

OFFSHORE OBSERVATIONS OF TROPICAL SEA BIRDS  
IN THE WESTERN PACIFIC

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DURING parts of 1945 and 1946 we made several voyages among the island groups of the western Pacific Ocean. As time permitted, counts of sea birds were made as an index to population densities in tropical waters. We tried also to determine the offshore distributions of the species encountered. The data presented here were gathered from an area of the North Pacific Ocean characterized by a fairly uniform oceanic bird fauna. Outlying stations which delimit the area selected are: a point approximately 500 miles northeast of Hawaii at about 148° W and 25° N; Ponape at about 7° N in the Caroline Islands; the vicinity of Rasa Island at approximately 24° 30' N and 131° E; and the area about the Bonin Islands, approximately 29° N. Included are waters near the Hawaiian, Marshall, Caroline, Mariana, Volcano, and Bonin island groups (Fig. 1). The northern limit of the area thus defined coincides in a general way with the January isotherm for 68° F; thus the area lies within the range of distribution of reef corals as mapped by Joubin (1912:299). The avifauna of these waters is a tropical one (Alexander, 1928:357); for example, typically temperate birds such as gulls do not occur regularly in this part of the Pacific Ocean.

Observation periods at sea are listed below:

<i>Inclusive dates within area defined</i>	<i>Route</i>	<i>Hours of observation</i>
July 6-9	Okinawa, Ryukyu Islands to Guam, Mariana Islands	13
August 1	Saipan, Mariana Islands to Iwo Jima, Volcano Islands	4
August 7-8	Iwo Jima to Saipan	8
August 21-26	Saipan to Okinawa	14
November 8-12	Tokyo, Japan, to Saipan	11½
December 9-14	Guam to Ponape, Caroline Islands	5
December 15-21	Ponape to Bonin Islands	9
January 9-12	Tokyo to Guam	14½
January 23	Guam to Rota, Mariana Islands	1½
January 25-26	Rota to Pagan, Mariana Islands	3
January 27-31	Pagan to Okinawa	14
February 19-24	Okinawa to Guam	16½
February 28-March 17*	Guam to Oahu, Hawaiian Islands	48½
March 22-26	Oahu to San Diego, California	7½
	Total	170

\* Day gained crossing International Date Line.

This report is based entirely on sight records made with 7 by 50 binoculars from the bridge of a landing-ship at a height of 55 feet above the water. Speed of the vessel varied from five to ten knots.

Efforts were made to count all sea birds observed during timed watch-periods of variable duration and frequency. The counts usually were made by a single observer. Minimal figures were taken when numbers of birds in a flock were estimated. For example, an approximation noted as "20 to 25 birds" was recorded here as 20. Exact distance from nearest land was recorded for each observation of an individual

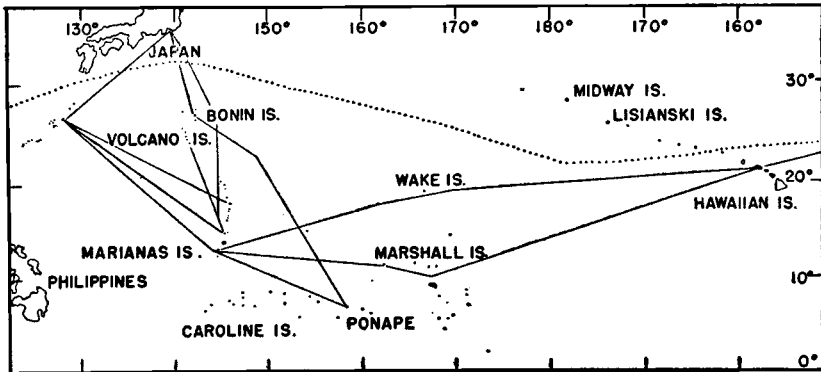


FIGURE 1.—Map of the western North Pacific Ocean showing routes traveled (solid lines). The dotted line approximates the northern limit of distribution of reef corals (modified from Joubin, 1912).

or flock. The distances were grouped later. Albatrosses, the only birds seen following the ship, were counted when first observed and additions to such flocks were counted only if they were known to be newcomers. Difficulties encountered in identification of oceanic birds led to compilation of Table 1 in which the birds are listed by generic or familial groups. Although such grouping according to higher categories masks species differences and variables such as daily and seasonal movements, it does point to fundamental differences in the offshore distribution of birds of several adaptive types. In general, the height of the breeding season for most of the tropical sea birds did not fall during the period in which our observations were made (see Fisher, 1903:775; Richardson and Fisher, 1950:304). Fewer observations were made in the area 25 to 50 miles offshore than farther out because departures from ports were made as a rule in late afternoon and arrivals during the early morning hours.

As the table shows, some types of oceanic birds range offshore more widely than do others. The tube-nosed swimmers are truly pelagic; flocks of shearwaters and petrels at considerable distances offshore are not an uncommon sight in tropical waters. While the tropic birds approach the pelagic mode of existence, they do not appear to range

as far. Perhaps this is a reflection of relative numbers and the fact that they often hunt individually. Boobies and tropical terns for the most part do not occur in numbers more than 50 miles from land. In the waters off the Marianas, they were found ordinarily foraging within 20 miles of the nearest land. Sooty and Gray-backed terns may range

TABLE 1

NUMBERS OF SEA BIRDS SEEN AT DIFFERENT DISTANCES FROM LAND, AUGUST 21, 1945, TO MARCH 26, 1946

	<i>Nautical miles from nearest land</i>						
	5-25	25-50	50-100	100-200	200-300	300-400	over 400
Albatrosses	—	2 (1)*	3 (1)	10 (6)	25 (3)	8 (2)	5 (3)
Shearwaters and petrels	3 (3)	1	93 (9)	20 (10)	82 (4)	2 (2)	—
Storm-petrels	—	—	1	—	—	—	—
Tropic birds	3 (1)	—	8 (4)	2 (2)	—	—	—
Boobies	40 (5)	1	3 (1)	1	2 (2)	—	—
Man-o'-war-birds	—	—	—	—	—	3 (2)	—
Sooty and Gray-backed terns	59 (2)	5 (1)	126 (3)	16 (4)	—	—	—
Other terns	51 (6)	—	—	1	—	—	—
Unidentified	—	—	—	1	11 (2)	—	—
Total number of individuals	156	9	234	51	120	13	5
Linear (nautical) miles surveyed	132	93	273	387	152	121	96

\* The figure in parentheses indicates the number of separate observations on which each total is based.

more extensively but probably do not do so during the nesting season. Large numbers of these birds indicated in the table were seen on one day and possibly represented migratory flocks.

Wynne-Edwards (1935:240) proposed an ecological classification of sea birds of the temperate North Atlantic. The three major groupings were inshore (foraging within sight of shore), offshore (seaward limits coincident with extent of the continental shelf), and pelagic. Because of the proximity of the 100-fathom line to shore in Micronesian waters, those areas lying but a few miles from the islands probably would be impoverished faunistically. Thus the feeding grounds of land-based birds might be expected to lie close to shore. This was found to be the case. Restriction of offshore birds to the proximity of land, presumably enforced by poorness of the surrounding waters, makes the distinction between inshore and offshore types difficult in the area dealt with here. Nevertheless, Wynne-Edwards' classification appears to be applicable in a general way to these tropical waters.

Accounts of the paucity of bird life in deep waters of the tropics have been summarized by Murphy (1936:88). In general, a correlation with available food may be made as shown by Jespersen (1930:14).

He found (p. 10) that the Sargasso Sea supported the least dense seabird populations in the North Atlantic. In those parts of the North Atlantic lying south of the 40th parallel he reported that no birds were observed on 28.1 per cent of the days spent more than 50 miles at sea. During our travels in the western North Pacific, 50 days were spent at distances greater than 50 miles from nearest land. On 14 of these days (28 per cent) no birds were seen. On a voyage from Guam to the vicinity of Wake Island, neither birds nor flying fish were seen in the period from March 1 to March 5 inclusive; four consecutive birdless days were the most recorded by Jespersen in the North Atlantic.

The following observations of individual species seemed noteworthy.

*Diomedea immutabilis*, LAYSAN ALBATROSS. Noted south of 30th parallel only to eastward of Wake Island. In those waters individuals of this species were seen singly on seven occasions; once, however, four were in sight at one time. The most southerly occurrence was that of a single individual 114 miles east of Wake Island on March 7 (latitude about 19° 40' N).

*Diomedea nigripes*, BLACK-FOOTED ALBATROSS. Noted to the west of the 180th meridian only in the latitude of Wake Island in March and northeast of the Bonin Islands in early January (see Starrett and Dixon, 1946:270).

*Puffinus leucomelas*, WHITE-FACED SHEARWATER. Single individuals were encountered rather frequently in the eastern Philippine Sea in July and August, south at least to about 16° 30' N (146 miles, 305° True from Tinian, Mariana Islands, July 9; 153 miles northwest of Saipan, August 23). On July 9, four were noted in one group and others singly. Jespersen (1933:193, 220) found this species as far south as latitude 21° N in waters south of Formosa on June 14, 1929. The breeding season of the White-faced Shearwater on islands off the Japanese coast extends from late March into October (Matthews, 1931:571). Dixon saw a single White-faced Shearwater on November 9, 160 miles east of Iwo Jima, Volcano Islands, but the species was not seen in Micronesian waters during the several subsequent months. Apparently the entire population moves into equatorial waters during the winter; specimens of *P. leucomelas* in the American Museum of Natural History from waters off New Guinea and adjacent islands were taken during the months from December to March (Ernst Mayr, letter, September 6, 1950).

*Puffinus pacificus*, WEDGE-TAILED SHEARWATER. Two flocks of 21 and 41 individuals, respectively, were seen simultaneously on August 22, at a point 100 miles, 260° True from Sariguan, Mariana Islands. Dark-bodied shearwaters were not seen in western Pacific waters

during the late autumn and winter months. However, white-bellied birds which may have represented a plumage phase of this species were noted off the southern Mariana Islands in January and February.

*Pterodroma hypoleuca*, STOUT-BILLED GADFLY PETREL. Noted occasionally well offshore in the Marianas-Carolines area from December to March. On February 22, at 17° 43' N, 139° 58' E (278 miles southeast of Parece Vela), a flock consisting of about 50 of these petrels and about two dozen unidentified (larger) shearwaters was sighted flying to and fro over one area. A petrel believed to be of this species was seen on December 16, at 10° 30' N, 157° 30' E (195 miles west-northwest of Ujelang Atoll, Marshall Islands).

*Oceanodroma* sp., STORM PETREL. The only storm-petrel noted was a white-rumped individual seen on November 8, 92 miles east-northeast of Muko Jima, Bonin Islands. Peters (1931:68-75) does not list any of the islands in the Volcano and Bonin groups or in Micronesia as breeding localities for members of the family Hydrobatidae.

*Phaëthon lepturus*, WHITE-TAILED TROPIC BIRD. Off the Marianas in January, single individuals were seen twice and two birds once; three were observed with a flock of Noddy and Black-naped terns on January 27, 21 miles northwest of Pagan. One was sighted about 1000 miles east-northeast of the island of Hawaii (28° N, 139° W) on April 24, 1945.

*Phaëthon rubricauda*, RED-TAILED TROPIC BIRD. Six records, August 7 to March 6, all west of 180° longitude, vary from 66 to 195 miles from nearest land. Each of these records was for a single Red-tailed Tropic Bird, although in one case two *P. lepturus* were seen simultaneously.

*Sula leucogaster*, BROWN BOOBY. A lone adult was seen flying eastward about 4:00 p. m. on February 22, 295 miles west of Anatahan, Marianas. Baker (1947:255) reported that the Gannet, *Morus bassanus*, often flew at a speed of 25 knots. If the speed of the Brown Booby approaches that of the Gannet, it appears that the individual seen would have needed to fly for a period of not less than 12 hours in order to reach land. An individual was noted 120 miles east-northeast of Maui, Hawaiian Islands, at 3:30 p. m. on March 23, 1946. Six of nine other observations of Brown Boobies made in the Mariana-Volcano islands area from August to January were within 17 miles of land.

*Sula sula*, RED-FOOTED BOOBY. Foraging flocks of 10 and 18 individuals of this species were seen 20 miles to the westward of the central Marianas on the morning of January 26. Two adults and one

bird in brown plumage were seen on January 12, 66 miles west of Guguan, Mariana Islands.

*Sula dactylatra*, BLUE-FACED BOOBY. One individual flew past the ship 200 miles southwest of French Frigate Shoals, Hawaiian Islands, (21° 08' N) late in the afternoon of March 14, 1946.

*Fregata minor*, PACIFIC MAN-O'-WAR-BIRD. Two were noted 337 miles southwest of Lisianski in the Hawaiian group on March 11. Later that day a lone female was seen gliding at a height of about 100 feet, being carried with a 15-knot wind, 333 miles southwest of Lisianski (21° 10' N). Man-o'-war-birds were not seen offshore on any other occasions.

*Sterna sumatrana*, BLACK-NAPED TERN. Terns presumably of this species were seen in the vicinity of Guam and Rota, Mariana Islands, and of Ponape, Caroline Islands, in December and January, usually within ten miles of shore.

*Sterna fuscata*. SOOTY TERN. Four were sighted shortly after sunrise on March 6, 135 miles west of Wake Island. Others were seen closer to that island, flying toward it, but they were not noted to the eastward of a point 41 miles east-southeast of Wake on March 7. Watson (1908:193) studied Sooty Terns in the Gulf of Mexico during the nesting season. He determined that they did not leave the island (Dry Tortugas) before daybreak and that they rarely traveled more than 15 miles (to the eastward of the island) during foraging periods. A possibility exists that the terns seen near Wake were migrating to the island to nest. Torrey Lyons, a botanist who spent a year on Wake Island, reported (MS) that some young of this species hatched in mid-February, 1940.

An individual, presumably of this species, was seen 162 miles southwest of Necker Island of the Hawaiian group about sunset on March 15. Terns, believed to be Sooties, and Brown Boobies ranged out to about 11 miles northwest of Farallon de Pajaros, Mariana Islands, on the afternoon of January 11. The terns flew from 20 to 60 feet above the surface.

*Sterna lunata*, GRAY-BACKED TERN. On March 6, when about 80 miles west-southwest of Wake, small groups of terns fitting the description of this species were distinguished from groups of Sooty Terns. Their wingbeats seemed more rapid and their flight more direct than that of the latter species. During one half-hour 77 terns were counted flying past the ship toward Wake Island, 48 of them being Sooty and 29 Gray-backed. Lyons (MS) reported this species as present on Wake Island from February until at least May 23, 1940.

*Thalasseus bergii*, CRESTED TERN. Noted within sight of the west coast of Guam on June 11 and July 10, 1945.

*Anous* sp., Noddy. Late in the afternoon of December 15, off the northwest coast of Ponape, Noddies were seen returning to the island until the ship reached a point approximately ten miles offshore. Here the Noddies were foraging at random, but they were not seen at greater distances from the island. Since specimens were not taken, species identifications of *Anous* were considered unwise.

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