OBSERVATIONS ON POPULATIONS OF NORTH PACIFIC PELAGIC BIRDS

BY LEE W. ARNOLD

DURING 1943, while serving on escort duty in the U. S. Navy, the writer became interested in the relative population densities of pelagic birds. Not until the period from June 8 to September 16, 1944, was it practicable to conduct and record the results of systematized random sample censusing which would tend to give a true picture of a given broad area of ocean expanse. The results of these counts are best presented in tabular form (Tables 1, 2 and Text-figure 1).

The censusing was done over an area from 30 miles west of Cape Spencer on the continental Alaskan coast to the island of Attu, the most westerly land body of the Aleutian chain (Text-figure 1). This includes an area of some 2,000 lineal miles. Most of the observations were conducted on the oceanic portion of the Aleutian Island National Game Refuge. Included are dissimilar observation periods (Tables 1, 2) from the standpoint of the time of day, weather, and sea condi-

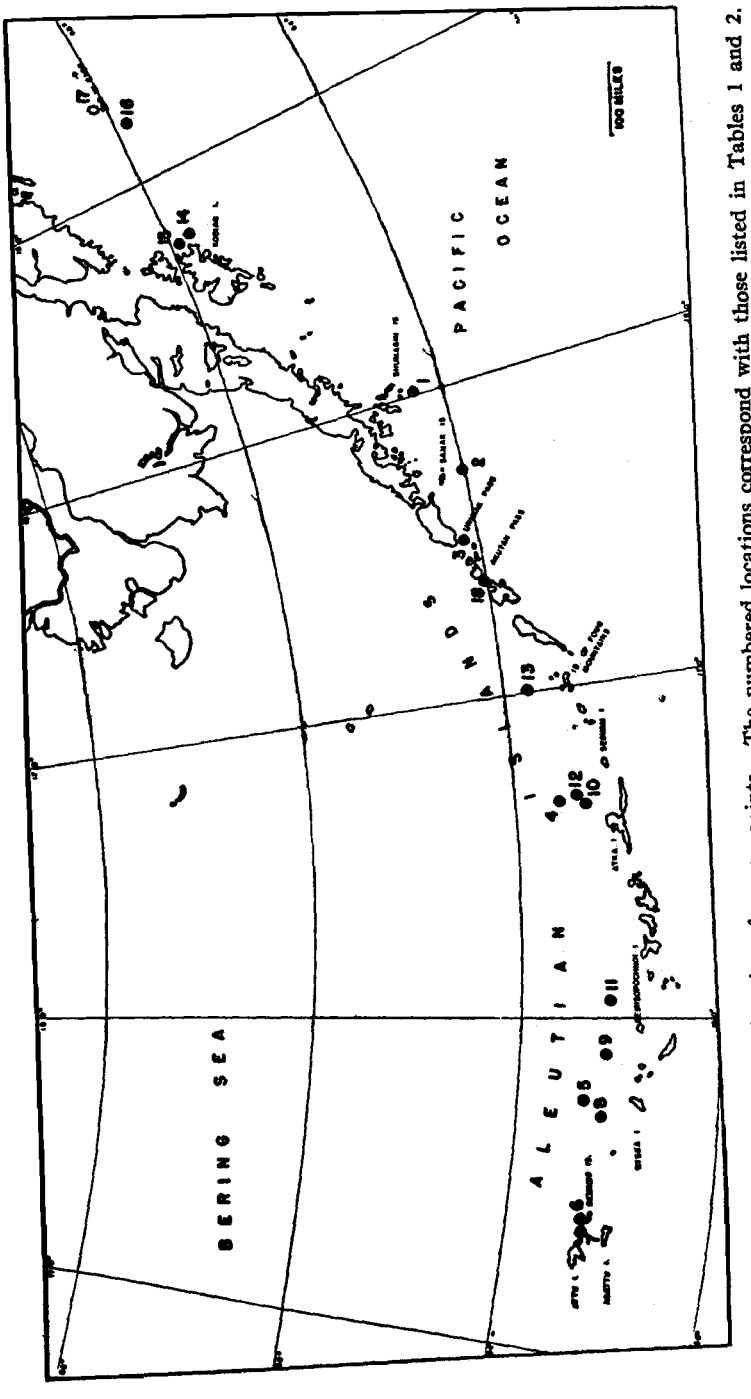
TABLE 1: TIME AND LOCATION OF CENSUS STRIPS

Observation Stations

1.[1] June 8: 6:00–8:00 p. m. 17 miles S. Shumagin Islands.
2. June 9: 5:00–8:00 a. m. 31 miles S. Sanak Islands.
3. June 9: Approx. 1:00–2:30 p. m. Unimak Pass.
4. June 11: 1:00–3:00 p. m. 75 miles N. W. Seguam Is.
5. June 14: 2:00–4:00 p. m. 59 miles N. Kiska Is.
6. June 16: 9:30–10:30 a. m. 3 miles N. Semichi Islands.
7. June 19: 10:00–12:00 a. m. Massacre Bay, Attu Island to 6 miles past sea buoy.
8. June 19: 10:00–12:00 p. m. 46 miles N. N. W. Kiska.
9. June 20: 9:00–12:00 a. m. 47 miles N. W. Semisopochnoi Is.
10. July 1: 7:00–8:00 a. m. 35 miles N. E. Atka Island.
11. July 8: 2 hours (time of day not recorded) 50 miles N. E. Semisopochnoi Is.
12. July 13: 6:00–8:00 a. m. 40 miles N. E. Atka Island.
13. July 13: 6:00–8:00 p. m. 30 miles N. Islands of Four Mountains.
14. July 16: 2:00–4:00 p. m. 10 miles E. Kodiak Island.
15. Aug. 7: 10:00–12:00 a. m. 8 miles E. Kodiak Island.
16. Aug. 9: 6:00–8:00 a. m. 175 miles E. Kodiak.
17. Aug. 10: 6:00–7:30 a. m. 30 miles W. Cape Spencer, Alaskan mainland.
18. Sept. 16: 1:00–4.00 p. m. Akutan Pass.

[1] The numbered observations correspond with those listed in Table 2 and mapped in Text-figure 1.

tions. All observations were made under conditions of 360° visibility from a position some 35 feet above the water. As all counts were conducted when the ship was cruising, a typical two-hour period would probably cover a 20 to 30-mile strip of ocean. Birds were



TEXT-FIGURE 1.—Geographical location of census points. The numbered locations correspond with those listed in Tables 1 and 2.

classified only to the grouping where positive identification was possible under the conditions described. An effort was made not to duplicate records of individuals of the Black-footed Albatross (*Diomedea nigripes*), Fulmar (*Fulmarus glacialis*), and the gull-type birds which were habitual ship-followers. During heavy seas it was entirely possible for smaller water-resting species such as auklets to escape detection. Identifications were made with the aid of W. B. Alexander's book, 'Birds of the Ocean' (G. P. Putnam's Sons, 1928).

Eighteen observation periods were selected as typical. Table 1 lists the positions of the recordings with regard to the nearest land, and also gives the definite time interval covered (Zonal standard war time). The numbers correspond to the census point as illustrated in Text-figure 1. The distance from land would vary but little during an observation period as most of the observations were made when the ship was travelling in a direction paralleling the island chain.

INTERPRETATION OF DATA

Table 2 records the observations according to the species and the time period involved. The column 'Periods Observed' should serve as an indicator of the relative distribution of the species; the totals for each observation period would be an indicator of area distribution of birds in general; and the 'Individual Totals' will give some idea of the relative numbers of individuals of the various species.

These data indicate that the Fulmar, Tufted Puffin (*Lunda cirrhata*), Shearwater (Slender-billed ?) (*Puffinus* sp.), and Black-footed Albatross are the only birds that could be classed as truly universal pelagic birds in the area concerned. Weather, sea conditions, time of day or distance from land appeared to have little to do with distribution of these birds. During periods of high winds and rough water, the Tufted Puffin was the only bird of the four with a decided tendency to 'ride out the storm' on the water rather than remain aloft. Under these conditions the Tufted Puffin, when approached by the ship, would often wait until the vessel was almost upon it and then, through a combination of swimming, flapping its wings and splashing, withdraw a few yards from the path of the vessel and plunge into the wall of water afforded by an oncoming swell.

The Short-tailed Albatross (*Diomedea albatrus*), a shy bird not given to ship-following but easily recognized at a distance, was seen in a somewhat restricted area near the western end of the island chain only. On only one occasion were the Short-tailed Albatross and the Black-footed Albatross observed during the same census period.

Information here presented and other observations would indicate

TABLE 2: SPECIES AND INDIVIDUALS NOTED AND PERIODS OF OBSERVATION

	1	*2*	*3*	*4*	*5*	*6*	*7*
Duration of observations in hours:	2	3	1.5	2	2	1	2
Date of observations:	*June 8*	*June 9*	*June 9*	*June 11*	*June 14*	*June 16*	*June 19*
Fulmar *Fulmarus glacialis*	100	1	38,000	..	2	..	1
Tufted Puffin *Lunda cirrhata*	125	82	1,900	9	1	..	1
Shearwater (Slender-billed?) *Puffinus* sp.	2,000	1,483	160,000	5	21	..	110
Black-footed Albatross *Diomedea nigripes*	8	1	100	7	..	..	..
Fork-tailed Petrel *Oceanodroma furcata*	..	..	..	18	2	..	..
Murre *Uria lomvia*	..	23	..	5	3	..	..
Short-tailed Albatross *Diomedea albatrus*	..	..	..	..	..	1	1
Ancient Murrelet *Synthliboramphus antiquus*	..	3	..	..	..	12	..
Kittiwake *Rissa tridactyla*	..	9	..	..	..	..	..
Auklet (Whiskered or Least) *Aethia* sp.	..	..	..	..	1	2	..
Phalarope *Phalaropodidae*	..	..	..	..	..	..	..
Horned Puffin *Fratercula corniculata*	16	..	..	..	..	..	..
Gull (Glaucous-winged?) *Larus* sp.	..	9	..	..	..	..	3
Cormorant (Pelagic?) *Phalacrocorax* sp.	..	..	..	..	..	..	4
Tern (Aleutian?) *Sterna* sp.	..	..	..	..	..	..	..
White-rumped Petrel *Oceanodroma leucorhoa*	..	..	..	3	..	..	..
Jaeger (Parasitic or Pomarine) *Stercorarius* sp.	..	..	..	..	..	..	..
Totals	2,249	1,611	200,000	47	30	15	120

that the Horned Puffin (*Fratercula corniculata*) is much less truly pelagic in its habits than the dark-colored Tufted Puffin. The latter was observed on the open ocean during even the most severe winter weather.

Although the great concentrations of sea birds in some of the Aleutian passes have been recorded by several observers, it is interesting to note the change in bird population during one day's cruising. On June 9 (Table 2, column 2) one Fulmar, only, was seen during the morning observation period. During the afternoon of the same day, when cruising through Unimak Pass, approximately 38,000 Fulmars

TABLE 2—*Continued*

8 2 *June 19*	*9* 3 *June 20*	*10* 1 *July 7*	*11* 2 *July 8*	*12* 2 *July 13*	*13* 2 *July 13*	*14* 2 *July 16*	*15* 2 *Aug. 7*	*16* 2 *Aug. 9*	*17* 1.5 *Aug. 10*	*18* 3 *Sept. 16*	*Periods observed*	*Totals of individual species*
3	7	2	2	3	19	54	11	17	49	..	15	38,271
12	17	24	2	29	7	11	16	..	..	23	15	2,259
6	7	..	..	..	30	72	4	..	71	4,000	13	167,809
..	16	6	7	4	4	5	..	19	5	..	12	182
2	9	4	2	..	..	..	..	19	..	..	7	56
10	..	..	1	2	21	..	..	..	..	..	7	65
5	..	1	..	..	..	..	..	..	..	..	4	8
..	..	..	..	..	12	..	..	..	..	..	3	27
..	1	..	..	..	..	..	..	..	..	30	3	40
..	..	..	..	..	..	..	..	..	..	1	3	4
..	..	..	..	..	20	..	15	..	..	..	2	35
4	..	..	..	..	..	..	..	..	..	..	2	20
..	..	..	..	..	..	..	..	..	..	..	2	12
..	..	..	..	..	..	..	..	..	..	3	2	7
..	..	1	..	..	..	..	..	1	..	..	2	2
..	..	..	..	..	..	..	..	..	..	..	1	3
..	..	..	..	..	1	..	..	..	..	..	1	1
42	57	38	14	38	114	142	46	56	125	4057		208,801

were recorded. The Fulmars and Shearwaters, congregated in this pass, evidently were feeding on a type of reddish orange water life. On occasion when one of the birds was hard-pressed to leave the area in the immediate vicinity of the ship, it would turn its head down and to one side and regurgitate a reddish orange liquid substance. Sometimes this process would be repeated several times before the bird had cast off enough 'ballast' to enable it to fly.

During recent months there have been increasing reports concerning the possible influence of radar and other high-frequency radio waves on birds. When the observations herein recorded were made, the

ship's radar equipment was in continuous operation. At no time did any of the birds observed show modification of behavior which might have been attributed to the presence of pulsating radio waves. In fact, when in tropical waters, Gannets frequently committed nuisance by roosting on the yardarms within a few feet of the radar and other high frequency radio antennae. On a few occasions during exceptionally favorable sea conditions it was possible to track albatrosses and frigate-birds by means of surface radar. The fact that in every case these birds maintained a steady course and speed, even though well within the range of the radar beam, would be indicative of the fact that they were probably unaware of radio waves being reflected from their bodies.

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NESTING OF THE SPOTTED SANDPIPER AT DETROIT, MICHIGAN

BY J. ROBERT AND JEAN T. MILLER

Plate 15

THIS paper concerns the 1947 nesting of the Spotted Sandpiper (*Actitis macularia*) on Belle Isle, an island in the Detroit River at Detroit, Michigan. The island is about three miles long and about half that wide at its widest point, and is primarily a public park with attractions such as bathing beaches, boat clubs, zoos, picnic grounds, etc. At the eastern end of the island are two narrow peninsulas (approximately a quarter mile long) with a large bay between them. Spotted Sandpipers nest on both of these peninsulas. Approximately the outer two-thirds of the more southern peninsula was utilized for this study.

HABITAT

The study area (Plate 15, figs. 1, 2) consists of 17.6 acres (paced) of dry meadow with a few trees, bounded on three sides by water and on the fourth side by habitat similar to that within the area. About 75% of the study tract was covered with four species of grasses of which blue grass (*Poa pratensis*) was the most common. The remainder was rocky shore with blue grass and sweet clover; 25 to 35-foot American elms with ground beneath covered by blue grass; some