

SEALS ELEPHANT - G.H. BALAZS



*National Museum of Natural History • Smithsonian Institution*

WASHINGTON, D.C. 20560 • TEL. 202-

September 12, 1984

Mr. George H. Balazs  
Assistant Marine Biologist  
Hawaii Institute of Marine Biology  
University of Hawaii at Manoa  
P. O. Box 1346  
Coconut Island  
Kaneohe, Hawaii 96744

Dear George:

A turtling friend of yours, Jack Frazier, has unwisely enlisted my help(?) in writing up a note on a young elephant seal that turned up in the Maldives. This of course reminded me of your Hawaiian occurrences, and in rummaging around my office I miraculously turned up our correspondence of 1980. It would be nice for our note if we could cite a publication on the Hawaiian records. Have you in the meantime published something that I have missed? Or do you have something in press?

Any news would be most welcome.

Sincerely,

Clayton E. Ray  
Research Curator  
Dept. of Paleobiology

(Introduction)

TOMICH

MAMMALS IN HAWAII  
2nd Edition MS -1984

7b

Confirmed sightings of the northern elephant seal at Midway bring the number of hair seal species in the state to a total of two. With additions and deletions, 22 whales and dolphins are accounted for. Three additional species remain unconfirmed. The Pacific white-sided dolphin (Lagenorhynchus obliquidens Gill), though reported (Nishiwaki, 1967, p. 38), is supported by no specific records. The same author (p. 34) ascribes also the common dolphin (Delphinus delphis Linnaeus) to Hawaiian waters. Again there are no specific records, and I have dropped both from the species list. Shallenberger (1981) has seen and photographed a bottlenose whale (Hyperoodon sp.)

October 17, 1984

George -

In response to your letter of the 11th I enclose 4 ms pages on the elephant seal. References are scattered in the biblio. Should you need any of them I can select accordingly.

It might be good to get the story together for the ELEPHANT as I am including only the bare essentials. BM has had my completed MS for 12 months. Some progress on getting cost estimates (I had arranged early for financing through a donor). I am urging publication by mid-1985.

P. Quentin Tomich  
P.O. Box 675  
Honokaa, Hawaii 96727

(keeping up biblio with additions weekly)

Quentin

Mirounga angustirostris. Northern elephant seal.

Original Description: Macrorhinus angustirostris Gill, Proceedings of the Chicago Academy of Sciences, 1:33-34. 1866.

Type Locality: Saint Bartholomew's Bay, Baja California, Mexico.

Native Range: Breeds regularly on offshore islands from Baja California to central California, i.e., Cedros Island, Mexico, to Point Reyes, California. Ranges widely into the more northern waters of the Eastern Pacific (Ronald, Selley and Healey, 1982).

Range in Hawaii: Vagrant, or perhaps a rare seasonal visitant, in the Northwestern Hawaiian Islands (three separate examples 1978-1980 at Midway Islands); and possible records for the neighboring Pearl and Hermes Atoll and Kure Atoll in the 1800's. Presence of the elephant seal in Hawaii was first confirmed in February 1978 by George H. Balazs who examined a living specimen at Midway (Fig. 80). The animal was a young female tagged a year earlier at San Miguel Island, off southern California, by Burney J. Le Boeuf of the University of California at Santa Cruz. Balazs later confirmed the occurrence of an immature male and a mature male, but details of these sightings have not been published.

(Balazs, pers. comm.). These seals swam some 3,500 miles to have reached the Midway Islands outpost from the Mexican, or California rookeries. See also, Altona (1978) <sup>and United States Department of Commerce</sup> who reported on the initial discovery. (177)

The elephant seals are relatives of the monk seals, classified to a different subfamily of the phocid, or hair, seals (Anderson and Jones, 1967). The male is a particularly large beast, largest of all the pinnipeds, up to 15 feet (4.5 m) in length and weighing

as much as 2.7 tons. Females reach a length of about 12 feet (3.6 m), but weigh only up to 0.7 tons. The male has an elongated, erectile proboscis, hence the name "elephant" seal (Ronald, Selley and Healey, 1982). Social rituals are intense in the breeding colonies, with fierce competition between males for dominance status (Bartholomew, 1952). Foods on the Pacific Coast include bony fishes, sharks and rays, and squids (Morejohn and Baltz, 1970).

Populations have recovered from 19th century sealing (described by Scammon, 1968), with overcrowding now forcing establishment of new colonies. Perhaps these social pressures promote a greater than usual dispersal from traditional breeding grounds, resulting in the several wandering animals to have arrived in Hawaiian waters. The elephant seal is a hardy species, spending its time at sea except when on the rookeries. Grinnell (1933) presents some information on the Californian populations of that era.

Both numbers and range were expanding.

Coopre and Stewart  
(1983) bring the record further up to date.

and Condit and Le Boef (1984)

Figure 79.--

Old Figure 45, retain as is, Laysan  
Island.

✓ Figure 80.-- Young female of the northern elephant seal  
(Mirounga angustirostris), the first of this species identified  
with photographic record in Hawaii. Midway Islands, February 1978.  
The animal had been tagged at a California rookery (George H.  
Balazs photo.)

End Paper.-- Study of a pet mongoose, 1979. (Drawn by  
Marcia Tomich.)

See also, Front Cover and Back Cover.

Dr. George H. Balazs  
NMFS Honolulu Laboratory  
P. O. Box 3830  
Honolulu, HI 96812

(11732-4)

numerous "6' seals at Midway"  
American Actinurus in the Pacific

occurrence of  
Elephant seals on the Northwestern Hawaiian Islands  
(in the Hawaiian Archipelago)

5 in Kaneohe Bay?  
1 off sand beach?

"Growth rates and age of sexual  
maturity in the  
Hawaiian monk seal"

To:

34-57 B. J. Le Boeuf, Biology  
UNIVERSITY OF CALIFORNIA  
DIVISION OF NATURAL SCIENCES  
APPLIED SCIENCES BUILDING  
SANTA CRUZ, CALIFORNIA 95064

Mr. George H. Balazs  
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FIRST CLASS





ARB 174 Natural History of Pearl  
and Hermes Reef  
by Amerson, Clapp and Wintz 241

40 small unidentified porpoises inside the lagoon near Southeast as he approached the island in a helicopter on 25 September 1966.

HAWAIIAN MONK SEAL

Monachus schauinslandi

Status

Common resident breeder; present year-round; occurs and breeds on most islands. Maximum recent POBSP and BSWF population estimate 195 in February and March 1963.

Observations

Hawaiian Monk Seals were first recorded by Morrell (1832: 217-218) 8-11 July 1825, who wrote "the sea-elephant and sea-leopard resort to the islands in the summer season, in large rookeries, and the former are perfectly tame." Osburn, who visited in August 1850, wrote of killing 10 or 12 seal for their livers and hearts; he also noted their tameness and estimated their weight at 500 pounds (Kemble, 1966: 155). Seals were next recorded in 1857 by Paty (1857: 2-3) who noted that the "islets...seemed to abound with...seals." Brooks, who visited Pearl and Hermes and other Northwestern Hawaiian Islands in July 1859, may have found seals here; he returned to Honolulu with a cargo of 240 barrels of seal oil and 1,500 seal skins (Anon., 1859a, 1859b). Brooks (1960: 502) failed, however, to mention seals in his subsequent description of the atoll, though he noted birds and turtles (see also Kenyon and Rice, 1959: 215).

Frear's notation of 35 seals and a newborn pup in December 1912 prompted Atkinson and Bryan (1913: 1050-1051) to write that "Pearl and Hermes Reef seem [sic] to have been the place where they were most abundant." In March 1913 Willett and Bailey found seals with pups on North Island and a nearby sandbar (Bailey, 1918: 399; 1956: 30), and Elschner (1915: 60) reported many there in September 1914. Munter (ms.) found 30 or 35, including several pups, in February 1916. Wetmore (ms.) estimated 125 on Grass, Seal and Southeast Islands in April 1923, while Galtsoff (1933: 19) counted 68 in the lagoon in summer 1930. Bailey (1952: 16) estimated over 100 seals when he flew over the atoll in May 1949.

A POFI survey in June 1950 found 100 seals during the day and noted that females had pups that were a few days or weeks old (POFI, 1950); Brock estimated 180 seals (Bailey, 1952: 25). Dumont and Neff (Svihla, 1959: 227) reported 96 in November 1954. Kenyon and Rice (1959: 221), on aerial surveys, counted 257 adults and subadults on 17 December 1956, and counted 33 pups on 15 April and 14 May 1957. Using the same type surveys, Rice (1960a: 377) counted 286 adults and subadults and 52 pups in spring 1958.

Hawaiian Monk Seals have been counted, sexed, and tagged on most BSWF, POBSP, and HDSFG survey trips during the 1960's. Tables 109 to 115 present all seal observation data for Pearl and Hermes.

UNIVERSITY OF CALIFORNIA, SANTA CRUZ

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CENTER FOR COASTAL MARINE STUDIES  
DIVISION OF NATURAL SCIENCES  
APPLIED SCIENCES BUILDING

SANTA CRUZ, CALIFORNIA 95064

April 6, 1978

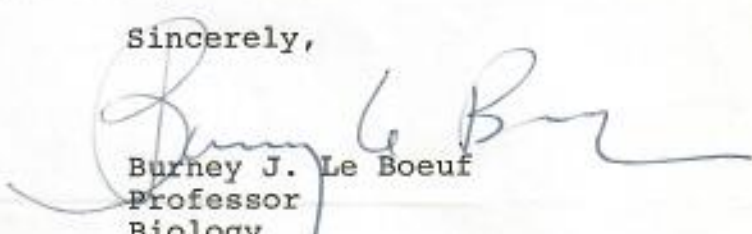
Mr. George H. Balazs  
University of Hawaii at Manoa  
Hawaii Institute of Marine Biology  
P.O. Box 1345  
Coconut Island  
Kaneohe, Hawaii 96744

Dear Mr. Balazs:

I agree that the appearance of an elephant seal in the Hawaiian archipelago is worthy of a short note. If you or Mr. Means is willing to write a draft of the paper from your point of view, I will be happy to put the finding in the context of other elephant seal movements we have discerned during the last ten years through the use of the tag-recapture method. Of course, it would be good to decide at the earliest moment where you intend to send the article. I am flexible and am willing to help you in any way I can.

Let me know how you want to proceed or simply send me a draft and I'll do what I can to improve it.

Sincerely,

  
Burney J. Le Boeuf  
Professor  
Biology

mkm



United States Department of the Interior

FISH AND WILDLIFE SERVICE

300 ALA MOANA BOULEVARD  
P. O. BOX 50167  
HONOLULU, HAWAII 96850

IN REPLY REFER TO: RF  
(808) 546-5608

December 27, 1978

George Balazs  
University of Hawaii, Coconut Island  
Hawaii Institute of Marine Biology  
PO Box 1346  
Kaneohe, HI 96744

Dear George:

A "data sheet" on the elephant seal sighting at Midway is attached for what it's worth. I lost my notes and was working from memory.

Four slides (duplicates) are attached which show the barnacles well. I have originals and will send them when you need them. I have marked on one map where I saw the seal.

Do whatever you wish with the data. I have also attached single copies of four other maps that you might be able to use from time to time. Feel free to duplicate if you need more.

Sincerely,

*J. Brent Giezentanner*  
J. Brent Giezentanner  
Refuge Manager  
Hawaiian/Pacific Islands  
NWR Complex

Enclosure

*Any word yet on the little one?*



Save Energy and You Serve America!

ELEPHANT SEAL DATA SHEET  
Midway Naval Station - 4/78

Date Observed: April 7, 1978\*

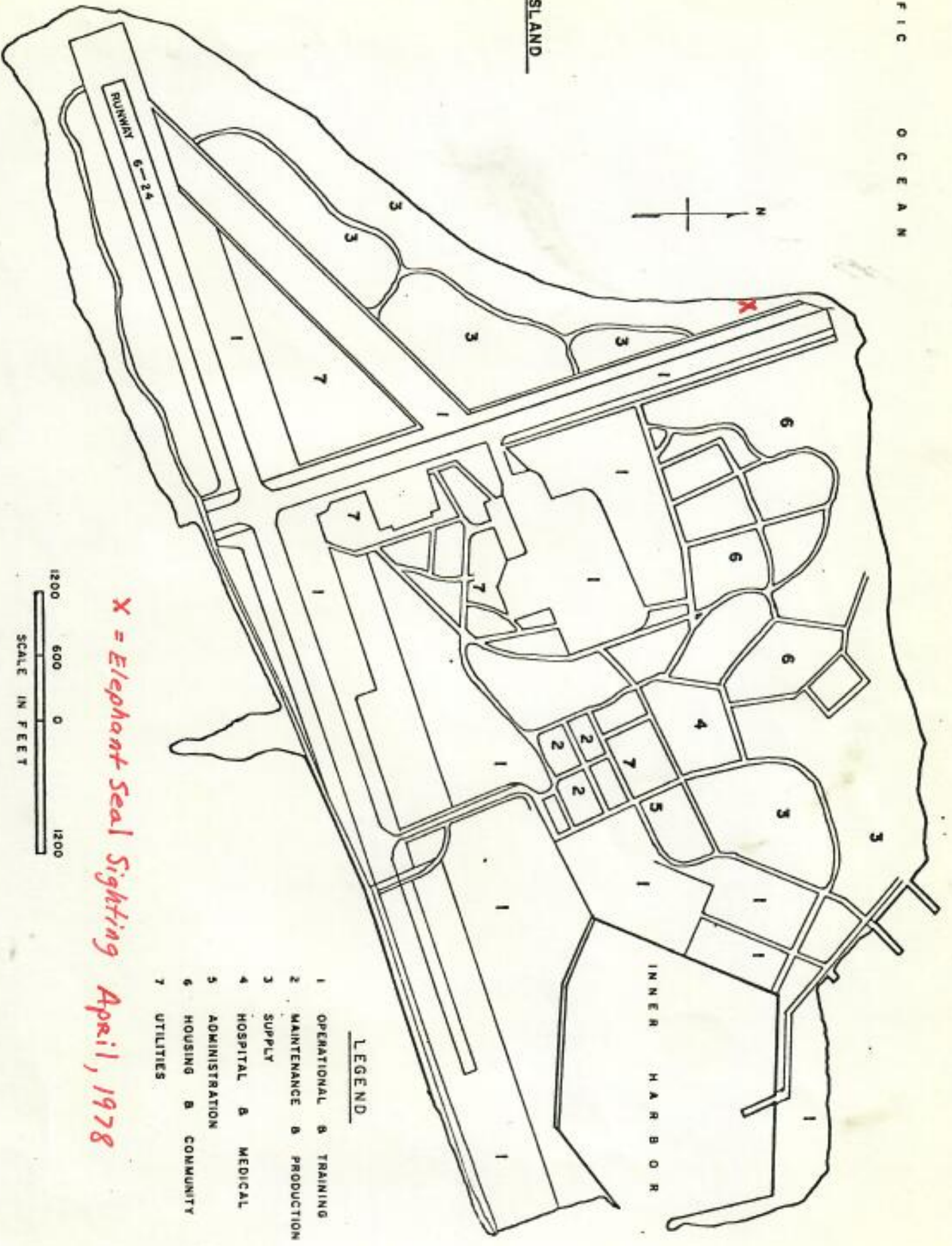
Location: Midway Naval Station, North end of West Beach

Notes: Male elephant seal, juvenile age class, 4½-5' long. Seal was observed at 2:00pm, hauled out on beach. Appeared to be very weak and in poor condition. Heavily covered with barnacles. Apparently had been hauled out for some time since barnacles were beginning to smell badly and were covered with flies.

Seal covered itself with sand using front flippers. Also buried its head in sand, apparently trying to get rid of fly problem. When approached, the seal raised its head weakly and blew, but made no attempt to flee, then went back to sleep.

I understand that two days later or so, the marines on maneuver in area 7 were observed dragging the seal around the beach with a rope. I heard they claimed they were trying to drag it into the water, but the witnesses say different. Bill Streeter, NMFS, has details. We should be very cautious about using this information. There is a real good C.O. at Midway now and he is strongly for wildlife protection. I don't want to foul up this cooperation.

\*I've lost my note sheet on the sighting and am trying to work from memory. It was either April 7 or April 20<sup>on 24</sup> as near as I recall. To tell the truth, I'm not even positive of the sex of the animal any more, but it's the same one you saw and not the earlier animal from Eastern Island. I do remember that it was definitely the opposite sex from the Eastern animal sighted in February.



*X = Elephant Seal Sighting April, 1978*

LEGEND

- 1 OPERATIONAL & TRAINING
- 2 MAINTENANCE & PRODUCTION
- 3 SUPPLY
- 4 HOSPITAL & MEDICAL
- 5 ADMINISTRATION
- 6 HOUSING & COMMUNITY
- 7 UTILITIES

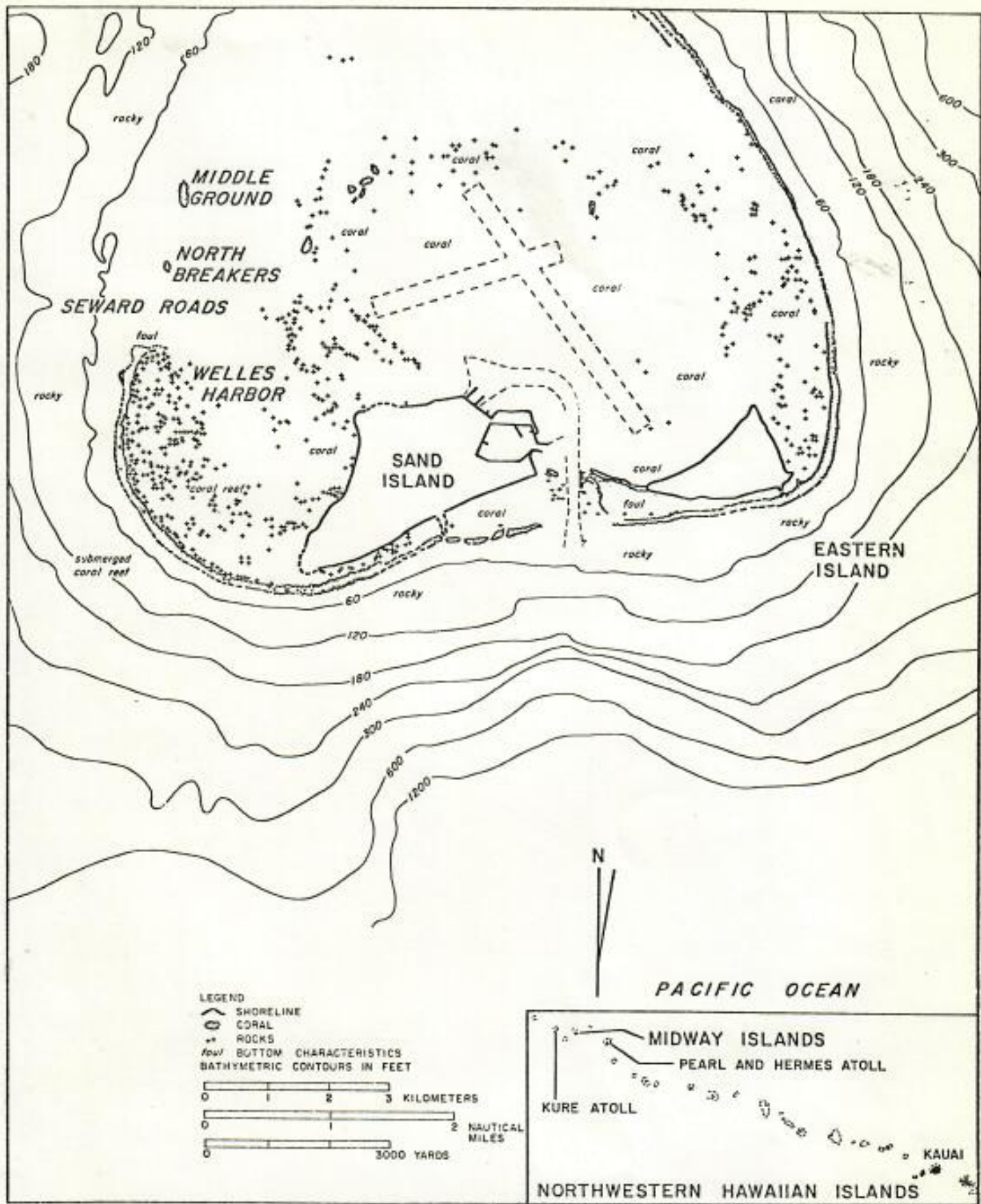
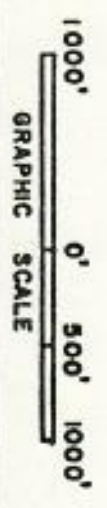
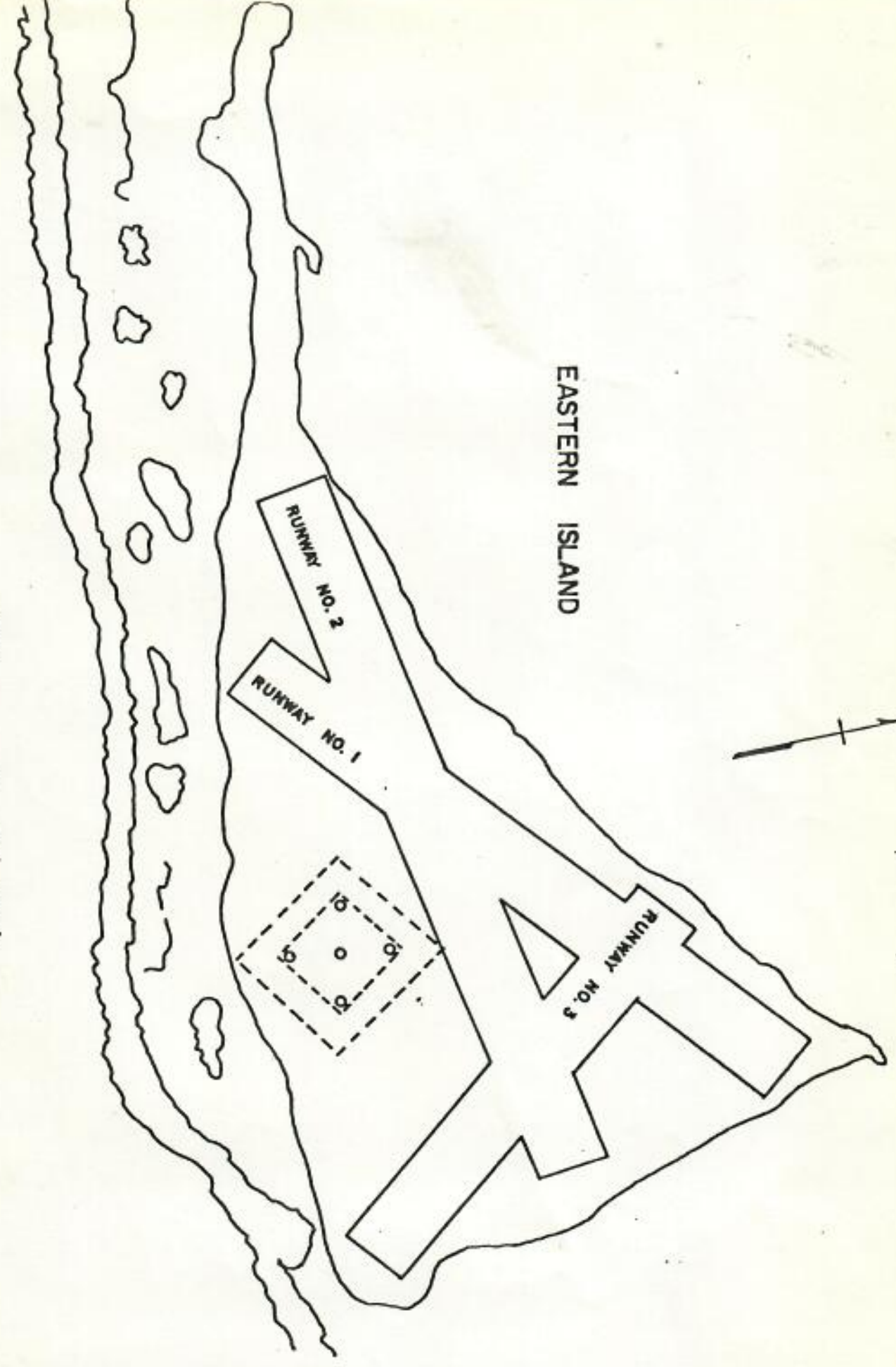
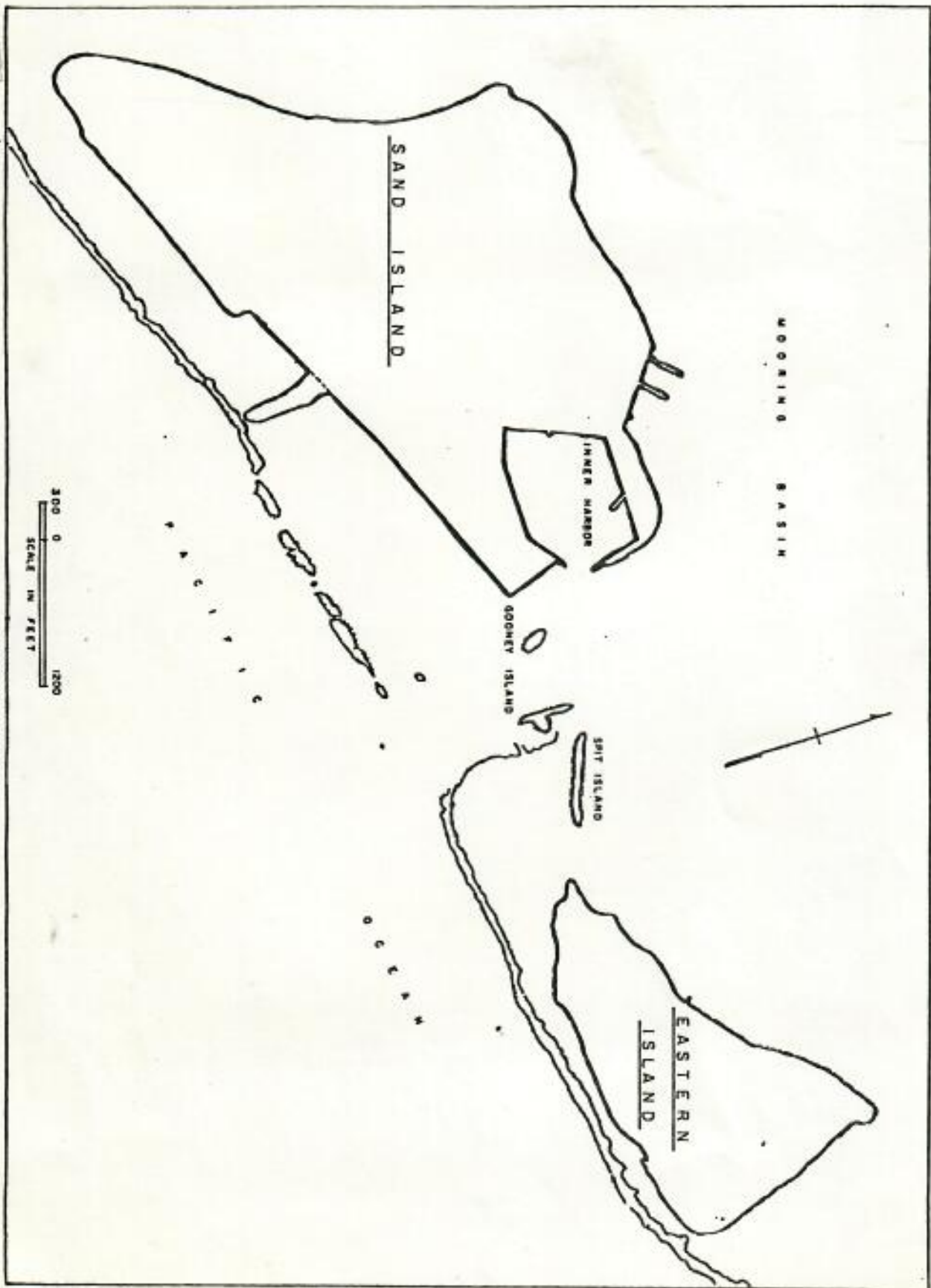


Figure 16. Midway Islands (from NOAA chart 19481)

EASTERN ISLAND

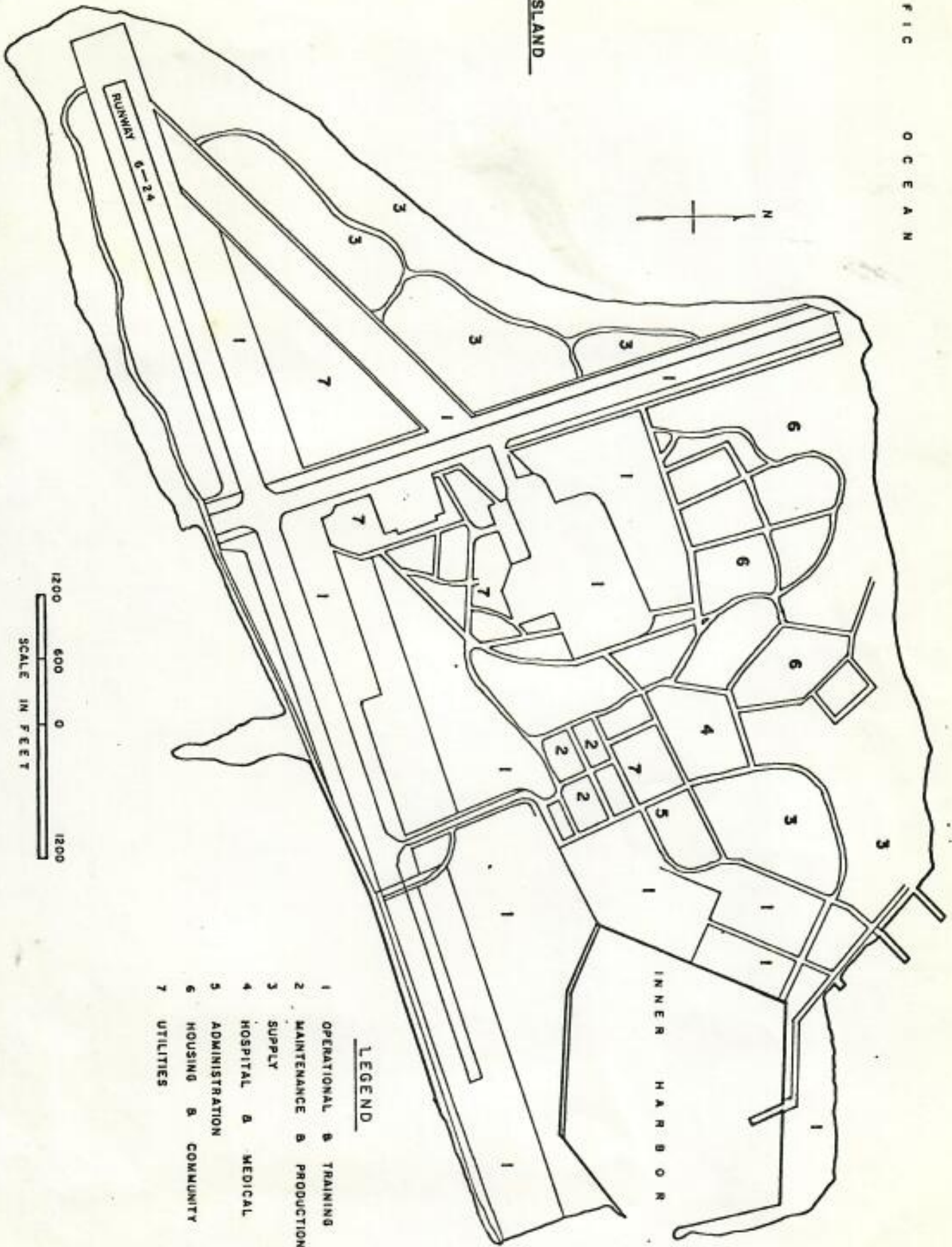




MIDWAY ISLANDS



SAND ISLAND



LEGEND

- 1 OPERATIONAL & TRAINING
- 2 MAINTENANCE & PRODUCTION
- 3 SUPPLY
- 4 HOSPITAL & MEDICAL
- 5 ADMINISTRATION
- 6 HOUSING & COMMUNITY
- 7 UTILITIES

#### ELEPHANT SEALS COLONIZE ADDITIONAL MEXICAN AND CALIFORNIAN ISLANDS

Nineteenth century sealers hunted the northern elephant seal, *Mirounga angustirostris*, so intensively for the oil provided by its blubber that the species was considered extinct during the period 1884 to 1892 (Townsend, 1899). In fact, only a few animals survived and they apparently bred only on an inaccessible beach on Isla de Guadalupe, Mexico (Bartholomew and Hubbs, 1960). With protection provided by the Mexican and United States governments early in this century, the population has made a steady and rapid recovery. The total population increased from an estimated 13,000 animals in 1957 (Bartholomew and Hubbs, 1960) to 48,000 in 1976 (Le Boeuf, 1977). As numbers increased, new or possibly former breeding areas were colonized. The seals bred on nine islands or island groups in 1976 (Le Boeuf, 1977). We report the birth of elephant seal pups on three more islands in recent years.

*Isla Natividad, Mexico (27°53'N, 115°10'W).*—An aerial census of this island on 17 February 1975 by B. Mate revealed a breeding aggregation of approximately eight adults and at least four newborn pups in a small cove on the southwest side of the island. Fifty-two additional elephant seals, including eight pups, were observed on other parts of the island.

*San Clemente Island, California* (32°53'N, 118°30'W).—At least one female, nursing a newborn pup, and four juveniles or subadult males were photographed by M. Bonnell from the air at Mail Point on the west side of this island on 28 January 1977. An aerial search of the perimeter of the island by M. Bonnell during the previous breeding season had revealed no elephant seals.

*Isla San Martin, Mexico* (30°29'N, 116°7'W).—A single pup was born here in mid-January 1977. The pup was seen suckling an adult female in the lagoon on the east side of the island on 12 February (L. Hobbs, personal communication). The mother weaned her pup before 19 February, when B. Le Boeuf visited the island and found only the pup and a juvenile elephant seal present. Elephant seals have been observed on Isla San Martin previously but only during the nonbreeding season, late March through November. For example, "up to a dozen young elephant seals" were observed on 7-8 April 1968 (Schulz et al., 1970), 69 juveniles were censused on 21 April 1970 (M. Bonnell and M. Pierson, personal communication), and 36 juveniles were counted on 28 May 1971 by B. Le Boeuf. Most of these migrants originated from rookeries to the south, especially Isla de Guadalupe. Since 1969, 11 yearlings bearing numbered tags attached to their hindflippers shortly after birth, were sighted on the island. Nine of them were born on Isla de Guadalupe, Mexico; the other two were born on Isla San Benito, Mexico, and San Miguel Island, USA, respectively.

Unless disturbed, we expect these incipient colonies to expand rapidly as others have in the past (Le Boeuf et al., 1974; Le Boeuf and Panken, 1977).

#### LITERATURE CITED

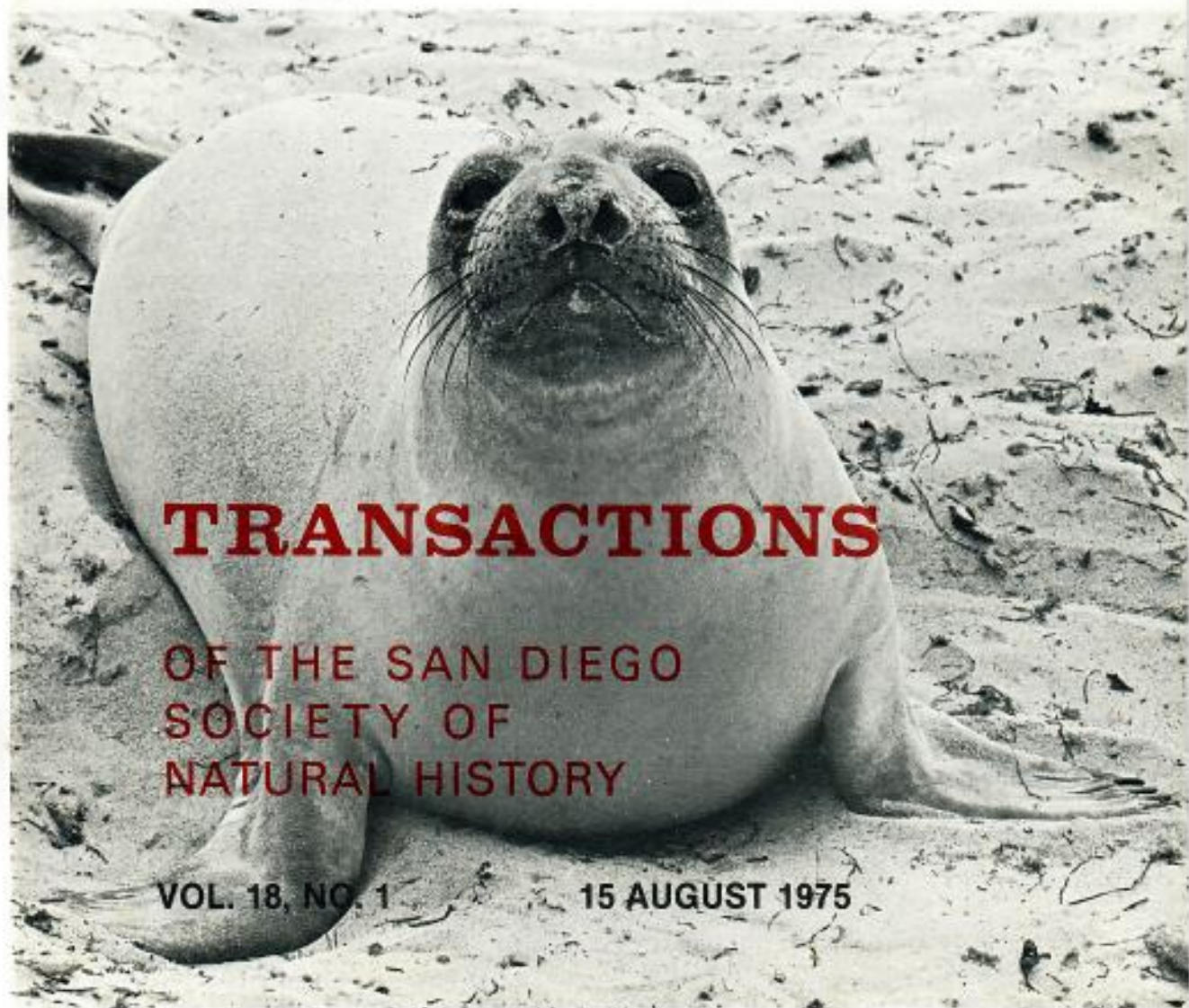
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LIBRARY OF  
GEORGE H. BALAZS

**RECORDS OF ELEPHANT SEALS, *MIROUNGA  
ANGUSTIROSTRIS*, ON LOS CORONADOS ISLANDS,  
BAJA CALIFORNIA, MEXICO, WITH RECENT ANALYSES  
OF THE BREEDING POPULATION**

**Burney J. Le Boeuf, Donald A. Countryman, and  
Carl L. Hubbs**



**TRANSACTIONS**

**OF THE SAN DIEGO  
SOCIETY OF  
NATURAL HISTORY**

**VOL. 18, NO. 1**

**15 AUGUST 1975**

## Records of Elephant Seals, *Mirounga angustirostris*, on Los Coronados Islands, Baja California, Mexico, with recent analyses of the breeding population

Burney J. Le Boeuf, Donald A. Countryman, and Carl L. Hubbs

**ABSTRACT.**—Northern elephant seals, *Mirounga angustirostris*, have been observed on Los Coronados Islands, Baja California, Mexico, on many occasions in recent decades, once in 1936 and often from 1949 to the present. Pups have been recorded on South Island in summer at least since 1950 and in winter since 1971. The composition of the breeding colony was tallied in 1974 and 1975. The colony is small (28 pups were born in 1974, 37 in 1975) and will probably not become much larger, due to the limited breeding space and to the exposure of the breeding beach. Pup mortality prior to weaning was at least 18 per cent in 1974 and 19 per cent in 1975. The colony receives immigrants from Isla de Guadalupe, Baja California.

**RESUMEN.**—Los elefantes marinos del norte, *Mirounga angustirostris*, se han observado muchas veces durante las últimas décadas en Las Islas Coronados, Baja California, México—una vez en 1936 y con frecuencia desde 1949 hasta ahora. Cachorros se han observado en la Isla Coronado del sur, en el verano, por lo menos, desde 1950 y en el invierno desde 1971. La composición de la colonia fue contada en 1974 y 1975. La colonia es muy pequeña (28 cachorros nacieron en 1974 y 37 en 1975) y probablemente no puede aumentar más porque falta espacio para reproducir y la zona de cría está espuesta a la marejada. La mortalidad de los cachorros antes del destete se calcula a por lo menos 18% en 1974 y 19% en 1975. La colonia recibe inmigrantes de la Isla de Guadalupe, Baja California.

The northern elephant seal population continues to increase since it was reduced to near extinction by sealers in the last century (Bartholomew and Hubbs, 1960; Radford, Orr, and Hubbs, 1965; Le Boeuf, Ainley, and Lewis, 1974). At present, the species has been reported to breed on islas Cedros, San Benitos, and Guadalupe, in northwestern Baja California, México; on San Nicolas, Santa Barbara, and San Miguel islands in southern California; and on Año Nuevo and Southeast Farallon islands in central California. Marine mammalogists in the area recognize that breeding also occurs on Los Coronados (small islands close to the northern border of Baja California). Elephant seals were rediscovered there more than 30 years ago (Bartholomew, 1950) and have been observed regularly since 1948, chiefly in the cove on South Island; also several biologists have seen young pups there. However, since none of the early censuses were made during the height of the breeding season in late January (Table 1), and few of these have been published, the precise composition and size of the colony has not been determined.

Observations on marine mammals in southern California and adjacent Baja California had been scanty for some time prior to the mid-1940's, but elephant seals may well have occurred earlier about Los Coronados. An item in the then current news notes of Scripps Institution of Oceanography reported that Mr. Robert Scripps had seen seven or eight there on 21 September 1936.

Reports of very young animals in the aggregation at West Cove of South Coronado Island (Table 1) — nine on 17 January 1971, six on 8 December 1972, and five on 22 February 1973 — indicated that pupping was occurring there (the eleven pups reported on 19 June 1950 and the two noted for 17 June 1966 may have wandered into the area instead of being born there). To determine whether elephant seals were actually breeding in this cove, and in what numbers, we circumnavigated the four islands six times in 1974 and 1975 (Figure 1). Two trips were made near the peak of the breeding season (on 31 January 1974 and 27

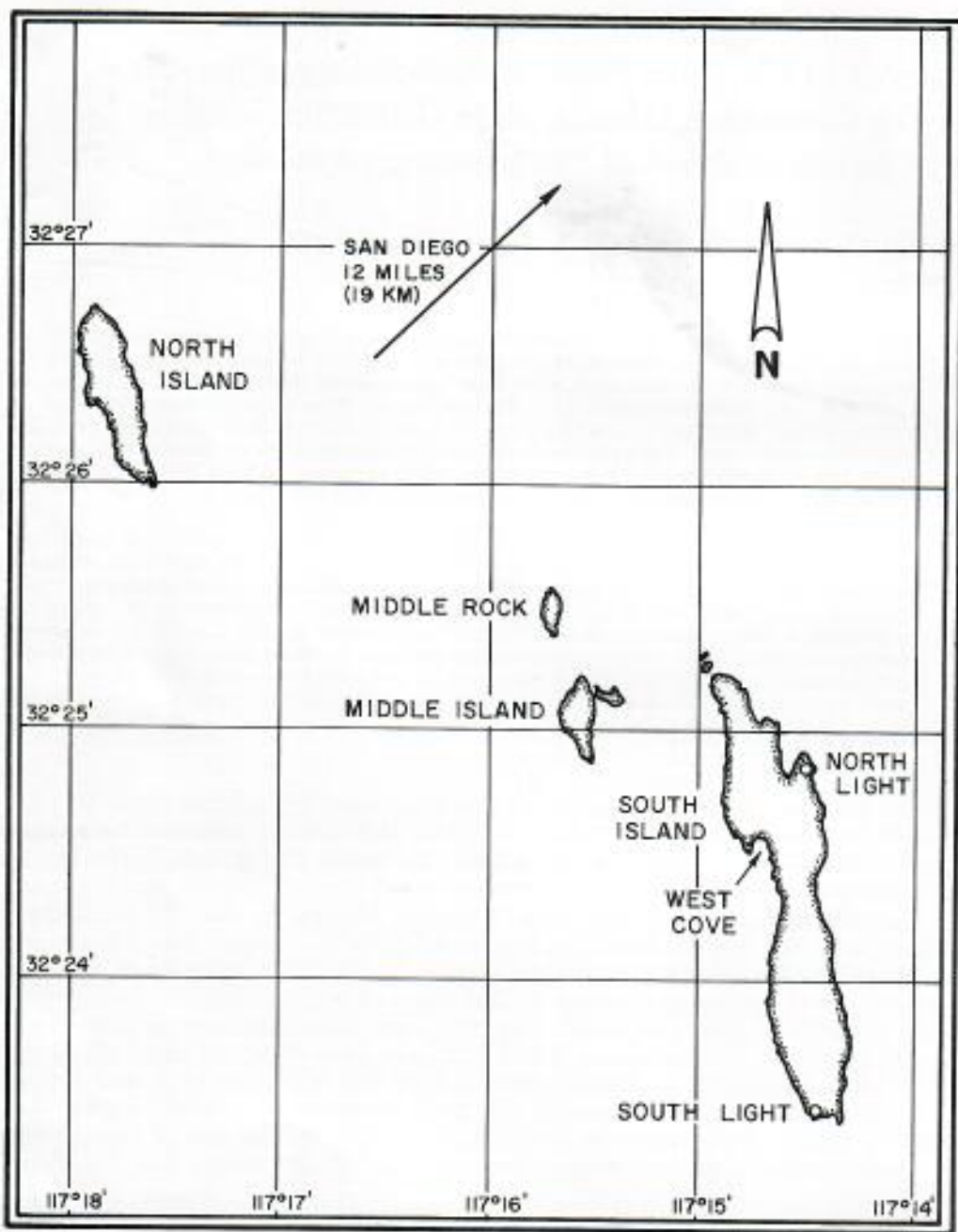


Figure 1. A diagram of Los Coronados. The breeding aggregation is located in West Cove on the South Island.

January 1975), when the number of breeding females is at a maximum (Le Boeuf, 1972). Other trips were made on 11 March 1974 and 13 March 1975, at the end of the breeding season, when all pups had been born but had not yet left the rookery. One census, on 8 May 1974, was made when molting juveniles predominate and when the total population reaches an annual peak in rookeries to the north; another census was made in the fall (4 October 1974) when yearlings and young juveniles are present. Our census dates were predetermined to coincide with key points in the annual cycle of northern elephant seals on other rookeries (Le Boeuf, Ainley, and Lewis, 1974; Odell, 1974).



Figure 2. Elephant seals (22) and California sea lions on the beach of West Cove, South Coronado Island, photographed by Conrad Limbaugh, 11 June 1952.

Virtually all elephant seals counted in January 1974 and 1975 (Table 2) were associated with a breeding aggregation in West Cove on South Island (Fig. 1 and 2). Here we went ashore to count and observe the animals more closely. The composition of the breeding colony and the activities observed were typical of rookeries of this size at this time of year. The harem was overseen by one adult male who prevented other males from approaching females, and he no doubt was responsible for all or virtually all of the breeding (Le Boeuf, 1974). The beach is composed of small pebbles and measures approximately 50m long and 5 to 12m wide at a tide of about +1m. The only other beach on Los Coronados that could possibly accommodate a small colony of elephant seals is on the north side of a cove on the east side of Middle Island; this beach is of approximately the same depth as the other but is less than half as long.

In January, 1974, three pups in natal pelage died in the rookery, one from apparent starvation, one from drowning, and one from wounds inflicted by adult seals. Two other pups were dying; one was an orphaned newborn and the other was an unusually large newly-weaned pup that was irretrievably stuck in a crevice (it was dead when we returned on 11 March 1974). Thus, pup mortality in this colony in 1974 was at least 5/28 or 17.9 per cent. The following year, three dead pups in natal pelage were counted in January and four additional carcasses were censused on 13 March 1975, for a minimum pup mortality of 7/37 or 18.9 per cent. Three of the mortalities in 1975 were weaned and newly-molted pups.

As expected from March observations elsewhere, few breeding males were observed, all breeding females had departed, the majority of animals in residence were weaned pups of the year, and yearlings and juveniles had begun to arrive for

the spring molt. In both years, slightly fewer weaners were observed than was expected. The others may have been swimming or they may have died and were washed out to sea.

The total number of elephant seals on 8 May 1974 was approximately double that on 31 January 1974, the peak of the breeding season. A similar relationship has been observed on Año Nuevo Island (Le Boeuf, Ainley, and Lewis, 1974) and on San Nicolas Island (Odell, 1974), which suggests to us that the temporal

TABLE 1. Censuses of Northern Elephant Seals on Los Coronados (in addition to those recorded in Table 2).

Date	Total Animals	Sex or Age Estimates	Location	Type of Census	Observer
21 Sept. 1936	7-8	Not specified	North Is.	Boat	R. Scripps (1936)
June 1948-1949	Individuals	Juveniles or subadults	Coronado Is.	?	"Lighthouse Keepers" (Bartholomew, 1950)
Last week of April 1949	73	Juveniles or subadults	Cove, South Is.	Land	G. A. Bartholomew (1950, 1952)
30 May 1949	3	Juveniles in kelp	North Is.	Boat?	L. W. Walker <sup>1</sup>
14-16 Aug. 1949	5		Cove, South Is.	Boat?	R. W. Lindberg (Bartholomew, 1951)
27 Nov. 1949	<5		South Is.	Boat?	C. L. Hubbs and G. A. Bartholomew (Bartholomew, 1951)
19 June 1950	38	4 adult males, 10 subadult males, 13 females, 11 pups	Cove, South Is.	Boat?	A. Allanson <sup>1</sup>
16 Nov. 1950	Several	In water	North of North Is.	Boat?	C. L. Hubbs
14 Oct. 1951	7	3 females and 4 juveniles	Cove, South Is.	Boat?	C. Limbaugh <sup>1</sup>
11 May 1952	22	No large adult males	Cove, South Is.	Boat?	C. Limbaugh <sup>1</sup>
12 July 1952	7		Cove, South Is.	Boat?	C. Limbaugh <sup>1</sup>
20 July 1952	30		Cove, South Is.	Boat?	C. Limbaugh <sup>1</sup>
6 June 1953	20	Subadult males	Cove, South Is.	Land	J. Fisher, R. T. Peterson, and C. L. Hubbs (Peterson and Fisher, 1955)
30 May 1957	21		Cove, South Is.	Boat?	A. L. Kelly <sup>1</sup>
2 Aug. 1961	9	3 adult males, 1 yearling	Cove, South Is.	Boat?	A. L. Kelly <sup>1</sup>
12 Jan. 1964	5		Cove, South Is.	Air	C. L. Hubbs
15 Mar. 1965	1		Los Coronados	Boat?	D. W. Rice (Rice, Kenyon, and Lluch, 1965)
30 Sept. 1965	7 <sup>2</sup>		Cove, South Is.	Boat?	D. Lluch <sup>1</sup>
17 June 1966	20	18 females or young males, 2 pups	Cove, South Is.	Land	C. L. Hubbs
1 June 1968	7		Cove, South Is.	Boat?	C. L. Hubbs
8 Mar. 1969	3+		Cove, South Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
7 June 1969	30		Cove, South Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
5 Aug. 1969	4	2 males, 2 females	Cove, South Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
14 Sept. 1969	2		Cove, South Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
6 Apr. 1970	79		South Is.	Boat	S. Bowen <sup>1</sup>
17 Jan. 1971	48	2 males, 33 females, 9 pups, 4 yearlings	Cove, South Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
2 May 1971	50		Cove, South Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
24 Oct. 1971	3		Cove, South Is.	Boat	A. L. Pentis <sup>1</sup>
18 Jan. 1972	35		Cove, South Is.	Air	S. Leatherwood (Odell, Leatherwood and Antonelli, manuscript)
2 Feb. 1972	32		Cove, South Is.	Air	L. Tsumoda <sup>1</sup>
7 Apr. 1972	85	30 very young animals	Cove, South Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
8 Dec. 1972	39	6 males, 27 females and subadults, 6 pups	Cove, South Is.	Land	S. Leatherwood (Odell, Leatherwood and Antonelli, manuscript)



TABLE 1. Continued

Date	Total Animals	Sex or Age Estimates	Location	Type of Census	Observer
22 Feb. 1973	25	7 males, 13 females and subadults, 5 pups	Cove, South Is.	Boat	D. Odell (Odell Leatherwood and Antonelli, manuscript)
10 Mar. 1973	4		Cove, South Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
	3		North Is.	Boat	
10 Mar. 1973	8		Cove, South Is.	Boat	A. L. Pentis <sup>1</sup>
13 May 1973	93	5 weaners 6 immatures	Cove, South Is. North Is.	Boat	J. R. Jehl, Jr. <sup>1</sup>
1 June 1973	99		Cove, South Is.	Land	A. L. Pentis <sup>1</sup>
7 Aug. 1973	8	2 males, 4 females, 2 weaners	Cove, South Is.	Land	J. R. Jehl, Jr. <sup>1</sup>
17 Mar. 1974	3	weaners	North Is.	Boat	A. L. Pentis <sup>1</sup>
	1	weaner	Middle Is.		
	8		Cove, South Is.		
23 July 1974	14		Cove, South Is.	Land	F. Todd and J. R. Jehl, Jr. <sup>1</sup>
15 Mar. 1975	38	including 4 large males	Cove, South Is.	Boat	A. L. Pentis <sup>1</sup>
16 Mar. 1975	34		Cove, South Is.	Boat	A. L. Pentis <sup>1</sup>
22 Mar. 1975	43		Cove, South Is.	Boat	A. L. Pentis <sup>1</sup>
23 Mar. 1975	16		Cove, South Is.	Boat	A. L. Pentis <sup>1</sup>

<sup>1</sup>Personal communication

<sup>2</sup>Seven young animals caught on Isla de Guadalupe were released in the water near the cove on South Island.

aspects of the annual cycle are essentially identical in each of these colonies. The animals censused on South Island on 8 May 1974 consisted of molting and recently molted juveniles of both sexes two to four years old, one possibly adult female, and a few pups that had been born in January. Juveniles predominated in the 4 October 1974 census, which also included a few yearlings and pubertal males. Thus, our censuses and those of previous observers (Table 1) reveal that key points in the annual cycle on South Island, as well as the composition of groups at various times of the year parallel those found on other rookeries (Allanson's census on 19 June 1950 may seem out of line with this statement, since the group composition he reports suggests a breeding colony. No doubt, the pups he observed were born in the previous winter and the females were juveniles. The "pups" were not necessarily born on Los Coronados).

The elephant seals of South Coronado Island are usually roughly associated with California sea lions (*Zalophus californianus*). The seals concentrate on the sandier part of the beach, leaving the cobbly areas or rocks to the moderate to large numbers of sea lions. The association between individuals of the two species varies from nearly complete segregation to close intermixing. Here, as elsewhere, the elephant seals are much the less wary, as is shown in Figure 2, taken at a time when nearly all of the sea lions had been frightened off the cobbles on the northern (left) part of the beach.

An eight-year tagging program confirms that the Coronados colony receives immigrants from the virtually saturated population at Isla de Guadalupe, 201 nautical miles (324 km) south and slightly west of Los Coronados. Since 1967, Le Boeuf and collaborators have tagged more than 8,000 elephant seals on the seven principal islands where the species breeds (Le Boeuf, Ainley, and Lewis, 1974); the majority were tagged as newly weaned pups. In recent years, seven seals tagged on Guadalupe have been seen on Los Coronados (Table 3). Six of these were tagged as pups and without question were born on Guadalupe; all six were in their second year of life when sighted on Los Coronados; all sightings were in winter or spring, and all animals were in apparent good health. Several other

TABLE 2. Six shore censuses of northern elephant seals in the west cove of South Island, Los Coronados, made in 1974 and 1975.

Date	Adult Males	Sub-adult Males	Females	Pups				Year-lings	Juveniles	Total Living	Total All Islands
				Suck-ling	Weaned	Orphaned	Dead				
31 Jan. 1974	5 <sup>1</sup>	3 <sup>1</sup>	29	13	11	1	3	1	0	63	67
11 Mar. 1974	2	2 <sup>2</sup>	0	0	20	0	1	4	5	33	34
8 May 1974	0	0	0	0	4	0	0	0	126	130	130
4 Oct. 1974	0	4	0	0	0	0	0	5	30	39	39
27 Jan. 1975	3	5 <sup>3</sup>	40	13	8	1	3	1	1	72	73
13 Mar. 1975	0	2	0	0	30	0	4	4	4	40	40

<sup>1</sup> Four males were observed elsewhere on the islands: one adult on the north point of South Island, one adult and one subadult about ½ mile south of the village on the east side of South Island, and one subadult in the east cove of Middle Island.

<sup>2</sup> One subadult was observed on the south end of South Island.

<sup>3</sup> One subadult was observed on the east side of South Island ½ mile north of the south end.

tagged animals have been seen on Los Coronados in recent years (Ronald R. McConnaughey, pers. comm.) but their age and sex was not determined.

The number of Guadalupe animals that migrate to Los Coronados appears to be small. Over 2200 elephant seals were tagged on Isla de Guadalupe during 1969, 1970, 1971, and 1973, but only two of 800 animals tagged there in 1973 were observed on Los Coronados. Seals born on Isla de Guadalupe also disperse to the San Benitos, San Nicolas, San Miguel, and Año Nuevo islands (Le Boeuf, unpubl. obs.).

Apparently the Coronados colony seldom if ever recruits from other colonies since none of 6,000 seals tagged on the San Benitos, Cedros, San Miguel, San Nicolas, Año Nuevo, and Southeast Farallon islands have been observed there.

In conclusion, elephant seals breed on Los Coronados but it is unclear when breeding began. Although the species has been observed on these islands since 1936, most of the early censuses were made during the non-breeding season. The appearance of elephant seals during the non-breeding season is no indication that a breeding colony is present in winter. Seals hauled out on Año Nuevo and Southeast Farallon islands in the spring and fall for several years before they began breeding there (Le Boeuf, Ainley, and Lewis, 1974). Not until 1964 were elephant seals censused during the breeding season on Los Coronados, and not until 1971 were females and pups reported (Table 1). Judging from the census figures, we speculate that breeding may have started on Los Coronados as early as 1950, certainly by 1964.

The present colony is small and precariously located. With tides of 2+ meters and moderate surf, much of the breeding beach, except for a few high spots next to the bluff, is flooded. On 27 January 1975 we observed the rookery from 0700 to 1000. There was a 10 to 15 knot wind, 2 to 4 ft swell from the south, and a tide of +7.3 ft at 0830. High water divided the single harem of females and their pups into two approximately equal groups that took refuge from the surf on two high spots approximately 10m apart at the base of the cliff. Density among females was so much higher than usual that most of them were in contact, female aggression was frequent and intense, and several pups were bitten. The group nearest the center of the beach was most vulnerable to wave action. For over an hour young pups were continuously being washed out to sea, struggling and swimming frantically, and then slammed back into the cliff by the pounding surf. This sort

TABLE 3. Tagged elephant seals observed on Los Coronados (all tagged on Isla de Guadalupe).

Tag No.	Tagging Information			Recovery Information				
	Age Category	Sex	Date	Beach Where Tagged on Isla de Guadalupe	Location	Date	Age in Months	Observer
Blue 30	pup	M	15 Feb. 1969	South Barracks	South Is.	5 Apr. 1970	15	S. L. Bowen
Blue 31	adult	M	15 Feb. 1969	North Barracks	South Is.	15 & 29 Apr. 1969	?	D. Hunsaker
Blue 182	pup	F	15 Feb. 1969	North Barracks	North Is.	29 Jan. 1970	12	C. L. Hubbs
Blue 369	pup	M	16 Feb. 1969	Pilot Rock	North Is.	29 Jan. 1970	12	C. L. Hubbs
UC 5198	pup	F	19 Feb. 1969	South Barracks	South Is.	21 Mar. 1970	14	S. L. Bowen
Blue 2068	pup	?	14 Feb. 1973	Pilot Rock	South Is.	8 May 1974	16	B. J. Le Boeuf
Blue 2096	pup	?	14 Feb. 1973	Pilot Rock	South Is.	8 May 1974	16	B. J. Le Boeuf

of periodic engulfing of the beach area, combined with the lack of other suitable breeding areas, has clearly set limits to the growth of the Coronados colony in the past and may be expected to continue to do so in the future.

#### ACKNOWLEDGEMENTS

We thank Sea World of San Diego for providing and operating M/V *Shamu*; Scripps Institution of Oceanography for providing a support vessel and personnel; Dr. Amin Zarur Ménes of the San Diego office of the Mexican government fisheries department for the permits needed to land on Los Coronados and for his active interest in the project; and Mrs. Elizabeth Noble Shor for bringing to our attention the observation of several elephant seals at the Coronados Islands in 1936.

This study has been supported in part by NSF grants GB-16321X and GB-414487X to B. J. L.

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Le Boeuf: Crown College, University of California, Santa Cruz, Ca., 95064.  
Countryman: Department of Biology, University of California, San Diego, La Jolla, Ca., 92037. Hubbs: Scripps Institution of Oceanography, La Jolla, Ca., 92037.



National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202-

May 13, 1980

Dr. George H. Balazs  
Assistant Marine Biologist  
and Deputy Chairman  
IUCN/SSC Marine Turtle Group  
Hawaii Institute of Marine Biology  
University of Hawaii at Manoa  
P. O. Box 1346  
Coconut Island  
Kaneohe, Hawaii 96744

Dear George:

Many thanks for the information about elephant seals in Hawaii -- fascinating! No need to be apologetic about not having gotten a paper out on them yet -- if you want to feel good about your track record, just compare notes with me someday! What I have not published would fill volumes. Enclosed is a "reprint" that is more revealing than I like to admit.

Anyhow, I hope you will be able to get out at least a note, say in the *Journal of Mammalogy*?, documenting these occurrences. Again thanks for the information.

Sincerely,

Clayton E. Ray  
Research Curator  
Dept. of Paleobiology

# The Washington Post

## LETTERS TO THE EDITOR

### Procrastination Week

Regarding the Rod MacLeish column March 8 on National Procrastination Week, I had intended to write earlier recommending that it be postponed until next week, but didn't get around to it. Maybe we could do it next year.

CLAYTON E. RAY  
Arlington.

That's strange, I thought it had been put off!

HOWARD E. PAINE  
Washington.

Rod MacLeish has performed a great public service by drawing the attention of your readers to National Procrastination Week.

His column of March 8, is a gem, to be saved and savoured daily. I do.

ANITA VON KAHLER GUMPERT  
Washington.

P. Quentin Tomich  
P. O. Box 675  
Honolulu, Hawaii 96727

September 23, 1983

Dr. George H. Balazs  
Hawaii Institute of Marine Biology  
P. O. Box 1346  
Kaneohe, HI 96744

Dear George:

Revision of Mammals in Hawaii is coming along well, just about ready for the Bishop Museum editor.

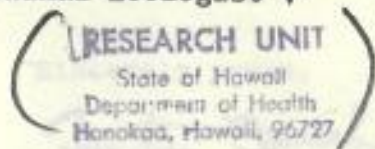
Among the fugitive materials yet to be tracked down is the report of the elephant seal on Midway. Dale Rice thought it might be in the Elepaio, but if so, I have missed it. If you could provide the reference, this would be appreciated. If in some obscure journal, a reprint or copy would be even better.

This new draft is looking well. It is short on new narrative but nearly 700 new items have been added to the bibliography. With the monk seal I left well enough alone and put in mainly only those following your paper of 1978. I have tried to bring the story story on whales up to date.

Sincerely yours,

*Quentin Tomich*

P. Quentin Tomich, Ph. D.  
Animal Ecologist V



sent  
color slide  
~ 10/14/83

P.S. Your shipping in returned. I'll send a copy of it to Dale Rice.

P. Quentin Tomich  
P. O. Box 675  
Honolulu, Hawaii 96927

October 7, 1983

Dr. George H. Balazs  
National Marine Fisheries Service  
P. O. Box 3830  
Honolulu, HI 96812

Dear George:

Thank you for the immediate and generous response to my request for information on the elephant seal. The timing was just right as I was in the 'last call' stage of getting the ms together.

Enclosed is my draft on Mirounga. You might check the dates and other data. This will do fine, but you should round up the notes with a report for the Elepaio.

Thank you for the revised monk seal biblio. I had not heard of it. Looks like few grains of sand are left unturned.

I have left space for the photo of the elephant seal and would appreciate use of your original. A B&W print would be best, but a color slide can be converted. The draft is packed off to the EM editor, so the photo should be made available as soon as is practical. I will need it here for appropriate processing.

Picked up a copy of HONOLULU in the dentists office last week and saw the good article on the green sea turtle. Also, that Alike Cooper has not improved his psyche especially.

*P.S. Your clipping is returned herewith and a copy is off to Dale Rice.*

Sincerely yours,

*Quentin Tomich*

P. Quentin Tomich, Ph. D.  
Animal Ecologist V

UNIVERSITY OF CALIFORNIA, SANTA CRUZ

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



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CENTER FOR COASTAL MARINE STUDIES  
DIVISION OF NATURAL SCIENCES  
APPLIED SCIENCES BUILDING

SANTA CRUZ, CALIFORNIA 95064

November 7, 1978

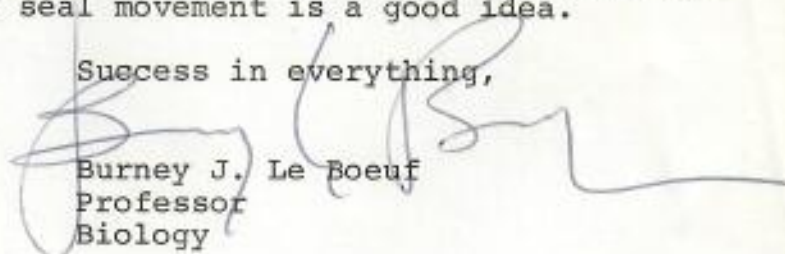
Mr. George H. Balazs  
University of Hawaii at Manoa  
Hawaii Institute of Marine Biology  
P.O. Box 1346  
Coconut Island  
Kaneohe, HI 96744

Dear Mr. Balazs:

Enclosed are a few of my recent papers on seals, as well as a list of papers that I have published in the last several years. I simply don't have copies of all of the papers that are listed. I have checked those that I thought would be most helpful in writing a note on elephant seal movements. I should add, however, that the bulk of the information that I have accumulated in the last ten years on elephant seal movements has not been published yet. My reasons are very simple -- that's the last sort of thing that one wants to publish because the picture is constantly changing and the longer you collect these kinds of data the more reliable and valid a statement you can make.

As I said to you in my last letter, I certainly think a note on this most unusual elephant seal movement is a good idea.

Success in everything,

  
Burney J. Le Boeuf  
Professor  
Biology

mkm

Enclosure



UNIVERSITY OF CALIFORNIA, SANTA CRUZ

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CENTER FOR COASTAL MARINE STUDIES  
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APPLIED SCIENCES BUILDING

SANTA CRUZ, CALIFORNIA 95064

March 7, 1978

Mr. George Blaz  
University of Hawaii  
Coconut Island  
P.O. Box 1356  
Kaneo, Hawaii 97644

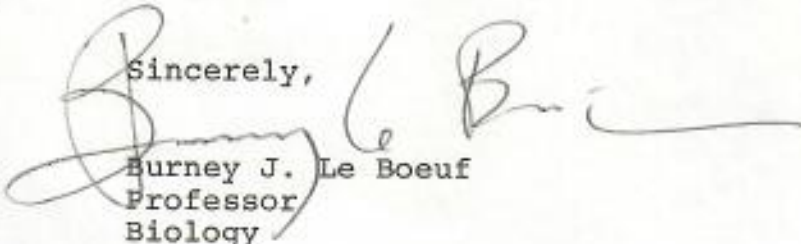
Dear Mr. Blaz:

Robert De Long told me that you sighted an elephant seal on Midway Island with two yellow tags attached to its flippers. Tags Number 5011 and 5012. The date of the sighting was approximately 11 February 1978. For your information, this animal was tagged on 18 February 1977 on Adam's Cove on the western tip of San Miguel Island. At the time of tagging, the female northern elephant seal had just been weaned and was approximately five weeks old.

This is the most unusual tag return of elephant seals that I have had during the entire ten years that I have been tagging these animals. During this time I have tagged over 14,000 animals throughout the entire breeding range, from San Francisco south to Baja California. Typically the animals travel from one rookery to the next as early as the first year of life and this is usually in a northward direction. The longest distances traveled are usually from Baja California or southern California to an area near Vancouver Island or in some cases a few individuals have been sighted in southern Alaska.

The Midway Island recovery seems to me to be most aberrant. I would be very interested to hear from you concerning additional details of this sighting.

Sincerely,

  
Burney J. Le Boeuf  
Professor  
Biology

mkm

34-115 B.J. Le Boeuf, Biology

UNIVERSITY OF CALIFORNIA  
CENTER FOR COASTAL MARINE STUDIES  
DIVISION OF NATURAL SCIENCES  
SANTA CRUZ, CALIFORNIA 95064



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE

MARINE MAMMAL DIVISION, MWAF  
BLDG. 32  
7600 SAND POINT WAY N. E.  
SEATTLE, WASHINGTON 98115

March 14, 1978

Mr. George H. Balazs  
Hawaii Institute of Marine Biology  
P.O. Box 1346, Coconut Island  
Kaneohe, Hawaii 96744

Dear George:

Your discovery of the tagged elephant seal (observed by Bill Streeter as a monk seal on 22 February) at Midway is very exciting news. I certainly encourage you to write the information for publication but suggest you add Burney LeBoeuf as a co-author for it was his research program that placed tags on the animal. You can get information on location and date of tagging from him:

Dr. Burney J. LeBoeuf  
Department of Natural Sciences  
University of California  
Santa Cruz, California 95060

I trust that Gary will continue to keep track of that animal. Should it depart the island and return, it would be most interesting to collect feces samples from it to obtain any information on the happy wanderer's food habits.

George, I want to thank you for sending along your observations on Monachus food habits in July 1977. I cataloged the worm specimens and entered the data into food habit files just last week. You will be cited if the data are used in reports, and I'll contact you for permission before they would be used in a publication.

Sincerely yours,

Robert L. DeLong  
Wildlife Biologist





*National Museum of Natural History • Smithsonian Institution*

WASHINGTON, D.C. 20560 • TEL. 202-

April 2, 1980

Mr. George H. Balazs  
Assistant Marine Biologist  
Hawaii Institute of Marine Biology  
University of Hawaii at Manoa  
P. O. Box 1346  
Coconut Island  
Kaneohe, Hawaii 96744

Dear Mr. Balazs:

Bob Brownell just mentioned to me recently that you have recent records of elephant seals in Hawaii. These are extremely interesting, and I would like very much to hear more about them. Have you published on them yet, or do you have plans to do so?

Enclosed is a copy of a recent publication on pinniped zoogeography -- records such as yours have potentially significant implications for seal dispersal.

Sincerely,

*Clayton*

Clayton E. Ray  
Research Curator  
Dept. of Paleobiology

*answered  
4/23/80*



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE

MARINE MAMMAL DIVISION, NMAFC  
BLDG. 32  
7600 SAND POINT WAY N. E.  
SEATTLE, WASHINGTON 98115

March 14, 1978

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Hawaii Institute of Marine Biology  
P.O. Box 1346, Coconut Island  
Kaneohe, Hawaii 96744

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Dr. Burney J. LeBoeuf  
Department of Natural Sciences  
University of California  
Santa Cruz, California 95060

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Sincerely yours,

Robert L. DeLong  
Wildlife Biologist



P. Quentin Tomich  
P.O. Box 675  
Honolulu, Hawaii 96727

December 20, 1983

Dr. George H. Balazs  
922-A Awaawaanoa Place  
Honolulu, HI 96825

Dear George:

I am returning now the transparency of the Midway elephant seal, and include a record copy of the B&W print I had made for the revision of the mammals book.

The MS pages as they stand now are included for your information. I would encourage you to publish your observations. A note in the Elepaio would be one way of getting the information into the record.

BM has the mammals MS and presumably is in the process of getting cost estimates and arranging, with a donor I found, for the printing.

Again, thank you for sharing.

Sincerely yours,

*Quentin Tomich*

P. Quentin Tomich, Ph. D.  
Animal Ecologist V

P.S. Should you need any of the references noted, I can supply them.

Also, if you make duplicate slides sometime I would like one for my file to use in occasional talks on the mammals.

*Q.T.*

Mirounga angustirostris. Northern elephant seal.

Original Description: Macrorhinus angustirostris Gill, Proceedings of the Chicago Academy of Sciences, 1:33-34. 1866.

Type Locality: Saint Bartholomew's Bay, Baja California, Mexico.

Native Range: Breeds regularly on offshore islands from Baja California to central California, i.e, Cedros Island, Mexico, to Point Reyes, California. Ranges widely into the more northern waters of the Eastern Pacific (Ronald, Selley and Healey, 1982).

Range in Hawaii: Vagrant, or perhaps a rare seasonal visitant, in the Northwestern Hawaiian Islands (three separate examples 1978-1980 at Midway Islands); and possible records for the neighboring Pearl and Hermes Atoll and Kure Atoll in the 1800's. Presence of the elephant seal in Hawaii was first confirmed in February 1978 by George H. Balazs who examined a living specimen at Midway (Fig. 80). The animal was a young female tagged a year earlier at San Miguel Island, off southern California, by Guiney J. Le Boeuf of the University of California at Santa Cruz. Balazs later confirmed the occurrence of an immature male and a mature male, but details of these sightings have not been published (Balazs, pers. comm.). These seals swam some 3,500 miles to have reached the Midway Islands outpost from the Mexican or California rookeries. See also, Altonn (1978) who reported on the initial discovery.

The elephant seals are relatives of the monk seals, classified to a different subfamily of the phocid, or hair, seals (Anderson and Jones, 1967). The male is a particularly large beast, largest of all the pinnipeds, up to 15 feet (4.5 m) in length and weighing

as much as 2.7 tons. Females reach a length of about 12 feet (3.6 m), but weigh only up to 0.7 tons. The male has an elongated, erectile proboscis, hence the name "elephant" seal (Ronald, Selley and Healey, 1982). Social rituals are intense in the breeding colonies, with fierce competition between males for dominance status (Bartholomew, 1952). Foods on the Pacific Coast include bony fishes, sharks and rays, and squids (Morejohn and Baltz, 1970).

Populations have recovered from 19th century sealing (described by Scammon, 1968), with overcrowding now forcing establishment of new colonies. Perhaps these social pressures promote a greater than usual dispersal from traditional breeding grounds, resulting in the several wandering animals to have arrived in Hawaiian waters. The elephant seal is a hardy species, spending its time at sea except when on the rookeries. Grinnell (1933) presents some information on the Californian populations of that era.

Both numbers and range were expanding. Cooper and Stewart (1983) bring the record further up to date.

Draft dated  
October 25, 1983

P. Quentin Tomich



Fig. 80



Records presence  
of turtles, too

Morrell, Benjamin, Jr.

A narrative of four voyages to the south seas, north and south Pacific Ocean, Chinese Sea, Ethiopia, and southern Atlantic Ocean, Indian and Antarctic Ocean from the year 1822 to 1831 p. 492

Harper Brothers, New York. 1841

(excerpts relating to Pinnipeds and Cetaceans)

p. xxiv \* Rookery properly means "a nursery of rooks" has been applied by all our South Sea navigators to the breeding encampments of various oceanic animals, such as seal, penguins, etc. It is possible, however, that it may have been derived from the verb to rook, or to ruck which signifies to squat; to bend and set close, to cower, etc. At the risk of transgressing the cannons of criticism, I shall use the term rookery as it is understood by South Sea sailors - "a spot selected by certain animals for the purpose of bringing forth their young".

First Voyage p. 29

p. 61-62 31 Dec 1822 - 1 Jan 1823 to 10 Jan. Kergulen's Land or Desolation Island did not see more than 3000 fur seal - took 200 on westside saw 4000 sea-elephants, and 1500 on eastside.

p. 63 Kergulen's Island-of animals, besides those before mentioned there are a few seal of fur and hair kinds and sea-elephants.

p. 66 Sandwich Land Lat.  $57^{\circ}10'S$ , Long  $26^{\circ}59'W$ .  
Candlemas Isles to Thule  
28 Feb - 6 Mar 1823 no fur seals, about 400 sea-elephants and about 50 sea-dogs

p. 69 19 Mar 1823 near North Cape N.W. South Greenland  
Lat  $62^{\circ}41'S$ , Long  $47^{\circ}21'W$ --land abounds with oceanic birds. Saw about 3000 sea-elephants, and 150 sea-dogs and leopards.

p. 70 Staten Land island which forms the southeastern extremity of South America

24-28 Mar 1823 boats out returned with 182 fur seal skins.

30 Mar 1823 Falkland Islands, Shallop Cove, New Island, boats out 17 hours returned with 22 fur seal skins.

p. 73 notes of fur seals and sealing around islands in Strait of Le Maire, S.A.

p. 116 22 to 25 August 1823 from port of Coquimbo, Chile to islands St. Ambrose and St. Felix--during passage saw sperm and right whales, porpoises, dolphins, etc.

p. 116-17 25 Aug 1823 St. Ambrose--boats ashore returned at 7 PM with 87 fur seal skins and on 26th visited St. Felix and picked up 211 fur seal skins.

--these islands lie about 500 miles NW of Port Coquimbo.  
500 W Copiapo in lat  $26^{\circ}30'S$ , long  $80^{\circ}0'W$ .

p. 119 9 Sept 1823 Lobos A Fuero lat  $6^{\circ}59'S$ , long  $80^{\circ}42'W$  -- boats out, returned with only 28 fur seal skins.

p. 119-20 10 Sept 1823 visited Lobos de Terra fur and hair seals found here in considerable numbers.

p. 124-126 3 Oct - 2 Dec 1823 Gallapagos Islands--took about 5000 fur seal skins, loaded 100 elephant tortoises live for food.

p. 126-130 12 Jan 1824 Island of Juan Fernandez in lat  $33^{\circ}40'S$  long  $78^{\circ}58'W$  - 90 miles eastward of Masafuero. Fur and hair seals formerly frequented this island but of late they have found some other place of resort.

p. 130-131 16 Jan 1824 Island of Masafuero - 3-1/2 million fur seals taken from island between 1793 and 1807 --boats out around the island from arrival (no date given) returned on 16th with only 13 fur seal skins--had seen about 50 fur seals on rocks they could not get at.

#### Second Voyage

p. 154 Oct 1824 island of Lobos SE of Rio de la Plata --on finding men already on the island for the purpose of taking fur seals set course for Falkland Islands.

p. 154-55 7-17 Oct 1824 Shallop Cove, New Island, Falkland Islands gathered eggs - 25 bbls. salted down, took 250 geese and teal, and several fur seals.

- p. 156 8 Nov 1824 west shore SA Cape Three Mountains---small islands near NW extremity of peninsula of Three Mountains--hair seals in great numbers resort to these islands, hair lions.
- p. 191-92 6 Feb 1825 Cocos Island (no seals reported) took on cocoanuts and departed this day.
- p. 192 10 Feb 1825 arrived in Gallapagoes Islands, Banks Bay, Albemarle Basin, Albemarle Island,--sent out boats but soon discovered we had reaped the harvest on previous voyage for there were very few fur - seals to be seen around the islands.
- p. 195-196 27 Feb 1825 --arrived at Guadalupe Island in lat 28°56'N., long 117°41'W. We lay here 3 days during which time we took a number of fur seals.
- p. 196 2 April 1825 Cerros Island--boats out, returned without finding either seals or sea-elephants.
- "There are many fine fish to be caught around this island, and it was formerly a great resort for sea-elephants and fur-seals; but it now appears to be entirely abandoned by these animals."
- p. 199 8 April 1825 Bay of St. Francis, lat 30°20'N ((Bahia San Quintin)). The banks of the bay are frequently visited by sea-leopards but they are very wild; the sea-otter likewise is sometimes taken by the natives, but they have become quite scarce and I believe the race is nearly extirpated.
- p. 200 8 April 1825 ten AM landed on Cenizas Island ((San Martin I.)) in search of fur seals. Here we found about 800 sea-elephants on a beach at the east side of the island; and on the north and west sides there were about 400 sea-leopards. Cenizas Island is about 5 mi. in circumference; lies about 18 miles from the southwest point of St. Francisco ((Caba San Quintin)) and is 3 miles west from the mainland.
- p. 206-207 23 April 1825--left St. Diego "while crossing the great Bay of St. Barbara, we examined many islands for fur-seals, but without much success. We saw a few sea-elephants, and a considerable number of sea-leopards, which were very wild." islands examined - St. Clement, St. Catalina, St. Barbara, St. Rosa, St. Miguel.
- p. 209 11 May 1825--arrived at Farallone Islands lat 37°41'N, long 122°35'W. "Many years ago this place was the resort of numerous fur seal, but the Russians have made such havoc among them that there is scarcely a breed left." "On this barren rock we found a Russian family, and 23 Codiaks, or northwest Indians, with their bark canoes. They were employed in taking sea-leopards, sea-horses and sea-elephants for their skins, oil, and flesh"--
- p. 212 20 May 1825--"we arrived at Cape Blanco, situated in lat 42°49'N long 124°13'W. between this cape and that of Mendocino which is in lat 40°17'N. long 123°12'W. There are many small islands and rocks, some of which lie three miles from the mainland. On these islands

or keys I expected to find fur seals, whereas I found them all  
manned with Russians, standing ready with their rifles to shoot every  
seal or sea-otter that showed his head above water."

p. 213 22 May 1825 off west end of island of Socorro the south point  
of which is in latitude 18°53'N long 110°9'W.

p. 213 30 May 1825 (Socorro) This island lies about ninety leagues  
due south from Cape St. Lucas, the most southern extremity of the  
Peninsula of old California--

"At six AM the boats were dispatched to examine the island in  
search of fur seals; but returned, after a faithful inspection,  
without seeing more than twenty animals of that species. They saw  
about three hundred sea-leopards, and fifteen hundred hair-seals."

p. 215 Chapt. VII

Sail from the Sandwich Islands, Northern Polynesia--(Hawaii to  
Niihau and Toura ((Kaula))  
Northwest of the Sandwich Islands are a number of uninhabited islands  
or rocky islets.--"these are called Bird's, Necker, Gardner, Allen,  
Lisiansky, Bunker, Clarke's, Massachusettes, etc.--

p. 216 1 July 1825 passed within a half mile Bird's Island ((Nihoa))  
lat 23°8'N long 161°58'W.

3 July 1825 passed within half a mile of Man-of-War's Rock  
((Gardner pinnacle)) lat 25°1'N long 167°27'W. inhabited by  
nothing but sea fowl and green turtles.

6 July 1825 landed on west side of Lisiansky Island lat 25°59'N  
long 173°44'W. Sometimes called Lassion's and sometimes Neavas's  
Island. "On the shores we found an abundance of sea-elephants and  
green turtles, but no where on island could we obtain fresh water."

BUT NOT LAYSAN

p. 217-18 8 July 1825 From Lisiansky Island westward saw many sperm whales  
landed on Pearl and Hermes on 8 July. S-end lat 27°31'N long 176°28'W.  
N. end lat. 28°22'N long 177°32'W) "the sea-elephant and sea-leopard  
resort to the islands in the summer season, in large rookeries, and  
the former are perfectly tame." large numbers of Green turtles are  
found - the hawk's bill may also visit.

p. 218 12 July 1825 crossed 180° in lat 28°30'N

13 July 1825 landed on Beyer's Island ((Woodward 1972 - probably  
Midway)) in lat 28°32'N. long 177°4'E Sea birds, green turtles, and  
sea-elephants resort to this island.

p. 218-19 14 July 1825 "found small low island ((Woodward 1972, Kure-Atoll)  
covered with sea-fowl, and the shores of which were lined with sea-  
elephants. Green turtles were found here in great abundance and two  
hawk's-bill turtles were seen." Its center is in lat 29°27'N long  
174° 31'E.

P. 219 23 July 1825 in lat 34°17'N long 170°42'W saw about 2000 sperm whale lying feeding, likewise saw sperm whale on the two following days in schools of from 50 to 100.

27 July 1825 in lat 34°11'N, long 156°47'W. again saw sperm whale.

p. 219-220 17 Aug 1825 Clipperton's Rock lat 10°15'N long 109°28'W. Fur seal and sea-elephant resort here in small numbers in the proper seasons and green turtle come hither to desposit their eggs. After taking what few fur-seal could be found about the island, we got underway and sailed for the Gallapagos Islands.

p. 251 8 May 1826 arrived New York with a cargo of rising 6000 fur seal skins.

### Third Voyage p.253

p. 285 South Africa searching for fur seals

13 Sept 1828 small island in lat 31°32'S long 17°56'E Here for the first time our search was successful.

p. 290 20 Sep 1828 Possession Island in lat 26°57'S long 15°8'E. reported pestilence or plague visited seals on island, "the whole island was literally covered with the carcasses of fur seals, with their skins still on them."

"They appeared to have been dead about five years and it was evident that they had all met their fate about the same period."

p. 291-92 24 Sept 1828 two islands -- east by north from Angra Pt. - have once been the resort of immense numbers of fur-seals, which doubtless destroyed by the same plague which made such devastation among them on Possession Island, as their remains exhibited the same appearance in both cases.

p. 293 6 Oct 1828 near Ichaboe Island "This is a fine place for making captive the great levithans of the ocean, the right whale great numbers of which strike on this part of the coast about the middle of June.

p. 294 referring to Ichaboe Island  
"--its shores are resorted to by multitudes of fur seal; we took about 1000 of their skins in a few days."

20 Oct 1828 Having taken as many fur-seal skins as was practicable we weighed anchor on Monday the 20th, and steered to the north examining the coast for fur seal.

p. 295-96 6 Nov 1828 After taking about a thousand fur-seal skins from Mercury Island--we got underway--for Bird Island.

7 Nov 1828 this little island (Bird) is in lat 24°38'S long 14°22'E. Right whale frequent area in July and August. We took here the skins of 1400 fur seal--

p. 303-4        15 Dec 1828 "on Monday, the 15th, we once more put to sea, and steered a southerly course for Mercury Island, touching at Bird Island on the way, from which we took a few fur-seal skins." Arrived at Mercury island on 22nd - on the 24th a party landed to kill seals--men swept off by waves one lost. Several hundred seals killed.

Fourth Voyage p. 341

p. 358        28 Dec 1829 arrived Lord Aucklands group (Auckland Isles) anchored in Carnley's Harbor--about 250 miles south of New Zealand.

4 Jan 1830--the boats returned from around the island without seeing a single fur seal and not more than 20 of the hair kind.

p. 363        In the year 1823, Capt. Robert Jonson in the schooner Henry of New York took from this island and the surrounding islets about 13000 fur seal skins.

p. 364        Searched "the Snares" lat 48°4'S, long 166°18'E no fur seals found - (previously removed by other sealers-)

NOTE: " " direct quotes from book  
( ( ) ) modern names inserted by Fiscus-DeLong.

Generally latitudes given are reasonably close to modern positions; longitudes are poor.

Excerpted by C. H. Fiscus and R. L. DeLong from the book March 1978  
MMD NWAFC NMFS

From Lee Mottler

AINOA means -

"eat without observance of tabu"

no Hawaiian word AIONA.

1824 Don Francisco Journal

calls it HAYNA Marin Journal

Jan-Feb in Majoris & Dec.

Feb-Dec 1824 Ceewards?

Rich Rogers "Shipwreck Museum"  
KONA 259-5339

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of  
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December 2, 1989

George:

Thank you very much for sending me the article about Mokupapapa. It was extremely interesting, and the timing could not be better. I will refer to one incident that Burney, the Discovery's first lieutenant, reported during my presentation to the SSC on December 4. That incident was that late in the afternoon of March 16, 1779, the Discovery encountered a Hawaiian paddling a canoe about 20 miles from Kaula Island.

I do not have the entire set of Beaglehole: life of Cook, just the one abridged version, and Burney's note on the encounter with the canoe is not in abridged version. Buzzy Agard told me a couple of months ago that he had written a report to somebody (he thought to WesPac) about an encounter between a western sailing ship and a lot of canoes far offshore of Niihau, Kauai, or Kaula Islands, or west of them. He tried to locate his paper, but could not. I never heard of such a thing. Maybe what Buzzy was referring to was Burney's entry.

Did you know that Burney returned to Niihau several years after 1779? I think it was in 1781 or thereabouts, if memory serves correct. He reported that nobody was living on Niihau at that time. That struck me as odd, but perhaps it makes sense, as water may have been a problem on Niihau during the dry season. Perhaps all the residents just went to Kauai. Or maybe they just hid from Burney. I met with Bruce Robinson, one of the owners of Niihau, during my project on native Hawaiian fishing rights. He believes Niihau has been continuously occupied since the Hawaiians first arrived here. I tried to relocate Burney's reference, but unfortunately I could not. Damn!

Do you have a copy of Bernice Judd's book Voyages to Hawaii Before 1860, as enlarged and edited by Helen Yonge Lind (Univ. of Hawaii Press, 1974)? It is a very useful reference, but it is incomplete, as it does not include a lot of whalers that visited Hawaii before 1860.

Thanks for sending the information about Ray Mehl. What a tragedy! I will send a contribution. I was going to send a contribution to the Advertiser's Christmas fund, but I will cut that in half and send the other half to Mr. Mehl.

You and I seem to have a bent for the same kind of stuff. Maybe one day we should have lunch at King's Bakery. Who knows what might result?

*Bob Gerson*



low islands on an extensive reef with an opening to the north-east, the position given being latitude  $4^{\circ} 45' N.$ , longitude  $165^{\circ} 50' E.$  of Paris.<sup>1</sup>

Ebon, a detached atoll in the south-western sector of the Marshall Islands, is close to the stated position. The *Pacific Islands Pilot* says that there are islets on all sides of the reef enclosing the lagoon except the north.<sup>2</sup> Joy was thus its discoverer.

### 101. George W. Gardner

ON 19 December 1824 George W. Gardner, of the American whaling vessel *Maria*, discovered a small island, judged to be 6 or 8 miles in length and 3 miles across, in latitude  $21^{\circ} 45' S.$ , longitude  $155^{\circ} 10' W.$ <sup>3</sup>

This is the position of the modern Maria Island, a detached atoll in the Austral Islands, which was no doubt the island discovered by Gardner.

### 102. Koerzen and Eeg

IN 1825 two Dutch naval vessels, the *Maria Regebergens* and the *Pollux*, commanded respectively by Koerzen and Eeg, made a traverse of the Ellice Islands, during which they made contact with an island which was not yet on the charts, in latitude  $7^{\circ} 10' S.$ , longitude  $177^{\circ} 33\frac{1}{2}' E.$  They called it *Nederlandsch Eyland*. It was inhabited by a fierce and athletic race of men.<sup>4</sup>

This was Nui, of which Koerzen and Eeg thus gave the first firm report. It may have been Mendaña's Isle of Jesus (see section 10).

<sup>1</sup> Duperré, L. I., *Mémoire sur les opérations géographiques* (Paris, 1827), p. 54.  
<sup>2</sup> *Pacific Islands Pilot*, vol. ii, p. 458.

<sup>3</sup> Stackpole, E. A., *The Sea-Hunters* (Philadelphia-New York, 1953), p. 354, citing *Nautischer Inquirer*, 23 May 1825.

<sup>4</sup> Horsburgh, J., *India Directory*, vol. ii (London, 1827), p. 596; Finlay, A. G., *A Directory for the Navigation of the Pacific Ocean* (London, 1871), p. 667; Meinicke, C. E., *Die Inseln des Stillen Ozeans* (Leipzig, 1888), vol. ii, p. 133.

### 103. George Anson Byron

GEORGE ANSON BYRON, of the British vessel *Blonde*, in 1825 came south from Hawaii. On 29 July 1825 he discovered an island, the position given being latitude  $4^{\circ} S.$ , longitude  $155^{\circ} W.$ , which he named Malden's Island. A landing party went ashore and found that it was uninhabited, but that there were ruins of previous structures.<sup>1</sup>

This was Malden Island, a detached island in the mid-Pacific area, the position of which is precisely that given by Byron, the identification being confirmed by the ruins. This was possibly seen by William Clark in 1823 (see section 96).

### 104. Prince B. Mooers

IN 1825 Prince B. Mooers, of the American whaling ship *Spartan*, saw an island, the position given being latitude  $1^{\circ} 10' N.$ , longitude  $154^{\circ} 30' E.$ <sup>2</sup>

Since this is very close to the position of Kapingamarangi, the southernmost of the Caroline Islands, and a particularly isolated island, it can reasonably be concluded that this was the island reported by Mooers. It is possible, although not probable, that this was the Dos Pescadores reported by the survivors of Grijalva's ship (see section 6).

### 105. Laysan Island

IN 1827 Captain Stanikowitch, of the Russian vessel *Moller*, found a small, low, uninhabited circular island with a lagoon. It appeared to be about 6 miles in circumference. The position was given as latitude  $25^{\circ} 46' N.$ , longitude  $171^{\circ} 49' W.$  The Russian hydrographer Krusenstern considered that this was the same as Laysan Island, a previous American whaling discovery, and it was named accordingly.<sup>3</sup>

This was the modern Laysan Island, in the north-western sector of the Hawaiian Islands.

<sup>1</sup> *Voyage of H.M.S. Blonde* (London, 1826), pp. 204-6.

<sup>2</sup> Stackpole, E. A., *The Sea-Hunters* (Philadelphia-New York, 1953), p. 372, citing *Nautischer Inquirer*, 3 Mar. 1827.

<sup>3</sup> Krusenstern, A. J., *Suppléments* (St. Petersburg, 1836), p. 110.

Discovery of  
the Pacific Islands 1960  
Sharp

March 28, 1854

a Whaling Voyage in the Pacific in 1854  
From the Sandwich Islands

Remarks on Board Saturday Mar 28<sup>th</sup>

The fore part of the day strong breezes from the N E by  
and rain squalls the Island of Attoo in sight about 11  
the captain went on shore and got 4 or 5 hogs come on  
board about 3 P.M. and kept off for the N W steering  
half S

Remarks on Board Sunday Mar 29<sup>th</sup>

All this the twentyfour hours fresh breezes and rain squ  
from the E and S E saw a shoal of Blackfish going  
quick to the windward steering W

Remarks on Board Monday Mar 30<sup>th</sup>

All this twentyfour hours light baffling winds and  
calms the watch employed at various jobs saw two  
sails bound to the Nward steering W

Lat 21.39 N

Long 162.19 W

Remarks on Board Tuesday Mar 31<sup>th</sup>

All this twentyfour hours light breezes from the  
the watch employed at various jobs saw a ship  
on our lee bow bound to the W steering W

Lat 21.45 N

Long 163.37 W

Remarks on Board Wednesday Apr 1<sup>st</sup>

Ship Callao A. B. Howland Master  
From the Sandwich Islands

Remarks on Board Friday Apr 3<sup>rd</sup>

The fore part of the day strong breezes from the N-  
by E about five o'clock A.M. the ship struck on a  
reef belonging to French small Islands and bank so  
we found it about 40 miles to the west from where  
it was layed down on the chart. The ship struck and  
hung thumping on the reef very hard for five or ten  
moments when she slid off over it she unhung the rudder  
and tore off a part of the false keel or part of it and  
otherways damaged her so that she leaks about 9.00  
strokes an hour after getting over one reef we saw  
another close to with breakers on it (the one we went over  
it) did not break on) we bent a hawser on to the  
Port anchor and cut it away that brought the

ship up and held her untill we bent the starb  
oard anchor and got that down the hawser soon  
chafed off and we lost the anchor we then bent  
the other chain on to the ledge and two boat anchors  
and two ~~boat~~ on blaber hooks and let that go  
then took our ruder in and fished the head of it  
the ship laying in 6 fathoms water with breakers  
within a cables length on each side there appears  
to be a reef on all sides of us there is a small  
sand island close to with a number of Elephant  
on it

Lat 23.33 N  
Long 166.00 W

Remarks on Board Saturday Apr 4<sup>th</sup>

The fore part of the day fine pleasant weather and  
light breeze from the S hung the rudder and sent  
the boat all to sea with a light breeze from the S

"Sketches" - "Main part" (2011)

herways damaged her so that she leaked about 9.00  
troubles an hour after getting over one I reef we soon saw  
another clost to with breakers on it (the one we went over  
it) did not break on) we bent a hawser on to the  
Port anchor and cut it away that brought the  
ship up and held her untill we bent the Starb  
oard anchor and got that down the hawser soon  
chafed off and we lost the anchor we then bent  
the other chain on to the kedge and too boat anchors  
and two ~~boat~~ on blaber hooks and let that go  
then took our ruder in and fished the head of it  
the ship laying in 6 fathoms water with breakers  
within a cables length on each side there appears  
to be a reef on all sides of us there is a small  
sand island clost to with a number of Elephant  
on it

Lat 23.33 N

Long 166.00 W

### Remarks on Board Saturday Apr 4<sup>th</sup>.

The fore part of the day fine pleasant weather and  
a light breeze from the S. hung the rudder and sent  
the bow boat off to sound out a passage about nine  
clock <sup>at</sup> took the anchors and got underway and stood  
out between the reefs and got in blue water once more  
the middle part fresh breezes all hands employed  
breaking out looking for the leak the latter part  
strong breezes double reefed the Topsails the ship by  
the wind on opposite Tacks

Lat 23.31 N

Long 166.10 W

a Whaling Voyage in the Pacific in  
From the Sandwich Islands

Remarks on Board Sunday Apr 5<sup>th</sup>

The fore part of the day a moderate gale took in the main sail and jib the middle part much the same the watch employed breaking so out looking for the leak but did not find it. The latter part more moderate set whole Topsails mainsail and jib and steered S the wind from the S by E the leak seems to be rather decreasing (it has plenty of chance to decrease yet)

Cloudy & Obs

Remarks on Board Monday Apr 6<sup>th</sup>

The fore part of the day light breezes from the S by E at daylight bluffed to the wind on the starboard tack just after breakfast the crew came aft with **George Wilson** at their head and insisted upon the ship's being taken in to Port they did not think it was safe to go North with her until she was repaired. The Boatsteerers were all opposed to go North except Charles the portugee he thought the Captain knew best what to do they were all finally persuaded to go to work again and go on to the S. The middle and latter parts calm for the last twentyfour hours the ship has leaked 484 strokes an hour Lat **23.14 N**  
Long **166.38 W**

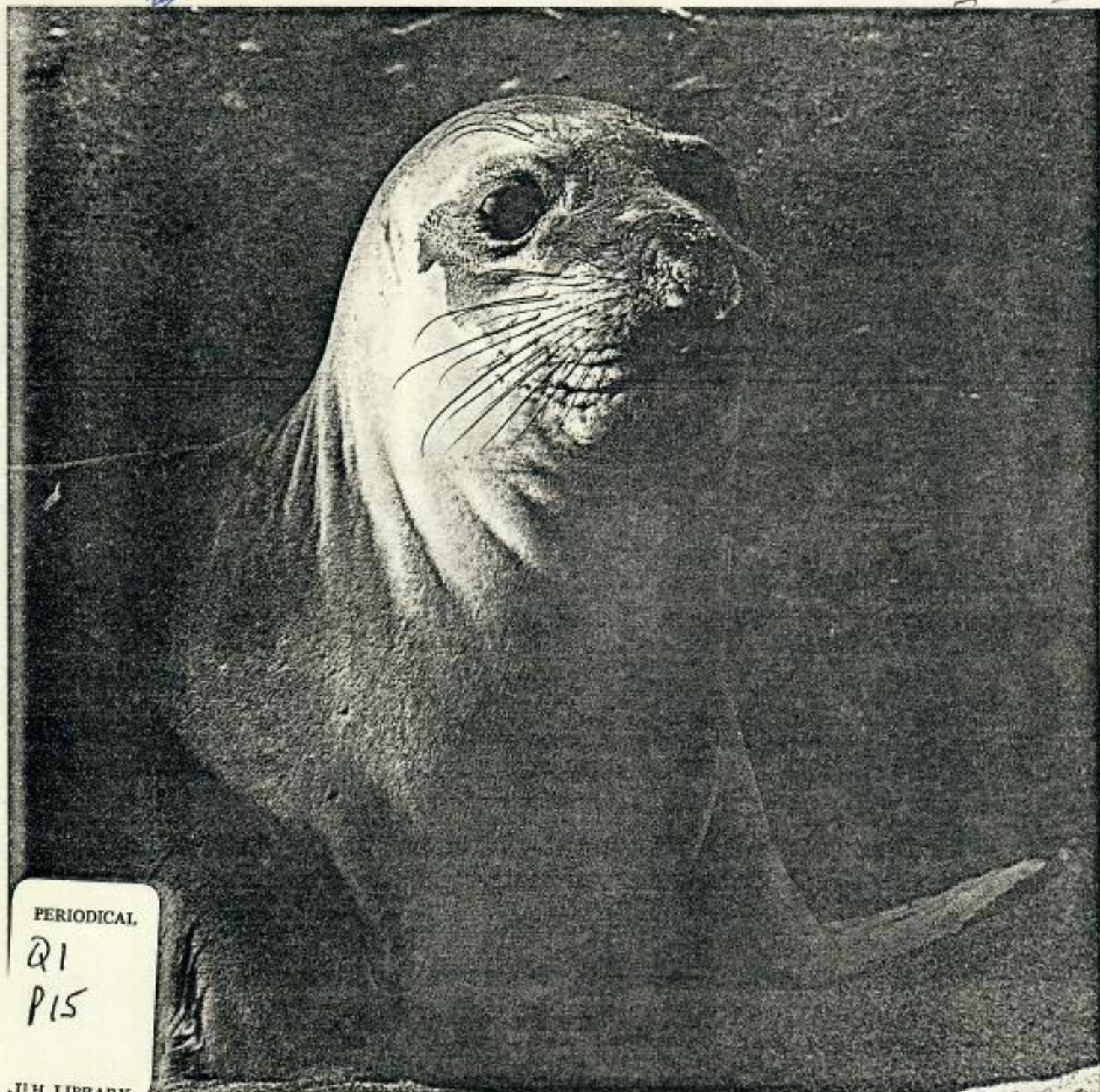
Remarks on Board Tuesday Apr 7<sup>th</sup>

The fore part of the day calm the middle part

Don't know - looking for a leak

# PACIFIC DISCOVERY

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VOLUME XXX NUMBER 5 SEPTEMBER OCTOBER 1977



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EXTANTION... SHRIMPBOATS... FERNANDINA... WEEDS... DOGFISH



## BACK FROM EXTATION?

Burney J. Le Boeuf

**D**ON'T be alarmed if you can't find the word "extation" in the dictionary. It isn't there yet. In 1976 R. C. Banks advocated its use as a single word "to describe the status of a species whose population has been reduced to such a low level that it can no longer function as a significant part of its normal ecosystem . . . or to the point where there is considerable doubt whether the species remains extant. . . ." I will use this newly coined word as a substitute for the more cumbersome conceptions, "nearly extinct," "probably extinct," and the like.

During this century, several animal species have been virtually annihilated either directly or indirectly by human activities. The California condor, the California sea otter, the California gray whale, and the black footed ferret are just a few examples.

However, despite being reduced to a minute fraction of their former abundance, populations of some of these species have apparently recovered—at least their numbers have increased dramatically and they have begun to reinhabit their former ranges. Such has been the case with the northern

elephant seal, *Mirounga augustirostris*, an animal that has been considered an endangered species since it was brought to extation by sealers during the last century. The number of elephant seals has increased enormously during the last few decades, and their present breeding range has broadened to a point such that it is almost as extensive as it was in pre-extation days. But it would be premature to conclude that elephant seals are safe, that the population is fit and viable, that this species has come back. We must question whether any species ever fully recover from extation, from being bludgeoned to the virtual brink of extinction. A species that recovers from extation is changed; it is genetically different from the pre-extation population. Thus, the recovery of an animal population from extation cannot be viewed simply from the point of view of the number of individuals that exist and the range they occupy. This has been demonstrated for one species, the northern elephant seal, but the general argument should apply to other species that have undergone similar histories.

In 1874 Scammon noted that northern elephant seals once bred from Point Reyes to Cabo

Above, center of a densely crowded harem of elephant seals on Pilot Rock Beach, Isla de Guadalupe. All are descended from the few dozen animals that escaped the oil hunters and survived on this island. (Photograph by Burney J. Le Boeuf)

LIBRARY OF  
GEORGE H. DALY


Right, Pilot Rock Beach, on Guadalupe, where one of the largest breeding aggregations of elephant seals in the world is located. (B.L.B.) Below, a most unusual habitat on Guadalupe is the marine caves just above water line. Here the rare Guadalupe fur seal breeds. (Photograph by R. S. Peterson)



of both sexes and all ages indiscriminately. Slaughter was so intensive that by 1860 elephant seals were no longer considered an important source of oil. By 1869 the species was considered to be virtually extinct ("extaille" in Banks' terminology). Ironically, this was before the northern elephant seal had been recognized as a separate species from the southern elephant seal.

During the period from 1865 to 1880, only occasional stragglers were sighted in the entire range, a few on Islas San Benito, and a few on Isla de Guadalupe. From 1884 to 1892, no elephant seals were seen anywhere, despite the fact that several museum expeditions made thorough searches for them. Finally, in 1892, Townsend and Anthony set out on a collecting expedition for the Smithsonian Institution. They saw only eight elephant seals in Baja California. All of them were in one place, a highly inaccessible, exposed beach on Isla de Guadalupe, a volcanic island 150 miles west of the Baja California mainland. The men killed seven of the seals, even though they realized that these animals represented "the last of an exceedingly rare species." This was unquestionably the nadir in the history of this species, the low point in its population history. Bartholomew and Hubbs have estimated that there may have been as few as 20 animals in the entire population in 1892, and probably no more than 100. They pointed out that the entire species has been reconstituted from this remnant population.

From 1892 until approximately 1930 the ele-



San Lazaro, and that they had been abundant along the entire coast during the early part of the 19th century—before sealing began. Seals began to be exploited in the first decade of the 19th century; this activity went on at a great pace for about forty years. The oil product which was reduced from blubber was very important in industry, being considered the best oil available with the exception of that of the sperm whale. Seal oil was used in house and street lighting, for lubricating machinery, in the tanning process, and in making paint, soap, and clothing. One adult bull was reported to have brought as much as 210 gallons of oil.

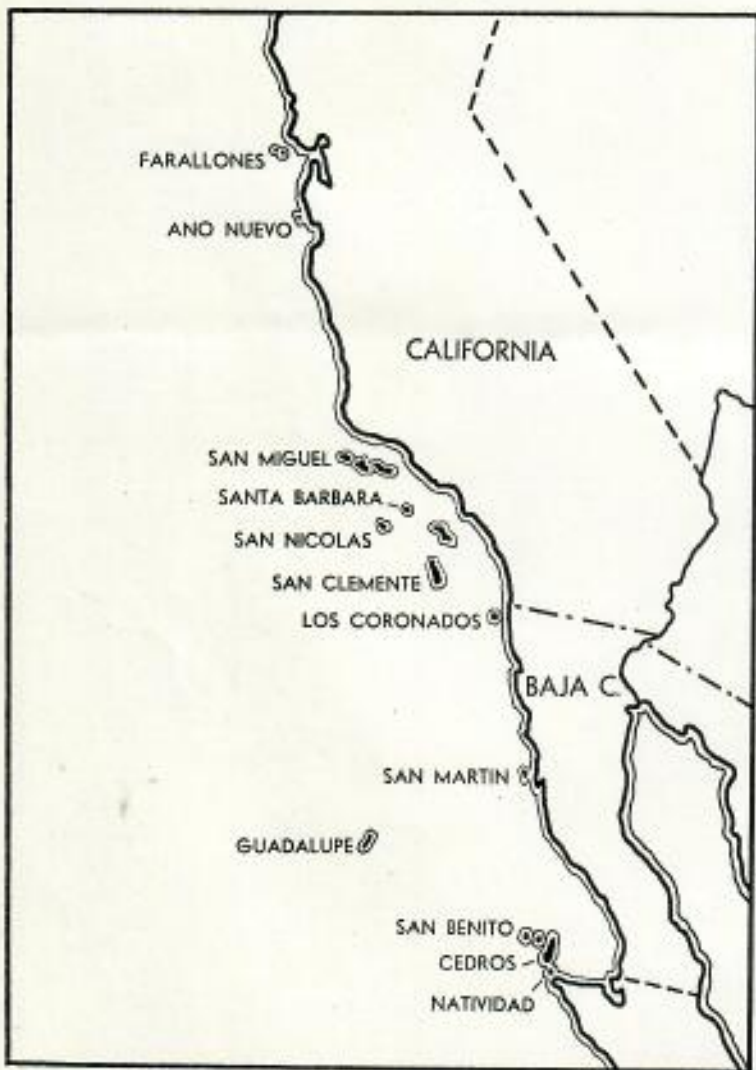
Because the elephant seal was not afraid of man, it was easy prey for sealers, who killed seals



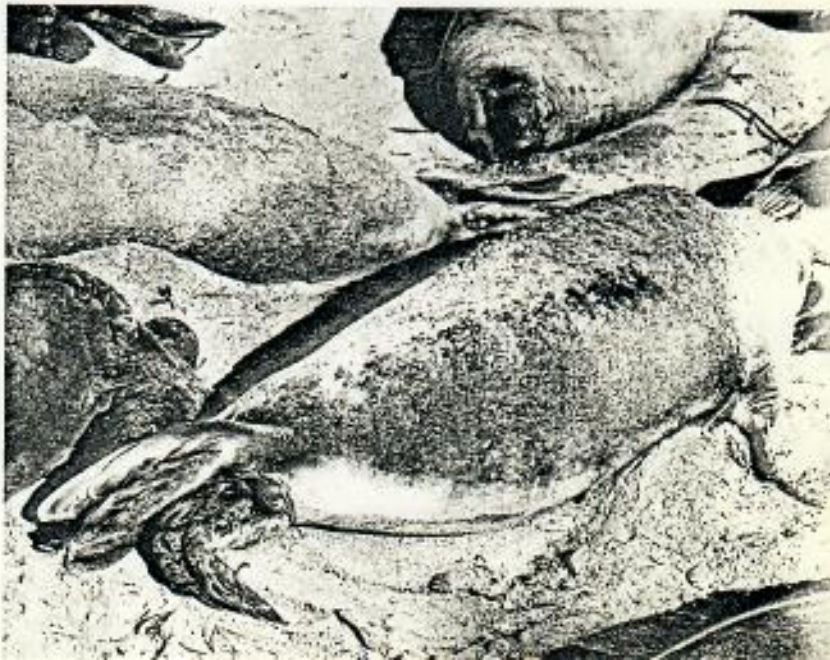
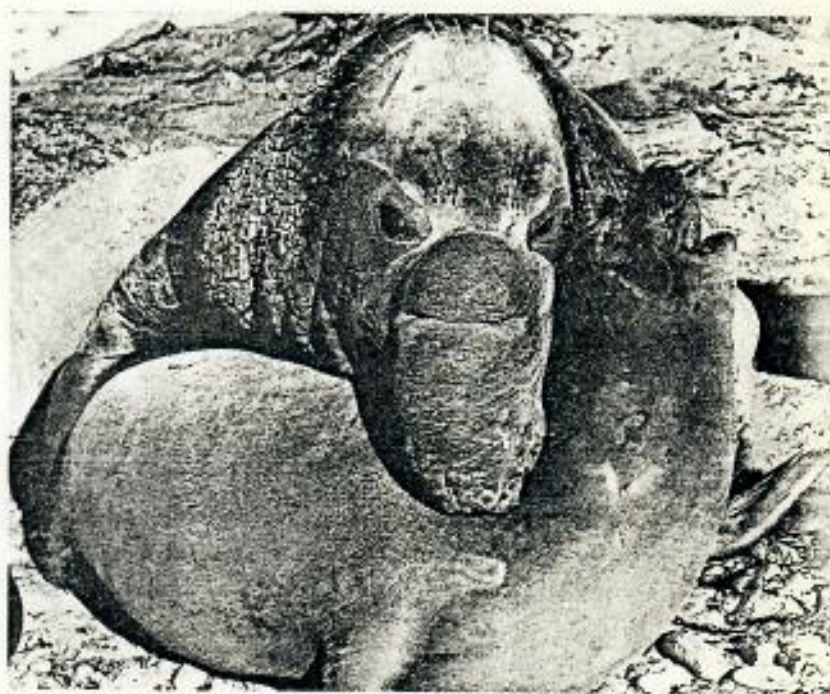
phant seal bred only in very small numbers, only on remote Isla de Guadalupe, and for much of the time only on "Elephant Seal Beach" on the northwest side of the island. There were too few seals to attract collectors or commercial interests. In 1922, Hanna and Anthony of the joint American-Mexican expedition to Isla de Guadalupe (which the California Academy of Sciences helped organize), reported finding 264 elephant seals on the entire island. Judging that the population would again be exploited, the Mexican government granted the species immediate and complete protection. So protected, the colony began to flourish, and within a decade animals began to disperse to other places along the coast of Baja California. When animals began to appear off the coast of

southern California, the United States government followed the example of the Mexican government and granted the species protection. Elephant seals have continued this growth trend in number and range up to the present.

The following table shows when elephant seals were initially observed at the principal rookeries, when breeding began, and estimates of colony size and total population number. Colony size was estimated by doubling the number of animals censused at the peak of the breeding season. That is, I assumed that 50% of the colony, composed of the young of the previous year and non-breeding juveniles, would be at sea during the breeding season. The population size was derived by summing up all of the colony estimates. This rough and



Above, northern elephant seals now breed on twelve islands along the coasts of California and Baja California. Right above, a bull seal biting a female on the neck as a prelude to mating. Right, an elephant seal pup being born. (Photographs by Ken Parker and Eugene Fisher)





most conservative estimate yielded a total of 47,684 elephant seals in existence in 1976.

Colony	Seals initially observed	Breeding began	Breeding females at peak season	Estimated total animals
Isla de Guadalupe . . . . .	—	—	4652	18,596
Islas San Benito . . . . .	1918	1930's	2382	9,238
San Miguel Island . . . . .	1925	1930's	3842	13,980
Los Coronados . . . . .	1948	1950's or later	44	152
Santa Barbara Island . . . . .	1948	late 1950's	68	252
San Nicolas Island . . . . .	1949	1st 1940's	616	2,214
Ano Nuevo Island . . . . .	1955	1961	687	2,718
Southeast Farallon Island . . . . .	1959	1972	60	260
Isla Cedros . . . . .	1965	1960's (?)	63	274
Population totals . . . . .			12,414	47,684

Bartholomew and Hubbs estimated a total population size of 13,000 seals in 1957. Thus, in less than 20 years, the total population has more than tripled in size. In addition, the number of breeding females counted at peak season gives an indication of the reproductive potential of the present population. This figure does not represent the entire population of breeding females since approximately 15% of them are at sea at the time. However, about 15% of the pups born every year die before weaning at four weeks of age, so the number of females censused at peak season yields a fair estimate of pups weaned—approximately 12,000 in 1976.

A closer look at the colonies gives another perspective on the dramatic increase in elephant seal numbers. In the present decade, four new colonies have been formed: Southeast Farallon Island in 1972, Isla Natividad between 1971 and 1975, and Isla San Martin and San Clemente Island in 1977. In addition, females gave birth on two mainland sites in recent years, the Point Reyes peninsula and Ano Nuevo Point. During the last few years, at least four major colonies doubled or tripled pup production. Pups born on Point Bennett, a rookery on the western tip of San Miguel Island, increased from 1357 in 1968 to 3711 in 1976. The San Nicolas colony increased in pup production from 218 in 1969 to approximately 737 in 1976. The Ano Nuevo Island colony produced 188 pups in 1968 and 640 in 1976. The number of pups born on Southeast Farallon Island during the years from 1972 to 1976 was 1, 2, 17, 35 and 60. Thus, the mean percentage increase in pups produced annually on these four rookeries was 12.5, 14.3, 12.5, and 25.0.

As of 1977, only two colonies seem to have reached equilibrium numbers—the mother colony on Isla de Guadalupe, and the colony on Islas San

Top, Point Bennett, the western tip of San Miguel Island, about a week before the peak of the breeding season. Elephant seal harems are all along the beach; the dark aggregations are California sea lions. (Photograph by Tom Dohl). Above, a portion of the same beach (B.L.B.)



Left, in the crowded harems, bulls sometimes trample pups to death. Below, a female bites an orphan trying to steal milk from her. (K.P., E.F.) At bottom, a male molting during the summer. (B.L.B.)

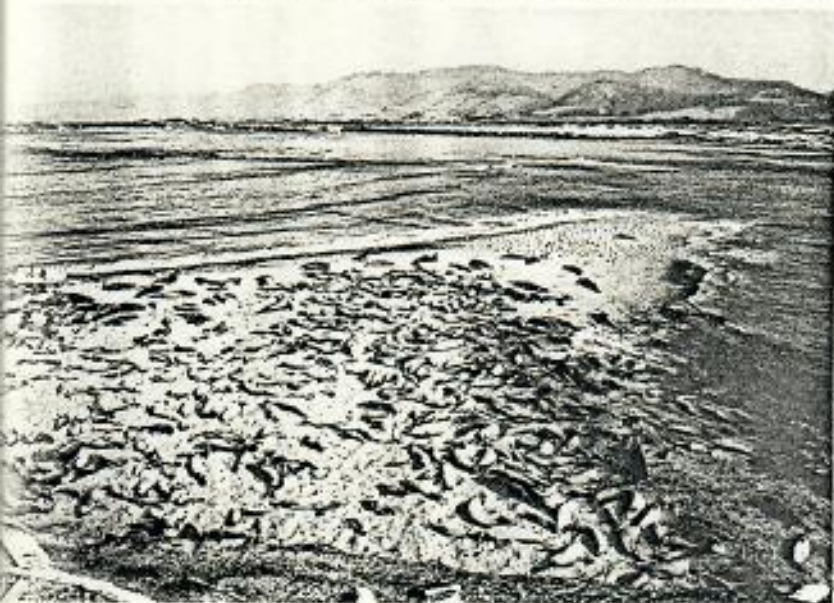
Benito. Two of the smallest rookeries, Los Coronados and Santa Barbara Island, cannot accommodate many more animals because they lack suitable breeding beaches.

Obviously, the rate of increase in elephant seals since the population minimum in the last century has been extremely high. Numerically, the seals have come back from extinction. However, recent evidence suggests that there was a cost incurred when their population was decimated; as a result, current generations of elephant seals may be lacking in adaptability.

Consider the fact that the thousands of seals extant all derive from a handful of ancestors, the few that lived through the carnage wrought by sealers in the last century. Various genetic phenomena characterize passing through a population bottleneck; one of the most conspicuous is a loss of genetic variability. Two principles explain the loss. The first is genetic drift, a genetic change in the population due to random phenomena rather than selection. This is simply a result of most of the population being exterminated. The extermination is presumed to be quite random and arbitrary. Many alleles, or alternate gene forms, are lost from the gene pool, and there is a great reduction in the number of heterozygotes, or animals in which genes from the two parents differ. The other factor, called the "founder principle," refers to the



Right, Islas San Benito, one of the southernmost elephant seal rookeries. (B. L. B.) Below Ano Nuevo Island shortly after the peak of the breeding season. (K. P., E. F.)



fact that the survivors of a severely depleted population contain only a small fraction of the total genetic variability of the parent population. The animals that survive extantion become the founders of the future population.

One of my graduate students, Michael Bonnell, tested the elephant seal population for genetic variability. The test for genetic variation that he used is based on variation in amino acid sequences of specific proteins, as determined by gel electrophoresis. The procedure derives from the fact that proteins differing in electrical charge or molecular weight move at different rates through a gel in an electrified field. The differential movements are detected by dyeing the proteins. Bonnell, and Robert Selander, who did the analysis, looked for genetic

variations in blood proteins, enzymes that are important in metabolism. Using seal blood samples collected at five different rookeries—Ano Nuevo Island, San Miguel Island, San Nicolas Island, Isla de Guadalupe, and Islas San Benito—they looked for polymorphisms, or different genetic forms, in 20 proteins at 23 loci. Polymorphisms are a reflection of underlying genetic differences in the loci encoding the structure of the proteins. Familiar polymorphisms are the number of different genetic forms that underlie eye color in a human population.

One measure of results is the mean number of animals in the sample having different alleles at one locus, or, to put it another way, the mean number of heterozygotes in the sample. In general, one finds 10 to 18% in vertebrates and 25 to 40% in invertebrates. Specifically, one finds an index of 15% in crickets, approximately 6% in rodents and in man, and 13 to 38% in fruit flies. Bonnell and Selander found no polymorphisms in the entire elephant seal sample that they analyzed. All proteins were monomorphic. At each genetic locus, the same two genetic forms were found in every individual that was examined. At each of the 23 loci examined, the 125 seals looked like identical twins, or rather like siblings from the same fertilized egg. The lack of polymorphisms in such a large sample, in an analysis of such a large number of proteins in this many locations, is odd, to say the least.

The southern elephant seal, *M. leonina*, the northern elephant seal's closest relative, provides a perspective on this situation. This antarctic species had a similar history of exploitation during the

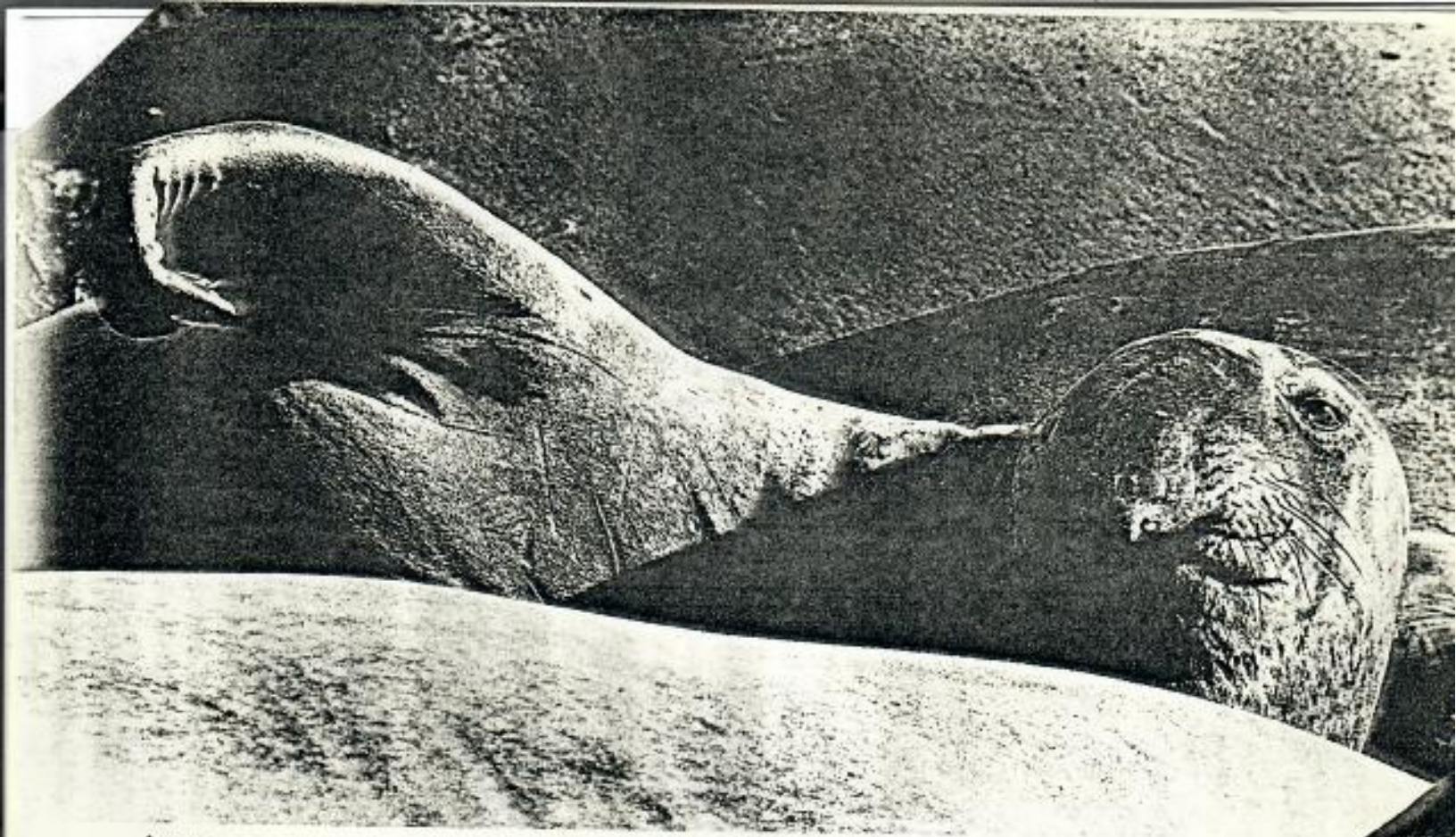
last century, but its population before and after exploitation was larger in number and broader in range and it was not so severely decimated as the seals in the northern hemisphere. McDermid's analysis of southern elephant seal blood revealed approximately 3% polymorphisms, five polymorphisms among 18 proteins in 42 individuals from Macquarie Island. Genetic variation in other pinnipeds is slightly higher, ranging from 3 to 6% polymorphisms, but generally lower than in terrestrial mammals. These data suggest strongly that the extreme population reduction of the northern elephant seal was very important in bringing about the current state of impoverished genetic variability.

Several other factors may have been important in decreasing the effective population size of the northern elephant seal and in bringing about genetic fixation. One important factor was inbreeding. When the population was reduced to a few survivors, inbreeding had to occur—the animals could breed only with closely related individuals. When inbreeding occurs, recessive genes are more likely to come together in the homozygous condition and thus get exposed to selection. Many such genes are deleterious. Because of this, a condition develops which is called "inbreeding depression," a loss in fitness due to severe inbreeding. This is manifested by loss of fertility, growth anomalies, and metabolic disturbances.

Another factor relating to genetic fixation,



Top, two very young males play-fighting. (B. L. B.) Above, two adults battling. Left, a subadult male elephant seal. (K. P., E. F.)



A young subadult male stretches his foreflipper as he peers over the back of another rest. (K. P., E. F.)

specific to northern elephant seals, is that males are extremely polygynous. A few males do most of the mating, thus intensifying the inbreeding. For example, one male may inseminate all of the females in a harem of 100 or more females, and he may monopolize breeding in this way for four or more breeding seasons, while all or most of the other males in the colony fail to mate at all. In small groups of females where there is little competition among the few males present, it is conceivable that one male could monopolize breeding even longer. This might have occurred during the period of population minimum. Such a mating system enhances inbreeding because all offspring from one year have the same father. Additionally, since females may copulate at age 2 and give birth for the first time at age 3, father-daughter matings begin to occur after a male has been dominant for 4 years in a row. If he dominates for 7 consecutive years, father-granddaughter matings would occur in the last year. Clearly, because of the manner in which elephant seals breed, inbreeding would be facilitated, particularly when population size is small. This condition, along with the population bottleneck, undoubtedly contributed to the reduction of genetic variability in the entire population which we see today.

So, there are approximately 48,000 northern elephant seals in existence today, and they breed

on islands spread out over a 1,000-mile range. But relative to the southern elephant seal, other pinnipeds, and terrestrial animals, the northern elephant seal population is genetically depauperate. It lacks genetic variation. The population has recovered from extation, but apparently in a changed and genetically impoverished state.

It has long been thought that genetic variation enables a population to adapt to environmental fluctuations. G. B. Johnson recently argued that "enzyme polymorphisms (genetic variation) increase fitness by providing a means of metabolically compensating for a varying environment." That is, individuals with multiple molecular forms of an enzyme may be capable of minimizing the effect of changed reaction conditions by adapting to alternate food species. This suggests that the northern elephant seal population may not be as fit as it appears. It may not be able to adjust to a drastic change in the environment. Such a change might simply be a reduction in number of its principal prey. The seals would not have the enzymatic options to utilize different food species in the area.

Consider this possibility in relation to the radical increase in elephant seal numbers. This increase is known as a population flush. In theory, a population flush is followed by a crash. In some cases, this is due to predator-prey oscillations. The

Canadian lynx thrives on its prey, the snowshoe hare, when the latter is abundant. The following year is marked by an increase in the production of predators and a reduction in the number of prey. Bereft of its principal source of food, the lynx population crashes. Similarly, when times are propitious, lemmings overgraze arctic tundra plants and proliferate; later, when the forage becomes scarce, the rodent population plummets. These are classic examples of population cycles in a simple food chain.

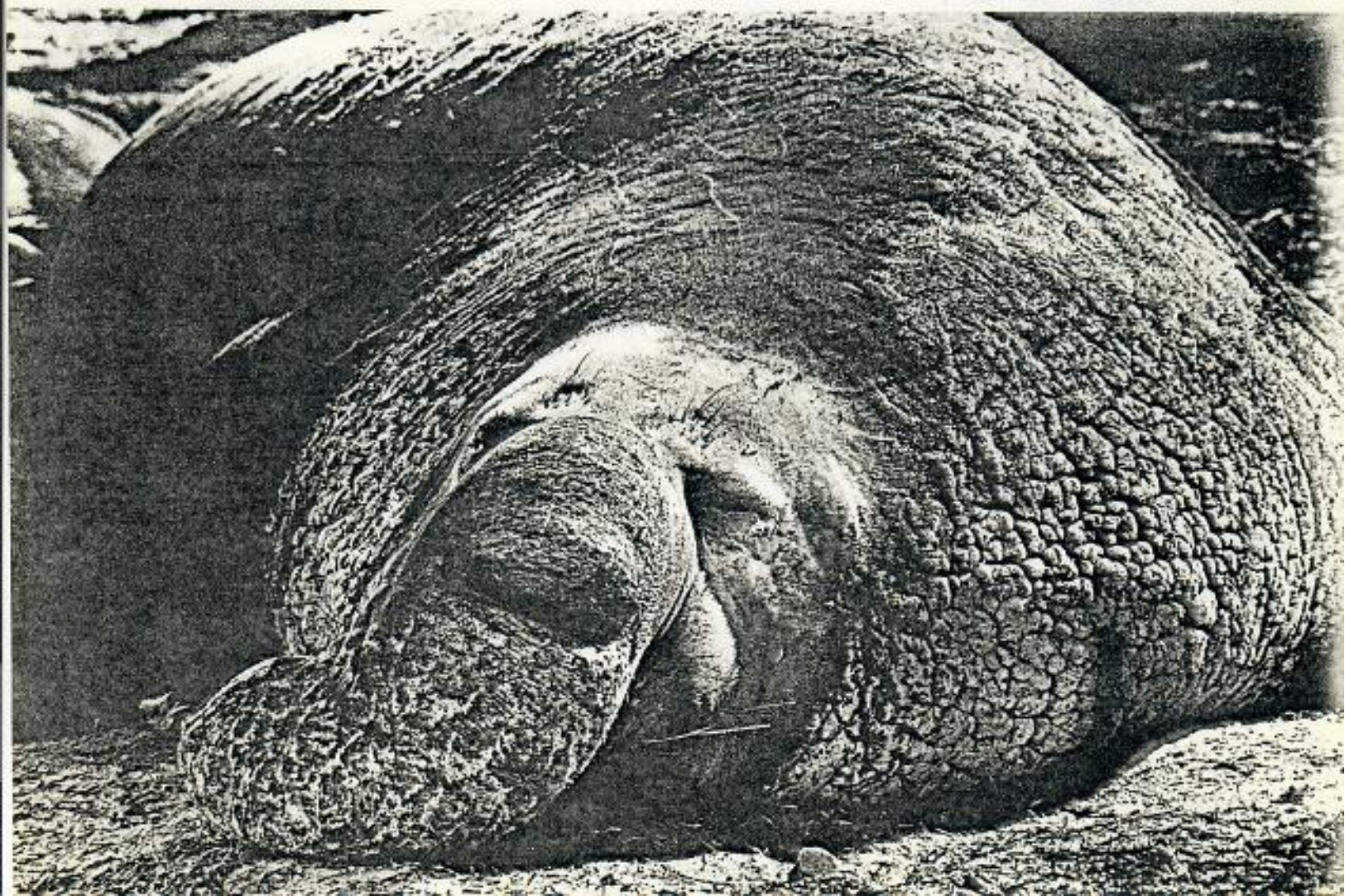
Unfortunately, no one knows whether the theory applies to a high trophic level marine mammal like the elephant seal. We simply do not know the complexity of the food web in which it operates. If it feeds primarily on a single food item, like its southern congener the southern elephant seal, which feeds on squid, there could be a problem. Depletion of the principal prey stock could cause the elephant seal population to crash for lack of food unless the seals switch readily to different prey species. Johnson's argument suggests that the genetically impoverished elephant seal may have limited alternatives in this regard, that lack of

genetic variability may be instrumental in bringing about a population crash.

Thus, the northern elephant seal population may not be as fit and viable as the obvious increase in numbers leads us to believe. The unusual genetic picture found in this species suggests that we withhold our optimism about the elephant seals' recovery for a while.

The broader implications of this story are obvious. Other species whose numbers have been severely reduced, species such as the California sea otter, the right whale, and the Guadalupe fur seal may also have incurred a similar reduction in genetic variability. Many research questions remain. What does it really mean for a population to lack enzyme polymorphisms? What kind of and how much genetic variation must a population possess in order to adapt to unpredictable environmental fluctuations? Why did the elephant seal recover so quickly in numbers while the Guadalupe fur seal is recovering so slowly? What is the nature of the food web in which these formerly exploited species operate? Studies aimed at answering these questions should be given high priority.

Adult male elephant seal at rest. (K. P., E. F.)



## Elephant seal Summary

Found Feb 10 on Midway Beach - 4 injuries - not real serious -  
Seals on Sand Is. (Midway) are rare - Tags 5011 5012 -

I observed seal on Feb 16 (at Midway Feb 16<sup>24</sup> ~~16~~)

Contacted NMFS agent John Naughton - friend - in Honolulu  
to notify - he subsequently call seal researchers in  
Seattle - found out that animal was tagged at San Miguel Is.  
in Feb of last year.

Seal stayed at Midway until Feb 20th - then gone  
10 days total

"First Twentieth Century record of an elephant  
seal in the Hawaiian Archipelago"

Note - B. Morrell's 1825 July report for Pearl & Hermes  
and Kure.



# Role of Hawaiians

The writer is Hawaiian curator of the University of Hawaii libraries.

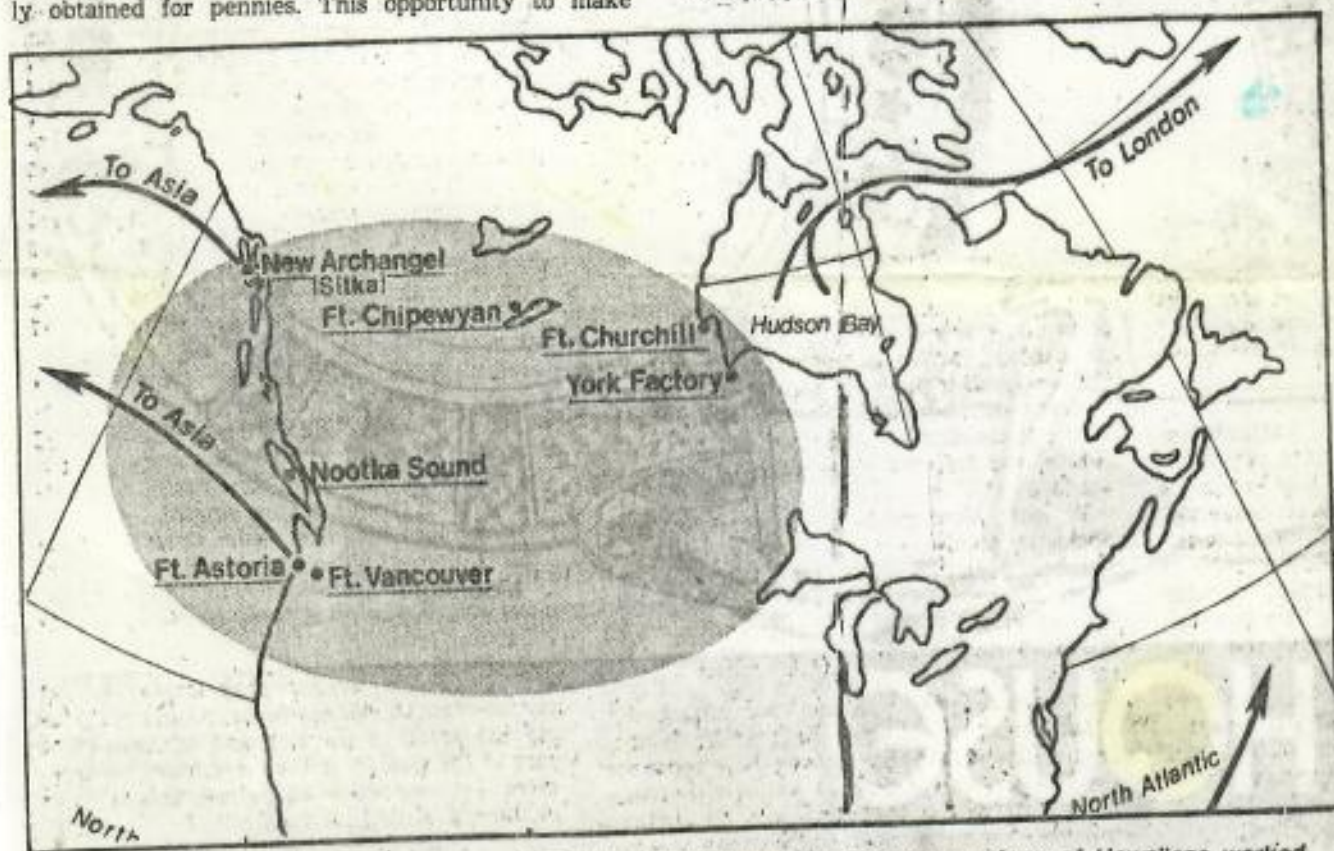
By David Kittelson  
Special to The Advertiser

Shortly after Captain James Cook was killed at Kealahou Bay, Feb. 14, 1779, the expedition's ships Resolution and Discovery sailed for the Pacific Northwest to continue their explorations. Here the crew bartered with coastal Indians for sea otter furs as protection against the cold in the arctic waters.

Later, on their homeward voyage, the ships stopped at Canton. The men were amazed to find Chinese merchants offering as much as \$120 for pelts originally obtained for pennies. This opportunity to make

fortunes led the ships' companies to the brink of mutiny. Two sailors actually did jump ship to seek their fortunes. Lt. James King later wrote of the possibility of establishing a fur trade involving the Pacific Northwest and China.

**THE FIRST VESSELS** to enter the lucrative maritime fur trade in 1785 were British. However, they were beset by commercial monopolies and lost their advantage to the Americans. And within 12 years the trade had become a virtual New England monopoly. By 1830 the maritime fur trade had dwindled into insignificance. Not only had sea otters become increasingly scarce, but also intensive, year-round competition for inland furs had been launched by Britain's Hudson's Bay Company and North West Company.



Map shows major fur export routes and Fort Vancouver area where large numbers of Hawaiians worked. They were employed primarily as cooks, gardeners, general laborers and herdsmen.

# s in the fur trade

The Honolulu Advertiser Wednesday, January 20, 1962 A15

The earliest fur trading vessels did not stop at Hawaii. However, as the sea otters diminished, ships had to range up and down the coast over several years in order to fill their holds. There were no West Coast ports at which these ships could reprovision. Consequently, the strategic location of Hawaii for the far-ranging maritime fur trade quickly became apparent.

The Islands not only provided supplies for the ships and recreation for their crews, but they also became a source of eager, trained Hawaiian seaman.

**AMERICAN FUR TRADING** voyages followed a circuitous pattern. Ships left New England ports with a skeleton crew, sailed around Cape Horn, and headed for re-provisioning in Hawaii. While here the captain also recruited Hawaiians to augment his crew for the long voyage to the Pacific Northwest. After gathering a cargo of furs, the ship returned to the Islands, took on supplies, discharged the Hawaiians (or most of them), and then sailed for Canton and home.

Hawaiians worked in the fur trade for a number of reasons. Most of which reflected the rigors of life as a commoner in the Hawaiian society. Here a small chiefly class, supported by the commoners controlled the land, economic production, taxation, society, and religion. While opportunities for adventure, travel, and wealth were undoubtedly major considerations in their leaving, the young commoners probably found that their new employment was more interesting, their labor no harder, and their conditions of services less restrictive, than at home.

The Hawaiian labor force was a key factor in the Hudson's Bay Company's Pacific Northwest operations. The Islands, although nearly 3,000 miles away from the coast, provided the best and most readily obtainable source of cheap, reliable labor. The coastal Indians, because of their close tribal affiliations, were considered unreliable. The French Canadian voyagers, on the other hand, were too highly-salaried to be employed at trading post work.

**THERE ARE NO EXACT** figures as to the total number of Hawaiians who were employed in the fur trade. However, The Friend of September 4, 1844, reported that 400 Hawaiians were working for the Hudson's Bay Company and that the Islanders comprised one-third of Fort Vancouver's compliment. The Russian-American Company is also said to have employed 1,070 Hawaiians at its North American settlements in 1851.

The Hawaiians who worked in the fur trade were generally quite highly regarded. There are few refer-

ences which do not call attention to their reliability, cheerfulness, honesty, and loyalty.

Hawaiians were employed primarily at Fort Vancouver and other interior posts where they worked as cooks, gardeners, general laborers, and herdsmen for sheep, swine, and cattle. They also achieved excellent reputations as lumbermen at Company sawmills. Hawaiians often joined trapping parties and trading expeditions. Here they filled a vital role as guards or soldiers.

**HAWAIIANS, HOWEVER** were best known for their seamanship, having been endowed with a special feeling for the sea and sailing. After a few days aboard larger ships, they became exceptional sailors on Western vessels. On these seagoing ships, where loyalty was especially prized, it was common knowledge that Hawaiians would stick by their officers in case of a mutiny or other disturbances on board. This trait was a carryover from the Hawaiian culture, where their chiefs were given unswerving loyalty from the commoners.

By 1844 the Hudson's Bay Company was paying its Hawaiian laborers at the rate of \$10 per month over a three-year contract period.

The demand for Hawaiian seamen and laborers set the stage for a dangerously large emigration from the Islands. During the century after Cook's arrival, the Hawaiian population dropped from 300,000 to 57,985. The most significant factors in this decline were the high mortality and low fertility levels caused by an appalling number of epidemics brought about by Western diseases.

However, emigration was serious enough for the Hawaiian Kingdom to attempt to control this outflow. The number of Hawaiians leaving the Islands jumped from 200 in 1823 to 4,000 in 1850. This latter figure represented about 5 per cent of the Islands' total population and 12 per cent of all Hawaiian males 18 years of age and over.

Hawaiians had originally been free to leave the Islands. By shipping on sailing vessels and working for Western companies they gained knowledge which was useful to Kamehameha I in building his foreign trade and in strengthening his army and navy.

However, as the population began dropping at an alarming rate, the Kingdom forbade Hawaiians to leave without governmental approval. Ship captains were also required to sign a \$200 bond to insure the safe return of Hawaiian seamen within three years.

See p220

THE MONK SEALS

by Judith E. King  
1956

205

I. *Monachus monachus*

History

The monk seal appears to have been always well known to the inhabitants of the Mediterranean area. Clark (1952) notes that bones of this seal were found in upper palaeolithic levels at Grimaldi, and there is evidence that seal hunting was quite an important activity in classical Greece. The skins were collected partly for the superstitions surrounding them and partly for use as clothes by the poor fisher folk. Boots, tents and dresses made of skin were said to protect one from lightning; a seal skin drawn round a field and then hung up by the door would save the field from hailstones, and the right flipper was supposed to be a cure for insomnia when put under the head at night. Greek writers such as Plutarch, Pliny, Homer and Aristotle knew and wrote of the seal. Aristotle must have examined one with care as he gives quite an accurate account in the *Historia Animalium*, but Keller (1887) says that on the whole the poets found the animal horrible and deformed, and objected to its oily smell. The presence of seals gave rise to many stories. The "half animal fish eaters" on the west coast of Africa were said to have made a pact with the seals not to interfere with each other's fishing, and in the *Odyssey* a woman who died on board ship was thrown overboard to serve as food for the seals and fishes. Because of their love of sun and sea the seals were put under the protection of Phoebus Apollo, the sun god, and Poseidon, the sea god. The seal was frequently shown alive in these times. Even then their docility and intelligence were noted, and Pliny tells how he saw some which answered by growls when their names were called. In earlier days there must have been more monk seals round the Greek coasts than there are now, as several towns have taken the name of the seal. Phocis is the name of an ancient Greek district that stretched past Mount Parnassus to the Gulf of Corinth, and there is at the present time Foca at the north end of the Izmir Gulf, Turkey, and Foča, an inland town in Yugoslavia. Keller (1887) notes that very ancient pre-Darian coins (ca. 500 B.C.) show a picture of a seal, and that coins from Rhodes show a seal's head. He also mentions that etymologically the Greek word for "phoca" means the swollen or plump animal, and must have been first applied, though not in a taxonomic sense, to the monk seal.

Some of the later history has been summarized by Monod (1932). An Italian map of the fourteenth century shows an island between Lanzarote and Fuerteventura in the Canary Islands called Ya de Uegi marini—the island of sea wolves—to-day called more simply Lobos Island; and in 1341 Niccoloso di Recco included seals in an inventory of the Canary Islands. In the fifteenth century Portuguese explorers found numerous bands of monk seals and killed many for their skins, and in 1434 Alfonso Baldaya started the industrial exploitation of the seals in the bay Rio del Oro, north of Cap Blanc. A traveller named Zarco reached Madeira in 1418 and named a small cove Câmara de Lobos because of the seals he found there. Rondoletius published his *Aquatilium Historia* in 1554 and included a drawing and a short Latin description of "de Vitulo maris mediterranci", but the first specific name was given by Hermann (1779) who described an animal from the Dalmatian coast

Bulletin of the British Museum (Natural History) Zoology Vol. 3 No. 5

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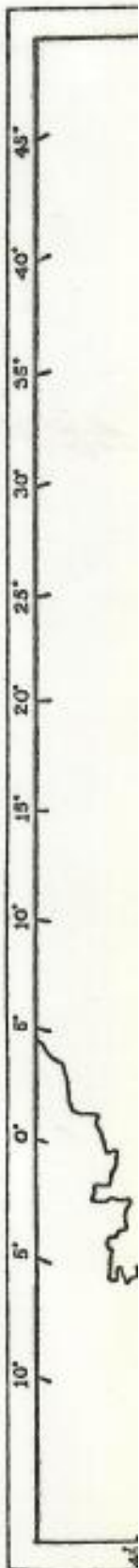
and called it *Phoca monachus*. Buffon (1782) mentions that seals from the Adriatic were kept in captivity in France and Germany in 1760, and describes a female seal that was on exhibition in Nîmes in 1777. He also gives a detailed description of a male seal that was caught on 28th October, 1777, "off the island of Guarnero" in the Adriatic. He saw this seal in Paris in December, 1778, and from the similarity of his description of it and of its locality and habits it seems that it must have been the same animal described by Hermann—a fact which Cuvier noted as early as 1813. Hermann saw the seal in Strasbourg at the end of October and beginning of November, probably in 1778, and says that it was being taken on tour by a company of Venetians who were going to Paris to show it to the King. He mentions that the seal was said to have been captured in the autumn of 1777 in the Dalmatian Sea at Ossero. Ossero is on the island of Cherso in the Gulf of Quarnero, off the Dalmatian coast. Buffon notes that the seal died in August, 1779.

Since that time there have been many references, though mostly of the occurrence of single individuals. Cuvier (1813) describes a seal that was kept in captivity for two years in a very small bath, only a foot longer and two feet wider than the animal itself. In this remarkably small enclosure it spent 9-10 hours of each day in six inches of water that were drained off each night. The London Zoological Gardens has three times kept a monk seal for short periods. The first specimen, a young female, arrived in May, 1882, but died the same day; the second was in 1894, when a young animal from Madeira lived there for three and a half months; and the last was in 1910, when a second animal from Madeira lived for four months. In 1926 the American Museum of Natural History received skins and skeletons of three seals from the Desertas Islands; these were believed to be the first Mediterranean seals in American museums. More recent references have again been concerned mainly with isolated occurrences, and there is at the time of writing a male monk seal from near Oran that has been in captivity for about two years in the Jardin des Plantes in Paris.

#### *Distribution and abundance*

The Mediterranean monk seal is known from the shores and islands of the Mediterranean and the western coast of North Africa (figs. 1 and 2). It has been recorded from: Gulf of Almeria, Spain; Cabrera, Balearic Is.; Toulon; Corsica; Cape Teulada and the Gulf of Cagliari in Sardinia; the island of Pelagosa in the Adriatic; the Gulf of Quarnero and Fort Opus in Yugoslavia along the Dalmatian coast; the Gulf of Salonika in north Greece; Cape Caliacra, and generally in the Black Sea and Bosphorus; Tantoura; El Arish; Port Said; the island of Galite off the Tunisian coast; Oran; Madeira and the Deserta Grande Islands; the Canary Islands, and along the African coast, including Cap Barbas, Baie d'Etoile and Baie du Levrier, to Cap Blanc.

Budker (1945) says that the southern limit along the African coast is 20° 49' N. (approximately the latitude of Cap Blanc), that its limit of distribution is influenced by the temperature of the sea and corresponds with the 20° C. winter isotherm. In the British Museum collections there is an Ascarid from a monk seal taken in Senegal





(approximate latitude  $15^{\circ}$  N.). It has been in the Museum since 1863, but there is no other information about the host.

Apart from the few references given by Monod (1932) for the fourteenth and fifteenth centuries there do not seem to be any other accounts of large scale commercial exploitation of the monk seal, although during a visit to Madeira in

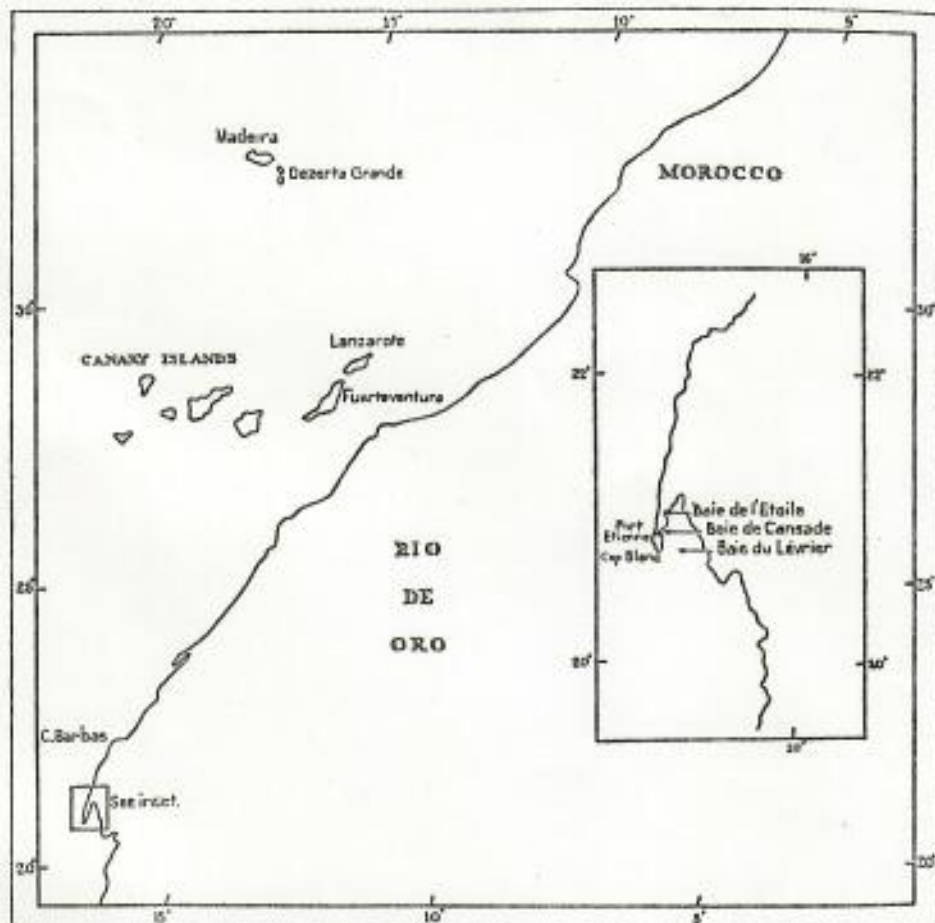


FIG. 2.—Map of Mauritanian coast and Atlantic islands, and inset of Cap Blanc to show distribution of *M. monachus*.

1945, Cadogan (1945) heard that "in 1943-4 a consignment of some twenty-five seal pelts had been seized by the Customs Officials at Funchal, and it was not thought likely that any further attempt would be made to commercialize them for the present". Any commercial use of an animal necessarily implies its abundance in the area. Admiral W. H. Smyth, writing of the period 1810-1824 (in Flower, 1932) says that "between Alexandria and Benghazi . . . we found fish and seals in

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abundance", but from then up to the present day there have been references only to single animals or small groups. Barceló (1875) said that seals were very common on the shores of the Balearic Islands at the time he wrote, but Cabrera writing in 1914 notes their disappearance from these parts. Aharoni (1930) notes that the seal is quite often offered for sale by fishermen from Askalon and Jaffa. Bertram (1943) says that a seal was seen off El Arish in about 1941, and according to Monod (1945), Agacino (1950) and Postel (1950) there must still be reasonably large colonies along the western coast of Africa down to Cap Blanc. Sixty seals were seen by Postel just north of Cap Blanc, and twenty-one by Agacino along the coast of Rio de Oro, and Cousteau and Dumas (1953) note the presence of a herd of about two hundred seals at Port Etienne. An adult female was surprised and killed in a cave in Corsica in 1947 (Troitzky, 1953), and Butler (in litt.) saw a seal in the Gulf of Salonika in 1950. There is still a small breeding colony in the more isolated regions of the Desertas Islands, although the fishermen there regard it as an enemy to their livelihood. A recent report in *The Times* (11th June, 1954) says that the monk seal still appears yearly on the Turkish coast. The main stronghold of the monk seal at present seems to be along the coast of Rio de Oro, and if not molested it is probable that its numbers will be maintained there.

#### Taxonomy

The first specific description of the monk seal is that given by Hermann in 1779. He named as *Phoca monachus* a male animal captured at Ossero, on the island of Cherso, off the Dalmatian coast in 1777, and seen by him in Strasbourg. He gives a very detailed description of the seal and its habits, and also a drawing of the whole animal with details of the head and flippers (Pl. 4, A). In 1782 Buffon, not knowing of Hermann's work, described the same seal which was, in 1778, on show in Paris. He gives a very good drawing of the animal (Pl. 4, B) but only refers to it as "Le phoque à ventre blanc". These two descriptions form the basis of practically all the succeeding names which have been applied to the monk seal.

Boddaert, in 1785, used Buffon's paper as the basis for his very brief Latin description of *Phoca albiventer*, a specific name which was in use for many years. In volume two of the third edition of Pennant's *Quadrupeds*, published in 1793, Pennant gives a description of the Pied Seal, mentioning Buffon, but adding "This I saw at Chester; it was taken near that city in May, 1766". It is difficult to know whether Pennant was applying Buffon's description to a seal actually taken near Chester, Cheshire, in which case it was very unlikely to have been a monk seal, or whether he was confusing the name with Cherso on the island of that name in the Adriatic. The drawing he gives is not very good, (Pl. 4, C) and shows an animal with a broad white ring round its neck and a white spot behind one flipper, the rest of the body being black. Pennant also describes the Mediterranean seal, quoting Hermann, but giving no picture. Shaw in 1800 uses Pennant's Pied Seal and Buffon's Phoque à ventre blanc for his *Phoca bicolor*, and used *Phoca monachus* for the Mediterranean seal. He uses the drawings previously given by Buffon and Pennant and labels both of them "Pied Seal var."

In a brief footnote, in which he quotes a passage from Buffon, Peron (1816) uses the name *Phoca leucogaster*, and in another equally brief footnote Fleming (1822) first suggests the use of the generic name *Monachus*, "Some seals, as *Ph. monachus*, are said to have four incisors in each jaw. Such will probably be constituted into a new genus, under the title *Monachus*". In 1824 Cuvier suggested *Pelagios* as a new generic name for *Phoca monachus* Hermann, a name which has given rise to many variants; Cuvier himself in 1826 called it *Pelagius*, McMurtrie (1834) used *Pelagus*, and Gray (1837) used *Pelagias*. Lesson in 1828 renamed Hermann's species *Phoca hermanni*, and Nilsson in 1838 called it *Monachus mediterraneus*. In 1841 Gloger called the monk seal of the Mediterranean *Pelagocyon monachus*, and in 1848 Menis used the name *Phoca crinita* for an animal presumably from the Adriatic (book not seen). Gistel, also in 1848, proposed the generic name *Rigoon* instead of *Pelagios* of Cuvier. Giebel (1848) linked the monk seals with the southern Phocids under the genus *Leptonyx* and the subgenus *Leptorhynchus*. This part of his classification is given here in full:

"*Leptonyx*

- a. *Stenorhynchus*
  - 1. *L. serridens*
  - 2. *L. leopardinus*
- b. *Leptorhynchus*
  - 3. *L. weddellii*
  - 4. *L. rossii*
  - 5. *L. monachus*."

The last synonym was given by Gray in 1854, when he named the new genus and species *Heliophoca atlantica* on the skin and skull of a young animal from Deserta Grande, Madeira. The skull and stuffed skin of this animal are now in the British Museum collections (Reg. No. 1853.10.6.4, 1063a.)

*Description*

Fully grown adults are about 8-9 ft. long. Gavard (1927) gives the length of a female which had produced a pup as 2.42 m. (7.9 ft.), but does not say whether this length included the hind flippers or not; Troitzky (1953) gives the nose to tail length of an old female as 2.78 m. (9.1 ft.), and both Postel (1950) and Agacino (1950) note that the biggest animals that they saw were about 3 m. (9.8 ft.) long. Monod (1945) gives the length of a male animal as 2.9 m. (9.5 ft.). Of the two adult skins in the Museum collection the length of the male is 2.38 m. (7.8 ft.) and of the female 2.1 m. (6.9 ft.). These measurements are from nose to tip of tail, but should be regarded with caution as that of the male was taken from a rather crumpled dressed skin, and that of the female from an undressed but folded skin. The weight of the female seal measured by Gavard was 300 kilos (661 lb.), and that measured by Troitzky was 302 kilos (666 lb.) without the viscera.

There is a certain amount of variation in the colour of the adult seal. Gavard says that it is all black except for some patches, particularly a large one of a dirty

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white colour round the navel, and some little yellowish patches on top of the head. Agacino (1950) notes that the seal is spotted ventrally, but that there is some variation in colour and the old male may be a silvery colour all over. The light yellowish beige colour of the female described by Troitzky was also probably due to age. Cousteau and Dumas (1953) saw a large white bull in one of the caves on the islands of La Galite, but this may have been the silvery colour of old age. The monk seal now in the Jardin des Plantes in Paris is thought to be an adult animal and is chocolate brown dorsally shading to greyish fawn ventrally. It did not appear to have a white ventral patch but had several whitish scar marks along the back. An examination was made of the few skins of this species in the British Museum collections. The dressed skin of a fairly young male animal, length from nose to tip of tail 1.75 m. (5.74 ft.) (1894.7.27.3, 1063h), is dark blackish brown dorsally, with a slightly yellowish appearance due to the yellow tips of the dark brown hairs. This shades to light brownish yellow ventrally, but without a light ventral patch. The skin of an adult male (length 2.38 m., 1890.12.30.1) is generally dark blackish brown, slightly yellowish along the centre of the back and belly due to the yellow hair tips. In the centre of the belly, slightly nearer the fore flippers than the tail, is a roughly diamond-shaped patch of dirty yellow colour, about 73 cm. long and 58 cm. wide. The whole of the skin, particularly under the chin, the sides of the neck and the centre and hinder region of the back, is covered with irregularly placed streaks and spots of yellowish hair. These marks show on the under surface of the prepared skin and may possibly be due to scars. The skin of the adult female (length 2.1 m., 1894.7.27.2, 1063g) is more like the young animal than the adult male. It is dark blackish yellow dorsally, the hairs being dark brown with yellowish tips. This shades to light greyish yellow ventrally, and there is no light ventral patch. The back shows a few light scar-like streaks similar to those found on the male. These whitish streaks were also noticed on the seals examined by Hermann and Carruccio (1893); they are found on both sexes. The white ventral patch seems to be irregular in its occurrence.

The hairs of the adult are very short and bristly and lie close to the body. They are approximately half a centimetre long. The appearance of the young seal before it moults its natal coat is described from the youngest skin in the Museum collections (1892.11.7.1, 1063l). The length of the skin from nose to tip of tail is 1.4 m. (4.4 ft.). Dorsally it is a rich dark brown, shading at the level of the fore flippers to a lightish brown ventrally. On the belly, slightly nearer the fore flippers than the tail, is a roughly diamond-shaped patch of a dirty yellowish colour with a few very small light brown spots on it. The patch is approximately 34 cm. long and 28 cm. wide at its widest point. There is a small light brown area along the upper lip, and the whiskers are also light brown and oval in cross section. The texture of the hair of this young seal is quite different from that of the adult. It is soft and woolly, the hairs are 1-1½ cm. long and do not lie close to the body as they do in the adult.

The whiskers range in colour from light yellow to brown; they are smooth, not wavy as in *P. vitulina*, and oval in cross section. Nails are present on both fore and

hind flippers. That on the first digit of the fore flipper is about 2.54 cm. (1 in.) long, and the others decrease slightly in size towards the fifth digit. The nails on the hind flippers are very small and inconspicuous. The tongue has a notch in its anterior end.

Lobstein (1817) described in some detail the anatomy of the viscera of a female seal that died in Strasbourg in 1815 after touring France and Germany for two years and Troitzky (1953) gives a brief description of the viscera of a full term foetus, but the most detailed recent investigation into the internal anatomy of *M. monachus* was done by Dieuzeide (1927) on a young male seal that was captured near Oran in December 1926, and which lived for a few months in the Experimental Station at Castiglione, Italy. A brief summary of the results, taken from Dieuzeide unless otherwise noted, is given here for completeness. The length of the male animal was 1.68 m. (5.5 ft.) from nose to tip of tail, and of Lobstein's female 2.13 m. (7.0 ft.). The oesophagus which lay mainly to the left of the trachea and large blood vessels was 60 cm. long and 4 cm. in diameter and was very dilatible. The oesophagus of the adult female (Lobstein) was 97 cm. long, the small intestine 14.5 m. and the large intestine 1.3 m. The whole alimentary canal was 17.5 m. (5.74 ft.)—eight times the length of the animal. There was no definite line of demarcation between the oesophagus and the stomach, which looked more like a dilatation of the oesophagus. The height of the stomach was about 25 cm., its width about 12 cm. and it led into the small intestine, which had a length of 12 m. and a diameter of 3-3½ cm. The caecum was a small pocket and the large intestine measured a metre in length by 4 cm. in diameter. The liver was large, measuring 40 × 40 cm. and consisted of six long pointed lobes. There was a large venous sinus (a dilatation of the inferior vena cava) and the round ligament (the remains of the umbilical vein) was well represented. The gall bladder was multilobulate and when full measured 13 × 13 mm. The left lung was the larger, weighing 950 gm., while the right weighed 850 gm. The kidneys were two oval masses, the right anterior to the left, with a combined weight of 1 kg. 140 gm. They were lobed and had an extensive vascular network. The left renal vein was large and of practically the same diameter as the vena cava. It was formed from the union of three large vessels and the superficial plexus of the kidney. On the right side the vena cava followed the inner border of the kidney and received vessels from it. The right kidney was supplied from the aorta by two renal arteries which arose a little anterior to the one going to the left kidney. The suprarenals were small and almond shaped, measuring 33 × 14 mm. The bladder was very thick (9 mm.) and measured 15 × 4 cm. The prostate was reduced and the testes were internal, measuring 4 × 1.5 cm. The penis was 8 cm. long and the baculum 7.8 cm. long. The heart was oval in shape, and Dieuzeide gives a detailed description of its anatomy.

Several species of parasites have been recorded from the stomach and intestine (Joyeux and Baer 1936, Baylis 1937, Markowski 1952). There are two Nematodes—*Contracaecum osculatum* (Rudolphi 1802) and *Porrocaecum decipiens* (Krabbe 1878), and four species of Cestode—*Diphyllobothrium coniceps* Linstow 1907, *D. elegans* (Krabbe 1865), *D. lanceolatum* (Krabbe 1865) and *D. hians* (Diesing 1850).

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Remarkably little information is available about the breeding habits of this seal. Practically all that is known is in a recent paper by Troitzky (1953). In this she mentions that after a gestation period of eleven months the pups are born on land in September and October and are fed by the mother for six or seven weeks. The female has four teats on the posterior part of the abdomen and lies on her side when feeding the pup. At the end of this time the pup moults its woolly coat and enters the water for the first time. Troitzky says that the young seals stay with their mothers for three years, that they do not begin to breed until they are four years old, and that mating of the adult animals takes place about seven or eight weeks after the birth of the pup. The sum of eleven months' gestation plus seven or eight weeks before mating makes a total breeding cycle of thirteen months, and although it is usual in most Phocids for the female to bear a pup at the same time every year, Troitzky says that this seal only has a pup every alternate year.

Apart from Troitzky's paper, most of the information about breeding times has to be inferred from records of still born pups, foetuses and young animals. Dathe (1934) records that a young female seal was caught on 19th September, 1933, on the Dalmatian coast. The umbilicus was not yet healed and the animal was thought to be only a few days old. Its length was approximately 90 cm. and it weighed 26 kilos. This little animal was kept in captivity and was going to be taken to Frankfurt Zoological Gardens. It was fed by bottle six or seven times a day on a mixture of half gruel and half milk with a little cod liver oil and freshly rubbed fish paste. On 26th September it was taken to Split, preparatory to moving to Frankfurt, but the journey re-opened a wound on its stomach, caused probably by a fish hook, and on 29th September it died, its length then being 1.20 m.

Carruccio (1893) notes that a foetus 50 cm. long was taken from a pregnant female on 21st May, 1891, and Gavard (1927) mentions a captive female that produced a still-born pup on 14th April, 1926. This pup weighed 2.25 kilos and measured 62 cm. Both these foetuses are of such a size that they would have been full term and born about September, and it is strange that Postel (1950) should say that the pups are born in the spring. Agacino (1950), who went to Las Cuevecillas, Rio do Oro on 26th December, 1945, says that at that time the smallest seals were 1.5 m. long, and that a mother was seen to be feeding her pup. This must have been a pup born very late in the season, probably about the middle of November.

The voice is said to be a sharp strong cry from the bottom of the throat (Cuvier, 1813), while Agacino (1950) says that when they are annoyed they make a noise like a wounded dog. Hermann said that the one he observed had a voice like that of a hoarse dog and that sometimes it would howl. This seal could not tolerate dogs, and would try to drive them away by clapping its teeth. The seals kept in captivity have all been noticeably intelligent and docile animals. They have become attached to their keeper and would recognize him, follow him about, and even obey his orders to a certain extent.

The feeding habits, as observed in captivity, are very interesting. The animal described by Hermann ate about 14 pounds of fish daily and in order to stress the expense of keeping it, inquisitive spectators were told that it ate only the best fish,

such as eels and trout. It did occasionally receive eels and carp, if paid for by the spectators, but usually it had whiting. It took the fish either out of the keeper's hands or caught them in its tank, but preferred to eat them in water. It seized the fish by the head, squeezed and shook them a few times and then swallowed them whole. Often intestines of the fish were found in the water, and although the keeper thought this was done deliberately, Hermann suggested that the insides of the fish came out accidentally when it was squeezed. Buffon saw the same animal while in Paris and said that there it was fed mainly on carp and eels, preferring the latter. The fish were sprinkled with salt, the eels eaten whole, but the carp were crushed with the teeth, let fall and then the belly of the fish ripped open and the entrails removed. The fish was then seized by the head and swallowed. Cuvier also notes that the entrails were removed and the fish swallowed head first. The seal at present in Paris was also seen to swallow its fish head first, and this has also been observed in *Halichoerus grypus* and *Phoca vitulina*. Indeed it seems possible that this method might be the normal one for Pinnipeds generally, as it would avoid any injury to the seal by the backwardly projecting fins, scales and spines of the fish. Two female seals described by Gavard (1927) also disembowelled their fish unless they were very small, and also were unable to pick the fish off the ground, and could eat them only in water. They ate sardines, bonito and octopus—about 12 kg. a day. Boettger (1951) notes that native fishermen along the African coast say that the seals eat fish and lobsters (*Palinurus*), and remains of fish of the genera *Dentex* and *Labrax* have been found in the stomach of a seal captured off Sardinia (Carruccio 1893). A monk seal in the Gulf of Salonika was seen to be playing with a large fish, tossing it into the air and catching it again (Butler in litt.)

Troitzky (1953) describes an adult female seal that was killed in a cave on Corsica in September, 1947. It was found to be pregnant and a full-term foetus was removed, but could not be revived. The pup, a female, was 120 cm. long and weighed 17 kilos. It was dark, greyish black colour, with a white ventral patch. Troitzky notes that the pup in its colouring did not differ from descriptions of what she regarded as "typical" *M. monachus*, but says that the mother was not so. She observes that in its dentition, its great size, and the time of breeding the adult resembles *M. monachus*, but the shape of its head with a long snout, the light colour, the absence of the white ventral patch, and the second digit of the fore flipper longer than the first are characters not associated with that species. After reviewing other members of the Phocidae she comes to the conclusion that these characters are more like those of Arctic Phocids, and says that the most logical conclusion is that this female is a hybrid, the result of a cross between a monk seal and, probably, *Phoca groenlandica*, and that it is interesting that such a hybrid should have been able to produce a pup.

It is considered extremely unlikely that such a cross could have taken place. *Phoca groenlandica* and other members of the Arctic Phocidae have not been recorded from the Mediterranean in Recent times, and indeed, they seldom occur south of Arctic latitudes. From the description of the teeth—worn, broken and diseased—it is assumed that the animal was old, and the light colouring was probably also due

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to age. The white ventral patch is not of universal occurrence amongst the monk seals. It is not possible to comment on the other two characters, from lack of exact information, but from the photograph of the adult seal, as far as it is possible to see the shape of the fore flipper does not appear to be unusual and the drawings and photograph of the skull do not appear to differ in any way from undoubted skulls of *M. monachus* in the Museum collection.

## II. *Monachus tropicalis*

### History

The first reference to the monk seal of the West Indies is that given in the account of the second voyage of Columbus. At the end of August, 1494, the ship anchored by the rocky island of Alta Vela, south of Haiti (= Hispaniola), and the men that went ashore killed eight "sea wolves" that lay sleeping on the sand (Kerr, 1824). The next record chronologically, and the first for Florida, is that of Herrera who, while describing Ponce de Leon's discovery of the Dry Tortugas Islands (lat.  $24^{\circ} 10'$  N. long.  $83^{\circ} 55'$  W.) on 21st June, 1513, said that a foraging shore party took fourteen seals (Moore 1953). Du Tertre (1667) was told by Brother Charles Poncet, who had been to Guadeloupe, that he had seen at least twenty asleep under the trees near the shore, and many of them were killed. Dampier (1705) noted that there were seals on the Alacrane Islands in 1675. Sloane (1707) saw them on the Bahama Islands in 1687, and Olafsen (1774) makes a reference to the seal of the Antilles. Hill (1843) gives a description of a young seal from Pedro Kays, and Gosse (1851) published an account of a voyage in 1846 by Mr. George Wilkie to Pedro Kays, where he saw several seals and killed a few. It was on this voyage that the type skin of *Phoca tropicalis* was obtained. In 1883 the U.S. National Museum received a mounted skull and skin from a female seal captured off Cuba earlier in the same year and presented by Prof. Felipe Poey (True and Lucas, 1885). In 1886 H. L. Ward and Prof. F. Ferrari Perez of the Mexican Geographical and Exploring Survey set out from Campeche to the Triangles to search for *Monachus*. (Ward, 1887b). Although they were only on the islands from 1st to 4th December, forty two specimens were taken away and shared between the two members of the expedition. Of the specimens retained by H. L. Ward a complete articulated specimen (1887.8.5.1), and a skin and skull (1889.11.5.1) are now in the British Museum (Natural History), and an articulated specimen (899c) is in the Cambridge Zoological Museum. These last two specimens were purchased from Ward by F. D. Godman of Cambridge. A recently born pup was taken back to Campeche, but it lived there only a week. A female seal was captured at the Triangles in 1897 and lived for nearly  $5\frac{1}{2}$  years in New York Aquarium, where it died in 1903. (Anon 1903). E. W. Nelson and E. A. Goldman, during their biological investigations of Mexico from 1892 to 1906 (Goldman, 1951), spent the period 18th to 23rd June, 1900, on the Triangles. Their main object there was to obtain specimens of seals, but apart from remarking that "in quest of these animals we were very successful", no mention is made of their abundance, or how many were killed. The New York Aquarium received four more

seals—an adult male and three yearlings—in June, 1909 (Townsend 1909). These were obtained from a dealer in Yucatan who presumably got them from from the Triangles or the Alacrane Islands. Several seals were seen on the Tortugas Islands during the period 1903-8 and two were kept in a moat for some time, where they became fairly tame (Moore, 1953). Six seals were captured by a fishing vessel in 1915 and taken to Pensacola, where they were kept in captivity for some time and then turned loose, when bathers in the area objected to their presence (Allen 1942). Townsend (1923) notes that a seal was killed near Key West, Florida in March, 1922. Gunter (1947) gives sight records of seals along the Texas coast in 1926 and 1932, and Lewis (1948) says that a young seal was killed at South West Kay in the Pedro Group in 1939. A. C. Wheeler (in litt.) saw two seals on the beach of Drunken Man's Cay, about two miles south of Kingston, Jamaica in November, 1949.

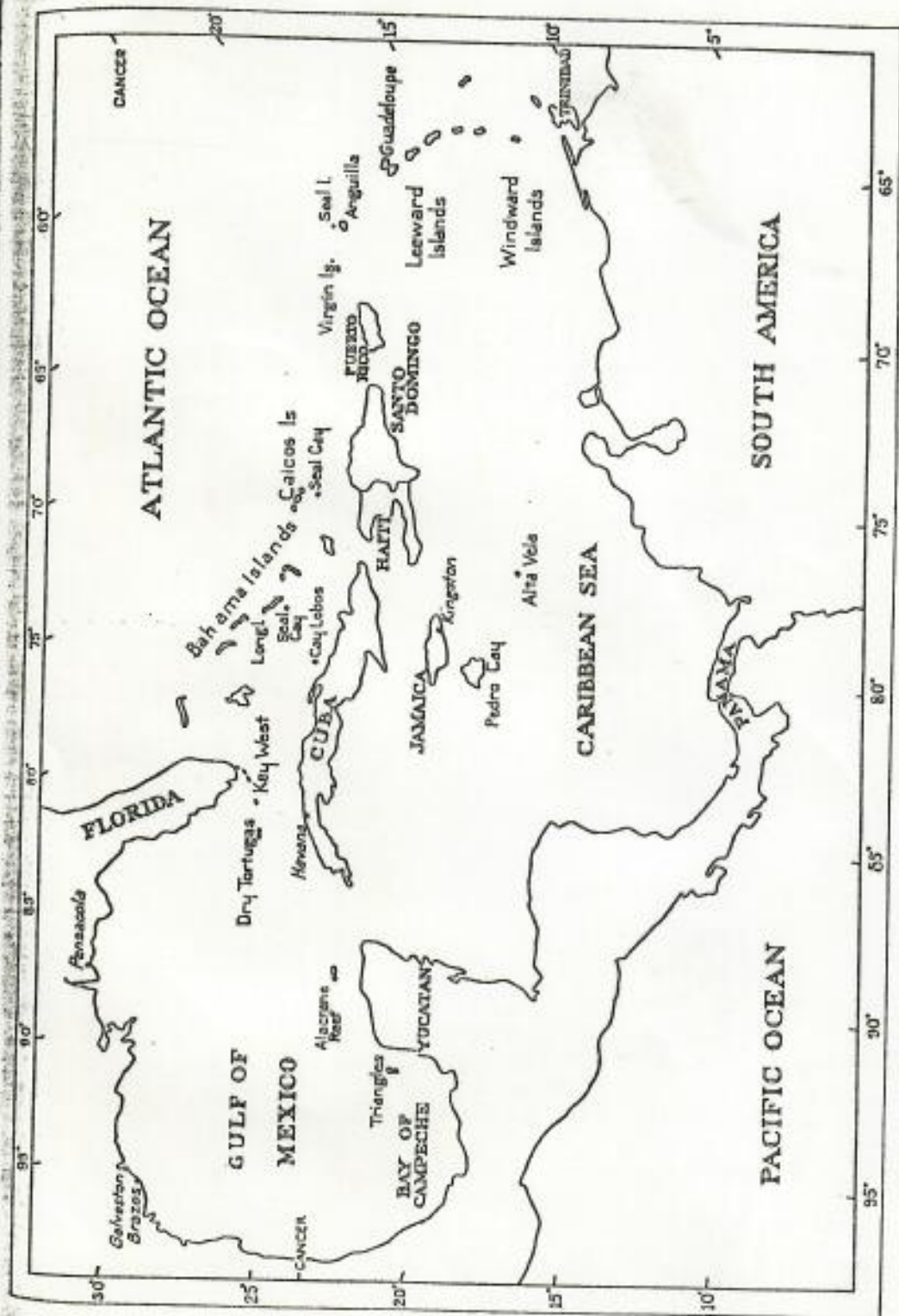
#### *Distribution and abundance*

The West Indian monk seal was at one time abundant in the Gulf of Mexico and off the islands in the Caribbean Sea (Fig. 3.). The presence of numerous Seal Cays and Islands and Lobos Cays show how widely the seal was distributed in the area.

1. Seal Cay, south of Long Island, Bahamas. lat.  $22^{\circ} 38' N.$ , long.  $75^{\circ} 54' W.$
  2. Seal Cay, south of Caicos Bank, Bahamas lat.  $21^{\circ} 10' N.$ , long.  $71^{\circ} 47' W.$
  3. Seal Island, north of Anguilla, Leeward Is, W. Indies lat.  $18^{\circ} 24' N.$ , long.  $63^{\circ} 20' W.$
  4. Cay Lobos, north of Cuba, lat.  $22^{\circ} 25' N.$ , long.  $77^{\circ} 36' W.$
- and Allen (1887a) gives the following :
5. Seal Keys—on the coast of Honduras in about lat.  $16^{\circ} N.$ , a few miles north-east of the Mosquito Coast.
  6. Seal Key—about 200 miles further south along the same coast in about lat.  $12^{\circ} 40' N.$

It has been recorded from the Bahama Islands ; Key West, Florida ; Galveston Bay and Brazos, Texas ; the Triangle Islands to the west of Yucatan, lat.  $20^{\circ} 55' N.$  long.  $92^{\circ} 12' W.$  ; the Alacrane reef to the north of Yucatan, lat.  $22^{\circ} 32' N.$ , long.  $89^{\circ} 45' W.$  ; the shores of Cuba and Jamaica ; the Pedro Kays to the south of Jamaica, lat.  $17^{\circ} N.$ , long.  $77^{\circ} 30' W.$  ; Alta Vela, a rocky island south of Haiti ; and Guadeloupe.

That the seal has formerly been abundant is evident from some of the earlier accounts. Dampier (1705) said of his visit to the Alacranes in 1675 : " Here are many seals . . . the Spaniards do often come hither to make Oyl of their Fat ; upon which account it has been visited by English-men from Jamaica, particularly by Capt. Long : who having the Command of a small Bark, came hither purposely to make Seal-Oyl." Sloane (1707) gives the following account of the seals of the Bahamas, " The Bahama Islands are fill'd with Seals, sometimes Fishers will catch one hundred in a night. They try or melt them, and bring off their Oil for Lamps to these Islands." In 1856 a Mr. Alexander was on the Triangles and saw only two

FIG. 3.—Map of Caribbean region to show distribution of *M. tropicalis*.

living seals, but remains of skeletons and hides indicated a once flourishing business; and although H. L. Ward does not say exactly how many he saw in 1886, there must have been quite a large colony as he killed over forty animals (Ward, 1887b). Allen (1887a) suggested that at the time of his writing seals were still present on the islets of Salt Key Bank, north of Cuba, the isles off Yucatan, and probably the isles between. In 1897 at the time of the capture of the seal for New York Aquarium about thirty were observed on the Triangles (Anon 1903), but as late as January, 1911, according to Lewis (1948) about two hundred seals were killed in this locality and at the time his paper was published he thought that there were perhaps still a few left there and on the South West Kay in the Pedro Group. In view of the fact that seals have been seen as recently as 1949 near Jamaica, and that Moore (1953) quotes a "well informed and responsible friend" who knows of the whereabouts of seals somewhere within their former range, it seems likely that a remnant of this species is still living.

#### Taxonomy

During Mr. George Wilkie's visit to the Pedro Kays in 1846 (Gosse, 1851) he obtained the skin of a monk seal which he gave to Gosse. Gosse sent this skin, which had no bones with it, to the British Museum where J. E. Gray published a description of it under the name *Phoca tropicalis* Gray, 1850. This skin has been stuffed and is in the Museum collection (Reg. No. 1847.2.2.2). Gosse (1851) republished the description of the seal given by Hill (1843), and in a footnote on p. 308 suggested the specific epithet "*wilkianus*", but he gave no generic name, and moreover, was already antedated by Gray. In 1866 in the *Catalogue of the Seals and Whales in the British Museum* Gray repeated the descriptive paragraph he gave in 1850, but used the name *Monachus tropicalis*.

#### Description

The nose to tail length of an adult male animal is between 7 and 8 ft., females being in general slightly smaller. Townsend (1906) gives the length of an old female with very worn teeth as 9 ft., but he was probably measuring to the tips of the hind flippers. The nose to tail lengths of both the skeleton in the British Museum, (probably a female) and that in Cambridge, (sex unknown) are both about 7 ft. 3 in. The nose to tail length of a dressed skin of an adult male (1889.11.5.1, 1064b) is 7 ft. 5 in., and Ward (1887b) gives nose to tail lengths of two pregnant females as 7 ft. 1 in. and 6 ft. 6 in. A female measuring 6 ft. 11 in. to the tip of the hind flippers and which had been in New York Aquarium for 5½ years weighed 360 pounds at death. This seal died from fatty degeneration of the heart, liver and kidneys, so presumably a healthy animal of this size would weigh less.

Ward (1887b) gives the following description of the colour of the adult seal: "Adults are grayish brown or grised on the back, a result of the Vandyke-brown hairs being tipped with light horn-color, the lower surface ochreous yellow to yellowish white. Females seem to have much less of the yellow or white on the ventral surface. From the black pelage of the extremely young to that of the adult

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there is an intermediate stage of yellowish gray on the dorsal surface, shading to almost a perfect ochre on the ventral portions." This is the most reliable account of the colour, and corresponds well with that of the stuffed specimen in the Museum, which is the type of *Phoca tropicalis* Gray. This animal is dark brown, and slightly lighter on the sides and belly. The hairs of the back are dark brown with a lighter tip, while those of the sides and belly have a more yellow tip. The hairs lie close to the body and are extremely short, the longest—those on the sides—being about 1 cm. long. A dressed skin of an adult male from the Triangles in the Museum collection (1889.11.5.1, 1064b) is dark blackish brown all over, with a slight yellowish tinge due to the yellow tips of the hairs. New born pups are black in colour and the hair is long, soft and woolly.

The whiskers are yellowish horn colour, some being slightly darker at their bases. Those of the Museum specimens are oval in cross section. Nails of appreciable size are present only on the fore flippers. That on the first digit is about an inch long, those on the remaining four digits decreasing gradually in size. The nails of the hind flipper are very small.

The description of the eye is given by Ward (1887b): "The pupil is medium sized, round, and well defined, the iris is light reddish brown in color, and with but little of the sclerotic coat showing. Over the cornea there appears a deadening film . . .", which he attributes to the strong reflection of the tropical sun from the coral sands.

Young animals are born about the beginning of December. Ward (1887b) was on the Triangles from 1st to 4th December and killed five females with full-term foetuses, and noticed another female with a new-born pup. The female has four teats. One of the foetuses measured 85 cm. from nose to tip of tail, was covered in black woolly hair and had black whiskers. Measurements of the skull and skeleton of this pup as well as those of adult animals collected by Ward are given by Allen (1887a).

Ward examined the stomach contents of several animals, but found only fluids and large numbers of intestinal parasites several inches in length. Gosse (1851) recorded the opinion of the "more experienced fishermen", who said that the seals fed "as generally on molluscous animals as on fish", but there is no proof of this. The animal noted by Hill (1843) lived for four months in captivity, without eating, and when it died "the fat was four inches thick and yielded four gallons of oil". The skull of this animal, which was then, as Hill (1846) says "an undescribed Seal", was exhibited at a meeting of the Zoological Society of London in September, 1846. Unfortunately it has not been possible to trace this skull, which was probably the first specimen of the West Indian monk seal to reach this country, arriving here shortly before the skin sent by Gosse which became the type.

The West Indian monk seal appears to be a fairly noisy animal. Hill (1843) said that his young animal "grunted, barked, growled and snarled like a dog", and Ward (1887b) said that the voice of the young was "a long drawn out guttural 'ah' with a series of vocal hitches during its enunciation". Townsend (1909) also noted that it was noisy, and the young often roared harshly.

On land at least the seal seems to be rather lethargic. Ward (1887b) notes that unless the seals were approached closer than three or four feet they showed no interest or alarm. Closer than that they would rouse themselves, bark, and move off a little. When Ward and his party attacked a group of seals they got more excited and would make savage rushes, and would then fall back on their dead fellows and bite and shake them. Nevertheless, as Ward notes "the whole aspect of the animals was one of indecision . . . they only roused themselves to action on being individually attacked". This behaviour is not peculiar to the monk seal, but seems to be common to all seals. Ward also notes the peculiar circumstance that several of the animals he collected had a growth of minute algae upon their backs and flippers, especially the hinder ones, so that they appeared quite green.

Although Ward says they are neither curious nor playful, Hill (1843) notes that the young specimen he kept in captivity was lively, and those kept in New York Aquarium were certainly playful. The two which were received in 1897 had the habit of filling their cheeks with water and squirting it at visitors, while the seal which arrived in 1909 amused itself by tossing flipperfuls of water into the faces of visitors.

### III. *Monachus schauinslandi*

#### History

The Hawaiian or Sandwich Islands are a chain of small islands near the centre of the North Pacific Ocean between  $18^{\circ} 55'$  and  $28^{\circ} 25'$  N., and  $154^{\circ} 48'$  and  $178^{\circ} 25'$  W. (Text-fig. 4); Honolulu on the island of Oahu being 2,100 miles S.W. from San Francisco and 3,445 miles S.E. from Yokohama. The chain stretches 1,578 miles from E.S.E. to W.N.W. All the islands are uninhabited, except Midway which is a transpacific cable station and sea plane base administered by the U.S. Navy, and Niuhau, Kauai, Oahu, Molokai, Maui and Hawaii. The entire chain forms the Hawaiian Islands Bird Reservation.

Perhaps owing to the remoteness of the islands on which they live, there are very few references to the Laysan monk seal. In the early part of the nineteenth century seals must have been numerous as Bryan (1915) records that in 1824 the brig "Ainoa" set out from Hawaii on a sealing voyage in that area, and in 1859 the "Gambia" returned to Honolulu with 1,500 seal skins and 240 barrels of seal oil, some of which was probably from Midway Id., which was discovered on this trip. In 1893 a Mr. J. J. Williams visited Laysan and heard of an earlier expedition that had killed sixty or seventy seals on the island (Atkinson and Bryan, 1913).<sup>2</sup> In 1905 Matschie published a description of a seal skull brought back from Laysan by Dr. H. Schauinsland, and named it after him. The U.S. revenue cutter "Thetis" returned in 1912 after a cruise to Midway and Laysan and brought back a seal skin which was presented to the Bishop Museum in Honolulu (Bryan, 1915) and parts of three others which are in The U.S. National Museum. Thirty five seals were seen on Pearl and Hermes Reef in 1913 (Atkinson and Bryan 1913), and Dr. Wetmore, who visited the area with the U.S.S. "Tanager" Expedition in 1923 saw a number of seals and collected ten for the U.S. National Museum (Bailey, 1952). In 1940 about

1. Bryan, W.A. 1915. Natural History of Hawaii. pp. 596, 117 pls.
2. Atkinson & Bryan, 1913. A rare seal. Bull. N.Y. Zool. Soc. 16: 1050-1051.

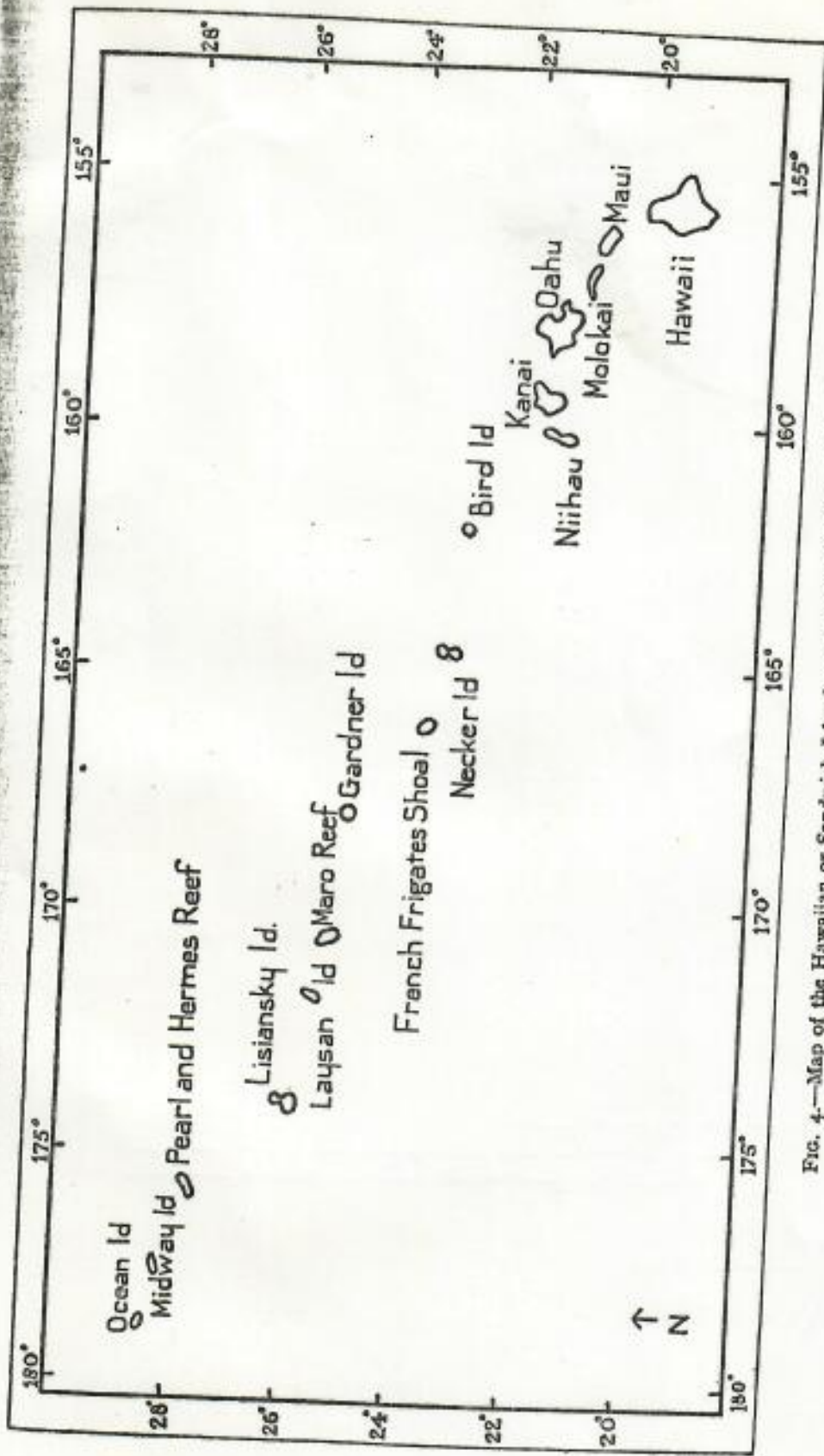


FIG. 4.—Map of the Hawaiian or Sandwich Islands to show distribution of *M. schauinslandi*.

half a dozen were seen round Midway (Blackman, 1941) and records of visits to the islands in 1949 and 1951 show that quite large numbers were seen resting on the beaches. The first, and it is believed, the only seal of this species to be kept in captivity outside the Hawaiian Islands was a young animal which was presented to San Diego Zoo by the Honolulu Zoo in 1951 (Anon, 1951). It was captured on French Frigates Shoal but only lived about three months in captivity.

#### *Distribution and abundance*

The Laysan seal has been recorded from the following of the Hawaiian islands: Ocean Island, Midway Island, Pearl and Hermes Reef, Lisiansky Island, Laysan Island, French Frigates Shoal, and a stray animal has been recorded from the coast of Hawaii, although they do not generally appear to go so far eastwards.

In 1824, 1859 and 1893 the seals were obviously very numerous, although in Schauinsland's own account of his visit to Laysan (Schauinsland, 1899) he only mentions that "seals come singly, indeed very seldom by the island". In 1912, Elschner (1915) who was also on the "Thetis" during its trip, noted that there were many seals on French Frigates Shoal and Pearl and Hermes Reef. Also on the latter island thirty five seals were seen in 1913 (Atkinson and Bryan, 1913). The U.S.S. "Tanager" Expedition sailed from Honolulu in April, 1923, for a visit to the Hawaiian Islands. The *Bulletin of the Bishop Museum* in Honolulu (Bull. 10, 1924) only mentions that several seals were seen on Lisiansky on this voyage, and that two skins and skulls were collected; Allen (1942) however, notes that Dr. A. Wetmore while on this expedition saw colonies of seals on Pearl and Hermes Reef and on Ocean Island, and estimated the total population to be about four hundred, and Bailey (1952) notes that he brought back ten specimens for The U.S. National Museum. Sixty eight seals were seen on Pearl and Hermes Reef in 1930, and five on Laysan in 1936 (Bailey, 1952), and Blackman (1941) who stayed for six months on Midway in 1939-40 saw about six seals. More recent visits to the islands (Bailey, 1952) show that the animals are still fairly numerous there. About thirty were seen on Laysan and over a hundred on Midway. A count of seals made in 1951 showed a total of 407 on the beaches, the largest populations being on Laysan (119) and Pearl and Hermes Reef (180). The others were seen on French Frigates Shoal, Maro Reef, Lisiansky and Midway. It was suggested that the large numbers on the beaches could perhaps be accounted for by the presence of tiger sharks in the water.

The monk seals are distinctive in being the only truly warm water form of Phocid, with the exception of the northern elephant seal (*Mirounga angustirostris*). So far as the distribution of the three species is concerned it is not difficult to accept the occupation of the West Indian islands from a source in the Mediterranean and along the Mauritanian coast, as the Canary Current passing down the latter coast would bear the emigrants to the eastern limit of the North Equatorial Current sweeping due west to the Caribbean Sea. The extension of the range of the genus to Hawaii and across the Isthmus of Panama is feasible when it is accepted that Phocids are capable of considerable overland journeys. For example Hayes (1928, p. 106) records that Captain Scott, when in the Antarctic, found seal carcasses as far as fifty miles inland

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and 5,000 ft. above the sea. The Isthmus of Panama at its narrowest is much less than fifty miles, and its lowest height above sea level less than 200 ft. If rivers were exploited by the seals the distances travelled overland might have been still further diminished. The North Equatorial Current in the Pacific could well have borne the animals to the islands they now occupy. Allen (1942) suggests that the colonization of the Pacific by the monk seal was from the West Indian stock in Tertiary time, when there was a waterway connecting the Atlantic and Pacific.

#### Description

Of the few records available only those of Matschie and Bailey (1952) give any information about the external features and Bailey includes some excellent photographs. A male, probably not full grown, collected by the "Thetis" measured 5.7 ft. from tip of nose to tip of tail, and a female 7.5 ft. Matschie gives the following description: "A scalp which I have for examination has very short, thick, bristly hair, loam coloured, with a silky shine. The lips are yellow-gray, and it is somewhat brownish on the front side of the neck. Most of the whiskers are light horn coloured, a few dark brown, and all with very thin points. The sides of the body of the stuffed animal in Bremen Museum are lighter than the back, the breast and stomach are whitish." Bailey notes that the underparts are light straw yellow and the back is dark slate grey.

While on the "Tanager" Expedition Dr. Wetmore examined the stomachs of seals for parasites. All the seals had abundant nematodes in the stomachs and Chapin (1925) has described these as a new species *Contracaecum turgidum*. Cestodes, *Diphyllobothrium hians*, were also found.

The birth of the young seals evidently takes in January. The "Thetis" saw pups at this time in 1912, and one was born during the visit of Governor Frear to Pearl and Hermes Reef in January, 1913 (Atkinson and Bryan, 1913). The young male seal that lived in San Diego Zoo for a short time (Anon, 1951) was received in May and died probably at the beginning of September. It was therefore about eight months old at the time of its death. It is described as a nursing pup of approximately three feet long. It had a silver-tinged coat which was dark brown above, paler on the sides and nearly white ventrally. The muzzle was whitish and had many coarse whiskers.

Atkinson and Bryan note that the seals are fearless and readily handled, and Blackman (1941) says that if cornered they threaten the intruder by opening their mouths widely and uttering an abrupt barking noise. He also says that they do not migrate, and probably feed on squid and fish. Bailey notes that an animal collected by Henry Palmer in 1891 had its stomach full of half digested fish; and he also makes an interesting observation that a large male seen in 1949 had a greenish-coloured face, but what the cause of this was he did not say.

#### SPECIMENS EXAMINED

The following specimens of *Monachus* have been examined. The list includes stuffed animals and skins, and unless otherwise mentioned the specimens are in the British Museum (Natural History).

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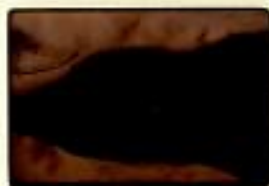
J. Brent Giezantner  
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Elephant Seal at  
Midway Giezantner

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Elephant Seal at  
Midway Giezantner

DEC 7812



Elephant Seal at  
Midway 4/78 Giezantner

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Elephant Seal at  
Midway Giezantner

