OBSERVATIONS ON PELAGIC BIRDS OF THE NORTHWEST PACIFIC

By NAGAHISA KURODA

In the summer of 1954 I had the good fortune to accompany the Japanese Fisheries Agency's 78-ton research vessel, Geizan-maru No. 8, on a 34-day voyage through northwest Pacific waters to investigate the northward migration of fur seals from their wintering grounds off Japan to their breeding islands in the Bering Sea. This paper reports the ornithological investigations I was able to make with the help of my companions. My thanks are due particularly to the Fisheries Agency officers, Messrs. Shiro Yoshizaki and Fukuzo Nagasaki, and to Mr. Osamu Izawa, who was the supervisor of the fur seal investigations.

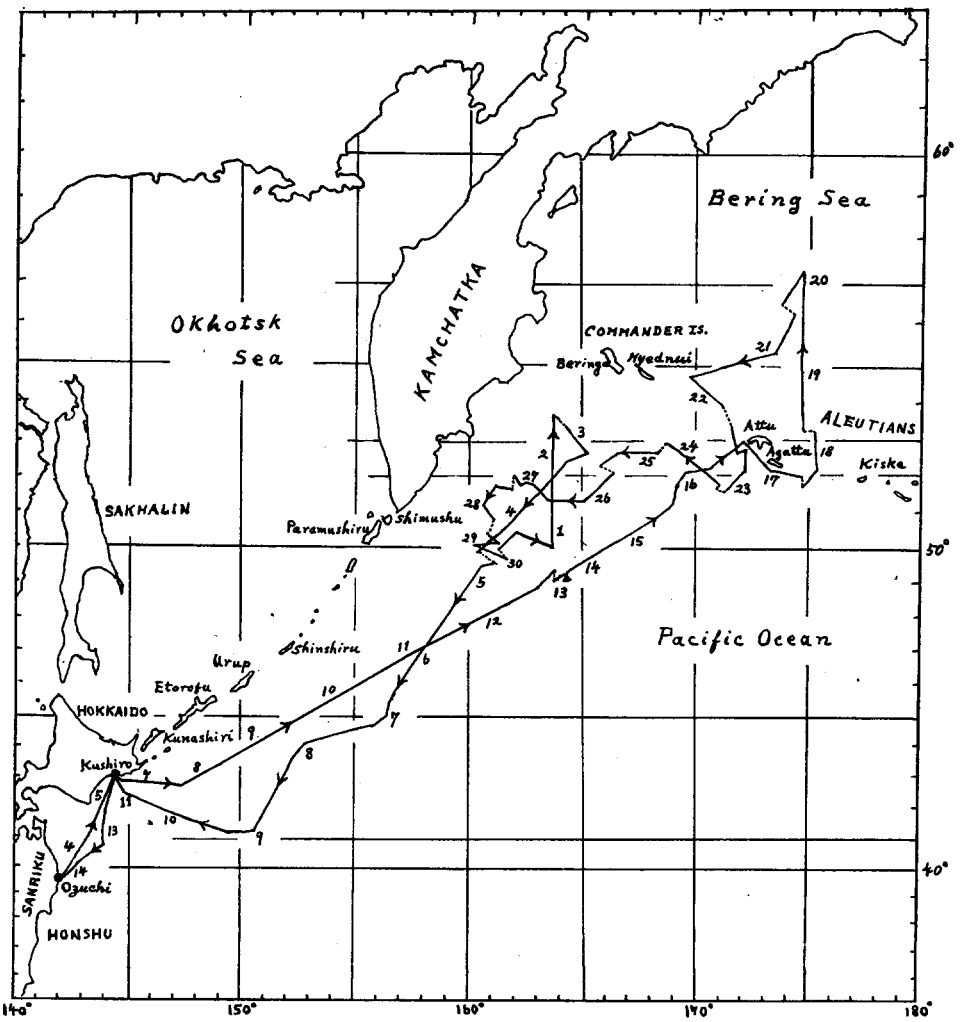

Fig. 1. Voyage of the Geizan-maru No. 8. The numbers along the ship's track are dates, ranging from June 4 to July 14, 1954. The dotted lines show the ship's drift when hove to at night.

The accompanying map (fig. 1) shows our itinerary. Leaving Ozuchi on the northeast coast of Honshu on June 4, we put in at Kushiro, Hokkaido, for a day and left there on June 7 for the Aleutians. We sailed north between Agattu and Kiska into the Bering Sea and reached our northernmost point, 57° 28′ N, on June 20. There we turned southwestward toward the Commander Islands and then southeastward to Attu waters, whence we worked westward, south of the Commanders and east of southern Kamchatka until July 4. On the return voyage we cruised south until we reached the edge of the warm current 240 miles southeast of Etorofu Island on July 9. From there we headed into Kushiro again, and thence back to Ozuchi, reaching our starting point on July 14 after logging 6000 nautical miles.

Throughout the voyage we were favored by good weather. Winds were generally moderate, often being just strong enough to dispel the heavy fogs so prevalent in these waters. They reached velocities of 5 or 6 meters per second only during the few days we encountered low pressure areas off South Kamchatka. The rest of the time the seas were fairly calm.

Air temperatures ranged between 8° and 9° Centigrade during the days and dropped from 3 to 5, and sometimes, when clouds thinned, to 10 degrees lower at night. Our warmest days were June 10 and July 4, when the clouds thinned enough to allow a weak sun to raise the air temperature to 13°C. Our coldest period was from June 7 to 11 off the Kuriles, where the cold current from the Okhotsk Sea remained at 2° to 4°C.; the night air temperature also never varied beyond those limits. After we crossed the northeast-southwest tide lines 180 miles southeast of Attu on June 15, we found relatively warmer waters, 5° to 6°, rarely 7°, in the Aleutians and the Bering Sea. As usual the skies were constantly cloudy, and until we reached summer weather again at the warm current on July 12 we saw the sun set only once, on June 12. The short nights, averaging only 7 hours, allowed long hours of daylight for bird observations.

Because this was the breeding season of northern species and because we remained well away from land throughout the voyage, the numbers of birds observed were comparatively low. Often we sailed for hours without seeing a single bird. In the cold waters off the Kuriles the number of species seen each day averaged 4.5, with extremes of 3 and 8. In the northern seas we usually recorded from 7 to 11 species daily, with a high of 12. When we reached the warm current on July 9 the daily total increased to 13, including a few cold-current species.

As will be noted in the list, the distribution of most birds was correlated primarily with water temperature, to a lesser extent with air temperature, and least of all with wind direction and velocity. The only species whose movements seemed to depend on the wind was the Slender-billed Shearwater (*Puffinus tenuirostris*), which was usually on the water and not in the air on calm days. The commonest and most widespread species was the Fulmar (*Fulmarus glacialis*), which was observed daily throughout the voyage; it was never absent from any list, and it seemed to fly wherever it wished regardless of wind and weather.

A rough measure of comparative population densities is afforded by dividing the number of each species observed by the hours of observation, for the ship maintained a fairly steady 7.5 knots during daylight hours. The highest densities were found in the Attu-Agattu waters (36 to 100 individuals per hour) and southwest of the Commander Islands (26 to 118 per hour). In both these areas the irregular currents contained an abundant supply of food, as indicated by our plankton collections, and the birds collected often had their stomachs filled with a species of *Euphausia*.

North of the Aleutians the bird density in the Bering Sea dropped to 4 to 6 individuals per hour, and it did not increase to 20 until we approached the Commander

Islands. South of these islands it ranged from 18 to 24 individuals per hour. In the cold current off the Kuriles the densities were comparatively low, from 4 to 15 per hour, increasing only once to 22 off Shinshiru where the Crested Auklet (*Aethia cristatella*) was locally plentiful. In the warmer offshore waters as we sailed southward, densities increased to 32 to 47 as the two albatrosses increased in abundance. Along the periphery of the warm current, abundance dropped to 21 per hour, but here we obtained some of our most interesting records: the two Australian petrels *Puffinus bulleri* and *Pterodroma solandri* collected for the first time in this region, an unexpected northward extension of the range of *Synthliboramphus wumisuzume,* and a radical change in the specific composition of the pelagic population.

ANNOTATED LIST OF SPECIES

Diomedea nigripes. Black-footed Albatross. This species ranges chiefly in the warmer waters south of the main range of the Laysan Albatross at this season. It is common in Japanese waters and we found it mostly where the air ranged between 17° and 22.5° and the water between 8° and 16°, seldom where the water was below 10°. Northward we encountered it but rarely. It seems to rest on the water more than does *immutabilis,* and I saw one swimming bird dive for several seconds after a sinking bait with its long wings half spread. Specimen: ♀, July 8, 1954, 43° 26′ N, 151° 41′ E, wt. 2090 gm. Observations:

Date	Locality	Temperature °C. Air	Water	Number seen
June 4	Off northern Honshu	17	13	8
June 5	45 mi. SW Kushiro	14	5	2
June 29	200 mi. E Paramushiro	11	6	1
July 2	200 mi. E s. Kamchatka	9	5.1	1
July 7	200 mi. ESE Paramushiru	13–15	7–8	2
July 8	150 mi. SE Etorofu	7–8	6–7	1
July 9	240 mi. ESE Kunashiri	17–22	15–16	11
July 10	140 mi. ESE Kushiro	18–21	8–9	2
July 11	13 mi. S Kushiro	7	8.2	1
July 13	50 mi. SW Kushiro	17	10–11.5	10
July 14	Off northern Honshu	17–22	12.5	9

Diomedea immutabilis. Laysan Albatross. This species was most plentiful 180 to 200 miles east-southeast of Shinshiru Island, where we saw 14 birds in one day. From this point northward we encountered only five single individuals along the Kuriles and none in the Bering Sea. Southward to northern Japan it was not plentiful. The species seems to avoid water above 13° and air above 17°. Specimen: ♀, July 7, 1954; 44° 56′ N, 155° 50′ E, wt. 2630 gm.

Date	Locality	Temperature °C. Air	Water	Number seen
June 4	Off northern Honshu	17	13	1
June 18	50 mi. E Agattu	6.2	5	1
June 23	18 mi. SW Attu	9.2	6.8	1
June 30	250 mi. E Paramushiru	11	5.8	1
July 1	250 mi. E Paramushiru	9.5	5	1
July 5	180 mi. ESE Paramushiru	11	5.5	1
July 7	200 mi. ESE Paramushiru	13–15	7–8	14
July 8	150 mi. SE Etorofu	7–8	6–7	1
July 9	240 mi. ESE Kunashiri	17–22	15–16	3
July 13	50 mi. SW Kushiro	17	10–11.5	1

Fulmarus glacialis rodgersii. Fulmar. This was the commonest bird encountered throughout the trip. Numbers counted daily ranged from ten to hundreds, in concentrations of from 1 to 77 per hour, the numbers being lowest in the warmer waters and at our point farthest north in the Bering Sea. The heaviest concentrations were found in Agattu-Kiska Strait (6.9 per hour), east of the Commander Islands (12.3 per hour), west of Attu (hundreds feeding at dawn, June 23), and in the waters

east of southern Kamchatka, where from 20 to 77 per hour were counted between July 2 and 6. The species was commonest in air temperatures between 5° and 14° and in water temperatures between 3° and 8°. The southernmost concentration was noted off the Hokkaido coast, where on June 5 and again on July 11 between 100 and 200 were counted in the cold current. In warmer air (up to 22.5°) and water (up to 12.5°) encounters were sporadic.

In typical flight the Fulmar rises fairly high above the water surface with stiff wingbeats and then glides down slowly. In a dead calm it may glide long distances almost touching the surface in the manner of shearwaters. Solitary birds were encountered frequently resting on the water, sometimes sleeping with the bill inserted in the back feathers until the ship passed close to them. They followed the ship often, circling around it continually and rushing immediately to any refuse thrown overboard. One calm evening when we stopped the ship they gathered to bait thrown to them and approached within a meter of the stern. They were easily caught on a hook and line, and we released immediately the several we caught that way. One after another came by in a low glide, braked to a stop with fast wingbeats near the bait, swam to it with lowered tail, and then dashed off to eat the prize at a distance. I never saw one dive.

The white phase of the Fulmar is rare in the western Pacific. Of more than 2180 Fulmars observed on the trip only 38 (1.7 per cent) were white. One of these was seen in Japanese waters, one off the middle Kuriles, the rest east of the Commanders and off Kamchatka. The two white phase birds I collected were both females, as was one I collected off Hokkaido in 1950, which suggests this coloring may be sex-limited. Specimens: ♂, June 5, 1954, 5 mi. off Kushiro, wt. 653.6 gm.; ♂, testes large, June 13, 1954, 48° 54′ N, 162° 06′ E, wt. 771.4 gm.; ♂, testes large, June 13, 1954, 48° 54′ N, 162° 06′ E, wt. 589 gm.; ♀, ovaries small, white phase, June 23, 1954, 52° 45′ N, 172° 06′ E; ♀, ovaries small, white phase, June 27, 1954, 51° 48′ N, 162° 50′ E.

Calonectris leucomelas. Streaked Shearwater. This species was seen only off northern Honshu. On June 4 a few miles off Yamada Bay we saw a thousand or more in waters where sardines were schooling. This is about 20 miles north of the breeding colony on Sanganjima, near Ozuchi. North of this the same day we saw only a few scattered individuals, and after that no more until we returned to these waters on July 14. The air temperatures there ranged from 19° to 20°, the water from 12° to 12.5°.

Puffinus carneipes. Pale-footed Shearwater. This is a warm temperature species, not seen in the north. Our records:

Date	Locality	Temperature °C. Air	Water	Number seen
July 9	240 mi. SE Kunashiri	20.7	16	1
July 13	50 mi. SW Kushiro	17	11–12	8
July 14	Off Honshu	20	12.5	7

Puffinus griseus. Sooty Shearwater. This species was abundant off the coast of northern Japan, but it was not seen in northern waters. Off northern Honshu we encountered small flocks during the morning, usually resting on the water. It feeds at dawn near the land where food is abundant and then scatters offshore during the day.

Date	Locality	Temperature °C. Air	Water	Number seen
June 4	Off northern Honshu	19	12	hundreds
July 10	130 mi. ESE Kushiro	20	12	9
July 11	13 mi. S Kushiro	7	8.2	few
July 13	39 mi. SW Kushiro	17	11.2	1
July 14	Off northern Honshu	20	12.5	hundreds

Puffinus tenuirostris. Slender-billed Shearwater. This was the commonest of the shearwaters in northern waters, usually being found singly and in small groups, occasionally in company with Fulmars. It usually flies obliquely with the wind, veering right and left in an S pattern. In stronger winds it occasionally flies obliquely into the wind, often turning in complete circles as it proceeds.

The first observed were three birds about 240 miles southeast of Paramushiru at latitude 48° N on June 12. North of that we recorded the species daily. On the return voyage it became markedly less plentiful south of 48°N. We saw 2 about 190 miles east-southeast of Shinshiru on July 8, 7 some 130 miles southeast of Kushiro on the 10th, 100+ in company with flocks of *P. griseus* on the 11th off Kushiro and on the 14th off the Honshu coast.

Its normal abundance was 10 to 50 per day, or 1 or 2 to over 10 individuals per hour. But 100 miles southwest of Attu on June 16 we counted 481 birds (46.6 per hour), and west of Attu at dawn on June 23 we met a huge flock of about a thousand feeding on *Euphausia* in company with Fulmars. Its numbers decreased rapidly as we sailed away from this area of abundant food supply, but it was fairly plentiful in Agattu-Kiska Strait, where we counted 126 birds (15.8 per hour) on June 18.

Northward in the Bering Sea from June 19 to 21 its occurrence was sporadic, ranging from 7 to 16 per day (1.7 to 2.5 per hour), but as we approached the Commander Islands on the 22nd we saw 30 (3.2 per hour). It was plentiful again from 120 to 180 miles southwest of the Commanders, where on July 1 we counted 130 (17.9 per hour) and on July 2, 285 (55.9 per hour), resting on the water or flying by in small flocks. A flock of about 100 birds encountered some 180 miles southeast of Paramushiru on July 6 was the southernmost of the main northern group seen.

We counted conservatively about 2020 individuals during the voyage. The species' distribution in the north showed little correlation with either air temperatures (6° to 11.5°) or with water temperatures (3.5° to 7°). Those seen off the Japanese coast at the end of the voyage were in air of 17° to 20° and water of 8° to 12.5°. Its abundance seems correlated rather with the available food supply. Specimens: ♀, June 16, 1954, 50° 18′ N, 169° 53′ E, wt. 570 gm.; ♀, June 23, 1954, 52° 48′ N, 172° 06′ E, wt. 855 gm. (stomach crammed with food).

Puffinus bulleri. Gray-backed Shearwater. Finding this species in the western North Pacific where it had never before been known was entirely unexpected. The two we collected on July 9 as we entered the edge of the warm current 240 miles southwest of Eterofu were apparently not stragglers, for we observed in all that day 17 individuals flying by, singly or in scattered groups of 2 or 3. The air temperature ranged from 18.5° to 22.5° and the water from 14.5° to 16°. We saw no more when we entered cooler waters the next day.

The Gray-backed Shearwater is very slender bodied, and its neck is relatively long. Its flight is extremely light. When we hove to to haul in a swordfish we had harpooned, several birds wheeled about in the offing as lightly as *C. leucomelas* and with similarly slow wingbeats. Specimens: ♀, July 19, 1954, 41° 10′ N, 149° 57′ E, wt. 342 gm.; ♀, July 9, 1954, 41° 12′ N, 149° 44′ E, wt. 418 gm.

Pterodroma solandri. Solander Petrel. The nearest to the western North Pacific this species had previously been collected was at Borodino Island, east of the Ryukyus. We observed it as follows:

Date	Locality	Temperature °C. Air	Water	Number seen	per hour
July 7	180 mi. SE Shinshiru	12–15	7.5–8	6	1.1
July 8	150 mi. SE Etorofu	7	6.2	1	0.2
July 9	240 mi. SE Etorofu	12–22	12–16	44	5.6

This bird is a large, black, long-winged gadfly petrel somewhat reminiscent of *Puffinus carneipes* at a distance, but at close range its sooty back, short black bill and feet, the whitish undersurface of the wings and the occasional white feathers in front of the eye are distinctive. Its wingbeats are slow, and it soars for good distances low above the calm surface. It occasionally rests on the water. The two collected on July 9 were wheeling over discarded swordfish offal in company with Gray-backed Shearwaters. Specimens: ♀, July 9, 1954, 41° 09′ N, 150° 19′ E, wt. 484.5 gm.; ♀, July 9, 1954, 41° 09′ N, 150° 02′ E, wt. 467 gm.

Pterodroma inexpectata. Peale Gadfly Petrel. This small New Zealand gadfly petrel evidently migrates to the western North Pacific as well as to the Aleutians, where it has been recorded regularly. Unlike the previous two species, it prefers colder surroundings. We found it principally in the cold, rough waters east of southern Kamchatka:

Date	Locality	Temperature °C. Air	Water	Number seen
June 24	100 mi. E Attu	6.2	6.2	1
June 26	200 mi. SSW Commanders	6.5–9	5–6.2	9
June 27	250 mi. SW Commanders	8	5.5	1
July 1	100 mi. E Kamchatka	7	5	2
July 3	150 mi. SW Commanders	6.5	5	5

Most of the birds were seen singly, appearing suddenly soaring on spread wings and sailing quickly out of sight in a wide arc. On June 26 we came upon two birds feeding on a dead pollack in company

with a few Fork-tailed Petrels. While one sat on the water and fed, the other fluttered over it much like a storm petrel. On the wing the black band along the anterior edge of the under wing is clearly observable. The dark breast is characteristic. I collected one: ♀, June 26, 1954, 51° 43′ N, 165° 18′ E, wt. 349.6 gm.

Oceanodroma castro. Madeira Petrel. This is a warm current species, and none intruded into the colder waters. We observed them as follows:

Date	Locality	Temperature °C. Air	Water	Number seen	per hour
June 4	Off northern Honshu	17	13	6	2
July 9	240 mi. SE Kunashiri	17–22	15–16	58	8.3
July 10	150 mi. SSE Kunashiri	18–21	8–12.8	43	8.6
July 13	Off southern Hokkaido	16.5–17	11–12	36	4.5

Oceanodroma leucorhoa leucorhoa. Leach Petrel. We encountered Leach Petrels most abundantly in the waters south of the southern Kuriles. It is a bird of the cold currents, but evidently it prefers slightly warmer waters than does *Oceanodroma furcata.* On the outward voyage I counted 15 per day on June 8, 9, and 10 (2 per hour), and 53 (10 per hour) on the morning of the 11th, north to 47°N, and none the rest of the day. North of this latitude we met the species only sporadically, except southeast of Attu where on June 24 we counted 18 birds (4.1 per hour). The northernmost were 3 birds seen at 55° 56′ N on June 21. East of Kamchatka we saw a few almost daily, ranging from 1 to 7 (0.2 to 1.3 per hour). On the return trip I counted 53 birds again (8.8 per hour) on July 6 in the same area east of Shinshiru. On July 7 the count was 132 (24.9 per hour) in air 13 to 15 degrees, water 6.6 to 8 degrees, on July 8, 27 birds (6.1 per hour) in air 7 to 8.8 degrees, water 6.2 to 7 degrees, and on July 9 only 7 (1 per hour) in air 17 to 22 degrees, water 14 to 16 degrees. But when we crossed the cold current on the 10th the count rose to 24 (4.8 per hour) in air 18 to 21 degrees, water 8 to 12 degrees. The species seems to prefer air temperatures between 13° and 15° and water between 6° and 8°, although we found it in air as low as 4° and as high as 21°, and in waters between 3° and 12.8°. Specimens: ♂, July 1, 1954, 50° 50′ N, 163° 32′ E; ♂, July 9, 1954, 41° 09′ N, 150° 03′ E.

Oceanodroma tristrami. Stejneger Petrel. The only examples of this warm-water species observed were a few off northern Honshu on June 4.

Oceanodroma furcata furcata. Fork-tailed Petrel. This is distinctly a bird of the colder waters. We found it principally where the air ranged from 5° to 12° and the water from 3° to 8°. We saw only scattered individuals in warmer areas. We first met the species south of Urup at latitude 44° 16′ N on June 9. The next day we counted 37 birds (3.7 per hour) southeast of Shinshiru. The next 4 days while we were farthest from land it was much less common, and we saw only 5 birds per day (0.4 to 1.3 per hour). From then on it became more common, averaging 5 to 14 daily (0.6 to 2 per hour) except at our northernmost point in Bering Sea where on June 20 we saw but a single bird. We found it commonest 100 miles east of Kamchatka where several were continually in sight behind the ship, and on June 28 I counted 128 birds (40 per hour). On the southward voyage we again found it concentrated southeast of Urup, and we counted 30 (6.7 per hour) on July 8 just slightly south of where we had first met it on the outward voyage. Specimens: ♂, June 10, 1954, 45° 34′ N, 153° 46′ E, wt. 58.9 gm.; ♀, June 27, 1954, 51° 58′ N, 162° 17′ E; ♀, June 28, 1954, 51° 40′ N, 160° 50′ E; ♀, July 1, 1954, 44° 55′ N, 155° 42′ E.

Oceanodroma furcata, O. leucorhoa, and *O. castro* each uses its wings differently in flight. The species *furcata* characteristically holds its wings bent backward, its fast wingbeats are the shallowest of the three, and it glides frequently. The species *leucorhoa* has longer wings than *castro* and thus looks larger; it flies with a slow, rhythmic, tern-like wingbeat and has the deepest stroke of the three. *Oceanodroma castro* flaps its shorter wings faster and not as rhythmically as does *leucorhoa.*

Phalaropus fulicarius. Gray Phalarope. This species is more pelagic and usually less plentiful off Japan than the following species. I saw two 150 miles south-southwest of Bering Island on July 3. The only others were five seen off the coast of Honshu on July 14, of which I collected a female, 17.5 miles east-northeast of Miyako.

Lobipes lobatus. Northern Phalarope. This species is abundant along the coast of northern Japan in May. The only ones we saw were 1 off Kushiro on June 4, and 5 off northern Honshu on July 14.

Catharacta skua. Great Skua. I saw 2 of these birds on July 9, and 1 on July 13, 50 miles off Cape Erimo, Hokkaido. I was unable to collect any of them, but the latter bird was very dark, similar

to one I collected off Hokkaido on May 31, 1951. Dr. R. C. Murphy examined this specimen when he visited Japan in November, 1953, and agrees with me that it is not *maccormickii,* to which all other Japanese specimens (about 40) are referable. The bird is uniformly deep, dark umber brown from head to underparts, darkening to almost black on the back. A few thin golden shafts are present on the nape, and the exposed white patch of the primaries does not exceed 20 millimeters on the undersurface of the quills. It is rather small in size: wing, 374; tail, 144; culmen, 47; tarsus, 61.5 mm.

Stercorarius pomarinus. Pomarine Jaeger. Specimen: ♂, July 2, 1954, 52° 32′ N, 163° 49′ E. This species was observed as follows:

Date	Locality	Temperature °C. Air	Water	Number seen
June 7	50 mi. E Kushiro	7.6–9	6–6.5	10
June 24	100 mi. E Attu	6	6	1
June 25	200 mi. E Attu	7–9	7	1
June 26	200 mi. SSW Commanders	9	5	1
June 27	250 mi. SW Commanders	6.7	5.5	1
June 28	150 mi. E s. Kamchatka	7	6	2
July 2	200 mi. E s. Kamchatka	10.2	5.2	2
July 3	150 mi. SW Commanders	7	5.3	1
July 4	200 mi. E s. Kamchatka	6	5	1
July 5	180 mi. ESE Paramushiru	7.5	6	1
July 9	240 mi. ESE Kunashiri	17	15.6	1

Stercorarius longicaudus. Long-tailed Jaeger. This species was much commoner than the preceding, as the records show. All but one of the birds observed were young, with the central tail feathers as short or shorter than those of *S. parasiticus.* The records are all assigned to *longicaudus* on the basis of the specimens collected, all of which are this species. It is indeed strange that no *parasiticus* was identified positively; this also has been my experience on other voyages off the Japanese coast.

The Long-tailed Jaeger is apparently the most pelagic of the three species in the genus. Most of the birds seen were solitary individuals. Once two birds chased each other until one vomited a fish, which the other caught in the air. They were seen occasionally chasing Red-legged Kittiwakes and sometimes attacking swimming Slender-billed Shearwaters. The records:

Date	Locality	Temperature °C. Air	Water	Number seen
June 16	100 mi. SW Attu	8	5	1
June 19	250 mi. E Commanders	6.5	5	1
June 20	250 mi. NE Commanders	6.8	5	1
June 22	50 mi. E Commanders	9	6	1
June 23	20 mi. SW Attu	8.8	6	1
June 24	100 mi. W Attu	8	6.5	1
June 27	240 mi. SW Commanders	6.7	5.8	2
July 1	250 mi. E Paramushiru	8	5	1
July 2	200 mi. E s. Kamchatka	7–9	5	4
July 3	150 mi. SW Commanders	7	5–5.3	2
July 4	200 mi. E Shimushu	6–7	5	8
July 5	180 mi. ESE Paramushiru	8	5.5	1
July 9	240 mi. ESE Kunashiri	20–22	15.3–15.5	2
July 13	50 mi. SW Kushiro	14.8	9	2

The birds seen on July 9 and 13 were young of the previous year, probably late migrants passing through these warm seas. Specimens, all immatures: ♂, June 16, 1954, 52° 19′ N, 170° 34′ E, wt. 285 gm.; ♂, June 24, 1954, 52° 24′ N, 170° 14′ E, wt. 269 gm.; ♀, July 2, 1954, 52° 54′ N, 163° 50′ E; ♀, July 3, 1954, 52° 41′ N, 164° 57′ E, wt. 304 gm.

Larus crassirostris. Japanese Gull. Seen only within 20 miles of the Honshu coast; the few observed were scattered, probably nonbreeding individuals.

Larus canus. Mew Gull. A few in immature plumage in Kushiro harbor were the only ones seen.

Larus schistisagus. Slaty-backed Gull. This gull breeds on Daikokujima off Akkeshi, Hokkaido, and was common in Kushiro harbor. None was encountered offshore.

Larus glaucescens. Glaucous-winged Gull. This large northern gull was encountered only in Attu, at the Commander Islands, and in Kamchatka waters. Its comparative rarity is probably attributable to the breeding season. It flies with slow wingbeats, and its wings look proportionately longer than those of the Herring Gull, which in turn has longer wings in proportion to body size than either the Slaty-backed or Glaucous gulls. Specimen: ♀ im., June 17, 1954, 52° 07′ N, 175° 50′ E. The records:

Date	Locality	Temperature °C. Air	Water	Number seen
June 17	20 mi. SE Agattu	7	5	1 im., 2 ad.
June 22	50 mi. E Commanders	8	6	1 im., 6 ad.
June 23	20 mi. SW Attu	8.8	6	3 ad.
July 2	200 mi. E s. Kamchatka	8.5	5	2 im.

Rissa tridactyla pollicaris. Common Kittiwake. This pelagic gull is doubtless much more plentiful at sea in the nonbreeding season than we found it during the voyage. It was commonest when the air temperature was between 7° and 13.5° and the water between 5° and 6°. Specimens: 2 ♂ ♂, June 17, 1954, 52° 07′ N, 173° 50′ E, wt. 513, 422 gm.; ♀, June 20, 1954, 57° 10′ N, 174° 32′ E, wt. 494 gm.

Date	Locality	Temperature °C. Air	Water	Number seen	per hour
June 10	100 mi. SE Shinshiru	7–13.5	3–3.5	9	1.2
June 16	180 mi. WSW Attu	8–10.1	3.8–5	8	0.8
June 17	20 mi. S Agattu	7	5.1	3	0.4
June 18	50 mi. NE Agattu	8	5.3	1	0.1
June 20	50 mi. NE Commanders	6.8	5	2	0.2
June 23	20 mi. SW Attu	9	5.8	5	0.6
June 24	100 mi. W Agattu	6	6	2	0.5
June 25	220 mi. S Commanders	7–9	6.2–6.9	15	2.1
June 27	240 mi. SW Commanders	8	5.4–6.2	3	0.6
June 28	100 mi. E s. Kamchatka	7	6	3	0.9
July 2	200 mi. SW Commanders	7–8.5	5	1	0.2
July 3	150 mi. SW Commanders	7	5–5.6	13	2.0
July 5	200 mi. E Paramushiru	11.5	5.2–5.6	1	0.2

Rissa brevirostris. Red-legged Kittiwake. In addition to its smaller size, this species can be told in the field from the preceding species by its darker back, by its shorter bill which is slightly greenish yellow rather than chrome, and particularly by its blood-red feet (vermilion in immature birds) with jet black claws. The immature birds have dark spots behind the eye and dark feathers along the edge of the wing but lack the black tip of the tail present in *tridactyla*. It is rather commoner than the Kittiwake in northern waters, but both were observed together on many occasions, often following our ship in company with Fulmars. Specimens: ♂, June 20, 1954, 57° 10′ N, 174° 32′ E, wt. 429.4 gm.; ♀, June 20, 1954, 57° 22′ N, 174° 45′ E, wt. 399 gm.; ♀, June 20, 1954, 57° 28′ N, 174° 52′ E, wt. 410.4 gm.; 2 ♂ ♂, June 25, 1954, 52° 52′ N, 167° 48′ E, wt. 463.6 gm. (1 bird); ♀, June 25, 1954, 52° 52′ N, 166° 47′ E.

Date	Locality	Temperature °C. Air	Water	Number seen	per hour
June 20	250 mi. NE Commanders	6.8	5	4	0.4
June 21	200 mi. E Commanders	6–7.5	5.2–5.5	5	1.2
June 22	50 mi. E Commanders	9	6	1	0.1
June 25	120 mi. E Commanders	7–9	6.2–6.9	19	2.7
June 27	240 mi. SW Commanders	6–9.2	5.4–6.2	9	1.7
June 28	100 mi. E Kamchatka	7	6	1	0.3
June 29	100 mi. E Paramushiru	11	6.8	1	0.3
July 2	200 mi. E s. Kamchatka	7–8.5	5	10	2.0
July 3	150 mi. SW Commanders	7	5–5.6	42	6.6
July 4	200 mi. E Shimushu	5.5–7	4.8–5.5	21	4.9
July 5	200 mi. E Paramushiru	11.5	5.2–5.6	10	2.0

Sterna hirundo longipennis. Common Tern. Specimen: ♀, July 3, 1954, 52° 57′ N, 164° 40′ E. Single birds were seen as follows:

Date	Locality	Temperature °C. Air	Water
June 14	270 mi. E Paramushiru	7	3.7
June 17	20 mi. SE Agattu	8.5	5
June 22	80 mi. E Commanders	8.5	6
June 24	100 mi. W Attu	7	6.2
June 25	220 mi. S Commanders	9.5	6.5
July 3	150 mi. SW Commanders	6	5

Uria lomvia arra. Thick-billed Murre. Murres were recorded on 19 of our 34 days of voyaging north of Kushiro. They were always seen singly, more often on the wing than swimming, and they were probably all nonbreeding individuals. They were rather rare off the Kuriles, but commoner in Agattu-Kiska Strait and east of Kamchatka. Numbers seen daily ranged from 1 or 2 (0.1 to 0.3 per hour) where they were rare, to 4 to 7 (0.6 to 2.2 per hour) where they were commonest. The northernmost records were single birds seen on June 19 and 21 at latitude 55° N. Air temperatures where they were observed ranged from 5° to 13°, water temperatures from 2.7° to 8.5°. Specimen: ♀, June 14, 1954, 49° 08′ N, 163° 10′ E.

Uria aalge. Common Murre. Most of the murres observed and the one collected were of the preceding species. The only Common Murres identified with certainty were four seen on July 3 southwest of the Commander Islands.

Brachyramphus marmoratus. Marbled Murrelet. This species was seen only near shore in the Kushiro area, 2 on June 5, and 6 on June 7, in air temperatures of 7.5° to 9°, water from 6° to 6.5°.

Synthliboramphus antiquus. Ancient Murrelet. This species was seen only twice: 4 birds east of Agattu on June 18, air 7°, water 4.5°; 2 birds east of the Commanders June 21, air 6.5°, water 5.5°. Specimen: ♂, June 21, 1954, 55° 10′ N, 172° 52′ E, wt. 235.6 gm.

Synthliboramphus wumisuzume. Japanese Murrelet. The movements of this species away from its breeding grounds in the Izu Islands are little known. Evidently some of them move northeastward along the Japanese coast along the edge of the warm current and into the milder cold current. Specimen: ♀, July 10, 1954, 41° 51′ N, 147° 22′ E, wt. 197.6 gm. We observed them as follows:

Date	Locality	Temperature °C. Air	Water	Number seen
July 9	240 mi. SE Etorofu	22.5	15.5	2
July 10	150 mi. ESE Kushiro	21	9	2
July 14	Off northern Honshu	17–22	12.5	4

Cyclorrhynchus psittacula. Paroquet Auklet. This species was observed fairly commonly in Aleutian waters, and a few were seen off southern Kamchatka. It is difficult to identify with certainty at a distance, and a number of tentative records in both these localities are omitted. Specimen: ♀, June 23, 1954, 52° 43′ N, 172° 12′ E. Iris white; bill orange-red, reddish at base, dark red at nares, white at edge of mouth of upper mandible and basal edge of under mandible; feet pale blue.

Date	Locality	Temperature °C. Air	Water	Number seen
June 18	Agattu-Kiska Strait	7	4.5	5
June 23	18 mi. S Attu	9.5	6	30
June 25	120 mi. S Commanders	8.7	6.2	4
July 2	200 mi. E s. Kamchatka	9	5	2

Aethia cristatella. Crested Auklet. A single bird 100 miles south of Urup on June 9 and 66 seen some 120 miles southeast of Shinshiru on June 10 were the only Crested Auklets encountered on the trip. On June 10 the species was quite common, flying about in small flocks, in singles and pairs, often circling the ship in curiosity. Birds on the water uttered a sharp *kirr kirr* before taking flight. The species' flight is fast and free, and the bird in the air resembles a miniature Tufted Puffin. The gonads of those collected were well developed. Specimens: ♂, June 9, 1954, 44° 19′ N, 150° 15′ E, wt. 266.8 gm.; ♂, June 10, 1954, 45° 32′ N, 153° 40′ E, wt. 326.5 gm.; ♀, June 10, 1954, 45° 32′ N, 153° 40′ E, wt. 282.5 gm.; bill orange, tipped yellow; feet lavender blue, the outer side whitish and webs and back of tarsus black.

Aethia pusilla. Least Auklet. This species was rather rare offshore and was encountered in numbers only east of Agattu. Specimen: ♀, June 18, 1954, 52° 08′ N, 175° 52′ E. Iris white; tip of bill reddish; feet pale blue, webs black.

Date	Locality	Temperature °C. Air	Water	Number seen
June 5	Off Kushiro	13	6.2	1
June 7	Off Kushiro	9	6.5	5
June 9	87 mi. SSE Urup	9	3.7	3
June 18	Agattu-Kiska Strait	6.6–8	5–5.3	68
June 19	250 mi. E Commanders	6.5	5	1

Cerorhinca monocerata. Rhinocerus Auklet. Single birds were seen in Japanese waters on June 4 and 5 and on July 14, in air temperatures of 14° to 20° and water of 12°. It was not met with elsewhere.

Fratercula corniculata. Horned Puffin. Rather rare throughout the voyage. Specimens: ♂, June 23, 1954, 52° 12′ N, 171° 56′ E; ♂, June 25, 1954, 52° 52′ N, 167° 47′ E, wt. 600 gm.

Date	Locality	Temperature °C. Air	Water	Number seen
June 9	100 mi. S Urup	6–9	3–3.7	3
June 22	60 mi. E Commanders	8	6	1
June 23	20 mi. SW Attu	9.5	7	1
June 25	110 mi. S Commanders	9	7	3

Lunda cirrhata. Tufted Puffin. This was the commonest of the alcids met with during the voyage, and it was absent from only three of the daily lists. The usual numbers observed were from 2 to 8 (0.3 to 1.5 per hour). It was most numerous around Attu and off Kamchatka, where between June 27 and July 2 we counted daily from 12 to 22 birds (1.9 to 3.8 per hour). We found it most often in air temperatures from 6° to 10° and in water temperatures from 5° to 7°.

We saw it usually in singles and pairs, flying rather high above the water. Almost every bird came to the ship to investigate it, circling around it several times, often coming close to the mast, then dashing off some distance and frequently returning once or twice. The bird flies free and fast, but when on the water it seems to be very heavy-bodied, and it has trouble taking wing. With its rapidly vibrating wingbeats, and its characteristic red bill and feet and white face, it was soon the most familiar of birds to our crew. Specimens: ♀ ad., June 9, 1954, 44° 17′ N, 150° 50′ E, wt. 817 gm.; ♂ ad., June 11, 1954, 47° 00′ N, 157° 32′ E, wt. 779 gm.; ♀ im., June 12, 1954, 48° 30′ N, 161° 40′ E (flightless); ♀ im., June 16, 1954, 51° 50′ N, 169° 06′ E (flightless); ? im., June 25, 1954, 52° 52′ N, 164° 44′ E (flightless); 2 ♀ ♀ im., July 2, 1954, 51° 52′ N, 163° 42′ E, wt. 722, 672 gm.

The first two birds, taken in early June off the central Kuriles, were adults with beautiful long tufts and fully developed gonads. The female, collected almost 200 miles from land, had a large yolk enveloped with gelatinous albumen at the end of the oviduct, almost ready to be laid. The immatures were flightless young of the previous year, which had molted their wing quills, as this species seems to do far at sea. In all, 24 such flightless birds were seen between June 12 and July 7. The subadults collected in late June and early July off Attu and southern Kamchatka seemed to be older young, for they had barely perceptible short tufts. Their feet were still pale colored on the outer side of the tarsus, and their gonads were very small. In juveniles the feet are ivory yellow and the iris umber brown. In subadults the tarsus is red, but pale orangish on the outer edge.

NON-OCEANIC BIRDS

Colymbus stellatus. Red-throated Loon. A single bird in nonbreeding plumage was seen near Attu on June 17.

Colymbus arcticus. Black-throated Loon. Divers, presumably of this species, were seen migrating on June 4 off the mouth of Ozuchi Bay, northern Honshu, in small groups of 8, 2, 5, and 12 birds each. They flew about 100 meters above the sea and were headed north-northeast. I had watched many of them migrating similarly in April and May, 1951. Some seem to head directly for the Kuriles; others move northward along the Hokkaido coast.

Histrionicus histrionicus. Harlequin Duck. I collected a male in worn plumage on July 1 at 50° 30′ N, 161° 49′ E, about 210 miles east of Paramushiru.

Melanitta nigra. Black Scoter. A flock of 10 birds was seen off Kushiro on July 11.

Phylloscopus borealis examinandus. Arctic Willow Warbler. I collected two females that came aboard the ship on July 1 some 180 miles east of southern Kamchatka and 200 miles southwest of Bering Island. It was foggy, with a gentle northeast breeze at the time.

Locustella ochotensis ochotensis. Island Grasshopper Warbler. A female was collected on the ship on June 29 about 170 miles east of Paramushiru. It came from the north in a weak north wind under cloudy skies.

Anthus spinoletta japonica. Water Pipit. A female was collected on shipboard on June 12 about 250 miles southeast of Paramushiru. The wind was northwesterly at the time, about 2 meters per second, and the sky was cloudy.

SUMMARY

This paper presents ornithological obervations made on a 6000-mile sea voyage from early June to mid-July, 1954, aboard a Japanese fur seal research ship. The vessel sailed northeastward from Hokkaido along the Kuriles to Attu, into the Bering Sea, southwestward past the Commanders and Kamchatka, and back along the Kuriles to Japan.

General oceanic conditions, air and water temperatures, winds, and the general distribution pattern of the seabird populations are described. Correlations between bird distribution and air and water temperatures can be made; species generally fall into cold-water and warm-water groups. A rough estimate of population densities is indicated by the number of individual birds seen per hour of observation. The greatest densities were found in the Attu-Agattu waters and off the Commander Islands.

A total of 37 oceanic and 8 non-oceanic species were recorded, of which 60 birds of 28 species were collected. The most interesting species reported are *Puffinus bulleri, Pterodroma solandri,* and *Pterodroma inexpectata,* each of which is recorded for the first time from the western North Pacific.

Yamashina Museum of Birds, Tokyo, Japan, March 1, 1955.