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WINTER BIRD POPULATIONS OF SELECTED  
SALTWATER HABITATS IN SOUTHEAST ALASKA

by

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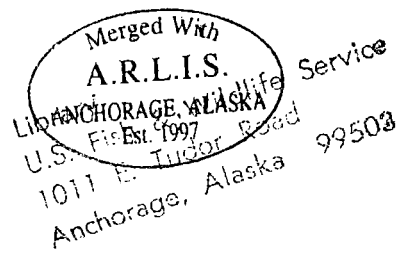
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WINTER BIRD POPULATIONS  
OF A PROTECTED SALTWATER  
BAY IN SOUTHEAST ALASKA

The following 10 studies were conducted in the coastal waters of Port Frederick, a large, deep-water bay system which indents the NE shoreline of Chichagof I., located in the Alexander Arch. of SE Alaska. The U.S. Fish and Wildlife Service began intensive winter surveys of Port Frederick in 1982. By means of simultaneous boat and plane surveys, investigators hoped to determine (1) the proportion of various species of waterbirds detected and counted by boat survey crews which are also detected and counted by air survey crews; (2) the variability of both boat and plane surveys, and the degree of annual variation in the percentage of birds counted from the air; and (3) the feasibility of applying correction factors to aerial survey data gathered over an extensive area of SE Alaska. A preliminary comparison of the air and boat counts was presented by J. G. King, B. Conant, and J. L. Trapp (1982. Comparison of air and surface counts of wintering waterbirds in a southeast Alaska bay. Pacific Seabird Group Bull. 9: 73). A detailed analysis will be published elsewhere.

Port Frederick is situated on the S side of Icy St. between Crist Pt. and Pt. Sophia. It extends for about 20 mi from NE to SW and averages about 2 mi wide. The water is clear, with no swell, but wind-generated waves of small to moderate amplitude are of frequent occurrence. Maximum tidal fluctuation during the surveys was about 23 ft. Two distinct habitat types are recognized, following B. Kessel (1979. Avian habitat

classification for Alaska. Murrelet 60: 86-94). Inshore and Offshore Marine Waters includes all waters seaward of the 60 ft isobath, and covers about 53% of the surface area of Port Frederick. Water depth ranges from 60 to 540 ft, with about 56% of the habitat having depths exceeding 300 ft. Nearshore Marine Waters and Tidal Flats includes a narrow band of coastal water extending seaward from the line of mean high water to the 60 ft isobath. The 60 ft isobath is located approximately 0.25 mi offshore of the line of mean high tide, although it extends considerably further (up to 1.0 mi) in the vicinity of tidal flats. About 31% of this habitat is tidal flat, being completely exposed at mean lower low water. The tidal flats are bare sand and fine gravel at the seaward edge, but the upper portions are vegetated with Alkali Grass (Puccinellia spp.), Common Spikerush (Eleocharis palustris), sedge (Carex lyngbyaei), Hair Grass (Deschampsia spp.), and Reed Bent Grass (Calamagrostis spp.). Tidal flats are most prominent where rivers or large streams flow into the bay. Most of the 110.66 mi of shoreline is rocky and precipitous. Port Frederick is bordered by dense Sitka Spruce (Picea sitchensis)-Western Hemlock (Tsuga heterophylla) forest, which encroaches nearly to the line of mean high tide in most places. In wetter situations, particularly near tidal marshes, a Red Alder (Alnus rubra) shrub community is prominent.

Counts of Inshore and Offshore Marine Waters plots were made from the bow of a 65-ft vessel as it cruised at a speed of about 11.5 mph. All counts of Nearshore Marine Waters and Tidal Flats were conducted in an open, 17-ft boat travelling parallel to the shoreline at an average speed of 8 mph. All shoreline counts were completed within + 3 hrs of high tide.

James L. Baker, Karen S. Bollinger, Patrick J. Gould, Robin E. Hunter, John I. Hodges, and Phillip F. Schempf assisted with the counts; Andy Anderson, Bruce Conant, and Rodney J. King provided logistical support and advise; and Dirk V. Derksen offered continuing encouragement and moral support.--JOHN L. TRAPP, U. S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, AK 99503, and JAMES G. KING, U.S. Fish and Wildlife Service, P.O. Box 1287, Juneau, AK 99802. Present address of JGK: 1700 Branta Road, Juneau, AK 99801.

INSHORE AND OFFSHORE MARINE WATERS, I.--Location: Alaska; Alexander Arch., Chichagof I., Port Frederick, 2.4 mi NW of Hoonah; 58°08'N, 135°28'W, N 1/2 of Juneau A-5 Quadrangle (1:63,360), USGS. Continuity: New. Size: 252.5 ha = 624.0 acres, consisting of 2 non-contiguous rectangular subplots, 0.25 x 1.80 mi and 0.25 x 2.10 mi (measured on USGS map). Subplots are centered on 1-min lines of latitude, which cross Port Frederick diagonally, providing a representative sample of this habitat. Description of Plot: See Introduction. Plot is located at the mouth of Port Frederick in relatively shallow and exposed waters. About 21% of the plot has water depths exceeding 300 ft. Coverage: Feb. 24-25. Total, 3 trips and 0.9 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Com. Murre, 42 (16.6, 6.7); Marbled Murrelet, 22 (8.7, 3.5); Oldsquaw, 9 (3.6, 1.4); Surf Scoter, 1 (0.4, 0.2); Mew Gull, 1; Glaucous-winged Gull, 1; Pigeon Guillemot, 1; Pelagic Cormorant, +. Average Total: 79 birds (31.3/km<sup>2</sup>, 12.7/100 acres). Remarks: Total species, 8. Coefficient of variation for all species combined, 51%. Highly variable survey data is characteristic of bird species of this

habitat, which exhibit an extremely clumped and dynamic distribution in response to temporal and spatial changes in the availability of mobile prey species.

INSHORE AND OFFSHORE MARINE WATERS, II.--Location: Alaska; Alexander Arch., Chichagof I., Port Frederick, 5.3 mi SW of Hoonah; 58°04'N, 135°34'W, S 1/2 of Juneau A-5 Quadrangle (1:63,360), USGS. Continuity: New. Size: 1068.4 ha = 2640.0 acres, consisting of 7 non-contiguous rectangular subplots 0.25-mi wide and ranging from 1.60 to 3.20-mi long (measured on USGS map). Subplots are centered on 1-min lines of latitude, which cross Port Frederick diagonally, providing a representative sample of this habitat. Description of Plot: See Introduction. Plot is located in the central portion of Port Frederick in relatively deep waters. About 69% of the plot has water depths exceeding 300 ft. Coverage: Feb. 19, 24. Total, 3 trips and 3.5 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Oldsquaw, 122 (11.4, 4.6); Com. Murre, 115 (10.8, 4.4); Marbled Murrelet, 32 (3.0, 1.2); Glaucous-winged Gull, 13 (1.2, 0.5); Mew Gull, 7 (0.7, 0.3); Pigeon Guillemot, 7; Barrow's Goldeneye, 4 (0.4, 0.2); Arctic Loon, 2 (0.2, 0.1); Pelagic Cormorant, 2; loon sp., 1; Red-necked Grebe, 1; Mallard, 1; Surf Scoter, 1; White-winged Scoter, 1; merganser sp., 1; Horned Grebe, +. Average Total: 310 birds ( $29.0/\text{km}^2$ , 11.7/100 acres). Remarks: Total species, 15. Coefficient of variation for all species combined, 53%. Oldsquaw was the only duck which consistently occurred in greater densities in this habitat than in Nearshore Marine Waters and Tidal Flats. Bald Eagles were observed in flight over the plot on several occasions.



INSHORE AND OFFSHORE MARINE WATERS, III.--Location: Alaska; Alexander Arch., Chichagof I., Port Frederick, 12 mi SW of Hoonah; 57°59'N, 135°40'W, NW 1/4 of Sitka D-5 Quadrangle and NE 1/4 of Sitka D-6 Quadrangle (1:63,360), USGS. Continuity: New. Size: 239.6 ha = 592.0 acres, consisting of 2 non-contiguous rectangular subplots, 0.25 x 1.40 mi and 0.25 x 2.3 mi (measured on USGS map). Subplots are centered on 1-min lines of latitude, which cross Port Frederick diagonally, providing a representative sample of this habitat. Description of Plot: See Introduction. Plot is located near the head of Port Frederick, where the bay narrows to widths of less than 1.0 mi and the waters are relatively protected. About 35% of the plot has water depths greater than 300 ft. Coverage: Feb. 19, 24. Total, 3 trips and 0.8 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Com. Murre, 1021 (426.1, 172.5); Marbled Murrelet, 22 (9.2, 3.7); Mew Gull, 11 (4.6, 1.9); Glaucous-winged Gull, 6 (2.5, 1.0); Oldsquaw, 5 (2.1, 0.8); Arctic Loon, 3 (1.3, 0.5); Pelagic Cormorant, 1 (0.4, 0.2); Surf Scoter, 1; White-winged Scoter, 1; merganser sp., 1; Red-necked Grebe, +. Average Total: 1071 birds ( $447.0/\text{km}^2$ , 180.9/100 acres). Remarks: Total Species, 11. Coefficient of variation for all species combined, 43%. One Bald Eagle was observed in flight over the plot. Murres and murrelets foraged actively in the plot, apparently in response to the calm waters and availability of an adequate food source (see Nearshore Marine Waters and Tidal Flats, VI-VII). This was the third consecutive winter in which we observed concentrations of murres and murrelets foraging in protected waters at the head of Port Frederick. A similar phenomemon has been documented elsewhere in Alaska (D. J. Forsell and P. J. Gould. 1981. Distribution and abundance of marine birds and mammals

wintering in the Kodiak area of Alaska. U.S. Fish and Wildl. Serv. FWS/OBS-81/13). Additional surveys are needed to assess the degree to which murre and murrelets use these sheltered waters in other bay systems, of which there are many, of SE Alaska.

NEARSHORE MARINE WATERS AND TIDAL FLATS, I.--Location: Alaska, Alexander Arch., Chichagof I., Port Frederick, 3 mi NW of Hoonah; 58°09'N, 135°30'W, NW 1/4 of Juneau A-5 Quadrangle (1:63,360), USGS. Continuity: New. Size: 318.6 ha = 787.2 acres (irregular shape, measured with polar planimeter on USGS map). Description of Plot: See Introduction. Plot is located at the mouth of Port Frederick in relatively exposed waters. Plot includes 4.09 mi of shoreline, and about 35% of the area is tidal flats. Coverage: Feb. 17-18, 20. Total, 3 trips and 1.4 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Surf Scoter, 170 (53.4, 21.6); Barrow's Goldeneye, 58 (18.2, 7.4); Mallard, 53 (16.6, 6.7); Harlequin Duck, 45 (14.1, 5.7); Glaucous-winged Gull, 26 (8.2, 3.3); Pelagic Cormorant, 25 (7.8, 3.2); Bufflehead, 21 (6.6, 2.7); Mew Gull, 19 (6.0, 2.4); Northwestern Crow, 16 (5.0, 2.0); Oldsquaw, 14 (4.4, 1.8); Horned Grebe, 10 (3.1, 1.3); White-winged Scoter, 8 (2.5, 1.0); Pigeon Guillemot, 5 (1.6, 0.6); Marbled Murrelet, 5; Red-necked Grebe, 2 (0.6, 0.3); Black Scoter, 2; Com. Merganser, 2; Red-breasted Merganser, 2; Arctic Loon, 1 (0.3, 0.1); Com. Loon, 1; Com. Murre, 1. Average Total: 486 birds ( $151.9/\text{km}^2$ , 61.5/100 acres). Remarks: Total species, 21. Coefficient of variation for all species combined, 26%. Bald Eagles (average of 6/trip) were observed in conifers near the high tide line, and may have foraged in the intertidal zone at low tide.



Eagles (average of 82/count), ravens (3), and magpies (+) were observed in conifers near the high tide line, and occasionally foraged in the intertidal zone at low tide. Coverage (1984): Feb. 17-20. Total, 4 trips (3 complete counts) and 12.8 party-hrs. Weather (1984): Warm and wet. Average temperature during Feb. (35.9°F) was 8.1° above normal. Total precipitation (5.54 in) was 48% above normal, with nearly all of it in the form of rain (snowfall was 6% of normal). Count (1984): Barrow's Goldeneye, 827 (40.3, 16.3); Mallard, 797 (38.8, 15.7); Surf Scoter, 680 (33.1, 13.4); Harlequin Duck, 353 (17.2, 7.0); Northwestern Crow, 229 (11.1, 4.5); White-winged Scoter, 192 (9.3, 3.8); Bufflehead, 182 (8.9, 3.6); Glaucous-winged Gull, 180 (8.8, 3.5); Rock Sandpiper, 128 (6.2, 2.5); Mew Gull, 100 (4.9, 2.0); No. Pintail, 81 (3.9, 1.6); Greater Scaup, 76 (3.7, 1.5); Canada Goose, 71 (3.5, 1.4); Red-breasted Merganser, 48 (2.3, 0.9); Green-winged Teal, 40 (1.9, 0.8); Oldsquaw, 39 (1.9, 0.8); Com. Murre, 39; Pigeon Guillemot, 28 (1.4, 0.6); Horned Grebe, 27 (1.3, 0.5); Pelagic Cormorant, 25 (1.2, 0.5); Black Scoter, 24, (1.2, 0.5); Marbled Murrelet, 22 (1.1, 0.4); Red-necked Grebe, 13 (0.6, 0.3); Com. Merganser, 12 (0.6, 0.2); Arctic Loon, 8 (0.4, 0.2); Dunlin, 6 (0.3, 0.1); Com. Loon, 4 (0.2, 0.1); Belted Kingfisher, 1; Yellow-billed Loon, +; Bald Eagle, +; Black-billed Magpie, +; Com. Raven, +. Average Total: 4232 birds ( $206.0/\text{km}^2$ , 83.4/100 acres). Remarks: Total species, 32 (27 recorded on all counts). Eagles (average of 86/count), ravens (17), and magpies (+) were observed in conifers near the high tide line, and occasionally foraged in the intertidal zone at low tide. The 31% reduction in numbers of birds compared to 1983 was due primarily to a decrease in the numbers of Surf Scoters present. Cumulative total species, 42 (28 recorded in all years). Mallard, Surf Scoter and,

NEARSHORE MARINE WATERS AND TIDAL FLATS, II.--Location: Alaska; Alexander Arch., Chichagof I., Port Frederick, 1.6 mi N of Hoonah; 58°08'N, 135°26'W, NE 1/4 of Juneau A-5 Quadrangle (1:63,360), USGS. Continuity: New. Size: 310.8 ha = 768.0 acres (irregular shape, measured with polar planimeter on USGS map). Description of Plot: See Introduction. Plot is located at the mouth of Port Frederick in relatively exposed waters. Plot includes 3.98 mi of shoreline, and about 13% of the area is tidal flats. Coverage: Feb. 17-18, 20. Total, 3 trips and 1.7 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Surf Scoter, 463 (149.0, 60.3); Northwestern Crow, 100 (32.2, 13.0); White-winged Scoter, 48 (15.4, 6.2); Harlequin Duck, 45 (14.5, 5.9); Oldsquaw, 17 (5.5, 2.2); Glaucous-winged Gull, 9 (2.9, 1.2); Pigeon Guillemot, 6 (1.9, 0.8); Mew Gull, 5 (1.6, 0.7); Horned Grebe, 4 (1.3, 0.5); Barrow's Goldeneye, 4; Pelagic Cormorant, 3 (1.0, 0.4); Red-breasted Merganser, 3; Red-necked Grebe, 2 (0.6, 0.3); Com. Murre, 2; Arctic Loon, 1 (0.3, 0.1); Bufflehead, 1; Black Scoter, 1; Com. Loon, +; Marbled Murrelet, +. Average Total: 714 birds ( $229.7/\text{km}^2$ , 93.0/100 acres). Remarks: Total species, 19. Coefficient of variation for all species combined, 12%. Bald Eagles (average of 6/trip) and Com. Ravens (2) were observed in conifers near the high tide line, and may have foraged in the intertidal zone at low tide.

NEARSHORE MARINE WATERS AND TIDAL FLATS, III.--Location: Alaska; Alexander Arch., Chichagof I., Port Frederick, extending from 1.1 mi NW to 3.4 mi SW of Hoonah; 58°06'N, 135°28'W, SE 1/4 of Juneau A-5 Quadrangle (1:63,360), USGS. Continuity: New. Size: 1108.5 ha = 2739.2 acres (irregular shape, measured with polar planimeter on USGS

map). Description of Plot: See Introduction. A complex mosaic of islets, rocks and protected coves on the E side of Port Frederick. Includes the village of Hoonah, with its associated small boat harbor, docks and other port facilities, and the settlement of Game Creek. Much logging activity along the shoreline. Plot includes 17.94 mi of shoreline, and about 36% of the area is tidal flats. Coverage: Feb. 19-20. Total, 4 trips (3 complete counts) and 7.6 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Mallard, 1225 (110.5, 44.7); Bufflehead, 315 (28.4, 11.5); Greater Scaup, 276 (24.9, 10.1); Surf Scoter, 275 (24.8, 10.0); Barrow's Goldeneye, 268 (24.2, 9.8); Northwestern Crow, 154 (13.9, 5.6); Mew Gull, 123 (11.1, 4.5); Glaucous-winged Gull, 90 (8.1, 3.3); White-winged Scoter, 81 (7.3, 3.0); Red-breasted Merganser, 39 (3.5, 1.4); Harlequin Duck, 36 (3.2, 1.3); Com. Merganser, 36; Oldsquaw, 23 (2.1, 0.8); No. Pintail, 19 (1.7, 0.7); Com. Murre, 15 (1.4, 0.5); Pelagic Cormorant, 13 (1.2, 0.5); Black Scoter, 11 (1.0, 0.4); Horned Grebe, 6 (0.5, 0.2); Pigeon Guillemot, 5 (0.5, 0.2); Red-necked Grebe, 3 (0.3, 0.1); Com. Loon, 1; Great Blue Heron, 1; Arctic Loon, +; Marbled Murrelet, +; Bald Eagle, +; Belted Kingfisher, +; Black-billed Magpie, +; Com. Raven, +. Average Total: 3017 birds ( $272.2/\text{km}^2$ , 110/100 acres). Remarks: Total species, 28. Coefficient of variation for all species combined, 17%. Eagles (average of 17/count), magpies (+) and ravens (+) were observed in conifers near the high tide line and near the harbor facilities, and occasionally foraged in the intertidal zone at low tide. A large school of Pacific Herring in the small boat harbor attracted mergansers, eagles, gulls and murrees.

acres). Remarks: Total species, 34 (19 recorded on all counts). Coefficient of variation for all species combined, 18% (ranging from 7% for scoters and mergansers to 100% for shorebirds). Eagles (average of 33/count), ravens (2) and magpies (+) were observed in conifers near the high tide line, and occasionally foraged in the intertidal zone at low tide. Coverage (1983): Feb. 24-28. Total, 6 trips (4 complete counts) and 23.7 party-hrs. Weather (1983): Mild and dry. Average temperature during Feb. (31.8°F) was 4.0° above normal. Snowfall was 16% below normal, and total precipitation was 45% of normal. Count (1983): Surf Scoter, 1759 (85.6, 34.7); Barrow's Goldeneye, 1004 (48.9, 19.8); Rock Sandpiper, 725 (35.3, 14.3); Mallard, 717 (34.9, 14.1); Harlequin Duck, 369 (18.0, 7.3); Glaucous-winged Gull, 351 (17.1, 6.9); White-winged Scoter, 256 (12.5, 5.0); Northwestern Crow, 239 (11.6, 4.7); Bufflehead, 171 (8.3, 3.4); Canada Goose, 128 (6.2, 2.5); Marbled Murrelet, 92 (4.5, 1.8); Pigeon Guillemot, 48 (2.3, 0.9); No. Pintail, 39 (1.9, 0.8); Mew Gull, 30 (1.5, 0.6); Horned Grebe, 28 (1.4, 0.6); Black Turnstone, 24 (1.2, 0.5); Red-breasted Merganser, 22 (1.1, 0.4); Com. Goldeneye, 21 (1.0, 0.4); Greater Scaup, 19 (0.9, 0.4); Pelagic Cormorant, 18 (0.9, 0.4); Oldsquaw, 16 (0.8, 0.3); Com. Merganser, 13 (0.6, 0.3); Com. Murre, 13; Red-necked Grebe, 12 (0.6, 0.2); Arctic Loon, 11 (0.5, 0.2); Black Scoter, 11; Surfbird, 11; Green-winged Teal, 7 (0.3, 0.1); Com. Loon, 5 (0.2, 0.1); Great Blue Heron, 4 (0.2, 0.1); Ancient Murrelet, 1; Belted Kingfisher, 1; Yellow-billed Loon, +; Bald Eagle, +; Herring Gull, +; Black-billed Magpie, +; Com. Raven, +. Average Total: 6166 birds (300.2/km<sup>2</sup>, 121.5/100 acres). Remarks: Total species, 37 (25 recorded on all counts). Coefficient of variation for all species combined, 17% (ranging from 16% for cormorants and shorebirds to 41% for mergansers).

NEARSHORE MARINE WATERS AND TIDAL FLATS, IV.--Location: Alaska; Alexander Arch., Chichagof I., Port Frederick, 5.8 mi SW of Hoonah; 58°04'N, 135°35'W, SW 1/4 of Juneau A-5 Quadrangle (1:63,360), USGS. Continuity: Established 1982, 3 consecutive years. Size: 2053.9 ha = 5075.2 acres (irregular shape, measured with polar planimeter on USGS map). Description of Plot: See Introduction. Located in the central portion of Port Frederick. Plot includes 27.84 mi of shoreline, and about 31% of the area is tidal flats. Coverage (1982): Feb. 19-20. Total, 4 trips (3 complete counts) and 14.2 party-hrs. Weather (1982): Cold and snowy. Average temperature during Feb. (21.4°F) was 6.4° below normal. Snowfall (29.6 in) was 47% above normal, while total precipitation was 38% of normal. The upper reaches of the tidal flats were covered with snow and ice. Count (1982): Surf Scoter, 1297 (63.1, 25.6); Mallard, 1101 (53.6, 21.7); Barrow's Goldeneye, 869 (42.3, 17.1); White-winged Scoter, 372 (18.1, 7.3); Harlequin Duck, 317 (15.4, 6.2); No. Pintail, 261 (12.7, 5.1); Canada Goose, 226 (11.0, 4.5); Glaucous-winged Gull, 193 (9.4, 3.8); Northwestern Crow, 141 (6.9, 2.8); Bufflehead, 133 (6.5, 2.6); Marbled Murrelet, 70 (3.4, 1.4); Surfbird, 68 (3.3, 1.3); Greater Scaup, 57 (2.8, 1.1); Dunlin, 43 (2.1, 0.8); Red-breasted Merganser, 39 (1.9, 0.8); Com. Murre, 30 (1.5, 0.6); Horned Grebe, 21 (1.0, 0.4); Oldsquaw, 19 (0.9, 0.4); Pelagic Cormorant, 15 (0.7, 0.3); Black Scoter, 15; Green-winged Teal, 14 (0.7, 0.3); Pigeon Guillemot, 12 (0.6, 0.2); Red-necked Grebe, 9 (0.4, 0.2); Mew Gull, 8 (0.4, 0.2); Com. Loon, 5 (0.2, 0.1); Com. Goldeneye, 5; Com. Merganser, 4 (0.2, 0.1); Arctic Loon, 3; Hooded Merganser, 2; Double-crested Cormorant, +; Bald Eagle, +; Glaucous Gull, +; Black-billed Magpie, +; Com. Raven, +. Average Total: 5351 birds (260.5/km<sup>2</sup>, 105.4/100



Barrow's Goldeneye consistently ranked among the 4 most abundant species. On average, these 3 species accounted for about 57% of all birds recorded. Canada Goose, No. Pintail, Bufflehead, Harlequin Duck, White-winged Scoter, Rock Sandpiper, Glaucous-winged Gull, and Northwestern Crow round out the top 10 species of this community. Twenty-seven species (including 12 observed in all years) were never recorded in densities greater than 0.9 birds/100 acres. The list includes such representative species as loons, grebes, cormorants, murre and guillemots. It is conceivable that many of these species would have been missed entirely if an appreciably smaller area had been counted. This illustrates the value of large count areas for obtaining accurate data on species composition and relative abundance in these types of habitats. Geese, dabbling ducks, and shorebirds were essentially restricted to the tidal flats, and Buffleheads, Mew Gulls and crows also exhibited a preference for that habitat.

NEARSHORE MARINE WATERS AND TIDAL FLATS, V.--Location: Alaska, Alexander Arch., Chichagof I., Port Frederick, 11.5 mi SW of Hoonah, 58°02'N, 135°43'W, SE 1/4 of Juneau A-6 Quadrangle (1:63,360), USGS. Continuity: New. Size: 2167.9 ha = 5356.8 acres (irregular shape, measured with polar planimeter on USGS map). Description of Plot: See Introduction. Plot encompasses the heads of 4 disjunct, protected coves, including Neka Bay and North, South, and Eight Fathom bights. Plot includes 28.25 mi of shoreline, and about 44% of the area is tidal flats. Coverage: Feb. 17-18, 20-21. Total, 6 trips (3 complete counts) and 7.9 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Mallard, 1603 (73.9, 29.9); Barrow's Goldeneye, 557

(25.7, 10.4); Canada Goose, 416 (19.2, 7.8); Surf Scoter, 411 (19.0, 7.7); Bufflehead, 336 (15.5, 6.3); Greater Scaup, 147 (6.8, 2.7); White-winged Scoter, 69 (3.2, 1.3); Com. Murre, 52 (2.4, 1.0); Harlequin Duck, 51 (2.4, 1.0); Northwestern Crow, 50 (2.3, 0.9); Glaucous-winged Gull, 44 (2.0, 0.8); Mew Gull, 33 (1.5, 0.6); Oldsquaw, 30 (1.4, 0.6); Marbled Murrelet, 20 (0.9, 0.4); Com. Merganser, 18 (0.8, 0.3); Pelagic Cormorant, 16 (0.7, 0.3); Red-breasted Merganser, 15 (0.7, 0.3); Horned Grebe, 6 (0.3, 0.1); Pigeon Guillemot, 4 (0.2, 0.1); Arctic Loon, 3; Red-necked Grebe, 3; Black Scoter, 3; sandpiper sp., 3; Great Blue Heron, 1; Belted Kingfisher, +. Average Total: 3885 birds ( $178.5/\text{km}^2$ , 72.3/100 acres). Remarks: Total species, 25. Bald Eagles (average of 29/count), Com. Ravens (2) and Black-billed Magpies (1) were observed in conifers near the high tide line, and may have foraged in the intertidal zone at low tide.

NEARSHORE MARINE WATERS AND TIDAL FLATS, VI.--Location: Alaska, Alexander Arch., Chichagof I., Port Frederick, 14.7 mi SW of Hoonah, 57° 59'N, 135°44'W, NE 1/4 of Sitka D-6 Quadrangle (1:63,360), USGS. Continuity: New. Size: 655.3 ha = 1619.2 acres (irregular in shape, measured with polar planimeter on USGS map). Description of Plot: See Introduction. Plot is located at the extreme SW extent of Port Frederick, where the bay narrows from 1.3 mi to less than 0.3-mi wide over a distance of 6 mi, and the waters are relatively protected. Plot includes 17.96 mi of shoreline, and about 24% of the area is tidal flats. Coverage: Feb. 20-21. Total, 3 trips and 4.2 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Barrow's Goldeneye, 315 (48.1, 19.5); Surf Scoter, 271 (41.4, 16.7); Com.

Murre, 153 (23.3, 9.4); Northwestern Crow, 100 (15.3, 6.2); Greater Scaup, 91 (13.9, 5.6); Marbled Murrelet, 73 (11.1, 4.5); Mallard, 61 (9.3, 3.8); Arctic Loon, 41 (6.3); Harlequin Duck, 35 (5.3, 2.2); White-winged Scoter, 27 (4.1, 1.7); Com. Merganser, 24 (3.7, 1.5); Pelagic Cormorant, 23 (3.5, 1.4); Oldsquaw, 23; Red-breasted Merganser, 21 (3.2, 1.3); Bufflehead, 17 (2.6, 1.0); Glaucous-winged Gull, 12 (1.8, 0.7); Pigeon Guillemot, 8 (1.2, 0.5); Red-necked Grebe, 5 (0.8, 0.3); Mew Gull, 3 (0.5, 0.2); Com. Loon, 1; Horned Grebe, 1; Belted Kingfisher, 1; Black Scoter, +. Average Total: 1306 birds ( $199.3/\text{km}^2$ ,  $80.7/100$  acres). Remarks: Total species, 23. Coefficient of variation for all species combined, 16%. Bald Eagles (average of 33/trip) and Com. Ravens (2) were observed in conifers near the high tide line, and may have foraged in the intertidal zone at low tide. Murres, murrelets and, to a lesser extent, Arctic Loons exhibited a preference for the relatively calm, protected waters at the head of Port Frederick. Murres and murrelets appeared to move into these sheltered waters early in the morning, forage actively during the day, and move out of Port Frederick in the late afternoon.

NEARSHORE MARINE WATERS AND TIDAL FLATS, VII.--Location:

Alaska, Alexander Arch., Chichagof I., Port Frederick, 11.5 mi SW of Hoonah;  $57^{\circ}59'N$ ,  $135^{\circ}39'W$ , NW 1/4 of Sitka D-5 Quadrangle (1:63,360), USGS. Continuity: New. Size: 458.4 ha = 1132.8 acres (irregular shape, measured with polar planimeter on USGS map). Description of Plot: See Introduction. Plot encompasses the S extremity of Port Frederick, including The Narrows and Salt Lake Bay. Waters are relatively protected. Plot includes 10.6 mi of shoreline, and about 30%

of the area is tidal flats. Coverage: Feb. 20-21. Total, 3 trips and 3.7 party-hrs. Weather: See Nearshore Marine Waters and Tidal Flats, IV. Count: Surf Scoter, 162 (35.3, 14.3); Barrow's Goldeneye, 147 (32.1, 13.0); Com. Murre, 108 (23.6, 9.5); Marbled Murrelet, 108 (21.2, 13.0); Mallard, 60 (13.1, 5.3); Arctic Loon, 36 (7.9, 3.2); Harlequin Duck, 32 (7.0, 2.8); Glaucous-winged Gull, 30 (6.5, 2.6); Mew Gull, 24 (5.2, 2.1); Bufflehead, 20 (4.4, 1.8); Com. Merganser, 15 (3.3, 1.3); Red-breasted Merganser, 12 (2.6, 1.1); Pelagic Cormorant, 8 (1.7, 0.7); Oldsquaw, 8; White-winged Scoter, 6 (1.3, 0.5); Red-necked Grebe, 4 (0.9, 0.4); Pigeon Guillemot, 3 (0.7, 0.3); Horned Grebe, 1 (0.2, 0.1); Belted Kingfisher, 1; Com. Loon, +; Greater Scaup, +; Black Scoter, +. Average Total: 776 birds ( $169.3/\text{km}^2$ , 68.5/100 acres). Remarks: Total species, 22. Coefficient of variation for all species combined, 24%. Bald Eagles (average of 30/trip) and Com. Ravens (2) were observed in conifers near the high tide line, and may have foraged in the intertidal zone at low tide. Murres, murrelets and, to a lesser extent, Arctic Loons exhibited a preference for the relatively calm, protected waters at the head of Port Frederick. Murres and murrelets appeared to move into these sheltered waters early in the morning, forage actively during the day, and move out of Port Frederick in the late afternoon.

NEARSHORE MARINE WATERS AND TIDAL FLATS, VIII.--Location:

Alaska, Alexander Arch., Chichagof I., Pt. Sophia to Neck Pt., 3.2 mi NE of Hoonah, 58°08'N, 135°22'W, NE 1/4 of Juneau A-5 Quadrangle (1:63,360), USGS. Continuity: New. Size: 277.1 ha = 684.8 acres (irregular shape, measured with polar planimeter on USGS map). Description of Plot:

Similar to Nearshore Marine Waters and Tidal Flats, I-VII, except that intertidal zone is less extensive, accounting for 18% of the total area and not exceeding 0.1 mi in width. Vegetated tidal flats are absent.

Boulders and rocky reefs are prominent. The 3.97 mi shoreline trends NW to SE and is exposed to frequent wind-generated wave action of moderate to high amplitude. Plot is bordered on the seaward edge by the deep, exposed Inshore and Offshore Marine Waters of 9-mi wide Icy St.

Coverage: Feb. 22, 24-25. Total, 3 trips and 3.1 party-hrs. All counts were conducted in an open, 17-ft boat travelling parallel to the shoreline at an average speed of 4 mph, and were completed within  $\pm$  3 hrs

of high tide. Weather: See Nearshore Marine Waters and Tidal Flats,

IV. Count: Surf Scoter, 408 (147.2, 59.6); Rock Sandpiper, 200 (72.2, 29.2); Harlequin duck, 133 (48.0, 19.4); White-winged Scoter, 130 (46.9, 19.0); Black Scoter, 48 (17.3, 7.0); Oldsquaw, 28 (10.1, 4.1); Black Turnstone, 23 (8.3, 3.4); Glaucous-winged Gull, 15 (5.4, 2.2);

Red-breasted Merganser, 12 (4.3, 1.8); Pelagic Cormorant, 10 (3.6, 1.5); Horned Grebe, 8 (2.9, 1.2); Surfbird, 7 (2.5, 1.0); Pigeon Guillemot, 3

(1.1, 0.4); Steller's Eider, 2 (0.7, 0.3); Com. Murre, 2; Marbled

Murrelet, 2; Com. Loon, 1 (0.4, 0.1); Red-necked Grebe, 1; Barrow's

Goldeneye, 1; Bufflehead, 1; Com. Merganser, 1; Mew Gull, 1. Average

Total: 1039 birds ( $375.0 \text{ km}^2$ , 151.7/100 acres). Remarks: Total



species, 22 (13 recorded on all trips). Coefficient of variation for all species combined, 28%. Bald Eagles (average of 7/trip) were observed in conifers near the high tide line, and may have foraged in the intertidal zone at low tide. The large numbers of birds recorded on this plot was unexpected, as we intuitively predicted relatively low densities along this exposed shoreline. The rocky reefs were obviously attractive to Harlequin Ducks, scoters and Rock Sandpipers,. The Steller's Eiders represent only the fourth record for SE Alaska. Karen S. Bollinger and Phillip F. Schempf assisted with the counts and Andy Anderson provided logistical support.--JOHN L. TRAPP, U. S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, AK 99503, and JAMES G. KING, U.S. Fish and Wildlife Service, P.O. Box 1287, Juneau, AK 99802. Present address of JGK: 1700 Branta Road, Juneau, AK 99801.

NEARSHORE MARINE WATERS AND TIDAL FLATS, IX.--Location: Alaska, Alexander Arch., Chichagof I., 6 mi ESE of Hoonah, 58°06'N, 135°16'W, NE 1/4, SE 1/4 of Juneau A-5 Quadrangle and SW 1/4 of Juneau A-4 Quadrangle (1:63,360), USGS. Continuity: New. Size: 1002.8 ha = 2476.8 acres (irregular shape, measured with polar planimeter on USGS map).

Description of Plot: Similar to Nearshore Marine Waters and Tidal Flats, I-VII, except that the shoreline zone is more exposed to wind and wave action. Plot includes about 14.96 mi of shoreline, and about 27% of the area is tidal flats. Vegetated tidal flats are limited and boulders and rocky reefs are prominent. Plot is bordered on the seaward edge by the deep, exposed Inshore and Offshore Marine Waters of 9-mi wide Icy St.

Coverage: Feb. 22, 24-25. Total, 3 trips and 7.5 party-hrs. All counts were conducted in an open, 17-ft boat travelling parallel to the

shoreline at an average speed of 6 mph, and were completed within ± 3 hrs of high tide. Weather: See Nearshore Marine Waters and Tidal Flats,

IV. Count: Surf Scoter, 612 (61.1, 24.7); Rock Sandpiper, 450 (44.9, 18.2); Harlequin Duck, 290 (28.9, 11.7); Mew Gull, 187 (18.7, 7.6)'

Bufflehead, 143 (14.3, 5.8); Glaucous-winged Gull, 121 (12.1, 4.9);

Barrow's Goldeneye, 113 (11.3, 4.6); Oldsquaw, 94 (9.4, 3.8);

Northwestern Crow, 60 (6.0, 2.4); Mallard, 48 (4.8, 1.9); White-winged

Scoter, 48; Black Scoter, 19 (1.9, 0.8); Black Turnstone, 13

(1.3, 0.5); Greater Scaup, 12 (1.2, 0.5); Horned Grebe, 9 (0.9, 0.4); Pelagic Cormorant, 8 (0.8, 0.3); Pigeon Guillemot, 8; Red-necked Grebe, 3 (0.3, 0.1); Com. Loon, 2 (0.2, 0.1); Marbled Murrelet, 2; Com. Murre, 1; Steller's Eider, +; Belted Kingfisher, +. Average Total: 2245 birds ( $224.0/\text{km}^2$ , 90.6/100 acres). Remarks: Total species, 23 (15 recorded on all trips). Coefficient of variation for all species combined, 29%. Bald Eagles (average of 14/trip) and Com. Ravens (1) were observed in conifers near the high tide line, and may have foraged in the intertidal zone at low tide. Most of the gulls were roosting on exposed rocks, reefs and gravel bars, and may have been attracted to the area by the activity of commercial fishing boats in Icy St. Karen S. Bollinger and Phillip F. Schempf assisted with the counts and Andy Anderson provided logistical support.--JOHN L. TRAPP, U. S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, AK 99503, and JAMES G. KING, U.S. Fish and Wildlife Service, P.O. Box 1287, Juneau, AK 99802. Present address of JGK: 1700 Branta Road, Juneau, AK 99801.

