

MARINE BIRD AND MAMMAL SURVEY OF YAKUTAT BAY, DISENCHANTMENT
BAY, RUSSELL FIORD, AND NUNATAK FIORD, ALASKA

Shawn W. Stephensen and Brad A. Andres

U.S. Fish and Wildlife Service
Nongame Migratory Bird Management
1011 East Tudor Road
Anchorage, Alaska 99503

February 2001

MARINE BIRD AND MAMMAL SURVEY OF YAKUTAT BAY, DISENCHANTMENT
BAY, RUSSELL FIORD, AND NUNATAK FIORD, ALASKA

Shawn W. Stephensen and Brad A. Andres

U.S. Fish and Wildlife Service
Nongame Migratory Bird Management
1011 East Tudor Road
Anchorage, Alaska 99503

February 2001

Citation: Stephensen, S. W., and B. A. Andres. 2001. Marine bird and mammal survey of Yakutat Bay, Disenchantment Bay, Russell Fiord, and Nunatak Fiord, Alaska. Unpublished Report, U. S. Fish and Wildlife Service, Anchorage, Alaska. 26pp.

EXECUTIVE SUMMARY

Because few surveys of marine birds and mammals have been conducted in the Yakutat, Alaska, area, particularly in Russell and Nunatak fiords, we undertook a pelagic and shoreline survey for these species in June 2000. A total of 5,015 individuals of 45 bird species and 166 individuals of 7 mammal species were observed during the surveys. The marine bird assemblage was dominated by waterfowl, larids, and alcids, and the most abundant species were the northern fulmar, mew gull, glaucous-winged gull, black-legged kittiwake, arctic tern, and marbled murrelet. Sea otters and harbor seals were the most abundant marine mammals encountered. Yakutat Bay and Russell Fiord had a high diversity of marine birds (33 and 30 species), whereas Nunatak Fiord supported fewer species (18 species). Russell Fiord had the highest shoreline and pelagic densities of birds. Shoreline density of black oystercatchers varied among areas of Russell and Nunatak fiords and was comparable to glacially-influenced areas of Prince William Sound, Alaska. Small numbers of yellow-billed loons (*Gavia adamsii*) and moderate numbers of Kittlitz's murrelets (*Brachyramphus brevirostris*) were encountered during surveys. Further surveys are needed to more precisely assess the population size of murrelets and to determine important foraging sites. Studies to estimate productivity of terns in Russell and Nunatak fiords could be useful to compare with colonies that are subjected to human disturbance along the outer coast.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
LIST OF APPENDICES.....	iii
INTRODUCTION	1
STUDY AREA AND METHODS	1
RESULTS AND DISCUSSION.....	9
RECOMMENDATIONS.....	13
ACKNOWLEDGMENTS	14
LITERATURE CITED	14
APPENDICES	16

LIST OF APPENDICES

Appendix 1. Latitude or longitude of pelagic transects surveyed for marine birds and mammals in Yakutat Bay (YB), Disenchantment Bay (DB), Russell Fiord (RF), and Nunatak Fiord (NF), Alaska - June 2000.....	16
Appendix 2. Common names, scientific names, 4-letter codes, and counts of marine birds and mammals observed on transects of Yakutat Bay, Disenchantment Bay, Russell Fiord, and Nunatak Fiord, Alaska - June 2000.....	17
Appendix 3. Location descriptions of shoreline transects surveyed for marine birds and mammals in the Yakutat area, Alaska - June 2000.....	20
Appendix 4. Bird and mammal species observed on shoreline transects of Yakutat Bay, Disenchantment Bay, Russell Fiord, and Nunatak Fiord, Alaska - June 2000.....	21
Appendix 5. Bird and mammal species observed on pelagic transects of Yakutat and Disenchantment Bays, Russell Fiord, and Nunatak Fiord, Alaska - June 2000.	23
Appendix 6. Densities (individuals/km ²) of bird and mammal species observed on shoreline and pelagic transects of Yakutat/Disenchantment bays, Russell Fiord, and Nunatak Fiord, Alaska - June 2000.....	24

INTRODUCTION

For much of south coast of Alaska, rudimentary information on the distribution and abundance of marine wildlife species is still lacking. Although some information indicates that bays and fiords near Yakutat provide important feeding, resting, and breeding habitat for numerous marine birds and mammals (Patten 1982), murrelets (*Brachyramphus spp*; Harke 1994, 1996) and shorebirds (Andres and Browne 1998), no comprehensive survey to document the abundance of bird and mammal species inhabiting Yakutat Bay, Disenchantment Bay, Russell Fiord, or Nunatak Fiord has been completed. In fact, little work has been done in Russell and Nunatak fiords since Shortt (1939) visited the area in 1936. Increase recreational use of these areas dictates that resource managers obtain reliable data on marine wildlife populations that is needed to develop effective management plans for these species. Several bird species of high conservation concern (e.g., yellow-billed loon [*Gavia adamsii*]; black oystercatcher [*Haematopus bachmani*]; Kittlitz's murrelet [*Brachyramphus brevirostris*]) are suspected to occur in moderate abundances in the marine waters surrounding Yakutat. We therefore undertook a pelagic and shoreline survey to determine the summer abundance of marine birds and mammals in the Yakutat Bay area.

STUDY AREA AND METHODS

The town of Yakutat (59° 32.9' N, 139° 43.8' W) is located along the northeastern Gulf of Alaska. Within the vicinity of Yakutat, our study area included Yakutat Bay (940 km²), Disenchantment Bay (north of Point Latouche; 45 km²), Russell Fiord (151 km²), and Nunatak Fiord (41 km²; Figure 1). Yakutat Bay opens to the Gulf of Alaska and terminates at the Hubbard Glacier at the head of Disenchantment Bay. Yakutat Bay is 35 km across at its widest and 5 km across at its narrowest in Disenchantment Bay. Russell and Nunatak Fiords are marine waters but had previously been freshwater lakes. Much of the area in the region has been designated as wilderness and is part of the Russell Fiord Wilderness (Tongass National Forest), Wrangell - Saint Elias National Park and Preserve, or Alaska Maritime National Wildlife Refuge. The U. S. Forest Service, National Park Service, and U. S. Fish and Wildlife Service have the responsibility to manage lands and trust resources within these areas.

We first divided the study area into 2 main units – Yakutat/Disenchantment bays and Russell/Nunatak fiords. We then further divided each bay or fiord unit into pelagic and shoreline sampling strata. To sample the pelagic strata, transects perpendicular to the shoreline were delineated at intervals of 7 km for Yakutat Bay, 2 km for Disenchantment Bay, and 3 km for Russell and Nunatak fiords. As a result, 4 transects were delineated for Yakutat Bay, 9 for Disenchantment Bay, 16 for Russell Fiord, and 8 for Nunatak Fiord (Figure 1). The shoreline stratum consisted of all waters within 200 m of land. The shoreline was systematically divided into segments by the latitude or longitude of the pelagic transects.

We used a 6.7-m aluminum boat to conduct pelagic and shoreline surveys for marine birds and mammals, and used methods developed by Klosiewski and Laing (1994). Two observers counted all birds and mammals detected in a sampling window 100 m on either side of the vessel, 100 m ahead, and 100 m overhead of the vessel. An additional person operated the boat. When surveying the shoreline, observers also recorded birds and mammals sighted on land within 100 m of shore. Observers scanned continuously and used binoculars to aid in species identification. Most transects were surveyed when wave height was <30 cm, and no surveys were conducted when wave height was >90 cm. A GPS and nautical compass were used to navigate transect lines. We conducted all shoreline and pelagic surveys between 16 and 19 June 2000.

A 2-person crew operated a 4.3-m inflatable boat to survey the shoreline of islands and bays near the town of Yakutat. The 2-person crew also conducted a survey of breeding black oystercatchers in Russell and Nunatak fiords. The shoreline was searched at a slow rate of speed to detect potential breeding birds. When a black oystercatcher pair was observed, observers went ashore and conducted a nest search. At each location, the number of adults, eggs, and chicks was recorded, and all pair observations were mapped to produce an estimate of linear pair density.

Due to time and weather constraints, not all transects could be surveyed. As a result, we sampled 27 pelagic transects (32.0 km²; Figure 2) and 24 shoreline transects (69.9 km²; Figure 3). Latitude and longitude of starting and ending points was recorded for each uniquely-numbered pelagic transect (Appendix 1). An oceanic navigation chart with delineated transect lines is archived with Nongame Migratory Bird Management, Anchorage, Alaska.

Population estimates of bird species were calculated by estimating density for the area surveyed and extrapolating to the total area of the 2 primary study areas (Yakutat/Disenchantment bays and Russell/Nunatak fiords). We used a ratio estimator (Cochran 1977:155) to determine population size in the 2 primary areas. Estimates of variance included only variability in counts on pelagic transects because the shoreline was surveyed completely. However, ice was too thick to survey some of the shoreline of Disenchantment Bay, and we assume no birds were present along these shorelines. Ocean and ice conditions also precluded sampling of some shoreline segments in Russell Fiord and southeastern Yakutat Bay (Figure 2,3). Thus, the population sizes are considered minimal estimates. We calculated population estimates for species that had >30 individuals observed on all transects.

During boat surveys and oystercatcher searching, we also surveyed previously known seabird colonies. Individual birds and nests were counted from the boat 50-100 meters offshore with binoculars. Large cliff-nesting areas were divided into smaller sections for ease of counting. All birds were identified to species; timing of counts occurred between egg-laying and fledging. The latitude and longitude of the colony was determined by a GPS, and we obtained 35-mm photographs of the colony. Data and photographs are archived with Nongame Migratory Bird Management, Anchorage, Alaska, and all data incorporated into the Beringian Seabird Colony Catalog computer database (U. S. Fish Wildl. Serv. 2000).

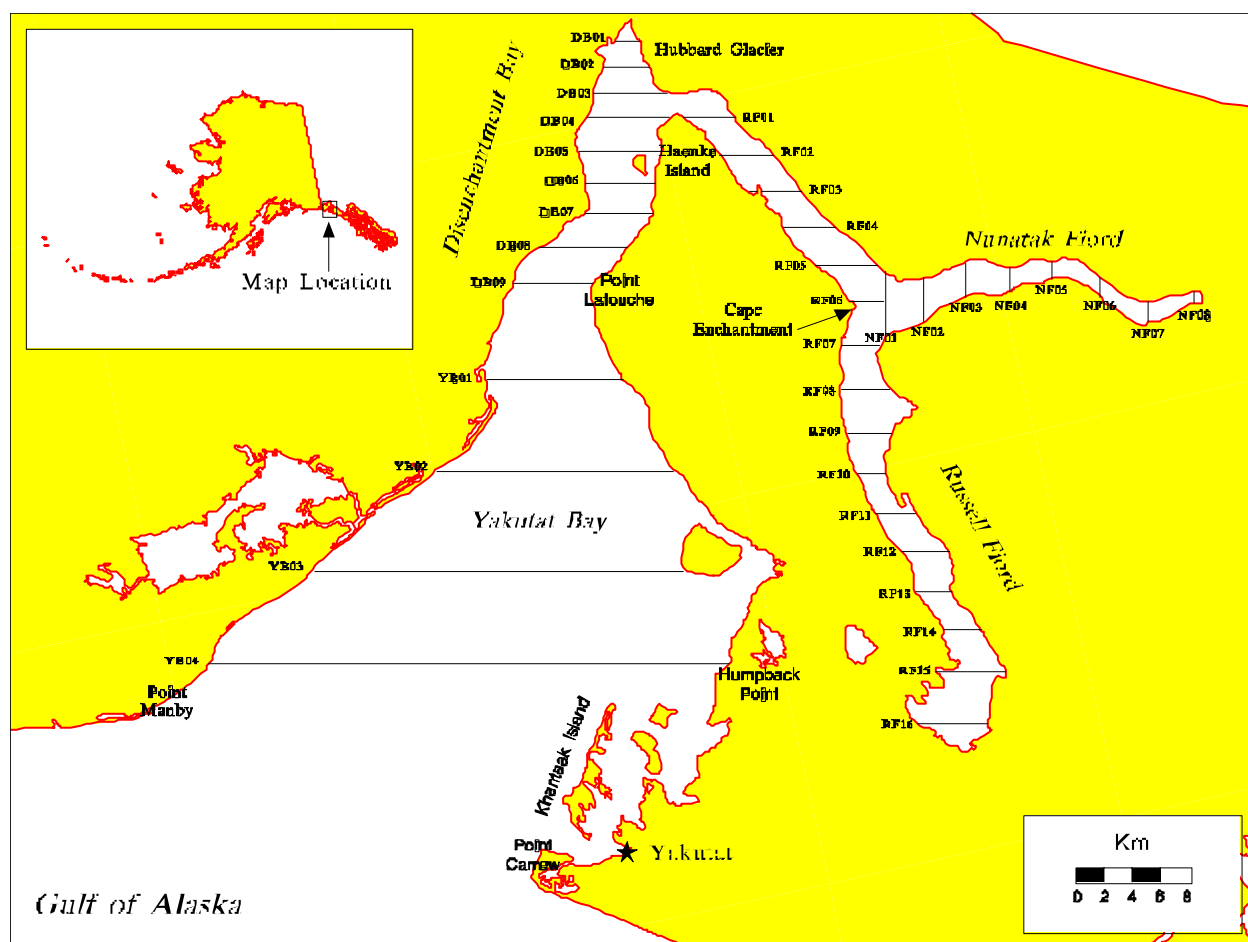


Figure 1. Pelagic transects selected in Yakutat Bay, Disenchantment Bay, Russell Fiord, and Nunatak Fiord, Alaska, for surveys of marine birds and mammals, June 2000.

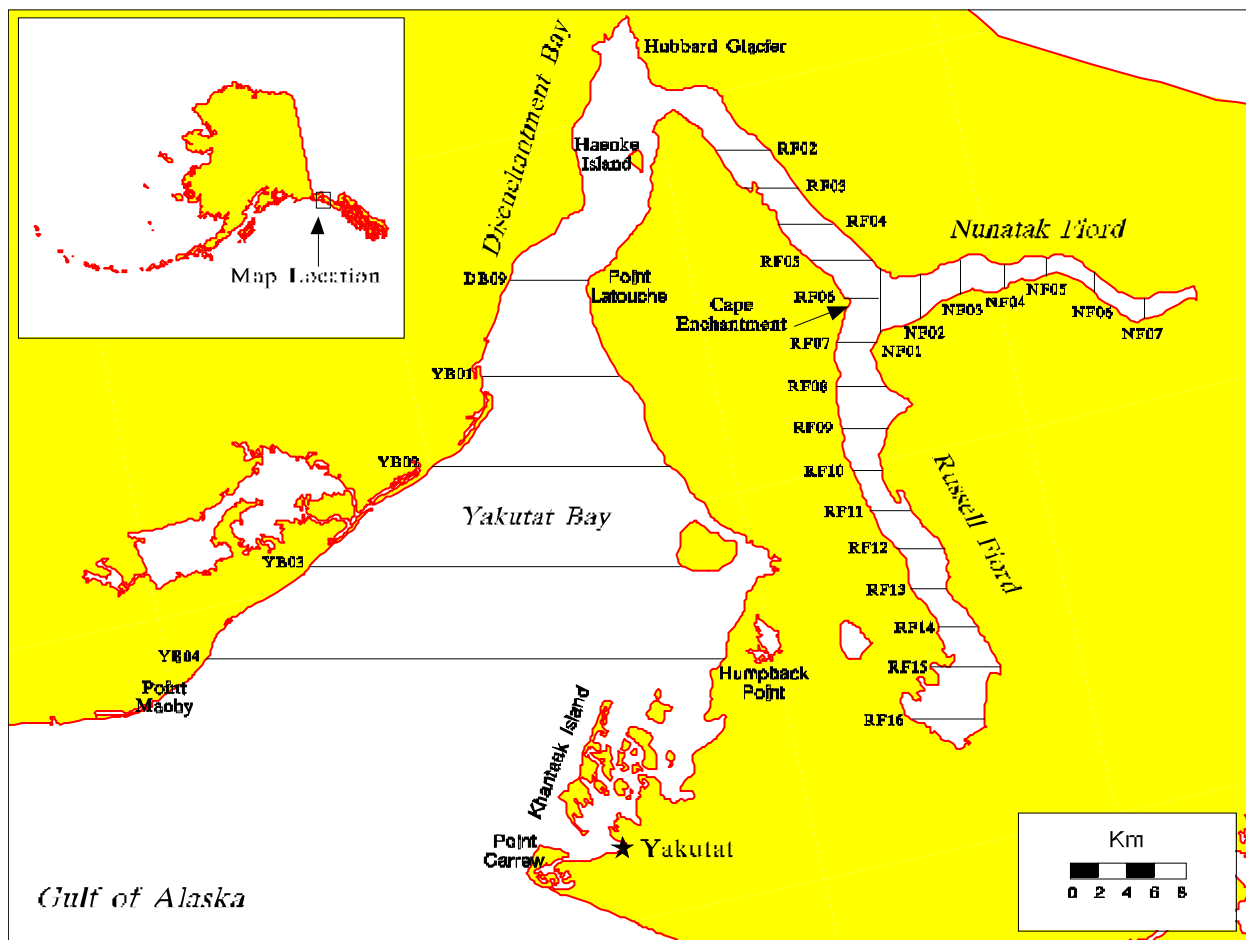


Figure 2. Actual pelagic transects surveyed in Yakutat Bay, Disenchantment Bay, Russell Fiord, and Nunatak Fiord, Alaska, for marine birds and mammals, June 2000.

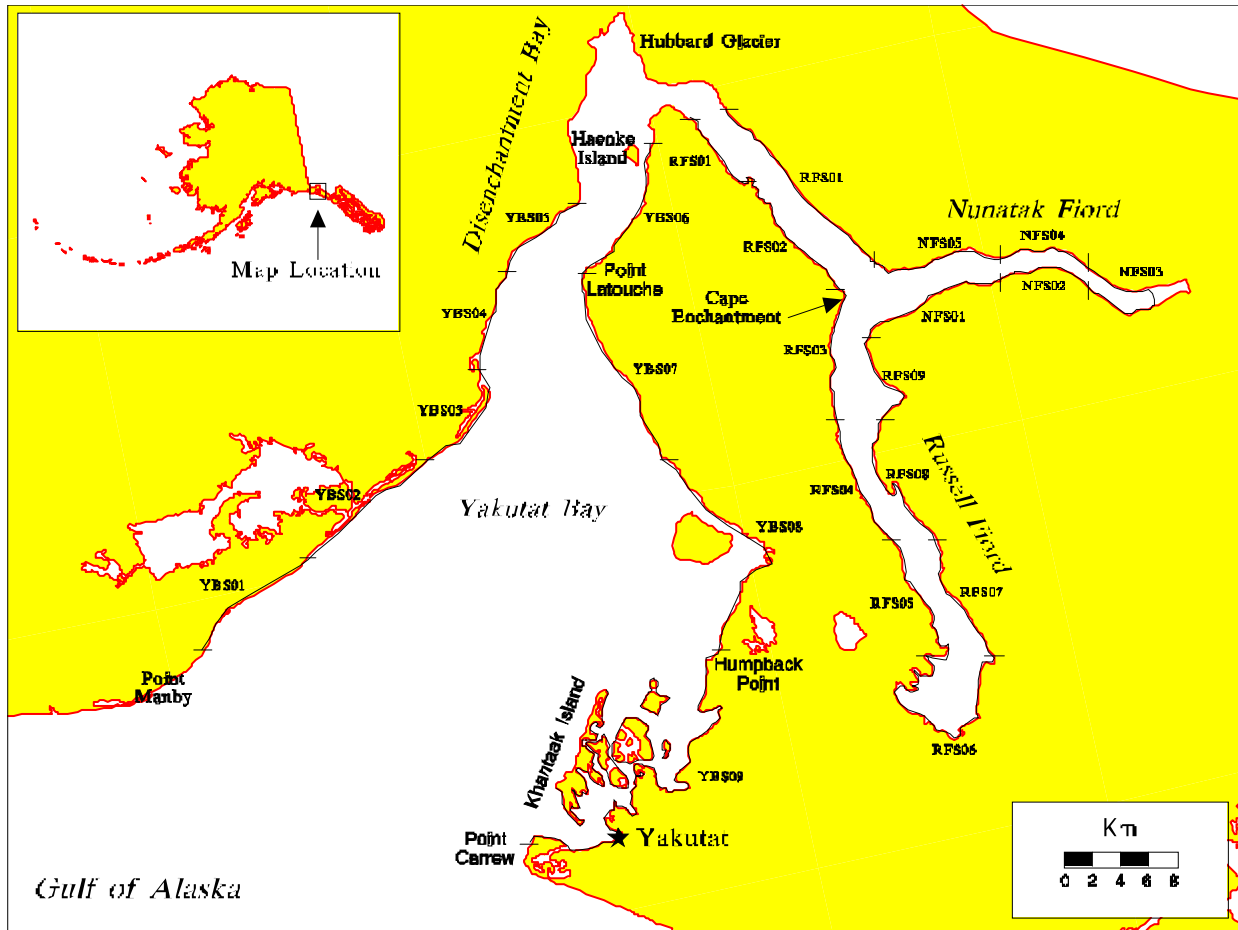


Figure 3. Actual shoreline transects surveyed in Yakutat Bay, Disenchantment Bay, Russell Fiord, and Nunatak Fiord, Alaska, for marine birds and mammals, June 2000.

RESULTS AND DISCUSSION

A total of 5,015 individuals of 45 bird species and 166 individuals of 7 mammal species were observed during the surveys. Scientific names of all species are provided in Appendix 2. The marine bird assemblage was dominated by waterfowl, larids, and alcids (Table 1). The most abundant species in these groups were the northern fulmar, mew gull, glaucous-winged gull, black-legged kittiwake, arctic tern, and marbled murrelet (Table 2). Sea otters and harbor seals were the most abundant marine mammals encountered (Table 2).

Yakutat Bay and Russell Fiord had a high diversity of marine birds (33 and 30 species), whereas Nunatak Fiord supported fewer species (18 species). Russell Fiord had the highest shoreline and pelagic densities of birds. Except for waterfowl (primarily Canada geese), Nunatak Fiord tended to have low densities of most marine birds (Table 1). In general, densities of marine birds along the shoreline were greater than those in pelagic areas (Table 1, 2). Russell and Nunatak fiords supported greater numbers of waterfowl and fewer larids than Yakutat Bay.

Shoreline density of harlequin ducks in Russell Fiord (12.3 birds/km²) was >2 times the density along shorelines of Yakutat Bay (5.2 birds/km²) and Nunatak Fiord (3.7 birds/km²). Shoreline densities of sea ducks (scoters and long-tailed duck) were more equitable between Yakutat Bay (2.8 birds/km²) and Russell Fiord (4.0 birds/km²); sea ducks were not observed in Nunatak Fiord. Northern fulmars and fork-tailed storm-petrels were only encountered in Yakutat Bay. A small population of yellow-billed loons (<150 individuals) summers in the Yakutat vicinity. Observations outside of this study indicate that loons consistently use the bay in the summer (B. A. Andres, pers. obs.).

High numbers of Kittlitz's murrelets were observed around Kriwoi Island and Redfield Cove; the density in the island area north of town was 3.9 murrelets/km². This area is not adjacent to tidewater glaciers, but other foraging marine birds were present when large numbers of murrelets were observed. Overall densities of marbled murrelets were similar among areas; shoreline density was higher in Yakutat Bay, whereas pelagic density was higher in Russell/Nunatak Fiord (Table 2). Densities of both murrelets were lower than those found for these species in Harriman Fiord during June 2000 (B. A. Andres, unpubl. data). Pelagic and shoreline densities in our study were much lower than those reported for Yakutat Bay by Harke and Leach (1996), but differences may have resulted in variability in sampling methods. In general, July densities of murrelets were greater in the open Gulf of Alaska than in Yakutat Bay (Harke and Leach 1996).

Pigeon guillemots were denser in Russell/Nunatak fiords than in Yakutat Bay (Table 2). While surveying for oystercatchers, several colonies of guillemots were encountered between West Nunatak Glacier and East Nunatak Glacier (74 individuals; 9.3 birds/km within the colonies' extent). Fewer guillemots were reported from the West Nunatak Glacier colony in 1979 (U. S. Fish Wildl. Serv. 2000).

Forty territorial pairs of oystercatchers were found along the shorelines of Russell and Nunatak fiords, and five additional oystercatchers were observed. Overall density of breeding pairs was 0.23 birds/km. Pair density was lowest in Nunatak Fiord (0.16 birds/km), moderate in the southern arm of Russell Fiord (0.23 birds/km), and highest in the northern arm of Russell Fiord 0.31 birds/km). A series of spits and small islands in southwestern end of Russell Fiord supported 8 pairs of oystercatchers (and >40 pairs of arctic terns). Local density on these island was about 7.3 birds/km. Without these pairs, density in the southern arm of Russell Fiord decreases to <0.1 pairs/km). Most oystercatcher pairs were found on alluvial fans or other rocky debris associated with the mouths of streams and small rivers. We found eggs or chicks with 13 of the pairs (32.5%); however, we did not spend large amounts of time searching for eggs or chicks. Ages of some of the chicks indicated that the earliest nests were initiated around 10 May.

Oystercatcher pair density in northern Russell Fiord was comparable to that found in Harriman Fiord, Prince William Sound, Alaska, (0.30 pairs/km) in summer of 2000 (B. A. Andres, unpubl. data). Most pairs in Harriman Fiord also nested on alluvial fans and the greatest concentration of breeding pairs was associated with a colony of arctic terns (>100 individuals).

Table 1. Shoreline and pelagic densities (individuals/km²) of major groups of birds observed in marine waters around Yakutat, Alaska - June 2000.

Species group	Yakutat/Disenchantment bays		Russell Fiord		Nunatak Fiord	
	shoreline (36.4 km ²)	pelagic (19.1 km ²)	shoreline (24.4 km ²)	pelagic (9.8 km ²)	shoreline (9.2 km ²)	pelagic (3.1 km ²)
Loons	1.5	0.4	0.9	0.5	2.0	1.0
Tubenoses	<0.1	1.7	-	-	-	-
Cormorants	0.2	0.3	<0.1	-	-	-
Waterfowl	9.9	-	31.0	2.2	28.0	3.9
Shorebirds	0.5	-	1.4	-	2.3	-
Larids	32.4	7.2	25.8	6.3	18.0	2.6
Alcids	12.9	8.8	8.9	16.4	11.1	1.3
All species	60.3	18.4	66.7	25.5	62.0	9.1

Table 2. Population estimates, and their standard errors (SE), and density of common marine birds and mammals recorded on shoreline and pelagic transects conducted in marine waters near Yakutat, Alaska - June 2000.

Species	Yakutat/Disenchantment Bays				Russell/Nunatak Fiords				
	population		density		population		density		
	total	SE	shoreline	pelagic	total	SE	shoreline	pelagic	
Birds									
Common Loon	190	74	1.15	0.16	67	32	0.65	0.23	
Yellow-billed Loon	4	-	0.11	-	46	45	0.03	0.23	
Pacific Loon	6	-	0.17	-	17	14	0.06	0.08	
All Loons	302	67	1.54	0.26	159	29	1.19	0.62	
Northern Fulmar	1,380	324	0.03	1.47	-	-	-	-	
Fork-tailed Storm-Petrel	197	156	-	0.21	-	-	-	-	
Pelagic Cormorant	247	191	0.03	0.26	-	-	-	-	
Canada Goose	-	-	-	-	222	-	6.61	-	
Mallard	-	-	-	-	126	-	3.75	-	
Northern Shoveler	24	-	0.66	-	42	-	1.25	-	
Surf Scoter	40	-	1.10	-	261	179	2.44	6.36	
Harlequin Duck	191	-	5.14	-	648	315	9.98	26.0	
Common Merganser	10	-	0.27	-	160	-	4.77	-	
Black Oystercatcher	9	-	0.25	-	44	-	1.31	-	
Parasitic Jaeger	155	74	0.19	0.16	40	21	0.30	0.77	
Bonaparte's Gull	366	-	10.07	-	-	-	-	-	
Mew Gull	579	179	7.78	0.31	435	77	9.41	24.51	
Herring Gull	746	428	0.19	0.79	39	20	0.27	0.70	
Glaucous-winged Gull	3,649	863	3.85	3.35	112	62	0.69	1.78	
Black-legged Kittiwake	1,799	39	6.68	0.05	-	-	-	-	
Arctic Tern	1,554	379	3.47	1.52	1,117	400	10.19	26.53	
Aleutian Tern	941	542	0.14	1.00	4	-	0.12	0.31	
Common Murre	100	36	0.03	0.11	-	-	-	-	
Pigeon Guillemot	124	78	0.69	0.11	215	91	2.86	7.45	

Table 2. (cont.)

Species	Yakutat/Disenchantment Bays				Russell/Nunatak Fiords			
	population		density		population		density	
	total	SE	shoreline	pelagic	total	SE	shoreline	pelagic
Marbled Murrelet	6,244	1,579	9.16	6.29	2,100	723	5.30	13.81
Kittlitz's Murrelet	927	233	2.47	0.89	55	43	0.30	0.77
All Murrelets	8,523	1,909	12.24	8.59	2,560	483	6.58	17.15
Bald Eagle	49	-	1.35	-	11	-	0.33	-
Northwestern Crow	54	-	1.48	-	52	-	1.55	-
Mammals								
Sea Otter	205	126	0.22	0.21	1	-	0.03	-
Harbor Seal	207	173	0.27	0.21	160	30	2.53	0.39

¹ population estimate for Yakutat Bay includes 357 glaucous-winged gulls and 1,507 black-legged kittiwakes from the Haenke Island colony count.

We surveyed the seabird colony the west side of Haenke Island, Disenchantment Bay, on 18 June. We counted 59 glaucous-winged gull nests and 342 individuals on the cliff-face, plus an additional 15 individuals roosting on icebergs. Black-legged kittiwake nests and individual birds totaled 963 and 1,361 respectively. An additional 146 individuals were roosting on rocks and icebergs. Thirteen pelagic cormorants were roosting on icebergs near the island, but no cormorant nests were located.

We were able to compare our results of the Haenke Island seabird colony survey to surveys previously conducted there in 1992 by the U. S. Forest Service (U. S. Fish Wildl. Serv. 2000). Observers in 1992 estimated 400 glaucous-winged gulls and 1,200 black-legged kittiwakes whereas, we counted 342 glaucous-winged gulls and 1,361 black-legged kittiwakes. Thus numbers of these 2 prevalent species have remained relatively the same over the last 8 years. Six black oystercatchers, 100 Arctic terns, and 60 pigeon guillemots were also counted in 1992. Ice conditions in 2000 precluded surveying areas of the island where these species occurred.

We also attempted to survey known colonies in Russell and Nunatak fiords. However, we did not have time to obtain an accurate count of mew gulls and arctic terns, the prevalent species, for many of the sites because nesting pairs were widely scattered across broad alluvial fans. We were able to get a crude sense of the size of the colonies. No breeding cormorants were present at Cape Enchantment or elsewhere in the fiords as previously described by Shortt (1939).

Table 3. Crude counts of mew gulls and arctic terns in colonies surveyed in Russell and Nunatak fiords during June 2000 and colony counts made in July 1979 (U. S. Fish Wildl. Serv. 2000).

Site	Mew Gull		Arctic Tern		Aleutian Tern	
	June 2000	July 1979	June 2000	July 1979	June 2000	July 1979
Varigated Glacier	X	15	30	20	2	10
Butler Glacier	70	25	54	30		
West Nunatak Glacier			-	10		
East Nunatak Glacier	X ¹	-	X	-		
Mt. Tebenkof			-	10		
Hendrickson Glacier	24	-	40	30		
Old Situk Creek			90	-		
Seal Bay	25	-	12	-		

¹ X = present at the site.

RECOMMENDATIONS

Precision of population estimates of common bird species are somewhat lower than other surveys of this type (Lance et al. 1999) and could be improved by further stratification of Yakutat Bay and increased sampling effort there. Concern about possible declines in Kittlitz's murrelet populations has recently been raised (Lance 1999), and a more thorough survey for this species should be undertaken. Because of significant seasonal, inter-annual, and spatial variability, several surveys may need to be conducted throughout the season (Day and Nigro 1999). Identification of foraging sites important to murrelets would be useful for managing human recreation, including tour boats, in the bay.

We recommend that seabird colonies be re-surveyed at least every 10 years (Stephensen and Mendenhall 1998), and, to examine species population trends over time, transects might be surveyed at 5-year intervals. Further work is needed to design a more efficient study for Yakutat Bay; sampling intensity was much greater in Russell and Nunatak fiords. Techniques for censusing seabird colonies are available from the Beringian Seabird Colony Catalog manager in Nongame Migratory Bird Management, Anchorage, Alaska.

Further study of abundance and productivity of oystercatchers, terns, and gulls in Russell and Nunatak fiords could be warranted. Comparative assessment of tern productivity in the fiords with concurrent work in colonies on sand beaches and spits that are accessible on the road system could provide useful information on the effects of human disturbance at the accessible colonies. Collection of data on productivity and pair density of oystercatchers could easily be included in this effort.

ACKNOWLEDGMENTS

Special thanks goes to B. Lucey, U. S. Forest Service, for operating the *Pesticus* and for aiding us with logistics arrangements. K. Wohl, U. S. Fish and Wildlife Service, and J. Barr, Pronatura Vercruz, assisted with survey data collection. The U.S. Forest Service provided lodging for us at their bunkhouse in Yakutat. M. and K. Sappington, Yakutat Charter Boat Company, provided the charter vessel and C. Grove provided the boat operation procedures briefing.

LITERATURE CITED

- Andres, B. A., and B. T. Browne. 1998. Spring migration of shorebirds on the Yakutat Forelands. *Wilson Bull.* 110:326-331.
- Cochran, W. G. 1977. *Sampling techniques*, 3rd ed.. John Wiley and Sons, New York, N. Y. 428pp.
- Day, R. H., and D. A. Nigro. 1999. Status and ecology of Kittlitz's murrelet in Prince William Sound, 1996-1998. *Exxon Valdez Oil Spill Restor. Proj. Final Rep.* (Restor. Proj. 98159), ABR, Inc., Fairbanks, Alas. 207pp.
- Harke, V. L. 1994. Surveys for marbled murrelets on the Yakutat Ranger District, Chatham Area, Tongass National Forest. Unpubl. rep., U. S. Forest Serv., Yakutat, Alas. 15pp.
- Harke, V. L., and T. J. Leach. 1996. Surveys for marbled murrelets on the Yakutat Ranger District. Unpubl. rep., U. S. Forest Serv., Yakutat, Alas. 13pp.
- Klosiewski, S. P. and K. K. Laing. 1994. Marine bird populations of Prince William Sound, Alaska, before and after the *Exxon Valdez* oil spill. *Nat. Resour. Damage Assessment Bird Study Number 2*. Unpubl. rep., U. S. Fish Wildl. Serv., Anchorage, Alas. 85pp.
- Lance, B. K., D. B. Irons, S. J. Kendall, and L. L. McDonald. 1999. Marine bird and sea otter population abundance of Prince William Sound, Alaska: trends following the *T/V Exxon Valdez* oil spill, 1989-98. *Exxon Valdez Oil Spill Restor. Proj. Annu. Rep.* (Restor. Proj. 98159), U.S. Fish Wildl. Serv., Anchorage, Alas. 117pp.
- Patten, S. M., Jr. 1982. Seasonal use of coastal habitat from Yakutat Bay to Cape Fairweather by migratory seabirds, shorebirds, and waterfowl. Pages 295-603 *in* Environmental assessment of the Alaskan continental shelf, final reports of principal investigators, Vol. 16. *Nat. Oceanic Atmos. Adm./Bur. Land Manage.*, Anchorage, Alas.
- Shortt, T. M. 1939. The summer birds of Yakutat Bay, Alaska. *Contrib. Royal Ontario Mus. Zool.*, No. 17, Toronto. 30pp.

Stephensen, S. W. and V. M. Mendenhall. 1998. Alaska seabird colony re-census plan. Unpubl. rep., U. S. Fish Wildl. Serv., Nongame Migratory Bird Manage., Anchorage, Alas. 153pp.

U. S. Fish and Wildlife Service. 1999. Beringian Seabird Colony Catalog manual for censusing seabird colonies. Unpubl. rep., U. S. Fish Wildl. Serv., Nongame Migratory Bird Manage., Anchorage, Alas. 27pp.

U.S. Fish and Wildlife Service. 2000. Beringian Seabird Colony Catalog – computer database and Colony Status Records archives. Unpubl. rep., U. S. Fish Wildl. Serv., Nongame Migratory Bird Manage., Anchorage, Alas. 27pp.

APPENDICES

Appendix 1. Latitude or longitude of pelagic transects surveyed for marine birds and mammals in Yakutat Bay (YB), Disenchantment Bay (DB), Russell Fiord (RF), and Nunatak Fiord (NF), Alaska - June 2000.

Transect	Latitude (N)	Longitude (W)	Transect	Latitude (N)	Longitude (W)
YB01	59° 50' 17.50"	--	RF07	59° 49' 44.89"	--
YB02	59° 46' 30.88"	--	RF08	59° 48' 07.77"	--
YB03	59° 42' 44.26"	--	RF09	59° 46' 30.65"	--
YB04	59° 38' 57.64"	--	RF10	59° 44' 53.53"	--
DB01	60° 02' 41.87"	--	RF11	59° 43' 16.40"	--
DB02	60° 01' 37.12"	--	RF12	59° 41' 39.28"	--
DB03	60° 00' 32.37"	--	RF13	59° 40' 02.16"	--
DB04	59° 59' 27.63"	--	RF14	59° 38' 25.04"	--
DB05	59° 58' 23.11"	--	RF15	59° 36' 47.91"	--
DB06	59° 57' 18.36"	--	RF16	59° 35' 10.79"	--
DB07	59° 56' 13.61"	--	NF01	--	139° 16' 11.22"
DB08	59° 55' 08.87"	--	NF02	--	139° 12' 56.98"
DB09	59° 54' 04.12"	--	NF03	--	139° 09' 42.73"
RF01	59° 59' 27.63"	--	NF04	--	139° 06' 28.49"
RF02	59° 57' 50.50"	--	NF05	--	139° 03' 14.24"
RF03	59° 56' 13.38"	--	NF06	--	139° 00' 00.00"
RF04	59° 54' 36.26"	--	NF07	--	138° 56' 45.76"
RF05	59° 52' 59.14"	--	NF08	--	138° 53' 31.51"
RF06	59° 51' 22.01"	139° 16' 11.22"			

Appendix 2. Common names, scientific names, 4-letter codes, and counts of marine birds and mammals observed on transects of Yakutat Bay, Disenchantment Bay, Russell Fiord, and Nunatak Fiord, Alaska - June 2000.

Common Name	Scientific Name	Code	Count
Common loon	<i>Gavia immer</i>	COLO	70
Yellow-billed loon	<i>Gavia adamsii</i>	YBLO	8
Pacific loon	<i>Gavia pacifica</i>	PALO	9
Red-throated loon	<i>Gavia stellata</i>	RTLO	13
Unidentified loon	<i>Gavia spp.</i>	UNLO	12
Northern fulmar	<i>Fulmarus glacialis</i>	NOFU	29
Fork-tailed storm-petrel	<i>Oceanodroma furcata</i>	FTSP	4
Double-crested cormorant	<i>Phalacrocorax auritus</i>	DCCO	6
Pelagic cormorant	<i>Phalacrocorax pelagicus</i>	PECO	6
Great blue heron	<i>Ardea herodias</i>	GBHE	5
Canada goose	<i>Branta canadensis</i>	CAGO	222
Brant	<i>Branta bernicla</i>	BRAN	3
Mallard	<i>Anas platyrhynchos</i>	MALL	126
Gadwall	<i>Anas strepera</i>	GADW	7
Northern shoveler	<i>Anas clypeata</i>	NOSH	66
Black scoter	<i>Melanitta nigra</i>	BLSC	47
White-winged scoter	<i>Melanitta fusca</i>	WWSC	27
Surf scoter	<i>Melanitta perspicillata</i>	SUSC	134
Unidentified scoter	<i>Melanitta spp.</i>	UNSC	1
Harlequin duck	<i>Histrionicus histrionicus</i>	HARD	543
Long-tailed duck (Oldsquaw)	<i>Clangula hyemalis</i>	OLDS	4
Barrow's goldeneye	<i>Bucephala islandica</i>	BAGO	13
Common goldeneye	<i>Bucephala clangula</i>	COGO	3

Appendix 2 (continued).

Common Name	Scientific Name	Code	Count
Common merganser	<i>Mergus merganser</i>	COME	170
Red-breasted merganser	<i>Mergus serrator</i>	RBME	34
Unidentified merganser	<i>Mergus spp.</i>	UNME	1
Unidentified diving duck		UNDD	1
Black oystercatcher	<i>Haematopus bachmani</i>	BLOY	53
Whimbrel	<i>Numenius phaeopus</i>	WHIM	8
Spotted sandpiper	<i>Actitis macularia</i>	SPSA	1
Unidentified shorebird		UNSB	3
Parasitic jaeger	<i>Stercorarius parasiticus</i>	PAJA	22
Long-tailed jaeger	<i>Stercorarius longicaudus</i>	LTJA	1
Bonaparte's gull	<i>Larus philadelphia</i>	BOGU	366
Mew gull	<i>Larus canus</i>	MEGU	613
Herring gull	<i>Larus argentatus</i>	HEGU	33
Glaucous-winged gull	<i>Larus glaucescens</i>	GWGU	233
Black-legged kittiwake	<i>Rissa tridactyla</i>	BLKI	244
Arctic tern	<i>Sterna paradisaea</i>	ARTE	549
Aleutian tern	<i>Sterna aleutica</i>	ALTE	28
Caspian tern	<i>Sterna caspia</i>	CATE	2
Common murre	<i>Uria aalga</i>	COMU	3
Pigeon guillemot	<i>Cepphus columba</i>	PIGU	131
Marbled murrelet	<i>Brachyramphus marmoratus</i>	MAMU	760
Kittlitz's murrelet	<i>Brachyramphus brevirostris</i>	KIMU	120
Brachyramphus murrelet	<i>Brachyramphus spp.</i>	BRMU	107
Unidentified murrelet		UNMR	1

Appendix 2 (continued).

Common Name	Scientific Name	Code	Count
Bald eagle	<i>Haliaeetus leucocephalus</i>	BAEA	60
Unidentified falcon		UNFA	1
Belted kingfisher	<i>Ceryle alcyon</i>	BEKI	2
Northwestern crow	<i>Corvus caurinus</i>	NOCR	106
Common raven	<i>Corvus cryptoleucus</i>	CORA	4
Black bear	<i>Ursus americanus</i>	BLBE	1
Sea otter	<i>Enhydra lutris</i>	SEOT	13
Wolverine	<i>Gulo gulo</i>	WOLV	1
Gray wolf	<i>Canis lupus</i>	WOLF	1
Harbor seal	<i>Phoca vitulina</i>	HASE	134
Moose	<i>Alces alces</i>	MOOS	3
Harbor porpoise	<i>Phocoena phocoena</i>	HAPO	10

Appendix 3. Location descriptions of shoreline transects surveyed for marine birds and mammals in the Yakutat area, Alaska - June 2000.

Transect	Location	Transect boundary (in relation to pelagic transects)
YBS01	West side Yakutat Bay	59° 38' 57.64" N (YB04) -- 59° 42' 44.26" N (YB03)
YBS02	West side Yakutat Bay	59° 42' 44.26" N (YB03) -- 59° 46' 30.88" N (YB02)
YBS03	West side Yakutat Bay	59° 46' 30.88" N (YB02) – 59° 50' 17.50" N (YB01)
YBS04	West side Yakutat Bay	59° 50' 17.50" N (YB01) – 59° 54' 04.12" N (DB09)
YBS05	West side Yakutat Bay	59° 54' 04.12" N (DB09) – 59° 56' 13.61" N (DB07)
YBS06	East side Yakutat Bay	59° 58' 23.11" N (DB05) – 59° 54' 04.12" N (DB09)
YBS07	East side Yakutat Bay	59° 54' 04.12" N (DB09) – 59° 46' 30.88" N (YB02)
YBS08	East side Yakutat Bay	59° 46' 30.88" N (YB02) – 59° 38' 57.64" N (YB04)
YBS09	East side Yakutat Bay	59° 38' 57.64" N (YB04) to Pt Carrew (incl. islands)
RFS01	West side Russell Fiord	59° 59' 27.63" N (RF01) – 59° 56' 13.38" N (RF03)
RFS02	West side Russell Fiord	59° 56' 13.38" N (RF03) – 59° 51' 22.01" N (RF06)
RFS03	West side Russell Fiord	59° 51' 22.01" N (RF06) – 59° 46' 30.65" N (RF09)
RFS04	West side Russell Fiord	59° 46' 30.65" N (RF09) – 59° 41' 39.28" N (RF12)
RFS05	West side Russell Fiord	59° 41' 39.28" N (RF12) – 59° 36' 47.91" N (RF15)
RFS06	South end Russell Fiord	59° 36' 47.91" N (RF15) – west side to east side
RFS07	East side Russell Fiord	59° 36' 47.91" N (RF15) – 59° 41' 39.28" N (RF12)
RFS08	East side Russell Fiord	59° 41' 39.28" N (RF12) – 59° 46' 30.65" N (RF09)
RFS09	East side Russell Fiord	59° 46' 30.65" N (RF09) – 59° 49' 44.89" N (RF07)
RFS10	East side Russell Fiord	139° 16' 11.22" W (NF01) – 59° 59' 27.63" N (RF01)
NFS01	South side Nunatak Fiord	59° 49' 44.89" N (RF07) – 139° 06' 28.49" W (NF04)
NFS02	South side Nunatak Fiord	139° 06' 28.49" W (NF04) – 139° 00' 00.00" W (NF06)
NFS03	East end Nunatak Fiord	139° 00' 00.00" W (NF06) – south side to north side
NFS04	North side Nunatak Fiord	139° 00' 00.00" W (NF06) – 139° 06' 28.49" W (NF04)
NFS05	North side Nunatak Fiord	139° 06' 28.49" W (NF04) – 139° 16' 11.22" W (NF01)

Appendix 4. Bird and mammal species observed on shoreline transects of Yakutat Bay, Disenchantment Bay, Russell Fiord, and Nunatak Fiord, Alaska - June 2000.

Species Code	Yakutat & Disenchantment (YBS_)									Russell Fiord (RFS_)										Nunatak Fiord (NFS_)				
	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	10	01	02	03	04	05
COLO	-	-	-	-	-	-	1	17	24	-	-	-	-	4	1	-	-	4	9	1	-	-	-	3
YBLO	1	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
PALO	-	5	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	
RTLO	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	9	3	
UNLO	-	1	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	
NOFU	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DCCO	-	-	-	-	-	-	-	-	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
PECO	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
GBHE	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	
CAGO	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	13	24	12	36	6	43	-	74	
BRAN	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MALL	-	-	-	-	-	-	-	-	-	10	27	1	32	-	3	-	24	5	7	-	3	14	-	
GADW	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	
NOSH	-	-	-	-	-	9	-	-	15	17	-	-	-	-	-	-	-	25	-	-	-	-	-	
BLSC	-	28	-	-	-	-	11	2	-	-	4	2	-	-	-	-	-	-	-	-	-	-	-	
WWSC	-	13	-	-	-	-	4	-	-	-	-	-	-	4	-	5	-	-	-	-	-	-	-	
SUSC	-	-	-	-	-	-	-	-	40	-	-	77	-	-	5	-	-	-	-	-	-	-	-	
UNSC	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
HARD	-	-	-	-	-	86	21	4	76	55	5	61	119	-	7	-	26	-	28	6	9	4	15	
OLDS	-	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
BAGO	-	-	-	-	-	3	-	-	-	-	-	4	3	-	1	-	-	-	-	-	-	-	2	
COGO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	
COME	-	-	2	-	-	-	-	4	4	-	3	10	19	-	11	-	-	30	43	23	13	-	8	
RBME	-	1	-	-	-	-	-	-	26	-	-	2	-	-	-	-	-	5	-	-	-	-	-	
UNME	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	
UNDD	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	
BLOY	-	-	-	-	-	4	2	2	1	2	3	1	6	-	2	1	2	2	4	5	4	4	8	
WHIM	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SPSA	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	
UNSB	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	9	-	-	-	-	-	-	
PAJA	-	2	4	-	-	-	1	-	-	-	-	2	1	-	2	-	-	-	2	-	-	-	3	
BOGU	-	-	-	-	-	-	-	-	366	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MEGU	3	16	17	1	-	15	-	41	190	12	29	8	27	4	75	2	14	13	32	17	2	3	67	
HEGU	-	-	-	-	-	-	-	-	7	1	-	6	-	-	-	-	-	-	2	-	-	-	-	

Appendix 4 (continued).

Species	Yakutat & Disenchantment (YBS_)									Russell Fiord (RFS_)										Nunatak Fiord (NFS_)				
	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	10	01	02	03	04	05
GWGU	101	2	-	-	2	5	6	-	24	3	1	-	-	-	2	-	-	1	14	2	-	-	-	-
BLKI	3	2	16	-	-	120	52	1	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTE	-	22	4	1	-	1	2	3	93	9	7	24	4	3	111	10	20	13	81	10	4	8	5	33
ALTE	-	-	1	-	-	-	-	-	4	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-
CATE	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COMU	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PIGU	-	-	-	-	-	16	5	-	4	1	11	-	-	-	-	6	2	18	14	4	8	1	31	
MAMU	24	59	8	6	4	3	1	7	221	6	8	12	11	15	19	2	17	9	38	4	19	13	1	4
KIMU	2	1	1	7	4	5	1	-	69	3	-	-	-	-	1	-	-	1	5	-	-	-	-	-
BRMU	1	4	2	-	1	2	6	6	-	4	2	1	2	-	3	4	-	4	10	-	-	-	-	3
UNMR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
BAEA	-	5	1	-	-	-	6	9	28	-	-	2	-	-	7	-	2	-	-	-	-	-	-	-
NOCR	-	-	-	-	-	-	21	3	30	-	5	22	1	1	16	-	-	1	1	2	-	-	-	3
CORA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-
BLBE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
SEOT	1	-	-	-	1	-	3	2	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
WOLV	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
WOLF	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HASE	-	6	7	1	3	6	3	5	9	4	4	-	-	2	56	2	-	-	3	3	-	9	-	2
MOOS	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-
HAPO	-	-	-	-	-	1	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5. Bird and mammal species observed on pelagic transects of Yakutat and Disenchantment Bays, Russell Fiord, and Nunatak Fiord, Alaska - June 2000.

Species	Yakutat & Disenchantment					Russell Fiord																Nunatak Fiord							
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
COLO	-	-	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YBLO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PALO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UNLO	1	-	2	2	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	1	-	-	-	-	-	-	-	-
NOFU	3	9	4	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FTSP	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PECO	-	-	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WWSC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUSC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HARD	-	-	-	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PAJA	-	-	2	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LTJA	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MEGU	-	1	-	5	-	-	-	-	-	-	5	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEGU	1	6	8	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GWGU	1	4	28	31	-	4	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BLKI	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTE	-	11	8	10	-	2	-	-	-	-	-	2	3	1	1	1	-	-	-	7	28	-	-	-	1	6	-	-	-
ALTE	-	-	3	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COMU	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PIGU	-	-	-	2	-	-	-	-	-	-	1	-	6	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
MAMU	7	13	28	72	-	-	-	3	2	-	-	-	19	1	3	13	8	4	26	47	2	-	-	-	1	-	-	-	
KIMU	5	1	3	7	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BRMU	5	4	4	14	-	-	3	-	-	-	3	-	1	-	1	-	-	2	-	15	-	-	-	-	-	-	-	-	-
UNFA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEOT	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HASE	-	-	-	1	3	-	1	-	-	1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 6. Densities (individuals/km²) of bird and mammal species observed on shoreline and pelagic transects of Yakutat/Disenchantment bays, Russell Fiord, and Nunatak Fiord, Alaska - June 2000.

Species	Shoreline (SH)			Pelagic (PL)			Total	
	Yakutat	Russell	Nunatak	Yakutat	Russell	Nunatak		
COLO	1.155	0.737	0.437	0.157	0.296	-	0.915	0.186
YBLO	0.110	0.041	-	-	-	0.971	0.072	0.093
PALO	0.165	-	0.219	-	0.099	-	0.114	0.031
RTLO	-	0.041	1.312	-	-	-	0.186	-
UNLO	0.110	0.082	-	0.262	0.099	-	0.086	0.186
NOFU	0.028	-	-	1.467	-	-	0.014	0.867
FTSP	-	-	-	0.210	-	-	--	0.124
DCCO	0.138	0.041	-	-	-	-	0.086	-
PECO	0.028	-	-	0.262	-	-	0.014	0.155
GBHE	-	0.205	-	-	-	-	0.072	-
CAGO	-	2.579	17.385	-	-	-	3.175	-
BRAN	0.083	-	-	-	-	-	0.043	-
MALL	-	4.463	1.859	-	-	-	1.802	-
GADW	-	0.287	-	-	-	-	0.100	-
NOSH	0.660	1.720	-	-	-	-	0.944	-
BLSC	1.128	0.246	-	-	-	-	0.672	-
WWSC	0.468	0.368	-	-	0.099	-	0.372	0.031
SUSC	1.100	3.357	-	-	-	3.883	1.745	0.371
UNSC	0.028	-	-	-	-	-	0.014	-
HARD	5.143	12.324	3.717	-	2.073	-	7.465	0.650
OLDS	0.083	0.041	-	-	-	-	0.057	-

Appendix 6 (continued).

Species	Shoreline (SH)			Pelagic (PL)			Total	
	Yakutat	Russell	Nunatak	Yakutat	Russell	Nunatak	SH	PL
BAGO	0.083	0.328	0.219	-	-	-	0.186	-
COGO	-	0.123	-	-	-	-	0.043	-
COME	0.275	4.749	4.811	-	-	-	2.431	-
RBME	0.743	0.287	-	-	-	-	0.486	-
UNME	-	0.041	-	-	-	-	0.014	-
UNDD	-	0.041	-	-	-	-	0.014	-
BLOY	0.248	0.942	2.296	-	-	-	0.758	-
WHIM	0.220	-	-	-	-	-	0.114	-
SPSA	-	0.041	-	-	-	-	0.014	-
UNSB	-	0.123	-	-	-	-	0.043	-
PAJA	0.193	0.287	0.328	0.157	0.197	-	0.243	0.155
LTJA	-	-	-	0.052	-	-	-	0.031
BOGU	10.066	-	-	-	-	-	5.234	-
MEGU	7.783	8.844	10.934	0.314	0.691	0.324	8.566	0.433
HEGU	0.193	0.368	-	0.786	0.197	-	0.229	0.526
GWGU	3.850	0.860	0.219	3.353	0.592	-	2.331	2.167
BLKI	6.683	-	-	0.052	-	-	3.475	0.031
ARTE	3.465	11.546	6.560	1.519	4.442	2.265	6.692	2.507
ALTE	0.138	0.164	-	0.995	-	-	0.129	0.588
CATE	0.055	-	-	-	-	-	0.029	-
COMU	0.028	-	-	0.105	-	-	0.014	0.062
PIGU	0.688	1.556	6.342	0.105	0.691	0.324	1.730	0.310

Appendix 6 (continued).

Species	Shoreline (SH)			Pelagic (PL)			Total	
	Yakutat Bay	Russell Fiord	Nunatak Fiord	Yakutat Bay	Russell Fiord	Nunatak Fiord	SH	PL
MAMU	9.158	5.609	4.483	6.286	12.438	0.971	7.307	7.707
KIMU	2.475	0.409	-	0.891	0.296	-	1.430	0.619
BRMU	0.605	1.228	0.328	1.414	2.468	-	0.787	1.609
UNMR	-	0.041	-	-	-	-	0.014	-
BAEA	1.348	0.450	-	-	-	-	0.858	-
UNFA	-	-	-	-	-	0.324	-	0.031
BEKI	0.055	-	-	-	-	-	0.029	-
NOCR	1.485	1.924	0.547	-	-	-	1.516	-
CORA	-	0.164	-	-	-	-	0.057	-
BLBE	-	0.041	-	-	-	-	0.014	-
SEOT	0.220	0.041	-	0.210	-	-	0.129	0.124
WOLV	-	0.041	-	-	-	-	0.014	-
WOLF	0.028	-	-	-	-	-	0.014	-
HASE	1.100	2.907	1.531	0.210	0.494	-	1.788	0.279
MOOS	-	0.123	-	-	-	-	0.043	-
HAPO	0.275	-	-	-	-	-	0.143	-