SEABIRDS IN MARINE HABITATS OF SOUTHEAST ALASKA

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

FORWARD

This report provides a preliminary review of progress in field or laboratory activities and is prepared for administrative use within the Fish and Wildlife Service. The interpretations and conclusions presented herein are frequently based on fragmentary data and partial analysis, and are subject to change. For these reasons, information contained in this report should be used or quoted with caution.

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SEABIRDS IN MARINE HABITATS OF SOUTHEAST ALASKA

The United States Fish and Wildlife Service, Office of Biological Services-Coastal Ecosystems has been conducting shipboard surveys of seabirds in Alaskan waters under Research Unit 337 as part of the Outer Continental Shelf Environmental Assessment Program. The area covered by this report includes all marine waters of Southeast Alaska bounded by 54N, 59N, 130W, and 140W. Marine habitats within this area have been grouped into four catagories: Oceanic Waters (depth greater than 1,800 meters), Shelfbreak Waters (depth from 180 to 1,799 meters), Continental Shelf Waters (depth less than 180 meters), and Inland Passage Waters including bays and fyords (Figure 1). A preliminary analysis of these data is presented in the following report.

METHODS

Data were obtained from 16 cruises in marine waters between January 31, 1975, and February 19, 1977 (Table 1). Strip censuses (transects) were employed based on a 10-15 minute (temporal) cruising time with the ship moving along a straight path at a constant speed (5-16 knots). The observer counted all birds observed forward of mid-ship to the projected end of the transect and laterally, on one side, to 300 meters. Only those birds observed within the transect boundaries during the actual time of the transect were counted. Ship following birds were recorded separately and not included in density estimates. Distances were determined where possible by a range finder using the design developed by Dennis Heinemann under RU 108 (Wiens et. al, 1977 and 1978). In bay situations, distances were estimated by observers who had been using the range finder under good conditions and had verified their estimating ability.

RESULTS

Oceanic Waters

Six families, 15 species and 674 individual seabirds were recorded during the months of January, February, May, June, and August within oceanic waters (Table 2). Alcidae was the most abundant family due to one flock of 312 Cassin's Auklets encountered in June. This also made Cassin's Auklets the most abundant species within the area. The highest monthly total bird density was recorded in June (23.4 birds/Km2). The densities for the remaining four months were very uniform ranging from 1.5 to 3.3 birds/Km2.

BLACK-FOOTED ALBATROSS (Diomedea nigripes): This species was recorded only in February and August but probably occurs throughout the summer. Two to four birds followed the ship on February 19, 1977, in the southwest part of the study area (ca. 54N x 137W). This represents one of our few winter records for the Gulf of Alaska.

NORTHERN FULMAR (Fulmarus glacialis): Fulmars were found in January, February and June with highest density recorded in February. This was the third most abundant species within oceanic waters.

SOOTY/SHORT-TAILED SHEARWATER (Puffinus griseus/P. tenuirostris): These non-breeding summer residents were recorded only in May and June. The populations in this arrea appear to be much lower than has been found in other parts of the Gulf of Alaska.

FORK-TAILED STORM PETREL (Oceanodroma furcata): These birds were found in all months surveyed except January. Densities appear to remain uniform ranging from a low of 0.2 birds/Km2 in August to a high of 1.0 birds/Km2 in June.

LEACH'S STORM PETREL (Oceanodroma leucorhoa): This species was found only in oceanic waters where it appears to be one of the most abundant summer residents.

JAEGER (Stercorarius sp.): One unidentified jaeger was seen in June and another in August.

GLAUCOUS-WINGED GULL (Larus glaucescens): This species was recorded in oceanic waters only in January and February.

HERRING GULL (Larus argentatus): Like the Glaucous-winged Gull, this species occurs in oceanic waters only during the winter. Our only records are of a few birds following the ship in February.

KITTIWAKE (Rissa sp.): All records for this area probably refer to Black-legged Kittiwakes. We recorded these birds in small numbers only in January and February. As with Glaucous-winged and Herring Gulls, these birds move into more coastal waters during the summer breeding season.

SABINE'S GULL (Xema sabini): Six birds were recorded on June 15, 1976, at 54° 30'N x 131° 29'W.

MURRE (Uria sp.): Murres were found in January and June indicating that small numbers are probably present in oceanic waters throughout the year.

ANCIENT MURRELET (Synthliboramphus antiquus): Four birds were seen on June 13, 1976, at 54° 14'N x 134° 41'W.

CASSIN'S AUKLET (Ptychoramphus aleutica): One bird was seen on January 31, 1975, and 321 were found on June 13, 1977. This latter concentration occurred at 54 28'N x 134 59'W and was the reason for this species being the most abundant bird occurring in oceanic waters.

RHINOCEROS AUKLET (Cerorhinca monocerata): We recorded this species in oceanic waters only in May and June.

TUFTED PUFFIN (Lunda cirrhata): Small numbers were found throughout oceanic waters in all months except August.

Shelfbreak Waters

Six families, 11 species, and 224 individual seabirds were recorded from shelfbreak waters in March and September (Table 3). Total bird density was highest in March but the September data are too few for adequate comparison. The family Laridae dominated the avifauna both in terms of species and number of individuals. Kittiwakes far outnumbered all other species.

BLACK-FOOTED ALBATROSS (Diomedea nigripes): Four birds followed the ship on September 12, 1975, at 58°28'N x 139°43'W.

NORTHERN FULMAR (Fulmarus glacialis): This was the second most abundant species in this area and was found in both months surveyed.

SOOTY SHORT-TAILED SHEARWATER (Puffinus griseus/P. tenniurostris): A few birds tentatively identified as Sooties were observed during the September survey.

FORK-TAILED STORM PETREL (Oceanodroma furcata): None were found in March, but large numbers were present in September.

JAEGER (Stercorarius sp.): One unidentified jaeger was seen on September 12, 1975.

GLAUCOUS-WINGED GULL (Larus glaucescens): This species was common in shelfbreak waters in March. The lack of sightings in September was probably due to the small number of transects taken during that month.

HERRING GULL (Larus argentatus): One bird was observed on March 19, 1975, and another on September 12, 1975.

KITTIWAKE (Rissa sp.): Most of these birds were identified as Black-legged Kittiwakes. This was the most abundant species observed in shelfbreak waters although only one bird was found in September.

ARCTIC TERN (Sterna paradisaea): One bird was found on September 12, 1975, at 58°27'N x 139°33'W.

MURRE (Uria sp.): One murre was found on March 19, 1976, at 58°06'N x 139°14'W.

TUFTED PUFFIN (Lunda cirrhata): Small numbers were seen throughout the area during both months surveyed.

Continental Shelf Waters

Seven families, 17 species and 649 individual seabirds were recorded in continental shelf waters during February, March, April, May, September, and November (Table 4). Northern Fulmars were the dominant members of this avifauna although Pintails, Sooty/Short-tailed Shearwaters, Herring Gulls and Kittiwakes reached high local densities. Total bird density was highest in April and May (21.6 and 22.1 birds/Km2 respectively). Densities in the remaining months ranged from 3.5 to 8.4 birds/Km2.

LOON (Gavia sp.): One loon was observed on February 19, 1976, and another on April 28, 1976. Both were in the area of 58N x 138W.

BLACK-FOOTED ALBATROSS (Diomedea nigripes): On bird was seen on March 19, 1976, at 58°07'N x 138°36'W, and another on April 28, 1976, at 58°20'N x 138°32'W.

NORTHERN FULMAR (Fulmarus glacialis): Recorded from September through March with densities ranging from 1.4 to 4.1 birds/Km2.

SOOTY/SHORT-TAILED SHEARWATER (Puffinus griseus/P. tennuirostris): Birds seen in April, May and September with largest numbers found in May.

BLACK BRANT (Branta nigricans): A flock of 15 birds was seen on April 28, 1976, at 58°29'N x 138°49'W.

PINTAIL (Anas acuta): Two groups numbering 68 and 101 individuals were observed on April 28, 1976, in the area of 58°25'N x 138°30'W.

PECTORAL SANDPIPER (Calidris melanotos): A flock of 25 birds was found on April 28, 1976, at 58°37'N x 138°04'W.

GLAUCOUS-WINGED GULL (Larus glaucescens): This species was found only during the months of February, March and April. Densities ranged from 0.2 to 1.1 birds/Km2).

HERRING GULL (Larus argentatus): We recorded this species from February through May with largest numbers (6.9 birds/Km2) occurring during the latter month.

KITTIWAKE (Rissa sp.): Most of these birds were identified as Black-legged Kittiwakes. They were present during all months surveyed. Densities ranged from 0.4 to 5.2 birds/Km2.

ARCTIC TERN (Sterna paradisaea): Three birds were found on May 11 1975, at 58°58'N x 139°50'W.

MURRE (Uria sp.): Sixteen birds were identified as Thick-billed Murres in February, 1976. The remaining birds found in February, April and November were not identified to species. Highest density occurred during the winter months.

MARBLED MURRELET (Brachyramphus marmoratum): Ten birds were observed on April 28, 1976, at 58°24'N x 138°36'W.

KITTLITZ'S MURRELET (Brachyramphus brevirostris): Two were seen on April 28, 1976, at 58°29'N x 138°42'W.

CASSIN'S AUKLET (Ptychoramphus aleutica): Twenty-six birds were found in April in the area of 58°25'N x 138°40'W.

HORNED PUFFIN (Fratercula corniculata): A single bird was observed on February 19, 1976 at ca. 58N°x 138W.

Inland Passage Waters

Nine families, 27 species and over 1,600 individual seabirds were recorded during the months of February, March, April, May, August, October, and December in inland passage waters. Alcids dominated the avifauna with Larids a close second. Murres were the most abundant species within the area although Glaucous-winged Gulls, Mew Gulls, Kittiwakes, and Marbled Murrelets reached high local densities. Total bird densities ranged from a low of 1.4 birds/Km2 in August to a high of 25.7 birds/Km2 in February.

COMMON LOON (Gavia immer): Single birds were seen on February 18, 1976, and May 20, 1976.

ARCTIC LOON (Gavia arctica): One bird was recorded on September 16, 1975.

NORTHERN FULMAR (Fulmarus glacialis): A single bird was encountered on March 18, 1976 at 56°13'N x 134°23'W.

FORK-TAILED STORM PETREL (Oceanodroma furcata): Four birds were seen on March 19, 1976 and six were found on September 16, 1975.

PELAGIC CORMORANT (Phalacrocorax pelagicus): This species was recorded in small numbers from September through March. None were observed in waters outside of the passage area.

EMPEROR GOOSE (Philacte canagica): One bird was observed on February 18, 1976, at 56°22'N x 133°42'W.

OLDSQUAW (Clangula hyemalis): Three birds were seen on October 23.

EIDER (Somateria sp.): One unidentified eider was found on December 1 at 56°20'N x 133°43'W.

WHITE-WINGED SCOTER (Melanitta deglandi): One bird was observed on October 23 at 58°16'N x 134°42'W.

SURF SCOTER (Melanitta perspicillata): Twelve birds were noted on October 23 and a few in April. All sightings were in the area of ca. 58°20'N x 134°45'W.

COMMON MERGANSER (Mergus merganser): Three birds were seen on February 18 at 56°15'N x 132°56'W.

RED-BREASTED MERGANSER (Mergus serrator): Two birds were observed on February 18 in the same area as the Common Mergansers.

BALD EAGLE (Haliaeetus leucocephalus): This species was observed on February 18, 1976, at 56°23'N x 133°33'W.

PHALAROPE (Genus?): Several unidentified phalaropes were observed in April.

GLAUCOUS-WINGED GULL (Larus glaucescens): This species appears to be present in relatively high numbers throughout the year. The lack of birds in April and August may have been the result of small sample size. Densities ranged from 0.4 to 3.3 birds/Km2 with greatest abundance in October.

HERRING GULL (Larus argentatus): Recorded from September through March with relatively uniform densities throughout that period (0.2 to 1.0 birds/Km2).

MEW GULL (Larus canus): These gulls were found from September through April with low densities in the fall and high densities in late winter.

BONAPARTE'S GULL (Larus philadelphia): Several birds were seen in April.

KITTIWAKE (Rissa sp.): All of these birds were identified as Black-legged Kittiwakes. They were observed only in September and October with most birds recorded from the latter month.

ARCTIC TERN (Sterna paradisaea): Several birds were seen in April.

MURRE (Uria sp.): Ninety-one percent of those murres identified to species were Common Murres. Murres were the most abundant species in this region. They were found in all seasons except summer with highest density in late winter (13.1 and 7.5 birds/Km2 in February and March respectively).

MARBLED MURRELET (Brachyramphus marmoratum): This species was recorded in relatively high numbers in May and September, but they were not observed during the other survey periods.

KITTLITZ'S MURRELET (Brachyramphus brevirostris): One bird was identified on May 30, 1976, at 58°42'N x 136°05'W.

ANCIENT MURRELET (Synthliboramphus antiquus): Three birds were found on February 18, and one bird was found on March 18.

CASSIN'S AUKLET (Ptychoramphus aleutica): Six birds were seen on February 18 and a few were found on March 18.

TUFTED PUFFIN (Lunda cirrhata): Two birds were recorded on February 18 at 56°11'N x 133°54'W. This species is apparently absent from the inner parts of the inside passage area.

SUMMARY

Members of 10 different families were observed within the four regions of the study area, including 35 species and 3,165 individual birds. Representatives of seven families were seen in both the Inside Passage region and the Coastal Shelf region. The Oceanic and Shelfbreak regions each included sightings of six families. The largest number of birds were observed within the Inside Passage region, and the least number of birds were seen in the in the Shelfbreak region. These two areas coinsided with the regions of the greatest and fewest transects, however, so this relationship may simply be a function of the number of transects conducted in each area. Th most numerous individual species seen within a region was Cassin's Auklet.

Three families; Procellariidae, Laridae, and Alcidae, were represented in all four regions by one or more species. Black-footed Albatross were observed in all areas except the Inside Passage region. Loons, ducks and geese were seen only within the Coastal Shelf and Inside Passage regions, while the Storm Petrels and Jaegers were present only within the Oceanic and Shelfbreak regions. The Inside Passage region was the only area where Cormorants and Bald Eagles were observed.

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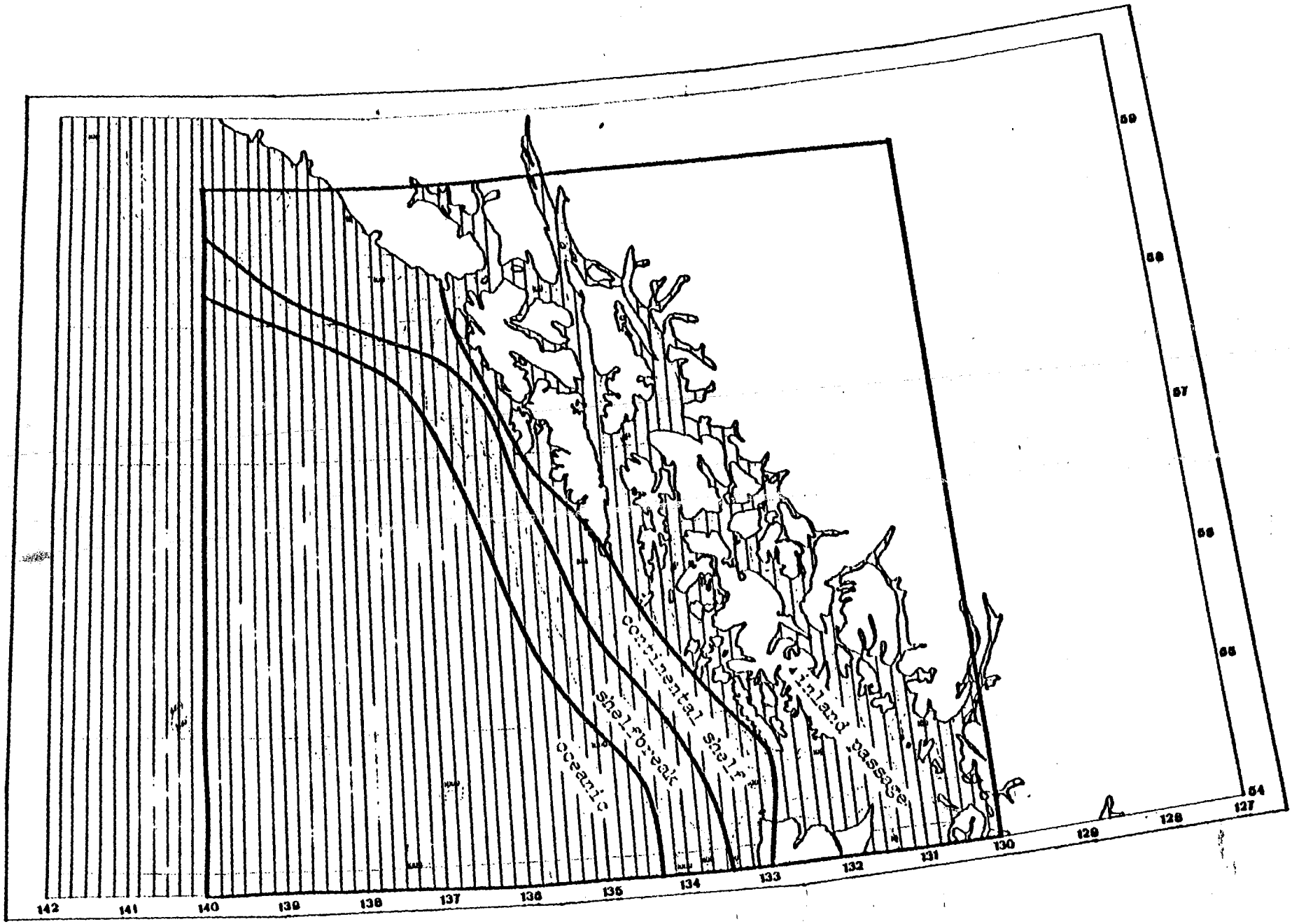

Figure 1. Southeast Alaska study area.

Table 1. Schedule of field operations within marine habitats of Southeast Alaska.

OPERATION NUMBER*	MARINE HABITATS			
	OCEANIC	SHELFBREAK	CONTINENTAL SHELF	INLAND PASSAGE
FW5002	1/31**	-	-	-
FW5004	6/12-13	-	5/11	-
"	-	-	4/21	-
FW5005	5/10	-	-	-
"	6/21	-	-	-
FW5015	8/7	-	-	-
FW5016	-	9/12	9/12	-
FW5020	-	-	-	8/31
FW5024	-	-	-	9/16
FW5025	-	-	-	10/23
FW5031	-	-	-	10/28
FW5033	-	-	11/30	12/1
FW6022	-	-	2/19	2/18
FW6005	2/26	-	-	-
FW6010	-	3/19	3/19	3/18-19
FW6018	-	-	4/28-29	4/30
FW6068	6/14-15	-	-	5/30
FW7027	2/19	-	-	-

* : FW5 = 1975, FW6 = 1976, FW7 = 1977
** : Month/Day

Table 2. Seabird abundance in oceanic waters of Southeast Alaska.

SPECIES	NUMBER OF BIRDS	RELATIVE ABUNDANCE (%)	$\bar{X}$ TRANSECT DENSITY (BIRDS/KM2)	RANGE OF TRANSECT DENSITIES
JANUARY (8 transects, 18.9 Km2 covered)				
Northern Fulmar	10	36	0.6	0.0-2.4
Glaucous-winged Gull	7	25	0.3	0.0-0.8
Kittiwake	4	14	0.2	0.0-0.5
Murre	2	7	0.1	0.0-0.8
Cassin's Auklet	1	4	0.1	0.0-0.4
Tufted Puffin	4	14	0.2	0.0-0.8
Total Birds	28	-	1.5	0.0-2.6
FEBRUARY (25 transects, 33.1 Km2 covered)				
Black-footed Albatross	4	4	0.1	0.0-0.1
Northern Fulmar	38	35	1.1	0.0-4.3
Fork-tailed Petrel	13	12	0.4	0.0-3.1
Unid. Storm Petrel	3	3	0.1	0.0-0.8
Glaucous-winged Gull	1	1	0.1	0.0-0.8
Herring Gull	+	+	+	+
Unid. Gull	3	3	0.1	0.0-0.8
Kittiwake	41	38	1.2	0.0-8.6
Tufted Puffin	5	5	0.1	0.0-1.5
Total Birds	108	-	3.3	0.0-11.4
MAY (2 transects, 2.7 Km2 covered)				
Shearwater	3	38	0.8	0.7-0.9
Fork-tailed Petrel	1	12	0.3	0.0-0.7
Rhinoceros Auklet	1	12	0.3	0.0-0.7
Tufted Puffin	2	25	0.4	0.0-0.9
Unid. Alcid	1	12	0.3	0.0-0.7
Total Birds	8	-	2.2	1.8-2.7
JUNE (12 transects, 20.0 Km2 covered)				
Northern Fulmar	10	2	0.5	0.0-1.7
Shearwater	26	5	1.2	0.0-2.6
Fork-tailed Petrel	20	4	1.0	0.0-4.2
Leach's Petrel	83	16	4.0	0.0-14.2
Unid. Storm Petrel	21	4	0.8	0.0-5.3
Unid. Jaeger	1	1	0.1	0.0-0.4
Sabine's Gull	6	1	0.1	0.0-1.8
Murre	1	1	0.1	0.0-0.5
Ancient Murrelet	4	1	0.2	0.0-2.1
Cassin's Auklet	321	62	14.1	0.0-164.2
Rhinoceros Auklet	4	1	0.2	0.0-1.1
Tufted Puffin	9	1	0.4	0.0-2.2
Unid. Alcid	7	1	0.3	0.0-3.7
Total Birds	513	-	23.4	1.0-186.3

Table 2 (continued).

SPECIES	NUMBER OF BIRDS	RELATIVE ABUNDANCE (%)	$\bar{x}$ TRANSECT DENSITY (BIRDS/KM2)	RANGE OF TRANSECT DENSITIES
AUGUST (2 transects, 4.4 Km2 covered).				
Black-footed Albatross	2	12	0.4	0.0-0.4
Fork-tailed Petrel	1	6	0.2	0.0-0.4
Leach's Petrel	10	59	2.2	0.9-3.6
Unid. Storm Petrel	3	17	0.7	0.0-0.9
Unid. Jaeger	1	6	0.2	0.0-0.4
Total Birds	17	-	3.8	1.8-5.9

TABLE 3. Seabird abundance in Shelfbreak waters of Southeast Alaska.

SPECIES	NUMBER OF BIRDS	RELATIVE ABUNDANCE (%)	$\bar{x}$ TRANSECT DENSITY (BIRDS/KM2)	RANGE OF TRANSECT DENSITIES
MARCH (16 transects, 14.4 Km2 covered)				
Northern Fulmar	31	16	2.2	0.0-7.5
Glaucous-winged Gull	14	7	1.0	0.0-6.3
Herring Gull	1	1	0.1	0.0-1.1
Kittiwake	119	62	7.8	0.0-55.5
Unid. Gull	10	5	0.7	0.0-5.5
Murre	1	1	0.1	0.0-1.1
Tufted Puffin	3	2	0.2	0.0-1.1
Unid. Alcid	7	3	0.5	0.0-2.5
Unid. Bird	4	2	0.3	0.0-4.4
Total Birds	190	-	13.3	1.1-65.5
SEPTEMBER (2 transects, 5.7 Km2 covered)				
Black-footed Albatross	4	12	0.5	0.0-1.1
Northern Fulmar	6	17	1.0	0.9-1.1
Shearwater	4	12	1.0	0.0-1.9
Fork-tailed Petrel	14	41	2.0	0.0-3.9
Unid. Jaeger	1	3	0.2	0.0-0.5
Herring Gull	1	3	0.2	0.0-0.5
Kittiwake	1	3	0.2	0.0-0.5
Arctic Tern	1	3	0.2	0.0-0.5
Hybrid Gull	1	3	0.2	0.0-0.5
Tufted Puffin	1	3	0.2	0.0-0.5
Total Birds	34	-	5.9	5.7-6.1

Table 4. Seabird abundance in continental shelf waters of Southeast Alaska

SPECIES	NUMBER OF BIRDS	RELATIVE ABUNDANCE (%)	$\bar{X}$ TRANSECT DENSITY (BIRDS/KM2)	RANGE OF TRANSECT DENSITIES
FEBRUARY (12 transects, 32.8 Km2 covered)				
Unid. Loon	1	1	0.1	0.0-0.3
Northern Fulmar	131	51	4.1	0.3-23.2
Glaucous-winged Gull	17	6	0.5	0.0-1.6
Herring Gull	4	2	0.1	0.0-0.8
Hybrid Gull	1	1	0.1	0.0-0.3
Kittiwake	36	14	1.1	0.0-2.4
Unid. Gull	3	1	0.1	0.0-0.4
Murre	52	20	0.8	0.0-6.4
Horned Puffin	1	1	0.1	0.0-0.3
Unid. Alcid	4	2	0.1	0.0-0.8
Unid. Bird	2	1	0.1	0.0-0.4
Total Birds	252	-	7.8	1.1-25.7
MARCH (8 transects, 6.6 Km2 covered)				
Black-footed Albatross	1	2	0.2	0.0-1.3
Northern Fulmar	24	43	3.7	0.0-11.3
Glaucous-winged Gull	1	2	0.2	0.0-1.3
Herring Gull	2	4	0.3	0.0-1.1
Kittiwake	18	33	2.6	0.0-7.5
Unid. Gull	6	11	0.9	0.0-3.7
Unid. Alcid	3	5	0.4	0.0-2.2
Total Birds	55	-	8.4	4.4-12.5
APRIL (16 transects, 9.0 Km2 covered)				
Unid. Loon	1	1	0.1	0.0-1.7
Black-footed Albatross	+	+	+	+
Shearwater	8	3	0.7	0.0-6.7
Black Brant	15	5	1.2	0.0-18.7
Pintail	169	57	11.6	0.0-101.0
Pectoral Sandpiper	25	8	2.6	0.0-41.7
Glaucous-winged Gull	11	4	1.1	0.0-11.7
Herring Gull	3	1	0.2	0.0-1.3
Kittiwake	5	2	0.4	0.0-6.3
Unid. Gull	1	1	0.0	0.0-1.7
Murre	4	1	0.3	0.0-2.5
Marbled Murrelet	10	3	0.6	0.0-10.0
Kittlitz's Murrelet	2	1	0.1	0.0-2.0
Cassin's Auklet	26	9	1.6	0.0-23.0
Unid. Alcid	13	4	0.9	0.0-7.5
Total Birds	293	-	21.6	0.0-126.0

Table 4 (continued)

SPECIES	NUMBER OF BIRDS	RELATIVE ABUNDANCE (%)	$\bar{X}$ TRANSECT DENSITY (BIRDS/KM2)	RANGE OF TRANSECT DENSITIES
MAY (2 transects, 0.7 Km2 covered)				
Shearwater	10	35	7.5	5.0-10.0
Herring Gull	9	31	6.9	6.7-7.1
Kittiwake	7	24	5.2	3.3-7.1
Arctic Tern	3	10	2.5	0.0-5.0
Total Birds	29	-	22.1	20.0-24.3
SEPTEMBER (1 transect, 1.8 Km2 covered)				
Northern Fulmar	3	20	1.7	-
Shearwater	9	60	4.9	-
Kittiwake	2	13	1.1	-
Unid. Murrelet	1	7	0.5	-
Total Birds	15	-	8.3	-
NOVEMBER (1 transect, 1.4 Km2 covered)				
Northern Fulmar	2	40	1.4	-
Kittiwake	1	20	0.7	-
Murre	2	40	1.4	-
Total Birds	5	-	3.5	-

Table 5. Seabird abundance in inside passage waters of Southeast Alaska.

SPECIES	NUMBER OF BIRDS	RELATIVE ABUNDANCE (%)	$\bar{X}$ TRANSECT DENSITY (BIRDS/KM2)	RANGE OF TRANSECT DENSITIES
FEBRUARY (18 transects, 44.7 Km2 covered)				
Common Loon	1	1	0.1	0.0-0.3
Unid. Loon	2	1	0.1	0.0-0.9
Pelagic Cormorant	3	1	0.1	0.0-1.1
Unid. Cormorant	18	2	0.5	0.0-3.6
Emperor Goose	1	1	0.1	0.0-0.3
Common Merganser	3	1	0.1	0.0-0.7
Red-breasted Merganser	2	1	0.1	0.0-0.7
Unid. Merganser	3	1	0.1	0.0-1.1
Unid. Duck	2	1	0.1	0.0-0.3
Bald Eagle	1	1	0.1	0.0-0.9
Glaucous-winged Gull	61	6	1.2	0.0-16.1
Herring Gull	33	3	0.7	0.0-3.2
Mew Gull	175	17	3.5	0.0-23.2
Unid. Gull	181	17	3.7	0.0-55.0

Table 5 (continued)

SPECIES	NUMBER OF BIRDS	RELATIVE ABUNDANCE (%)	$\bar{X}$ TRANSECT DENSITY (BIRDS/KM2)	RANGE OF TRANSECT DENSITIES
Murre	422	41	13.1	0.0-95.5
Marbled Murrelet	33	3	0.7	0.0-6.1
Ancient Murrelet	3	1	0.1	0.0-1.1
Cassin's Auklet	6	1	0.1	0.0-2.1
Tufted Puffin	2	1	0.1	0.0-0.7
Unid. Alcid	67	7	1.6	0.0-10.7
Unid. Bird	2	1	0.1	0.0-0.7
Total Birds	1021	-	25.7	1.1-125.5
MARCH (19 transects, 24.0 Km2 covered)				
Northern Fulmar	1	1	0.1	0.0-0.8
Fork-tailed Petrel	4	1	0.1	0.0-1.5
Pelagic Cormorant	3	1	0.1	0.0-2.1
Glaucous-winged Gull	11	4	0.5	0.0-3.3
Herring Gull	26	9	1.0	0.0-10.7
Mew Gull	51	17	2.2	0.0-18.3
Unid. Gull	4	1	0.1	0.0-1.0
Murre	181	61	7.5	0.0-89.3
Ancient Murrelet	1	1	0.1	0.0-0.8
Cassin's Auklet	+	+	+	+
Unid. Alcid	11	4	0.5	0.0-4.0
Total Birds	293	-	13.1	0.0-90.8
APRIL (0 transects, 2 periods of general observations)				
Surf Scoter	+	+	+	+
Unid. Phalarope	+	+	+	+
Mew Gull	+	+	+	+
Bonaparte's Gull	+	+	+	+
Unid. Gull	+	+	+	+
Arctic Tern	+	+	+	+
Unid. Alcid	+	+	+	+
MAY (1 transect, 1.1 Km2 covered)				
Common Loon	1	14	0.9	-
Glaucous-winged Gull	1	14	0.9	-
Marbled Murrelet	4	58	3.6	-
Kittlitz's Murrelet	1	14	0.9	-
Total Birds	7	-	6.4	-
AUGUST (3 transects, 4.4 Km2 covered)				
Unid. Gull	1	17	0.2	0.0-0.7
Murre	5	83	1.2	0.0-3.6
Total Birds	6	-	1.4	0.0-3.6

Table 5 (continued).

SPECIES	NUMBER OF BIRDS	RELATIVE ABUNDANCE (%)	$\bar{X}$ TRANSECT DENSITY (BIRDS/KM2)	RANGE OF TRANSECT DENSITIES
SEPTEMBER (5 transects, 9.7 Km2 covered)				
Arctic Loon	1	1	0.1	0.0-0.5
Unid. Loon	1	1	0.0	0.0-0.5
Fork-tailed Petrel	6	7	0.7	0.0-2.8
Pelagic Cormorant	2	3	0.2	0.0-1.1
Unid. Cormorant	1	1	0.1	0.0-0.5
Unid. Scoters	9	10	0.9	0.0-4.2
Unid. Ducks	3	4	0.3	0.0-1.7
Glaucous-winged Gull	17	19	1.7	0.0-3.3
Herring Gull	5	6	0.5	0.0-1.4
Mew Gull	2	2	0.2	0.0-0.5
Kittiwake	8	9	0.9	0.0-1.7
Unid. Gull	1	1	0.1	0.0-0.5
Murre	23	26	2.4	0.0-9.5
Marbled Murrelet	9	10	1.0	0.0-5.0
Total Birds	88	-	9.2	3.1-15.3
OCTOBER (4 transects, 10.1 Km2 covered)				
Glaucous-winged Gull	50	47	3.3	0.0-10.0
Herring Gull	1	1	0.2	0.0-0.5
Mew Gull	1	1	0.2	0.0-0.3
Kittiwake	16	15	2.2	0.0-5.0
Oldsquaw	3	3	0.5	0.0-1.5
White-winged Scoter	1	1	0.2	0.0-0.5
Surf Scoter	12	11	2.0	0.0-2.6
Murre	23	21	2.7	0.0-5.0
Total Birds	107	-	11.5	4.7-10.0
DECEMBER (7 transects, 14.7 Km2 covered)				
Unid. Loon	1	1	0.1	0.0-0.5
Unid. Cormorant	1	1	0.1	0.0-0.5
Unid. Eider	1	1	0.1	0.0-0.5
Glaucous-winged Gull	6	7	0.4	0.0-1.4
Herring Gull	9	10	0.2	0.0-2.4
Unid. Murrelet	72	80	4.9	0.0-33.3
Total Birds	90	-	6.1	0.0-36.2