

PELAGIC BIRDS OBSERVED ON A NORTH PACIFIC CROSSING

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Kuroda (1955) recently demonstrated the inadequacy of our knowledge of the distribution of pelagic birds of the North Pacific Ocean by collecting three species of shearwaters new to the western North Pacific. Other reports of precise distributional data for pelagic North Pacific birds away from the coasts include Arnold's (1948) record of birds seen from a destroyer in the Aleutian area and Yocom's (1947) and Thompson's (1951) reports on the behavior and distribution of Black-footed Albatrosses (*Diomedea nigripes*) between San Francisco and Hawaii.

In June, 1955, I crossed the North Pacific on a troopship along the course shown in figure 1. The ship maintained a nearly constant speed of 16 knots (18.4 mph). Table 1 lists the daily position of the ship at noon, the height of waves, and air and water temperatures. The International Date Line was crossed on June 8. For the sake of clarity, June 8, west of the date line, has been designated June 8 W, and June 8, east of the date line, June 8 E. Four hours of observations were made daily from a lower deck on the north side of the ship. Alexander's book (1928) was used in making identifications. The number of individuals of the commonest species seen and identified is recorded in table 2. All figures represent cumulative daily totals except those for the albatrosses. Figures for the albatrosses indicate the maximum number following the ship at any one time during the observation period. In addition to the species listed in table 2 and in the annotated list, a large number of birds which were not identified to species was seen. Many black storm petrels were about on June 4 and 5 and fewer were seen daily until June 11. At least three species were noted, two dark-rumped forms and one white-rumped form. On June 4, hundreds of large, white-bellied petrels were about. The number of these birds dwindled daily, the last five being noted on June 8 W.

Several factors make it difficult to assess critically the apparent daily fluctuations in the numbers and relative abundance of the species seen and to make comparisons with the observations of others. The most important of these factors is the limited scope of the data, since all observations were confined to a period of 11 days in June. Seasonal movements cannot, therefore, be considered in an evaluation of observed local concentrations. Waves limited the visibility of birds sitting on the water to 300 yards. Birds skimming low over the swells, such as albatrosses, shearwaters, and petrels, are more easily overlooked in rough water. King and Pyle (1957) found an inverse correlation between the height of waves and the number of scattered birds sighted per hour in the Central Pacific. Some birds, especially certain species of shearwater, may become more active under windy conditions (Kuroda, 1955). The ship-following habit of certain storm petrels and albatrosses makes them particularly conspicuous and adds an additional bias to comparisons of species abundance. Daily activity cycles may also affect the data obtained (Yocom, 1947; King and Pyle, 1957).

The ocean currents and water masses encountered may be briefly described as follows: on June 4 and 5, we passed through an area where the cold Subarctic Pacific Water mass, carried south by the Oyashio Current, mixes with the warmer waters of the Central Water mass being moved northeast by the Kuroshio Current. Both are deflected east, the Kuroshio continuing as the Kuroshio Extension and the North Pacific Current and exerting a warming influence on the waters encountered until we approached longitude 170°W (June 6–June 8 E). Here, the cooling influence of the more northern Aleutian Current, which is the eastward deflection of the Oyashio Current, prevailed. This current flows east to the American coast, dividing there and flowing south as the

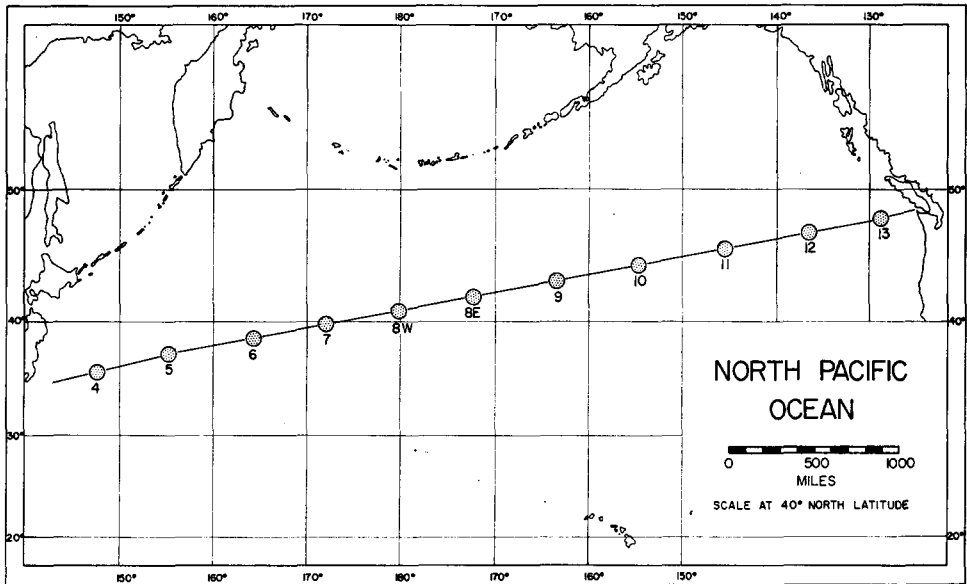


Fig. 1. Noon positions during crossing of North Pacific Ocean in June, 1955.

California Current and north as the Alaska Current (Sverdrup, Johnson, and Fleming, 1942). Thus, with no essential change in the supplying current, water temperature remained nearly constant during the last five days of the trip (June 9–13).

ANNOTATED LIST OF SPECIES

Diomedea nigripes. Black-footed Albatross. This species now breeds on the Leeward Islands of Hawaii, on the Marshall and Volcano islands, and on Johnston Island. Nonbreeding individuals range throughout the North Pacific and south Bering Sea (Alexander, 1954). There has been considerable interest in determining the factors which may influence the concentrations of nonbreeding individuals. In the course of systematic cruises in the waters off the southern coast of California, Miller (1940) found Black-footed Albatrosses concentrated where upwelling at the continental shelf produced cold and turbulent surface waters rich in nutrients and zooplankton. In the coastal channel he found none; farther west the number quickly dropped to zero as the surface waters became warmer and the upwellings were left behind. Yocom (1947) failed to find a similar concentration at the continental shelf farther north, and he concluded that this species was uniformly distributed in the waters through which he sailed. However, his observations in the coastwise waters were much less extensive than those of Miller. Thompson (1951) found a considerably greater number of albatrosses following his ship in the colder waters of the California Current than in the warmer waters of the East Central Water mass to the west. This relationship held at all seasons. He suggests that concentrations of Black-footed Albatrosses are "confined to low temperature waters, rich in nutrients and of a high biotic productivity." He also devised an index to jellyfish abundance and found that it closely paralleled the abundance of the albatrosses.

Black-footed Albatrosses were seen every day except June 8 W, the date of maximum abundance of the Laysan Albatross. In the warmest waters, which were encountered off the coast of Japan, a number of Black-footed Albatrosses continually followed the ship. The number dwindled at mid-ocean and in the five days preceding the final day of the trip only an occasional small group of stragglers was about. Then, on the final day of the voyage, within 200 miles of Seattle, a great number of Black-footed Albatrosses accompanied the ship to within a few miles of Cape Flattery; the last of these birds turned away less than a mile from land. The recorded water temperatures show that maxi-

Table 1

Noon Positions and Noon Air and Water Temperatures with Variation
Between 8:00 a.m. and 8:00 p.m.

Date, 1955	Noon position		Air temperature in degrees centigrade	Water temperature in degrees centigrade	Wave height in feet
	Latitude	Longitude			
June 4	35° 35' N	148° 12' E	21 (20-21)	21 (17-21)	3-5
June 5	37° 05' N	156° 08' E	18 (17-19)	17 (17-18)	3-4
June 6	38° 30' N	164° 29' E	14 (12-14)	15 (15-18)	3-6
June 7	39° 40' N	172° 15' E	12 (11-14)	15 (14-15)	5-9
June 8 W	40° 50' N	179° 55' W	13 (12-13)	12 (12-13)	4-7
June 8 E	42° 12' N	172° 05' W	12 (11-12)	11 (11-12)	2-5
June 9	43° 21' N	163° 19' W	11 (7-11)	11 (9-11)	1-2
June 10	44° 28' N	154° 44' W	9 (8-12)	10 (10-10)	0-1
June 11	45° 51' N	145° 35' W	9 (9-12)	9 (9-10)	1-2
June 12	47° 09' N	136° 35' W	9 (9-11)	11 (10-11)	2-3
June 13	48° 09' N	127° 12' W	8 (8-16)	11 (10-11)	2-8

Table 2

Number of Individuals Seen During Four-hour Observation Period

Species	Date in June, 1955										
	4	5	6	7	8W	8E	9	10	11	12	13
<i>Diomedea nigripes</i>	25	14	8	15	0	3	9	3	3	3	30
<i>Diomedea immutabilis</i>	0	0	1	5	10	8	0	0	0	0	0
<i>Puffinus</i> sp.	100+	300+	54	75	2	8	11	163	68	135	10
<i>Pterodroma inexpectata</i>	0	0	0	0	4	6	8	5	0	0	0
<i>Oceanodroma furcata</i>	0	0	0	0	0	0	0	0	0	12	2
<i>Phalaropus fulicarius</i>	0	0	0	13	0	0	0	6	22?	0	0
<i>Fratercula corniculata</i>	0	0	0	0	0	4	2	1	2	4	0
<i>Lunda cirrhata</i>	0	0	0	0	0	4	33	73	4	11	8
Black storm petrels	abd. ¹	abd.	many	many	many	19	9	4	0	0	0
Unidentified large petrels	abd.	many	55	34	5	0	0	0	0	0	0

¹ Abd. = abundant.

Table 3

Black-footed Albatross Abundance and Sea Water Temperature in the Northwest Pacific,
compiled from Kuroda (1955)

Temperature, degrees C.	2-3	4-5	6-7	8-9	10-11	12-13	14-16
Number of days	3	15.5	12.5	3	1	2	1
Albatrosses per day	0.0	0.2	0.2	1.6	10	8.5	11

imum numbers occurred in both the coldest and the warmest waters encountered. The cold water conditions off Seattle were not of a local nature but extended throughout a considerable part of the North Pacific which we traversed; the abundance of albatrosses, on the other hand, was much more local. Further, the abundance of this species in the warm (14°-17°C.) waters off Japan suggests that concentrations are not actually confined to waters of low temperature. Kuroda (1955) also found the greatest numbers of this species in the warmest waters he encountered (table 3) although the temperature ranges which he recorded barely overlap those of Thompson (1951).

Considering all available data, however, it seems likely that we are dealing, not with a direct influence of water temperature, but rather with the combined influence of all of the factors which determine the food supply of this species. These factors probably vary in different parts of the non-

breeding range, and they may or may not be strictly dependent on water temperature. One such factor may be the habit of scavenging after ships. The concentrations of albatrosses in the heavily fished waters off the coast of central Japan, near the coast of northern Japan (Kuroda, 1955), and again off Seattle suggest such an explanation. Yocom (1947) found that a number of albatrosses concentrated about his ship within a day after anchoring; apparently the birds were attracted by garbage thrown overboard. It seems unlikely, however, that the observations of Miller (1940) and Thompson (1951) can be accounted for in such a manner. Extensive observations and a further analysis of the food supply of this species will probably be necessary before the factors influencing its pelagic distribution can be determined with any degree of certainty.

On days when this species was most frequently encountered, the number usually mounted throughout the day until late afternoon, when it would decrease again before dark. There was also a tendency for the number of albatrosses to peak slightly in the early morning. It seems unlikely that the late afternoon peak is the result of a gathering of birds behind the ship during the day, since carefully observed individuals usually followed the ship for less than three hours (about 50 miles). Miller (1942) found that of 25 individuals of this species marked off southern California only one persisted for as far as 50 miles.

Diomedea immutabilis. Laysan Albatross. This species seems less prone to follow ships than is the Black-footed Albatross (Thompson, 1951; personal observation). However, as many as 10 trailed the ship on one occasion. Usually individuals passed our ship without turning, and for this reason the figures recorded for this species in table 2 probably represent a greater density than similar figures for the Black-footed Albatross. On June 8 W and June 8 E, when the greatest number of this species was seen, the birds seemed to be quite evenly distributed throughout the area. No more than one individual was in sight at any one time other than the small group which followed the ship. One individual overtaken on the water took flight by spreading its wings and running over the surface into the wind. The wings were slightly elevated and held fixed. When it was airborne, a slight change in the pitch of the wings sent it gliding down the trough of a wave and away without ever having flapped its wings.

Puffinus tenuirostris and *P. griseus*. Slender-billed Shearwater and Sooty Shearwater. These two species are treated together because of the difficulty encountered in making positive identifications. The whiter under wing coverts of *griseus* and the somewhat less rigid wing stroke of *tenuirostris* (Nichols, 1946) seem to be the best characters to separate them in flight. The larger size of *griseus* is perhaps a deceptive character unless direct comparison is possible. Concentrations off the Japanese coast were probably mainly of *tenuirostris*. At 4:00 p.m. on June 5, we passed more than 100 shearwaters in a group on the water. On the same date, considerable numbers were seen flying slightly west of north into a wind of 10 knots out of the northeast. After June 8 E, *griseus* seemed to be commoner than *tenuirostris*. Often this species was seen with whales. A single bird just off Cape Flattery was most probably *griseus*.

Pterodroma inexpectata. Scaled Petrel. Of the 23 birds identified, ten were flying in pairs; the rest were seen singly. On June 8 E, a pair was seen in the company of a Laysan Albatross about a whale.

Oceanodroma furcata. Fork-tailed Petrel. Scattered single birds were seen well off the Washington coast; they were 100 miles or more from land.

Phalaropus fulicarius. Red Phalarope. On June 7 two pairs rose from the water and zig-zagged out of sight in front of the ship. The sexes were undetermined. The individuals of each pair flew less than three feet apart while the pairs themselves were over 100 feet apart. The other birds seen on June 7 were a single individual and a flock of eight. On June 10, three pairs were sighted flying low over the ocean. They settled on the water, and when they took flight again, as the ship approached, all of the individuals were well separated. Two more flocks of 10 and 12 phalaropes, seen on June 11, could have been of either this species or the Northern Phalarope (*Lobipes lobatus*).

Catharacta skua. Skua. A single bird was noted on June 8 E.

Larus glaucescens. Glaucous-winged Gull. Two joined the Black-footed Albatrosses which were following the ship 30 miles west of Cape Flattery.

Sterna sp. A single light colored tern passed the ship in the early morning of June 8 E and continued on out of sight to the north.

Uria sp. We came on two murrelets sitting on the water shortly before noon on June 9 when we

were over 750 miles from the nearest island of the Aleutians. They dove quickly and were not seen again.

Cerorhinca monocerata. Rhinoceros Auklet. Two flew past the ship 18 miles off Cape Flattery.

Fratercula corniculata. Horned Puffin. Scattered individuals of this species were noted over a wide area across the ocean. They were easily distinguished from the following species by their white underparts and whitish cheeks. One seen on June 11 was in fully adult plumage while all the others were in more worn plumage. Throughout the voyage none was seen flying. This species has apparently never been recorded from the open waters of the North Pacific before.

Lunda cirrhata. Tufted Puffin. Almost all of the individuals noted were single birds in dull plumage. Occasionally two were noted within a few yards of one another, but no greater concentration than this was seen. One flying bird was seen on June 11 and several more were aloft on June 12. On June 13, all of the eight birds seen were flying in pairs and these birds were much more brilliantly colored than any seen at mid-ocean. Probably these were breeding birds from the nearby coast. The remainder of the birds recorded in table 2 were overtaken as they sat on the ocean where they were visible up to about 250 yards. Thus it seems likely that a large number of this species was scattered on the open waters of the North Pacific south of the Aleutians at the time of this voyage. Bent (1919:88) reports that "after the breeding season is over and the young are able to take care of themselves they all move away from their summer homes, to roam about on the open seas, where very little seems to be known about their winter habits. I have seen this species farther from land, by several hundred miles, than any of the other Alcidae and suppose that they are widely scattered during the winter over the north Pacific Ocean." Perhaps the birds seen at the time of this voyage were immature birds of the previous year which had wintered on the open ocean. In this species, as in other Alcidae, the molt seems to include a complete and simultaneous shedding of the primaries, leaving the bird temporarily flightless. Many of the individuals overtaken on the water seemed to lack wing quills and flapped helplessly away from the oncoming ship in a manner reminiscent of a flightless duck. Other birds with fully grown wings rose from the water only after extended runs across the surface and seemed to have particular difficulty on calm water or when fresh winds were lacking. Kuroda (1955) collected several flightless birds in June in the western North Pacific.

SUMMARY

Observations on birds seen during 11 days of a North Pacific crossing from the waters off central Japan to Seattle are recorded. The correlation of water temperature with the occurrence of nonbreeding concentrations of Black-footed Albatrosses is discussed, and it is suggested that further records are necessary to adequately evaluate the factors influencing the distribution pattern. Three species of alcids, the Tufted Puffin, Horned Puffin, and a species of murre were seen on the open ocean several hundred miles from the nearest land.

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