	Small to large nestlings seen.
Totals	5,974 ⁺	676 ⁺	-	

ROUND ISLAND

Round Island was visited for about 30 minutes on 13 June. Only one bird species, Blue-faced Booby, was recorded from this small sandy island. About 40 adult Blue-faced Boobies were on and flying around the island, however, only one nest with two eggs was found. It would appear that earlier high tides had destroyed the nests of this species on this low island and they were just reneating. The breeding cycle for this species on the other islands in the atoll supports this.

No birds were banded on Round Island. Vegetation, as in 1965, was completely lacking from this island.

MULLET ISLAND

Mullet Island was not visited, but was observed from about 100 yards

on 13 June. No birds were observed on this small sand spit, which is probably awash at high tide.

NEAR ISLAND

Near Island was not visited, but was observed from East Island. Brown Noddies roosted on this low-lying sand spit, which was awash at high tide.

BARE ISLAND

Bare Island was not visited, but could be clearly seen at low tide from East Island. It is awash at high tide, but when exposed is a roosting site for Brown Noddies.

GIN ISLAND

Gin Island was visited on 9 June for about 30 minutes. Only five bird species were recorded from this island, as shown in Tables 1 and 9. The only species nesting on Gin Island was the Blue-faced Booby, of which 16 nestlings were banded.

Although quite high in several areas, Gin Island is composed solely of sand and contains no vegetation. The main portion of the island appears to remain intact with the beaches changing due to wave action. The northward projecting sand spit present in 1965 has now disappeared. The surf around this island is very rough and dangerous, with the only fairly safe landing on the north side. This may depend, however, on weather and sea conditions and the current island shape.

LITTLE GIN ISLAND

Little Gin Island was visited for about 30 minutes on 9 June. Six bird species were present, three of which were breeding (Tables 1 and 10). Breeding species included Black-footed Albatross, Blue-faced Booby, and Brown Noddy. Six Blue-faced Booby nestlings were banded.

One plant species, Boerhavia, was recorded, but only a few specimens were observed. Like Gin Island, Little Gin Island has undergone considerable change in shape. The northward projecting portion is completely gone, with only the south portion remaining. The sea is very rough on all sides and the currents very strong, making landing by small craft dangerous. Landing was accomplished on the north tip but everything in the raft got quite wet.

Note: It is recommended that on future trips to Gin and Little Gin Islands the following measures be taken. (1) Trips be undertaken preferably in the morning or before noon. (2) Trips should be taken only if the

sea and weather conditions are favorable. (3) A minimum of equipment should be taken, but should include extra food and water. (4) A two-way radio should be taken, as well as flares. (5) Life jackets should be available and worn if a landing is attempted in the surf.

TABLE 9. Bird Population Estimates, Gin Island, FFS, May-June 1967

Species	Adult Population	Number of Young	Number of Eggs	Remarks
Blue-faced Booby	50	18	3	Eggs to large chicks.
Golden Plover	1	-	-	On beach.
Ruddy Turnstone	5	-	-	On beach.
Brown Noddy	5	0	0	Roosting on beach.
Black Noddy	1	0	0	Flying over.
Totals	62	18	3	

TABLE 10. Bird Population Estimates, Little Gin Island, FFS, May-June 1967

Species	Adult Population	Number of Young	Number of Eggs	Remarks
Black-footed Albatross	25	75	0	Young almost fledged late June.
Blue-faced Booby	25	8	2	Eggs to large chicks.
Golden Plover	2	-	-	On beach.
Ruddy Turnstone	5	-	-	On beach.
Brown Noddy	25	2	0	Small colony.
Black Noddy	5	0	0	Roosting birds.
Totals	87	85	2	

DISAPPEARING ISLAND

This small sandy island, located at the south tip of the atoll, was not visited due to its distance from East Island. It was observed from the air on 22 June, but no animal or plant life could be seen due to the height and distance of the plane.

SHARK ISLAND

This small sand island, located at the north tip of the atoll, was not visited.

OTHER ISLANDS

Three unnamed sandy islets are now present at FFS, all of which have been observed before. One small sand islet is located just north of Gin Island, and is present on H.O. Chart 4171. Another, also shown on H.O. Chart 4171, is just northwest of Trig Island. Still another, not on H.O. Chart 4171 but present in 1965, is located about 300 yards west of East Island. All of these islets are awash at high tide.

Brown Noddies were observed roosting on all of these islets. Hawaiian Monk seals also used these for basking.

MAMMALS

No rats or mice were seen on any of the islands at FFS. Three adult dogs (1♂, 2♀♀) are present on Tern Island. One of the females gave birth to eight pups during June.

Hawaiian Monk Seals were present on all islands visited at FFS. Population estimates for each island are given in Table 11. No seals were tagged during this trip; however, 12 previously tagged seals were observed and their tags recorded. These are all from FFS and are listed in Appendix B.

Several porpoise were observed outside the reef as the ships approached FFS on the morning of 25 May. None were seen inside of the lagoon.

REPTILES

Many Geckos were seen on Tern Island. One specimen was seen on East Island, the first to be recorded from this islet.

Sea Turtles were observed on almost all islands visited, including Tern Island. Population estimates for each island are presented in Table 12. Since tag pliers were not available until the last week of the survey, the turtle population was not disturbed except to paint females that were laying. This was only done as time permitted however. Even so, many of those that were painted were present in the daytime; however, there was undoubtedly a large daily turnover in the population.

Egg laying was observed every night during the survey, with the number ranging from 5 to 21 per night (depending on the island). Egg laying appeared to increase throughout June.

TABLE 11. Hawaiian Monk Seal Population Estimates, FFS, May-June 1967

Island	Adults	Subadults	Pups
Tern	1	2	0
East	10±	5±	0
Whale-Skate	15±	10±	2
Trig	10±	5±	1
Round	3	0	3
Gin	1	3	0
Little Gin	2	4	0
Bare	1	0	0
Near	1	0	0
Totals	44±	29±	6

TABLE 12. Sea Turtle Population Estimates, FFS, May-June 1967

Island	Adults	Subadults	Egg Laying
Tern	3	0	Some sites observed
East	20 to 60 daily	1	5 to 21 per night
Whale-Skate	20 to 45 daily	3	5 to 10 per night
Trig	10 to 25 daily	0	5± per night
Gin	5	0	No sites observed
Little Gin	3	0	No sites observed

Don't Have!

Thirty-four adult turtles (9♂, 25♀♀) were tagged during the last week of the survey. Data for these are presented in part 1 of Appendix C. Six previously tagged turtles were recaptured and these data are presented in part 2 of Appendix C. Of particular significance are two recaptures which show that turtles do move within the Leeward Hawaiian Islands. One was originally tagged at Pearl and Hermes Reef, while the other was originally tagged at Laysan Island. Both were tagged in the fall (non-laying). The female tagged on Laysan was laying at FFS.

ARTHROPODS

Ticks were found on East, Whale-Skate, Trig, and Tern Islands. Ornithodoros capensis were very common on East, Whale-Skate, and Trig Islands, especially in the Sooty Tern and Brown Noddy colonies. Ixodes laysanensis were found only at Whale-Skate Island on Blue-faced Booby chicks, Brown Noddy chicks and adult Gray-backed Terns. Two specimens of I. laysanensis and two of O. capensis were collected. Specimens of Rhipicephalus sanguineus, the brown dog tick, were again seen on the dogs at Tern Island.

Chiggers attacked both POBSP personnel on East, Whale-Skate, and Trig Islands. Specimens were collected from Gray-backed Terns.

PLANTS

No plants were collected. Photographs, most of which included vegetation, were taken on East, Whale-Skate, Trig, and Tern Islands.

SERA SAMPLES

A total of 96 sera samples was taken from three species of seabirds (Blue-faced Booby, Red-footed Booby, and Great Frigatebird) on Whale-Skate Island.

PHOTOGRAPHS

Both black-and-white and color 35 mm. photographs were made of the plant and animal life on East, Whale-Skate, Trig, and Tern Islands, and on La Perouse Pinnacle. Color 16 mm. movies (16,000 feet) were also taken of the islands and their animal and plant life and of the activities of POBSP and USCG personnel. This footage, when added to 600 feet made in 1965 and 1966, will be used in a documentary film of FFS being made by Amerson. Low-level aerial photographs (both 35 and 16 mm.) were taken from the U.S. Coast Guard plane on 22 June.

SUMMARY

All islands at FFS except Shark and Disappearing, were surveyed for birds, mammals, and reptiles. Twenty-seven bird species were recorded from the atoll, three of which were new records (White-tailed Tropicbird, Cattle Egret, and Short-eared Owl). Of the 20 seabird species, 16 were breeding. A total of 13,956 birds of 13 species was banded. A total of 2,534 band returns from 17 species was taken, with 2,468 of these being originally from FFS and 66 from elsewhere. Population estimates and breeding status of the avifauna were obtained on each island visited.

Thirty-four adult sea turtles were tagged, and six tag returns were obtained. Two of these were tagged on other Leeward Hawaiian Islands. No Hawaiian Monk Seals were tagged, but 11 previously tagged individuals were recaptured (all originally tagged at FFS). Population estimates were made for both sea turtles and Hawaiian Monk Seals.

Ticks and chiggers were collected. Sera samples totaled 96. Photographs were taken of the plant and animal life on the major islands at FFS.

242 907
72.7 27.39

APPENDIX C. Part 1 - Sea Turtle Tag Data, French Frigate Shoals,
May-June 1967

<u>HG & F</u> <u>Tag No.</u>	<u>Sex</u>	<u>Measurements</u> *	<u>Location</u>	<u>Date</u>	<u>Remarks</u>
601	F	38 x 35	Whale-Skate I.	06-18-67	On Beach
602	F	33 x 32	"	"	"
603	F	38 x 35.5	"	"	"
604	F	37 x 35	"	"	"
605	F	37 x 35	"	"	"
606	M	35 x 33	"	"	"
607	F	35.5 x 33	"	"	"
608	F	38 x 34.5	"	"	"
609	M	36 x 34	"	"	"
610	F	38 x 34.5	"	"	"
611	F	37 x 38	"	"	"
612	F	39.5 x 37	"	"	"
613	F	41 x 40	"	"	"
614	F	38 x 34	"	"	"
615	F	39 x 36	"	"	"
616	M	35 x 33.5	"	"	"
617	M	32 x 30.5	"	"	"
618	F	39 x 36	"	"	"
619	F	39.5 x 36	"	"	"
620	F	38.5 x 35	"	"	"
621	F	39 x 34.5	"	"	"
622	F	38.5 x 26	"	"	Post laying
623	F	39 x 36	"	06-19-67	On beach
624	M	35 x 32	"	"	"
625	F	39 x 38	"	"	"
626	F	41.5 x 39	"	"	"
627	F	35.5 x 33	"	"	"
628	F	38 x 38	"	"	"
629	M	33.5 x ?	"	"	"
630	F	38 x 36.5	"	"	"
631	M	34 x 32	Trig I.	06-20-67	"
632	M	35 x 34	"	"	"
633	F	36 x 33.5	"	"	"
634	M	34 x 33	"	"	"

* Length x width, in inches.

Appendix B. Hawaiian Monk Seal Tag Returns, French Frigate Shoals,
May-June, 1967

<u>Tag No.</u>	<u>Age</u>	<u>Sex</u>	<u>Location</u>	<u>Date</u>	<u>Remarks</u>
HG & F A3	Yearling	?	East I.	05-26-67	on upper beach
HG & F A4	Yearling	?	East I.	05-26-67	on upper beach
"	"	"	Whale-Skate I.	06-06-67	on beach
HG & F A7	Yearling	?	East I.	05-26-67	on upper beach
HG & F A8	Juvenile	?	Whale-Skate I.	06-03-67	on beach
HG & F A9	Yearling	?	Whale-Skate I.	06-02-67	on beach
HG & F A14	Subadult	?	Whale-Skate I.	06-02-67	blood around tag
"	Yearling		Whale-Skate I.	06-06-67	on beach
HG & F A15	Yearling	?	Whale-Skate I.	06-02-67	on beach
"	"	"	Whale-Skate I.	06-06-67	on beach
HG & F A16	?	?	Whale-Skate I.	06-06-67	on beach
HG & F A20	Subadult	?	Whale-Skate I.	06-02-67	on beach
"	"	"	Whale-Skate I.	06-18-67	on beach
HG & F A24	Subadult	?	Little Gin I.	06-09-67	on beach
HG & F A30	?	?	Trig I.	06-08-67	on beach
"	"	"	Whale-Skate I.	06-18-67	on beach
POBSP 177	Adult	F	Whale-Skate I.	06-02-67	w/pup

Appendix A. Inter-island Bird Movement to French Frigate Shoals,
25 May-22 June 1967

Wedge-tailed Shearwater

615-01347 Banded: Sand-Johnston, 05-05-64, A-U;
 Captured and released: Whale-Skate I., FFS, 06-18-67, A-U, roosting

Blue-Faced Booby

737-92943 Banded: Kure, 06-02-65, Local-U
 Captured and released: East I., FFS, 05-27-67, A-F, roosting

737-44193 Banded: Sand-Johnston, 02-27-65, A-U
 Captured and Released: Trig I., 06-08-67, A-F, 1 egg

767-48248 Banded: Wake I., 06-19-66, S-U
 Captured and released: East I., FFS, 05-26-67, A-M, roosting

558-83080 Banded: North I., Pearl & Hermes Reef, 06-23-63 A-U
 Captured and released: Whale-Skate I., FFS, 08-16-65, A-F
 Captured and released: Whale-Skate I., FFS, 06-26-66, A-F
 Captured and released: Whale-Skate I., FFS, 06-03-67, A-F, roosting

Red-footed Booby

587-80553 Banded: Laysan I., 09-17-64, A-U
 Captured and released: East I., FFS, 06-11-66, A-U
 Captured and released: East I., FFS, 03-11-67, roosting
 Captured and released: East I., FFS, 05-28-67, A-U, roosting

587-80575 Banded: Laysan I., 09-17-64, I-U
 Captured and released: Trig I., FFS, 08-13-66
 Captured and Released: East I., FFS, 08-23-66
 Captured and released: Whale-Skate I., FFS, 06-05-67, A-U, roosting

587-90358 Banded: Sand-Johnston, 03-03-67, S-U
 Captured and released: Whale-Skate I., FFS, 06-02-67, S-U, roosting

587-90371 Banded: Sand-Johnston, 03-14-67, S-U
 Captured and released: East I., FFS, 05-27-67, S-U, roosting

587-90384 Banded: Sand-Johnston, 03-29-67, A-U
 Captured and released: Whale-Skate I., FFS, 06-16-67, A-U, roosting

597-12485 Banded: Kilauea Pt., Kauai, 07-07-64, N-U
 Captured and released: East I., FFS, 05-29-67, S-U, roosting

737-43298* Banded: Unknown (issued to: Dr. Henry Fitch, Lawrence Kans., 1963)
 Captured and released: Trig I., FFS, 06-08-67, A-U, roosting

737-43522 Banded: Sand-Johnston, 02-17-66, I-U
 Captured and released: Whale-Skate I., FFS, 06-06-67, S-U, roosting

* If this prefix were ^{as} misread (767 instead of 737) the bird would be from FFS.

Red-footed Booby (cont.)

- 737-43537 Banded: Sand-Johnston, 02-19-66, S-U
 Captured and released: East I., FFS, 08-19-66
 Captured and released: East I., FFS, 05-27-67
- 737-43570 Banded: Sand-Johnston, 02-22-66, S-U
 Captured and released: East I., FFS, 05-26-67, A-U, roosting
- 737-43584 Banded: Sand-Johnston, 02-22-66, S-U
 Captured and released: East I., FFS, 06-12-66, S-U
 Captured and released: Whale-Skate I., FFS, 06-03-67, A-U, roosting
- 737-43594 Banded: Sand-Johnston, 02-22-66, I-U
 Captured and released: Whale-Skate I., FFS, 06-18-67, S-U, roosting
- 737-43608 Banded: Sand-Johnston, 02-25-66, A-U
 Captured and released: Trig I., FFS 06-19-67, A-U, roosting
- 737-43659 Banded: Sand-Johnston, 03-24-66, I-U
 Captured and released: East I., FFS, 06-11-67, S-U, roosting
- 737-43697 Banded: Sand-Johnston, 04-03-66, I-U
 Captured and released: East I., FFS, 06-10-66, S-U
 Captured and released: Whale-Skate I., FFS, 06-05-67, S-U, roosting
- 737-43708 Banded: Sand-Johnston, 04-10-66, I-U
 Captured and released: Whale-Skate I., FFS, 06-02-67, I-U, roosting
- 737-43709 Banded: Sand-Johnston, 04-10-66, S-U
 Captured and released: East I., FFS, 06-10-67, S-U, roosting
- 737-43807 Banded: Sand-Johnston, 04-23-66, S-U
 Captured and released: East I., FFS, 05-26-67, S-U, roosting
- 737-43910 Banded: Sand-Johnston, 06-07-66, I-U
 Captured and released: East I., FFS, 05-26-67, S-U, roosting
- 737-43923 Banded: Sand-Johnston, 06-12-66, S-U
 Captured and released: Whale-Skate, FFS, 06-02-67, S-U, roosting
- 737-44156 Banded: Sand-Johnston, 02-26-64, I-U
 Captured and released: East I., FFS, 06-10-66, A-U
 Captured and released: Laysan I., 10-20-66, A-U
 Captured and released: East I., FFS, 05-27-67, A-U, nesting
- 737-44786 Banded: Sand-Johnston, 05-26-65, I-U
 Captured and released: East I., FFS, 08-05-65, S-U
 Captured and released: Sand-Johnston, 04-15-66
 Captured and released: East I., FFS, 06-11-66, S-U
 Captured and released: East I., FFS, 05-29-67, A-U, nesting
- 737-44818 Banded: Sand-Johnston, 06-02-65, I-U
 Captured and released: East I., FFS, 08-05-65, S-U
 Captured and released: Trig I., FFS, 06-08-67, A-U, roosting

Red-footed Booby (cont.)

- 737-44953 Banded: Sand-Johnston, 12-12-65, A-U
Captured and released: Trig I., FFS, 06-08-67, A-U, roosting
- 737-98180 Banded: Green I., Kure, 11-11-64, I-U
Captured and released: East I., FFS, 05-27-67, S-U, roosting
- 737-99721 Banded: Green I., Kure, 08-30-66, N-U
Captured and released: Trig I., FFS, 06-08-67, I-U, roosting
- 747-55034 Banded: Wake I., 01-05-65, I-U
Captured and released: Trig I., FFS, 06-08-67, A-U, on empty nest
- 757-25759 Banded: Laysan I., 08-09-65, I-U
Captured and released: East I., FFS, 05-26-67, S-U, roosting
- 757-25853 Banded: Laysan I., 08-09-65, I-U
Captured and released: East I., FFS, 06-10-67, S-U, roosting
Captured and released: Whale-Skate I., FFS, 06-17-67, S-U, roosting
- 757-27968 Banded: Lisianski I., 10-19-66, S-U
Captured and released: East I., FFS, 06-10-67, A-U, roosting
- 757-28266 Banded: Lisianski I., 10-19-66, A-U
Captured and released: Sand-Johnston, 04-12-67,
Captured and released: Whale-Skate I., FFS, 06-04-67, S-U, roosting
- 757-28533 Banded: Laysan I., 10-22-66, A-U
Captured and released: Trig I., FFS, 06-19-67, A-U, roosting
- 767-40186 Banded: Eastern I., Midway, 07-24-65, N-U
Captured and released: Whale-Skate I., FFS, 06-06-67, S-U, roosting
- 767-40274 Banded: Eastern I., Midway, 07-22-65, N-U
Captured and released: Whale-Skate I., FFS, 06-05-67, I-U, roosting
- 767-40293 Banded: Eastern I., Midway, 07-22-65, N-U
Captured and released: Whale-Skate I., FFS, 06-04-67, S-U, roosting
- 767-41241 Banded: Laysan I., 03-08-65, A-U
Captured and released: East I., FFS, 06-10-66, A-U
Captured and released: East I., FFS, 05-26-67, A-U, nesting
- 767-41469 Banded: Laysan I., 03-10-65, A-U
Captured and released: Trig I., FFS, 06-19-67, A-U, roosting
- 767-45028 Banded: Kilauea Pt., Kauai, 09-03-65, I-U
Captured and released: East I., FFS, 06-11-67, S-U, roosting
- 767-47104 Banded: Mokapu Pt., Oahu, 06-08-66, N-U
Captured and released: Whale Skate I., FFS, 06-06-67, I-U, roosting

Red-footed Booby (cont.)

767-48529 Banded: Mokapu Pt., Oahu, 07-14-66, N-U
 Captured and released: Sand-Johnston, 04-03-67
 Captured and released: Whale-Skate I., FFS, 06-05-67, I-U, roosting

767-48744 Banded: Mokapu Pt., Oahu, 07-14-66, N-U
 Captured & released: East I., FFS, 05-29-67, I-U, roosting

Great Frigatebird

667-39708 Banded: Green I., Kure, 11-04-63, I-U
 Captured and released: East I., FFS, 06-16-66, I-U
 Captured and released: Whale-Skate I., FFS, 06-04-67, S-F, roosting

737-44950 Banded: Sand-Johnston, 02-11-65, I-U
 Captured and released: East I., FFS, 05-27-67, S-F, roosting

757-25564 Banded: Laysan I., 06-12-66, A-M
 Captured and released: East I., FFS, 05-30-67, A-F, roosting

767-50530 Banded: Green I., Kure, 05-11-67, A-F
 Captured and released: East I., FFS, 06-12-67, A-F, roosting

Ruddy Turnstone

682-17042 Banded: Unknown (issued to: Haw.Nat.Wild.Ref., 1964)
 Captured and released: East I., FFS, 05-27-67, A-U, on beach

Sooty Tern

753-21240 Banded: Sand-Johnston, 08-27-63, A-U
 Captured and released: East I., FFS, 05-27-67, A-U, (BPB, AD)

823-24654 Banded: Sand-Johnston, 04-26-65, A-U
 Captured and released: East I., FFS, 06-10-67, A-U, (BPR, AD)

823-47773 Banded: Sand-Johnston, 05-21-65, I-U
 Captured and released: East I., FFS, 05-30-67, A-U, (BPB, AD)

843-79924 Banded: Sand-Johnston, 07-19-65, A-U
 Captured and released: East I., FFS, 06-10-67, A-U, (BPr, AD)

863-05273 Banded: Eastern I., Midway, 07-21-65, A-U
 Captured and released: East I., FFS, 05-30-67, A-U, (BPN, AD)

893-09661 Banded: Laysan I., 08-06-65, A-U
 Captured and released: East I., FFS, 05-28-67, A-U, (BPN, GN)
 on beach

903-64636 Banded: Laysan I., 06-14-66, A-U
 Captured and released: East I., FFS, 05-28-67, A-U, (BPB, GN), on
 beach

Sooty Tern (cont.)

923-09462 Banded: Manana I., Oahu, 05-31-66, N-U
 Captured and released: East I., FFS, 05-30-67, A-U, (BPB, AD)

Brown Noddy

753-30305 Banded: Sand-Johnston, 11-11-63, A-U
 Captured and released: East I., FFS, 05-28-67, A-U, nesting

753-30396 Banded: Sand-Johnston, 11-14-63, A-U
 Captured and released: Whale-Skate I., FFS, 06-04-67, A-U, (BPB)
 roosting

793-29149 Banded: Necker I., 09-25-64, L-U
 Captured and released: Trig I., FFS, 06-08-67, A-U, (BPN), roosting

853-99578 Banded: Sand-Johnston, 02-19-66, A-U
 Captured and released: East I., FFS, 06-10-67, A-U, nesting

Black Noddy

682-47167 Banded: Green I., Kure Atoll, 07-18-66, A-U
 Captured and released: Whale-Skate I., FFS, 06-06-67, A-U, roosting

753-25537 Banded: Sand-Johnston, 02-03-64, I-U
 Captured and released: Whale-Skate I., FFS, 06-03-67, A-U, (BPr)
 roosting

773-40880 Banded: Lisianski I., 03-12-64, N-U
 Captured and released: Whale-Skate I., FFS, 06-05-67, A-U, roosting

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The May 1971 Expedition Report
to Pearl and Hermes Reef has not
yet been prepared.

Kridler, Coad and Smith

. Hawaiian Islands National Wildlife Refuge
Expedition Report
French Frigate Shoals
May 13-20, 1971

Personnel:

David L. Olsen - Assistant Wildlife Administrator
Ernest Kosaka - Hawaii Division of Fish and Game
Bil Gilbert - Writer representing Sports Illustrated

Itinerary:

- May 13 Depart Kailua, 7:00 AM. Arrive Honolulu International Airport 7:30 AM. Depart Honolulu via FAA DC-3 for French Frigate Shoals 8:30 AM. Conducted aeral census of seals and turtles. Checked equipment out and visited Trig Island.
- May 14 Conducted biological investigations on Shark Island.
- May 15 Conducted biological investigations on La Perouse Pinnacle and spent the night camping on East Island.
- May 16 Conducted biological investigations on East, Round and Mullet Islands.
- May 17 Conducted biological investigations on Trig and Whale Skate Islands.
- May 18 Conducted biological investigations on East, Big and Little Gin Islands, camped overnight on East Island.
- May 19 Completed biological investigations on Trig and Whale Skate, returned to Tern Island.
- May 20 Assembled gear for departure and departed French Frigate Shoals 2:30 PM via FAA DC-3. Arrive Honolulu 5:45 PM. Returned to Kailua via government vehicle 10:00 PM.

General:

Weather conditions throughout the entire trip were excellent. Although a few rain squalls were seen on the horizon on several days, no rain was recorded on any of the islands. Winds were slight and variable, seldom exceeding 6 or 7 knots. The highest wind speed recorded during the week was 10 knots. On several days the ocean appeared to be glassy smooth and this was most unusual for French Frigate Shoals at this time of the year.

A 16 ft. skiff and 40 hp. outboard motor were provided by the Coast Guard for our transportation from Tern Island to the other islets. Lodging and meals were provided at a nominal cost by the Coast Guard.

The objectives of this trip were twofold, the first was to continue with our biological investigations of the Hawaiian monk seal and green sea turtle populations and to census the seabird populations present there. The second was to provide Mr. Gilbert with the opportunity to visit and learn to appreciate the natural values involved with the Hawaiian Islands National Wildlife Refuge. His article on the trip will probably be published in an August issue of Sports Illustrated. 1971

Although no formal marine investigations were conducted, some diving was accomplished around several of the islets. This afforded Mr. Gilbert the opportunity to gain an appreciation of the values of the marine aspect of the refuge (table 7).

Wildlife Populations

All of the islets except Disappearing were visited during our stay and wildlife population estimates were made on each islet. On Shark, Tern, Trig, Whale Skate, Round, East and Gin Islands, head counts of the larger species of nesting seabirds were made. Where chicks were present head counts were also made. Reliability figures for each of the population estimates are included in the counts (Table 1).

La Perouse Pinnacle was visited and all members of the party landed on the ledge. Ernest Kosaka successfully scaled the pinnacle.

Our visit to the island was made prior to the peak of the sooty tern nesting season. Probably no more than 10% of the terns using East and Whale Skate Islands were on eggs. Estimates of sooty tern populations were made by calculating the number of birds per square yard and using a plainmeter to delineate out the high concentration areas.

Although wedge-tailed shearwaters were present in great numbers on some of the islands, no eggs were found. Many of the birds were digging burrows but the majority of them left their nesting areas during the daylight hours.

A storm which hit the north end of the atoll eliminated all the nesting albatross on the north side of Tern Island.

Two nights were spent on East Island. In addition to observing nesting turtles, specimens of seabirds were collected for pesticide analysis. Ten noddy terns, ten wedge-tailed shearwaters together with ten sooty terns and their eggs were collected. Of the 30 birds collected, 4 were previously banded: sooty tern numbers 923-22147 and 923-17393, common noddy terns numbers 923-47467 and 923-21362.

Wildlife Management Studies

Studies of the Hawaiian Monk Seal

An aerial census of the seal population was conducted on May 13. The islets were circled several times and 3 observers censused the seals. Although there was a slight variation in counts this census is considered reliable.

Table 2
Aerial Census - Seals

<u>Island</u>	<u>Number</u>
Disappearing	32
Gins	42
East	17
Round	1
Mullet	17
Whale Skate	16
Trig	15
Shark	8
Tern	<u>1</u>
Total:	<u>149</u>

A total of 41 seal pups were tagged (Table 3). All were double tagged with identically numbered monel tags. Sexing was accomplished by rectal examination.

Nine previously tagged animals were observed during our stay at French Frigate Shoals. Of the 54 seal pups tagged during July 1970 on French Frigate, only 6 were observed during this period.

Of the 39 pups tagged during 1969 on French Frigate only 2 were observed. These data again suggest a heavy mortality during the first few years.

We made a special effort to try to find tagged adult females for todate we still have not observed a tagged adult female which was originally tagged as a pup.

Seal tag return data are shown in table 4.

Table 3
Seal Tagging Data
French Frigate Shoals

<u>Tag no.</u>	<u>Date</u>	<u>Location</u>	<u>Sex</u>
951	5/18	East Island	M
952	5/18	East Island	M
953	5/18	Big Gin	M
954	5/18	East Island	F
955	5/18	East Island	M
956	5/18	East Island	M
957	5/18	East Island	F
958	5/18	East Island	F
959	5/18	East Island	M
960	5/18	East Island	F
961	5/18	East Island	F
962	5/16	Mullet Island	M
963	5/16	Mullet Island	F
964	5/16	Round Island	F
965	5/16	Round Island	M
966	5/16	Round Island	M
967	5/16	Round Island	M
968	5/16	Round Island	M
969	5/16	Round Island	M
970	5/16	Round Island	M
971	5/16	Round Island	F
972	5/16	Round Island	F
973	5/16	Round Island	M
974	5/16	Round Island	M
975	5/16	Round Island	M
985	5/13	Trig Island	F
986	5/14	Shark Island	M
987	5/15	Whale Skate	M
988	5/15	Whale Skate	F
989	5/15	Whale Skate	M
990	5/15	Whale Skate	M
991	5/15	Whale Skate	F
992	5/15	Whale Skate	F
993	5/15	Whale Skate	F
994	5/15	Whale Skate	F
995	5/15	Whale Skate	F
996	5/15	Whale Skate	F
997	5/15	Whale Skate	M
998	5/15	Whale Skate	M
999	5/18	East Island	F
1000	5/18	East Island	F

Table 4
 Seal Recapture Information
 French Frigate Shoals
 May 12-20, 1971

<u>Tag No.</u>	<u>Location</u>	<u>Age</u>	<u>Tag Date</u>	<u>Age</u>	<u>Sex</u>	<u>Location</u>	<u># Previous Returns</u>
* 668	Little Gin	SA	9/9/69	Y	F	Laysan	
* 767	Little Gin	Y	7/15/70	P	M	Round	
** 788	Whale Skate	SA	6/21/69	P		East	
*** 789	East	SA	6/27/69	P	F	East	1
* 904	East	SA	7/11/70	P	F	Whale Skate	
*A914	Whale Skate	SA	7/11/70	P	M	Whale Skate	
*A921	Whale Skate	SA	7/12/70	P	M	Whale Skate	
* 927	Little Gin	Y	7/13/70	P	M	Little Gin	
** 928	East	Y	7/13/70	P	M	East	

Key:

- * Double tagged
- ** Single tagged
- *** Yellow nylon tag

Studies of the Green Sea Turtle

Although an attempt was made to conduct an aerial census of the turtles on the islands it proved unsuccessful. From the air it was evident that many more turtles were in the shallow waters adjacent to the island than there were on the beaches. For example, approximately 40 turtles were noted just off the north end of East Island while only 8 were observed on the beach. Census figures of turtles found on each islet cannot be considered a reliable estimate of the turtle population present around the atoll. In light of the number of turtles seen in the water in comparison of the number tagged, we estimated the French Frigate turtle population at 250 animals during that week.

Although we visited several of the islets on several days our repeated visits seem to have no adverse affect on turtle use of the islets.

Two nights were spent on East Island in an effort to observe turtles in the process of nesting. During the first night a single turtle came up on the beach and nested. The process was not observed and no effort was made to excavate the nest site. On the second night three turtles apparently nested and one was observed during the entire nesting process. Once the body cavity and pit were excavated it took 15 minutes to lay the clutch of 68 eggs. An hour was spent filling and packing the hole, and concealing the site. A total of 42 fresh (considered to have been excavated during the past month) turtle pits were observed on East Island.

A total of 47 turtles were tagged during the week at French Frigate Shoals. The smallest was 130 lbs. while the largest tipped the scales at 305 lbs (Table 5). Four previously tagged turtles were recovered (Table 6). Two had been tagged at Lisianski over three years ago while the other were previously tagged at French Frigate Shoals. No significant changes in measurements were noted.

An unusual observation of copulating sea turtles was made. In the shallow waters adjacent to East Island a group of 6 turtles was observed milling around a copulating pair. Olsen observed the incident from underwater and recorded it on film. All of the turtles swimming around the pair were males and they exhibited rather aggressive behavior and attempted to break up the pair. A note on this observation will be published in one of the herpetological journals.

Table 5
Turtle Tagging
French Frigate Shoals
May 1971

Tag #	Date	Sex	Plastron Length	Carapace				Thickness	Weight	Is.
				Length Straight	Width	Length Curved	Width			
940	5/13	M	27.7	34.2	26.5		12.0	195	T	
941	5/13	F	30.9	36.3	29.2		13.8	275	T	
942	5/13	F	28.0	33.1	25.1		12.5	205	T	
** 943	5/14	M	26.3	33.9	24.9	35 1/2	32 1/4	11.7	180	S
** 944	5/14	F	30.3	38.6	29.3	39 1/2	36	13.7	280	S
945	5/14	F	28.8	36.1	28.3		13.2	235	WS	
946	5/14	M	25.9	33.3	26.2		12.3	180	WS	
947	5/14	M	27.6	35.0	26.8		12.6	220	WS	
948	5/14	M	24.1	31.0	24.1		10.5	130	WS	
949	5/14	F	27.7	34.2	26.1		14.9	225	WS	
950	5/14	M	28.2	34.5	27.1		12.1	220	WS	
951	5/15	F	26.2	33.1	25.8		12.1	185	T	
952	5/15	M	27.2	34.0	25.6		12.2	195	T	
953	5/16	M	28.1	35.9	27.7	36	39.2	14.3	225	E
954	5/16	F	29.1	36.0	26.3	38	37	14.8	E	
955	5/16	M	27.2	33.5	27.3	35 1/2	34	12.4	E	
956	5/16	F	29.8	37.2	27.7	40	37 1/2	13.0	E	
957	5/16	F	31.0	36.5	27.6	39 1/2	38	14.4	E	
958	5/16	F	30.7	38.2	29.8	40	38	13.9	E	
959	5/16	F	30.0	36.6	29.0	40	39 1/2	14.8	E	

Tag #	Date	Sex	Plastron Length	Carapace		Length Curved	Width Curved	Thickness	Weight	Is.
				Length Straight	Width Straight					
960	5/17	F	30.1	36.3	26.7	39 1/2	35	15.3	290	WS
961	5/17	F	29.6	35.8	28.4	38 1/2	36 1/2	13.1	230	WS
962	5/17	M	28.7	36.6	27.5	38 1/2		12.3	240	WS
963	5/17	F	29.8	37.6	27.6	40	38	15.2	253	WS
964	5/17	M	27.4	34.7	26.9	37 1/4	35	12.6	210	WS
965	5/17	M	27.0	34.7	26.5	38	32 3/4	10.5	155	WS
966	5/17	F	31.1	36.9	29.2	40 1/4	38	15.1	280	WS
967	5/18	M	26.1	33.4	24.5	35	31 1/2	11.6	175	E
968	5/18	M	25.1	33.3	26.3	35 1/2	34	11.1	180	E
969	5/18	F	28.8	35.1	26.9	37	35	14.9	235	E
970	5/18	F	28.8	35.3	27.8	36		14.8	260	E
971	5/18	F	30.8	38.5	27.6	40 1/2	39	13.8	275	E
972	5/18	F	27.6	33.3	27.1	35 1/2	35 1/2	13.3	230	E
973	5/18	F	27.5	34.5	26.9	36 1/2	36	14.9	255	E
974	5/18	F	30.0	37.2	28.2	40	38 1/2	15.8	305	BG
975	5/18	F	29.2	35.6	26.5	38	35 1/4	13.9		BG
976	5/18	F	30.5	37.3	27.6	40	36 1/4	15.3		BG
977	5/18	F	27.4	33.8	25.5	35 1/2	33	12.6		LG
978	5/18	M	27.8	34.7	27.8	36 1/2	33 1/8	13.1		LG
979	5/18	M	27.9	35.6	26.9	37 1/4	35 3/4	12.8		LG
980	5/18	M	25.2	31.4	23.9	33 1/5	33	11.7		LG
981	5/18	F	29.0	36.7	27.5	38 1/4	35 3/4	13.2		LG
982	5/18	F	29.6	36.9	28.9	39	38 1/4	13.9		LG

Tag #	Date	Sex	Plastron Length	Carapace				Thickness	Weight	Is.
				Length Straight	Width	Length Curved	Width			
983	5/18	F	29.9	37.3	30.1	40 1/4	39 1/4	14.7		LG
984	5/18	F	29.2	36.2	28.0	38 1/4	36 1/4	14.5		LG
985	5/18	F	29.7	37.4	28.6	40 1/2	37	14.9		LG
986	5/19	M	22.0	27.2	21.4	28.8	25.3	9.9		E

Key to IS.

E - East Island

WS - Whale Skate

T - Trig Island

BG - Big Gin

LG - Little Gin

S - Shark Island

Table 6
Turtle Retraps
French Frigate Shoals

<u>Tag #</u>	<u>Sex</u>	<u>Location</u>	<u>Plastron Length</u>	<u>Carapace</u>		<u>Thickness</u>	<u>Round Measurements</u>	<u>Weight</u>	<u>Date</u>
				<u>Length</u>	<u>Width</u>				
660	F	East Is.	31.8	30.4	38.1	15.1	40 X 43	330	5/16/71
	F	Lisianski	32.0	30.3	33.4	15.7		325	3/20/68
459	F	Whale Skate	28.7	35.4	27.4	13.5	37 X 34.9	250	5/15/71
	F	Trig Is.					38 1/2 X 36		3/13/67
	F								2/23/69
644	F	Whale Skate	29.1	34.6	28.6	12.3	37 X 35 3/4	255	5/17/71
	F	Lisianski	29.6	34.4	28.6	12.7	37 X 35.5	225	3/30/69
	F	Lisianski					36 3/4 X 34 1/2		9/26/67
736	F	Trig Is.	29.9	37.8	28.6	13.7	40 X 36 1/4	270	5/17/71
	F	East Is.	No measurements taken - nesting						

Appendix

Table 7
Diving Time
French Frigate Shoals

<u>Date</u>	<u>Time</u>	<u>Location</u>	<u>Depth</u>
5/13	1 hour	Trig Island	18'
5/14	2 hours	La Perouse, Tern	32'
5/16	2 hours	Tern Island	21'
5/18	1 hour	East Island	12'
5/19	1 hour	East Island	9'

Hawaiian Islands National Wildlife Refuge
Pearl and Hermes Reef Trip Report
July 15, 1971

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Turtles p 4

The Pearl and Hermes Reef Unit of the Hawaiian Islands Refuge was visited on July 15 via U. S. Navy helicopter based at Midway Naval Station. Bureau personnel was Eugene Kridler, Wildlife Administrator. Pilots were Lt. Cmdr. Michael Rij and Lt(JG) Bruce Briggs.

Logistic support was provided by Capt. Robert Anderson, Commanding Officer of Midway Naval Station. Authorization for such support was granted by Rear Admiral Thomas B. Hayward, Commandant of the Fourteenth Naval District and Fleet Air Hawaii.

The helicopter departed Midway at 8:10 AM and arrived at Pearl and Hermes Reef at 9:35 AM flying in the face of 15-20 knot southeast winds. North Island was first visited than Southeast and Kittery Islands. Seal Island was visited by wading in chest high water across the small channel separating it and Kittery. Little North and Grass Islands were not landed upon because of unanticipated heavy consumption of fuel on the flight down and the need to insure a sufficient amount for the return flight. All islands and sandbars were censused by air for seals and turtles. Because of other commitments of the air crew, only enough time was spent on the islands to inspect seals for tags, tag pups, and tag turtles. At 1:45 PM the party departed Pearl and Hermes with a good tailwind and arrived at Midway at 2:40 PM.

Because of the priority given to seals, only the most casual of bird observations were made. Time did not permit checking the interior of the islands for nesting activity, numbers or even presence; thus, observations are very incomplete.

Laysan Finch - Examination was made of the Erogrostic clumps on the west part of the island for nests. Only 1 new nest but as yet with no eggs was found. Birds themselves were frequently seen in the vegetation all around the perimeter of the island. Many immatures with yellow at the base of the bill were noted indicating successful reproduction so far this year.

Sooty Terns - Common on Southeast, Seal, North and Grass Islands. Young on the west side of Southeast were about 2/3 grown and had assumed the dark feathered plumage. No other observations were made.

Gray-backed Tern - Several adults noted on Southeast Island and also 1 large young capable of flight.

Common Noddy Tern - Common on all islands except Kittery. Many were incubating eggs. Some small downy young were seen.

Hawaiian Noddy Tern - Very common on Southeast. Less so on all others. None on Kittery. Several flocks of 50-75 seen on Seal Island. Nesting phenology not checked.

Fairy Tern - 16 adults noted on Southeast Island and 3 on Seal. Nesting not checked.

Wedge-tailed Shearwater - Common on all islands except Kittery. A number incubating eggs in depressions on surface at Southeast Island.

Christmas Island Shearwater - none seen.

Sooty Storm Petrel - none seen.

Red-tailed Tropicbird - Uncommon on all islands.

Blue-faced Booby - In low numbers on beaches of all islands. Most with young of various sizes from newly hatched to those able to fly. None noted on Kittery.

Red-footed Booby - Common on Southeast Island, none observed on the others. Chicks large downy to partly feathered. Some almost at flight stage.

Brown Booby - Seen only on Southeast. Several half-grown young noted.

Frigatebird - Common on Southeast Island. Less so on North and Seal. Unable to check Grass. Young half-grown and partly feathered.

Black-footed Albatross - Very few on any of the islands. Those noted were young which appeared almost capable of flight. Low mortality observed.

Laysan Albatross - Several hundred still left on Southeast, North and Seal Islands. A few adults on Southeast and one incident of feeding a chick noted. Using the week at Midway as a criteria, at this time many young have already left with many others leaving as each day passes. Low mortality appeared evident.

Ruddy Turnstone - A flock of 25 seen on North and about 15-20 at Southeast. In full color yet.

Wandering Tattler - One observed on Southeast.

Hawaiian Monk Seal - all islands were censused on the ground except for Grass Island, Little North and the wreck on the east reef and the sandbars between Southeast and Grass Islands. All were censused also by air. The results are shown in Table 1. Some animals moved into the water before they could be sexed and thus are classified as "unknown".

Table 1
Seal Census
Pearl and Hermes Reef
July 15, 1971

<u>Island</u>	<u>Adult Male</u>	<u>Subadult Male</u>	<u>Pup Male</u>	<u>Adult Female</u>	<u>Subadult Female</u>	<u>Pup Female</u>	<u>Adult Unknown</u>	<u>Pup Unknown</u>	<u>Total</u>
North	5	1	1	10		1	6		24
*Little North							14		14
Southeast	4	1		9	2		9		25
*Sandbars							5		5
Wreck									0
*Grass							9	1	10
Seal			1	3		1	2		7
Kittery	<u>6</u>	—	—	<u>6</u>	—	—	<u>9</u>	—	<u>21</u>
Total	15	2	2	28	2	2	54	1	106

*Aerial only

Two pups were double tagged with the standard monel metal cattle ear tag - one tag per flipper. In addition one pup about 3 weeks old and still nursing was tagged at one of the small islands between Sand and Eastern at Midway on July 19 (because cooperators there no longer had tags). The two tagged on the refuge already had been weaned and were very fat and had acquired the silver gray plumage. Tagging data are as follows:

Navy tagged seals??

- #1001 Pup male North Island 7/15/71 Weaned Silver-gray
- 1002 Pup female North Island 7/15/71 Weaned Silver-gray
- 1003 Pup male Midway Atoll 7/19/71 Nursing Black (3-4 weeks)

As much as possible, all animals were checked for tags. There were 5 such returns. The information is as follows:

No.	Recovery Data				Tagging Data			
	Age	Sex	Date	Island	Age	Sex	Date	Island
A-99	SA	F	7/15/71	Southeast	P	F	3/22/67	Seal
A-137	A	F	7/15/71	Southeast	SA(Y)	F	7/6/67	Southeast
A-180	A	M	7/15/71	Kittery	A	M	7/10/67	Seal
A-338	A	F	7/15/71	Southeast	SA(Y)	F	3/22/68	Southeast
A-931	SA	F	7/15/71	Seal	P	F	8/17/70	Southeast

Laysan

All except No. 931 had been tagged at Pearl and Hermes and had been recorded there several times before this trip. The latter was tagged as a pup on Laysan on Aug. 17, 1970 was very fat and looked very similar in appearance to a large gray pup. The tag on No. 338 was about half-way torn out of the web of the rear flipper. Other than No. 931, all appeared to carry but one tag only.

Tag loss

Moult condition was checked on 14 animals on North Island. Of 4 males recorded, 1 had moulted and 3 had not moulted as yet. Of the 10 adult females 2 had not mounted, but 8 were in the process of moulting. One of the unsexed adults had moulted and one had not. The subadult male had not moulted and possessed the usual brownish pelage well coated with green and brown algae or diatoms.

Green sea turtles - only 3 turtles were seen in the whole atoll and all at North Island. Two about 30 in. long were seen offshore about 20 ft. One animal which crawled ashore while we were on the island was tagged. The data follows:

Tag no.	Sex	Carapace	Width
498	F	32 5/8 in.	24 1/4

No straight-line measurements were taken since the calipers had not been put aboard the plane at Hickam AFB by cargo handlers.

There were several tracks on Southeast Island which appeared to have been made within the past night or two. Sixteen pits dug sometime earlier this summer were found on Southeast, 6 on North and 3 on Kittery Islands. One was dug into in an effort to find eggs - with no success. Several others were probed for the egg pits, with equal lack of success; however the probe was unsatisfactory and had time permitted more excavations might have yielded positive results. The pits appeared similar to those at French Frigate Shoals. We suspect that turtles do nest at Pearl and Hermes but in very low numbers.

Fish - only 1 shark was seen within the lagoon at the west side. None were noted around any of the islands.

General Observations - The mustard (Brassica) on Southeast Island was dormant and dry. Lush mats of Tribulus covered the western part of that island. Considerable Setaria covered the larger eastern area. On Seal Island there were lush growths of Eragrostis covering much of the vegetated part of the island. There was little change at North Island. Kittery, as usual, was devoid of any vegetation.

Expedition Report
Hawaiian Islands National Wildlife Refuge
Nihoa, Necker, French Frigate Shoals
August 16-26, 1971

Personnel

David L. Olsen - Acting Wildlife Administrator
Robert Shallenberger - Graduate Student, UCLA, presently associated
with the Oceanic Institute
Dr. Rick Grigg - Chief Scientist, Precious Coral Project
Jim Vansant - Graduate Student, University of Hawaii
Bill Worcester - Graduate Student, University of Hawaii
David Childs - Smithsonian Institute

Itinerary

- August 16 - 10:00 PM, depart Pier 19, Honolulu, via TERITU (University of Hawaii Oceanographic Vessel)
- August 18 - 5:00 AM, arrive Nihoa. Landed at 8:00 AM and conducted biological investigations. Overnight on Nihoa.
- August 19 - Continued biological investigations on Nihoa, departed 12:30 PM. Conducted marine investigations adjacent to the island. TERITU departed Nihoa 3:00 PM. Oceanographers dredged most of the night.
- August 20 - Continued dredging in 1,200 ft. depths between Nihoa and Necker.
- August 21 - Arrived in the waters off Necker 12:00 PM. Landed on Necker 12:30, departed from the island 3:00 PM. Continued deep water dredging throughout the night.
- August 22 - Arrived north side of French Frigate Shoals 9:00 AM. Shore party landed on East Island 11:00 AM. Conducted marine investigations and a "show me" trip. Conducted marine investigations around La Perouse Pinnacle. Departed TERITU and overnight on Tern Island.
- August 23 - Conducted wildlife investigations and collected rock samples on La Perouse Pinnacle. Overnight Tern Island.
- August 24 - Conducted wildlife investigations on [?] Big Gin, Little Gin and East Islands. Overnight Tern Island.
- August 25 - Conducted biological investigations on Round, Whale Skate, and Trig Islands. Overnight Tern Island.

August 26 - Reviewed proposed construction plans for new housing facility at Tern Island. Depart Tern Island 1:20 PM. Arrive Honolulu International Airport 5:20 PM.

General

The Hawaii Institute of Marine Biology obtained a \$25,000 grant through the Sea Grant program to investigate the potential precious coral resource in the Leeward Islands. This group of scientists was specifically interested in the group of precious corals called "Gorgonians". Included in this group are the pink, angel skin, bamboo and gold corals. The animals are found at relatively narrow depth bands, seldom deeper than 220 fathoms and seldom shallower than 180 fathoms. Their growth is usually the best on hard bottoms swept by strong currents. Suitable habitat types were thought to exist between Nihoa and Gardner Pinnacles.

Most of the precious coral harvested in the Pacific comes from either the South China Sea or the Milwaukee Banks, a shallow area located approximately 500 miles northwest of Midway. The precious corals are being harvested exclusively by the Japanese.

Although university scientists have located a 5 million dollar bed of pink coral just a few miles off Makapuu Point on Oahu, it was felt that the potential in the Leeward Islands could be even greater. Most of the species found in the beds off Oahu were found during this expedition but the beds were not as dense. The findings of precious coral in this expedition were not impressive and Dr. Grigg indicated that he felt that the resource was quite limited.

The TERITU is a 90 ft. research vessel equipped with an array of winches and other heavy machinery topside. The vessel has commonly been called the "rolly polly" or "seasick machine" and we all vouched for the fact that it was well named.

Trade winds prevailed during the entire trip, however, on a few days the winds exceeded 25 knots. A few hard rain squalls were encountered, however, weather was not a factor which hampered the completion of work.

Although funded entirely by the Sea Grant program, the expedition could best be described as multidisciplinary. In addition to collecting precious coral, several other types of collections were made. Shallow water species of corals were identified and collected around Nihoa and French Frigate Shoals and plankton samples were collected in several areas. Under Olsen's supervision, David Childs collected a number of species of coralline algae in the surge zone around Necker and Nihoa. Childs also made coralline algae collections at the 125 ft. depth off Nihoa and took several dredge hauls at depths up to 600 ft. in other area.

Olsen and Shallenberger collected rock samples at La Perouse Pinnacle for the Geological Survey in Menlo Park, California. Recent findings have shown that the "hot spot", relating to the continental drift theory, may well be located somewhere between Gardner and La Perouse Pinnacles. Potassium-argon dating techniques will be applied to the collected samples and the findings should be "exciting" so say the geologists.

NIHOA

The primary objective at Nihoa was to complete the finch and millerbird transects. Approximately 13 man hours were required to complete these counts. Population data were also collected for the other species of birds found on the island. The most unusual observation was that of a mockingbird on Miller Flat by Shallenberger.

Although strong southeast winds swept into the cove at Nihoa, a landing was affected with little difficulty. A small rubber raft was towed into the landing site, the equipment was thrown up on the rock ledge and the raft was tied up on the island overnight. The landing and departure the following day were without incident and most of the equipment was kept relatively dry.

Nihoa was extremely dry. As evidenced by the appearance of the vegetation, it had been some time since the last rain. Seeps in the valley were dry.

While Olsen and Shallenberger collected bird population data, divers from the TERITU surveyed some of the reef life adjacent to Nihoa on the west side. They dove in several of the caves and reported that several appeared to have openings in the top. The only way to explore these caves would be to use a ladder from a small boat on a calm day.

Shallenberger completed the transects on the west half of the island while Olsen completed the east half. Population estimates were made of all the seabirds present on the island and the data are presented in table 1.

Table 1
 Bird Population Data
 Nihoa
 August 1971

Wedgetailed Shearwater	2,000
Christmas Island Shearwater	40 adults, young down to fully feathered
Bulwers Petrel	4,000, young 1/2 grown
Red-tailed Tropicbird	200, young 3 weeks to fully feathered
Red-footed Booby	1,000 birds, most young fully feathered although some still incubating eggs
Brown Booby	40 pr., young 4 weeks to flying
Blue-faced Booby	40 pr., most young fully feathered
Frigatebird	1,200, most young 3/4 grown
Bristle Thighed Curlew	1
Ruddy Turnstone	8
Wandering Tattler	1
Grey-backed Tern	7,000, chicks 4 weeks to flying
Sooty Tern	1,000, young fully feathered
Common Noddy Tern	5,000, eggs to fully feathered
Blue Grey Noddy Tern	20
Fairy Tern	3,000, young fully feathered
Mockingbird	Shallenberger observed and photographed one Miller Flat
Nihoa finch	3,759, see Wildlife Management Study

Wildlife Management Studies

Studies of the Nihoa Finch

Fifty random transects were conducted on Nihoa. Each transect measured 16.5 feet wide by 200 feet long (206,250 sq. ft.) and the total area sampled was 4.73 acres. A total of 114 birds was counted on transect. Using the accepted method of calculating the population the total finch count was 3,759.

$$\text{Total Birds} = \frac{\text{Number counted X Total area}}{\text{Area sampled}}$$

$$\text{Total Birds} = \frac{114 \times 156}{4.73} = 3,759$$

Raw field data are included in table 2. Standard deviation was calculated and at the 95% confidence level the population is 3,759 \pm 28% or from 2707 to 4811.

$$s = \sqrt{\frac{n(\sum x^2) - (\sum x)^2}{n^2}}$$

$$\sum x = 114$$

$$s = \sqrt{\frac{50(846) - (114)^2}{2500}}$$

$$\sum x^2 = 846$$

$$n = 50$$

$$s = \sqrt{\frac{29,304}{2500}}$$

$$n^2 = 2500$$

$$m = 2.288$$

$$s = 2.3237$$

$$\bar{s}x = \frac{2.327}{7.071} = .032$$

$$95\% \text{ CL} = m \pm 1.05 \times s \bar{x}$$

$$95\% \text{ CL} = 2.288 \pm 2.008 \times .032$$

$$95\% \text{ CL} = \pm 28\%$$

Although a search was made for evidence of nesting, no active nests were found. No banded birds were noted.

Studies of the Nihoa Millerbird

Fifty random transects were conducted on Nihoa. Each transect measured 16.5 feet wide by 200 feet long (206,250 sq. ft.) and the total area sampled was 4.73 acres. A total of 12 birds was counted on transect. Using the accepted method of calculating the population the total millerbird count was 273.

$$\text{Total Birds} = \frac{\text{Number counted} \times \text{Total area}}{\text{Area sampled}}$$

$$\text{Total Birds} = \frac{12 \times 156}{4.73} = 273$$

Raw field data are included in table 2. Standard deviation was calculated and at the 95% confidence level the population is 273 \pm 67% or from 91 to 454. The high confidence limits are due to the degree of variability in the transect data.

$$s = \sqrt{\frac{n(\sum x^2) - (\sum x)^2}{n^2}}$$

$$\sum x = 12$$

$$s = \sqrt{\frac{50(20) - 144}{2500}}$$

$$\sum x^2 = 144$$

$$n = 50$$

$$s = \sqrt{\frac{836}{2500}}$$

$$n^2 = 2500$$

$$m = 2.4$$

$$s = .5783$$

$$\overline{sx} = \frac{.5783}{7.071} = .081$$

$$95\% \text{ CL} = m \pm 1.05 \times s \overline{x}$$

$$95\% \text{ CL} = 2.4 \pm 2.008 \times .081$$

$$95\% \text{ CL} = \pm 67\%$$

Table 2
Raw Data
Finch and Millerbird Transects

<u>Transect #</u>	<u>Millerbird</u>	<u>(N²)</u>	<u>Finch</u>	<u>(N²)</u>	<u>Transect #</u>	<u>Millerbird</u>	<u>(N²)</u>	<u>Finch</u>	<u>(N²)</u>
2	0	0	0	0	111	0	0	6	36
5	0	0	2	4	112	0	0	3	9
7	0	0	0	0	122	0	0	1	1
15	2	4	1	1	126	0	0	2	4
21	0	0	0	0	128	0	0	3	9
22	0	0	4	16	130	0	0	10	100
25	0	0	3	9	132	0	0	5	25
30	0	0	0	0	133	0	0	7	49
33	0	0	2	4	134	0	0	5	25
35	0	0	9	81					
38	0	0	0	0					
40	2	4	0	0	Totals:	12	144	114	846
41	0	0	3	9					
47	0	0	0	0					
48	0	0	3	9					
49	0	0	2	4					
51	0	0	1	1					
54	0	0	2	4					
57	1	1	3	9					
58	0	0	2	4					
62	2	4	4	16					
68	0	0	0	0					
70	0	0	0	0					
71	0	0	0	0					
73	0	0	3	9					
74	0	0	12	144					
75	1	1	3	9					
77	0	0	3	9					
86	0	0	4	16					
87	1	1	11	121					
88	0	0	5	25					
89	0	0	9	81					
92	1	1	4	16					
93	0	0	0	0					
99	0	0	0	0					
100	0	0	0	0					
101	0	0	1	1					
103	0	0	12	144					
104	0	0	3	9					
108	2	4	3	9					
109	0	0	2	4					

NECKER

Only a short stay was permitted on Necker and the scientific party used a small rubber boat to effect the landing. Ten seals were counted in Shark Bay and a single turtle was noted swimming in the area adjacent to the landing. No attempt was made to census the other wildlife populations on the island.

FRENCH FRIGATE SHOALS

General

The TERITU arrived at French Frigate Shoals on Sunday, August 22 and the day was spent surveying wildlife populations on La Perouse Pinnacle and East Island. Members of the scientific party from the TERITU were afforded the opportunity to visit East Island and observe and photograph the wildlife there. Dives were made off East Island and around La Perouse Pinnacle and a number of photographs of the marine life in the area were taken. The TERITU remained in the vicinity of French Frigate Shoals overnight then it continued northwest toward Brooks Banks. Olsen and Shallenberger returned to Tern Island and remained there until the weekly log flight arrived on August 26.

The crew at Tern Island provided a 16 ft. skiff equipped with a 40 hp. motor for our research and patrol efforts throughout the week. Lodging and meals were provided at a nominal cost and Tern Island was the base out of which we worked. Trade winds prevailed during the week and although the lagoon became rather choppy at times, weather did not hamper our operations. Each day a different series of islands were visited and wildlife population estimates were made on Trig, Whale Skate, Tern, East, Round, and the Gin Islands and La Perouse Pinnacle. Shark and Disappearing Islands were not visited, however, an aerial seal census was conducted on these two islands on August 26.

The shapes of some of the islands (changed considerably) since our last visit in May. A long sand spit had been added to East Island while Mullet Island no longer existed. Also two smaller islands which had developed to the south of the Gin Islands were no longer present.

Wildlife Populations

Seabird populations were censused on each of the islands within the atoll (table 3). The albatrosses were notably absent, however, the sooty terns and wedgetailed shearwaters were still present in significant numbers. Of particular interest was the observation of a mockingbird. This bird was observed and photographed a number of times around the residences on Tern Island.

Table 3
 Bird Population Data
 French Frigate Shoals
 August 1971

<u>Bird</u>	<u>Tern</u>	<u>Trig</u>	<u>Whale Skate</u>	<u>Round</u>	<u>East</u>	<u>L. Gin</u>	<u>Big Gin</u>	<u>La Perouse</u>
Wedgetailed Shearwater	700	45	450		450			
Burrows	200	15	150		150			
Christmas Is. Shearwater	1							
Bulwers Petrel	2							
Tropicbird	20*		10 est.		10 est.			
Red-footed Booby	18	1	14 ck		10			1
Brown Booby								40
Blue-faced Booby		37 A 29 ck	95 A 22 ck			45	3	40
Frigatebird		6	64 ck		40		1	25
Golden Plover	2							
Curlew	1							
Ruddy Turnstone	20	18		1	80			1
Sanderling							1	
Grey Backed Tern			Present		Present			
Sooty Tern			1,200		10,000			
Common Noddy Tern	600	40	3,200		3,000		50	2,500
Hawaiian Noddy Tern	300							
Fairy Tern	120							400
Nihoa Finch	7+							
Mockingbird	1							

*20 young - eggs to fully feathered

A = Adult
 ck = Chick

Aug 15-26, 71

Studies of the Green Sea Turtle

Only two large turtles were seen at French Frigate Shoals. This was a marked difference from the great numbers observed during our visit in May and it was apparent that most of the adults had moved away from the atoll. The two large turtles observed had flippers bitten off and they both found swimming difficult. The one judged to be in fairly good condition was tagged. Another smaller platter size turtle was also tagged (table 4).

The Coast Guard crew reported that turtle hatching had passed its peak. The peak was from July 1 to August 15 and during that time young turtles could be seen almost every night around Tern Island. Confused by the lights around the island, they usually headed for the brightest lights and those were located at the "mess deck". The seaman on night watch usually picked up young turtles and released them into the sea. CBM Kline reported that three bucketfuls were picked up and dumped into the ocean one night during the peak of hatching.

From interviews with men stationed on Tern Island it appeared that at least several hundred young turtles hatched on Tern Island. Young turtles were never seen hatching during the daylight hours.

Although a thorough search was made of Tern Island each night we were there the hatching apparently occurs in spurts. No young turtles were noted on the first 2 nights. However 25 young were found on the third night. Most were found in and around the "mess deck". A few were picked up and simple experiments were performed with them. Several were placed near the dark end of the runway and a flashlight was turned on some 10 feet away. All immediately headed toward the light. They even changed direction as the light moved. Notes on speed of the young turtles were also made. It was observed that a young turtle could travel approximately 200 feet in less than 5 minutes. Their speed was amazing. Observations were also made of young turtles as they made their way into the water. Even as hatchlings they appear to be wonderful swimmers. Although they had a tendency to float they would immediately dive and swim under water for distances up to 10 feet. Although all the young turtles we released appeared to make it safely without being taken by reef fish, the men stationed at Tern Island reported that they commonly observed young turtles being taken by fish during their first swim.

A turtle pit count was conducted on each of the islets (table 5). Although the data are somewhat subjective this count represents our best estimate. If each of the pits in this count represented a clutch of 80 eggs, approximately 37,000 young could have been hatched on French Frigate Shoals.

Table 4
Turtle Tagging Data
Tern Island
French Frigate Shoals
August 1971

<u>Tag #</u>	<u>Sex</u>	<u>CL</u>	<u>CW</u>	<u>PL</u>	<u>TH</u>	<u>Est. Wt.</u>	<u>Round</u>
1076		13.6	11.6	11.1	5.1	8 lbs.	14 3/8 X 13 1/8
1077	F	36.0	29.2	29.1		280 lbs.	38 1/4 X 35 1/4

Table 5
Turtle Pit Count*
French Frigate Shoals
August 1971

Tern	21
Trig	63
Whale Skate	118
East	180
? Little Gin	12
? Big Gin	<u>70</u>
Total	464

*This count represents all those pits which were thought to have been dug this year. Some were fresh while others were probably several months old. In some cases one pit was dug inside another. Shallow, probably false pits were not counted, however, undoubtedly some false pits were included in this count. In general, the count is somewhat subjective, but it represents our best estimate.

Studies of the Nihoa Finch

A total of seven Nihoa finch were counted on Tern Island. Two were obviously adult males (one banded) while the remainder were either females or immatures. A single active nest was located in the pile of concrete blocks near the east end of the island. A nestling probably no older than 2 days was found in the nest. The pile of concrete blocks appears to be the only location on Tern Island where Nihoa finch have been found nesting.

Marine Investigations

Some diving was conducted on Nihoa and French Frigate Shoals and Dr. Grigg collected a few specimens of coral for identification. Members of the precious coral team dove around the cliffs on the west side of Nihoa on August 18. They reported a number of sharks. Most appeared to be the grey reef shark (Carcharhinus menisorah). One larger shark was seen, however identification was not made.

Four members of the party rowed a rubber boat into Necker while other members of the party swam in along side the rubber boat. Again, a number of small sharks were noted.

A number of dives were made around French Frigate Shoals. Dr. Grigg collected a number of specimens of coral around East Island and they will be identified and reported on at a later date.

Dr. Grigg stated that in comparison with the main islands of Hawaii, French Frigate Shoals appeared to have far fewer species.

A dive was made at La Perouse Pinnacle primarily for photographic purposes. Rock samples were also collected which will eventually be analyzed by geologists from the Geological Survey Office in Menlo Park.

In an effort to determine if sharks were taking young turtles, a shark line was set at Tern Island. On the first night the line was set, a 5' grey reef shark C. menisorah was taken. Its stomach was empty. On the second day a small (approximately 4 1/2 ft.) grey reef shark apparently took the bait. A large tiger shark probably noted the struggling smaller shark and "gobbled him up", thus impaling himself on the large hook. After quite a struggle, eight men managed to pull the shark just out on the beach. He was dispatched with a ".45" and lifted up on a boat winch for a long series of vanity pictures. She measured 11'10" and probably weighed over 1,000 lbs. Fifteen young no longer than 2" were found attached to a rather large yolk sack. A large slipper lobster was the only thing found in its stomach.

None of the men from the LORAN station had even seen a shark of this size before. Ironically it was caught right in their local swimming hole and the line was attached to the diving board. Our Refuge Benefit units derived from swimming around Tern Island will undoubtedly decline.

Table 8
Diving Time (Olsen)

<u>Date</u>	<u>Location</u>	<u>Time</u>	<u>Depth</u>	<u>Purpose</u>
August 19	Nihoa	1 1/2 hrs.	30 ft.	General Marine Investigations
August 22	East Island	1 1/2 hrs.	25 ft.	General Marine Photography
	La Perouse	1 hr.	32 ft.	General Marine Photography
August 23	La Perouse	1/2 hr.	30 ft.	Collecting rock samples
August 24	Big Gin Island	1/2 hr.	12 ft.	Turtle tagging

Seal Census Data
French Frigate Shoals
August 1971

<u>Island</u>	<u>Adult</u>	<u>Yearling & Subadult</u>	<u>Pup</u>	<u>Unknown</u>	<u>Total</u>
Tern	1				1
Shark				18	18
La Perouse		1			1
Trig	10	16	1		27
Whale Skate	9	9	10		28
Round	4		4		8
Little Gin	3	2			5
Little Little Gin	7	3			10
Big Gin	2				2
East	5	4	3		12
Disappearing	—	—	—	<u>50</u>	<u>50</u>
Totals:	41	35	18	68	162

Seal Recapture Information
 French Frigate Shoals
 August 22-26, 1971

<u>Tag No.</u>	<u>Location</u>	<u>Tag Date</u>	<u>Age</u>	<u>Sex</u>	<u>Location</u>
682	Whale Skate	6/14/69	Y	M	Whale Skate
683	Little Gin	6/14/69	Y	F	Whale Skate
686	Little Gin	6/14/69	Y	M	Whale Skate
754	East	7/10/70	P	F	East
767	Little Gin	7/15/70	P	M	Round
768	Whale Skate	7/10/70	P	M	Round
786	East	6/21/69	Y	F	East
788	Trig	6/21/69	Y		East
794	Trig	6/21/69	Y	F	East
901	Whale Skate	7/10/70	P	F	Whale Skate
905	Little Gin	7/10/70	P	M	Whale Skate
910	Little Gin	7/11/70	P	M	Whale Skate
918	Whale Skate	7/12/70	P	M	Whale Skate
952	Whale Skate	5/18/71	P	M	East
969	Whale Skate	5/16/71	P	M	Round
986	Whale Skate	5/14/71	P	M	Shark
990	Whale Skate	5/15/71	P	M	Whale Skate
992	Whale Skate	5/15/71	P	F	Whale Skate
1000	East	5/18/71	P	F	East

*duplicate
Turtle
Nos.*