

BIOLOGICAL MONITORING AT THE CHAMISSO ISLAND GROUP, ALASKA IN 2014



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Key Words: Alaska, black-legged kittiwake, Chamisso Island, Chukchi Sea, circumnavigation, common murre, *Fratercula corniculata*, horned puffin, invertebrates, marine mammals, populations, Puffin Island, *Rissa tridactyla*, seabirds, thick-billed murre, *Uria aalge*, *Uria lomvia*, wildlife

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INTRODUCTION

The primary objectives of the 2014 work were to collect data on population numbers and/or productivity of four indicator species representing two major feeding guilds: 1) diving fish-feeders (common and thick-billed murre [*Uria aalge* and *U. lomvia*] and horned puffins [*Fratercula corniculata*]), and 2) surface fish-feeders (black-legged kittiwakes [*Rissa tridactyla*]). Other objectives included collecting information on other species of wildlife and plants, as well as current use of the area by humans.

Results from 2014 are reported here in the figures and tables, and archived at Alaska Maritime National Wildlife Refuge (AMNWR) headquarters in Homer, Alaska. Data summaries also will be included in the annual Alaska seabird monitoring summary report (Dragoo et al. 2015). Because data occasionally are reanalyzed, some values listed in this report may differ from those reported in previous years. Data presented here include the most up-to-date values available at the time of this report and supersede previous reports.

STUDY AREA

Chamisso and Puffin islands and the adjacent sea stacks are located approximately 105 km south of Kotzebue Alaska at about 66° 13' N, 161° 50' W. They were established as the Chamisso Island National Wildlife Refuge (NWR) by President Taft in 1912, incorporated into AMNWR at its creation in 1980, and designated as wilderness in 1975. The Chamisso Island group contains over 60% of the estimated breeding seabirds in Kotzebue Sound (Nelson and Sowls 1985). The area has been described in previous reports (see DeGange and Sowls 1978, Nelson and Sowls 1985, Sowls and Roseneau 1989) and the wilderness proposal (Troyer 1970).

These islands have been visited infrequently by Fish and Wildlife Service personnel. Troyer (1970) spent two days at Chamisso Island in July 1968 as part of a study of areas suitable for wilderness designation. DeGange and Sowls (1978) spent 11-14 August 1977 inventorying seabird colonies there and on the Choris Peninsula. In August 1981, while censusing seabird colonies in southern Kotzebue Sound, Nelson and Sowls (1985) visited Chamisso and Puffin islands, and set up seabird monitoring plots on each. Sowls and Roseneau (1989) spent 6-11 August 1987 in the islands.

METHODS

Personnel: The 2014 U. S. Fish and Wildlife Service (USFWS) Chamisso Island field team consisted of Don Dragoo, Chukchi Sea Unit Biologist and Leslie Slater, Gulf of Alaska Unit Biologist (both AMNWR; 5-13 August). The crew was flown by charter pilots to a drop off point on the southwestern coast of the Choris Peninsula and then boated to the Chamisso Island campsite from there. The same landing strip was used for the return flights to Kotzebue. Moving the crew and all of the gear required three flights and three skiff-loads to deploy the camp. Two boat-loads and two flights sufficed for the return trip.

Data Collection and Analysis: The methods used to collect and analyze seabird-related data followed the procedures described in DeGange and Sowls (1978), Nelson and Sowls (1985), Sowls and Roseneau (1989), and USFWS (2014).

- We circumnavigated Chamisso Island four times, at different times of the day, to yield replicate counts of birds within pre-defined survey census areas (Nelson and Sowls 1985). We also counted birds from our skiff at South Rock and Mid Rock on 7 August.
- Photographs were taken of much of the Chamisso Island coastline (especially the start and end points of the circumnavigation survey census areas; Appendix A), and the entirety of Puffin Island, South Rock, and Mid Rock. Photographs are archived at AMNWR.
- Counts were conducted at most of the permanent land-based plots at Puffin Island on 7 August. Deteriorating weather conditions forced the crew to leave the island before all plots could be counted.
- Photographs of the North Side Pinnacle plot on Puffin Island were merged in Photoshop™ and used to obtain population counts.
- Photographs of Puffin Island plots were used to estimate black-legged kittiwake nest contents to assess productivity.

INTERESTING OBSERVATIONS

- As in past years, horned puffin numbers in 2014 were higher during counts late in the day at Chamisso Island, but total puffin numbers in 2014 were much lower than those from 1977 and 1981. This year's Chamisso Island horned puffin counts were similar to those from 1987.
- When we arrived at Chamisso Island on 5 August, we were met at the beach by Raymond Lee, Jr., a resident of the village of Buckland. He, his wife, and daughter were on the island picking berries (blueberries were abundant and tasty during our visit). Mr. Lee visited the island again on 12 August and told us about his and other local residents' subsistence activities in the Chamisso Island area, including egging, whale and seal hunting, berry picking, and fishing in the vicinity. Anecdotal information and discussions with staff of the Selawik National Wildlife Refuge indicated that residents of Kotzebue also visit the Chamisso Island group for recreational and/or subsistence purposes.
- Un-weathered trash on Puffin Island indicated recent access by humans, presumably for subsistence egging.
- Black-legged kittiwake productivity was approximately 0.35 (n=250 nests) on Puffin Island in 2014 (Table 1). This compares with an estimate of 0.91 in 1987 (n=212 nests; Sowls and Roseneau 1989).

ACKNOWLEDGEMENTS

We would like to thank Tina Moran, Brittany Sweeney, Susan Georgette, and Chester Ballot at the Selawik National Wildlife Refuge for graciously providing advice, logistical support, and bunkhouse space in Kotzebue. Jared, Jessie, and China of Golden Eagle Outfitters in Kotzebue did a great job of flying us and our gear to the drop-off site and returning us safely to town. We appreciated their patience, good humor, and professionalism. Finally, we would like to express our gratitude to the staff of the Alaska Maritime National Wildlife Refuge for their help and support; especially Steve Ebbert, who graciously allowed us to pilfer his equipment stores. Cover photo was taken by Leslie Slater.

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Figure 1. Map showing the location of the Chamisso Island group, Kotzebue Sound, Alaska (red circle).



Figure 2. Map of the southern Choris Peninsula and Chamisso Island group, Kotzebue Sound, Alaska, showing the location of the Choris Peninsula drop-off point and the camp site at Chamisso Island.

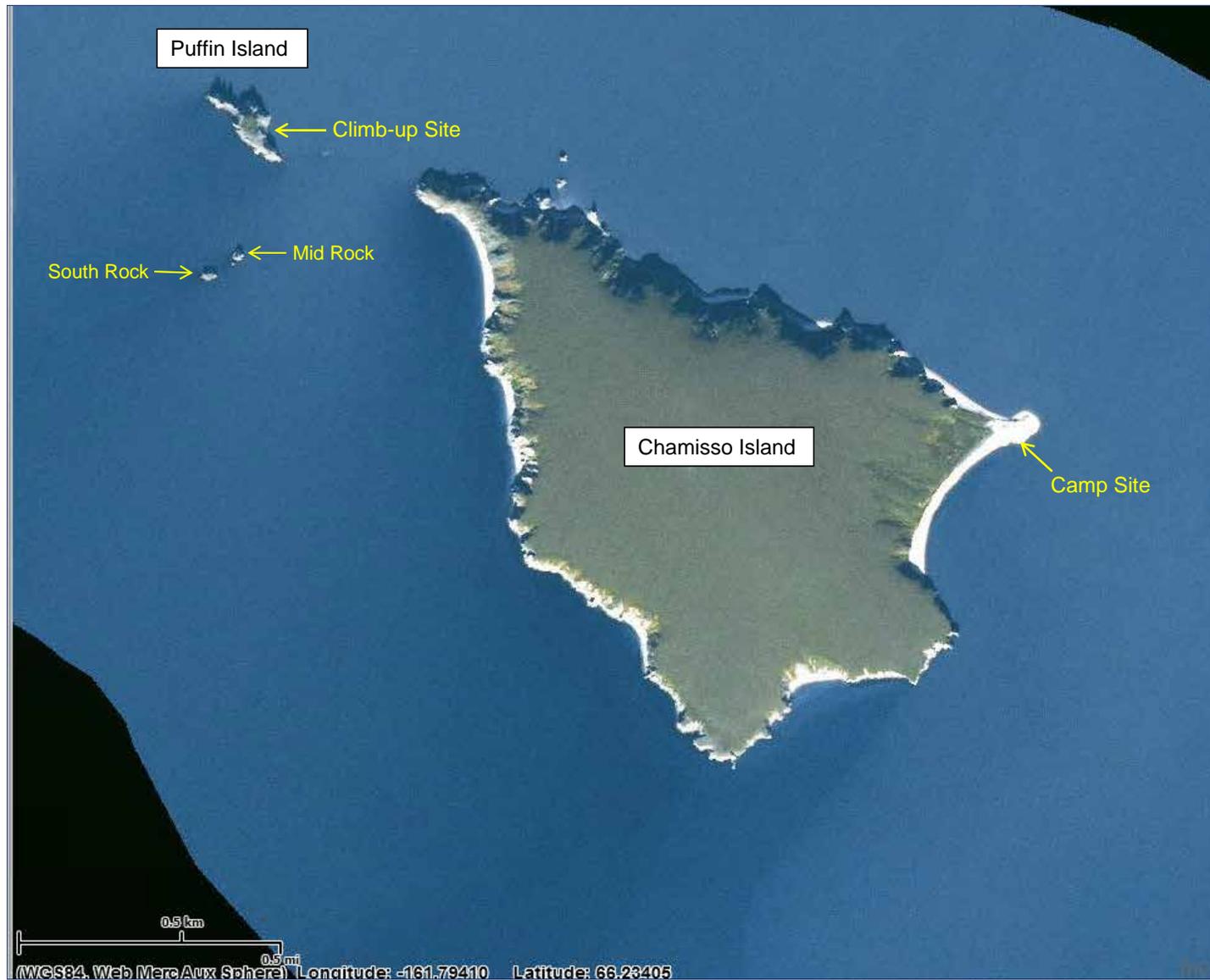


Figure 3. Map of the Chamisso Island group, Kotzebue Sound, Alaska showing the camp site on Chamisso Island and the climb-up site on Puffin Island.

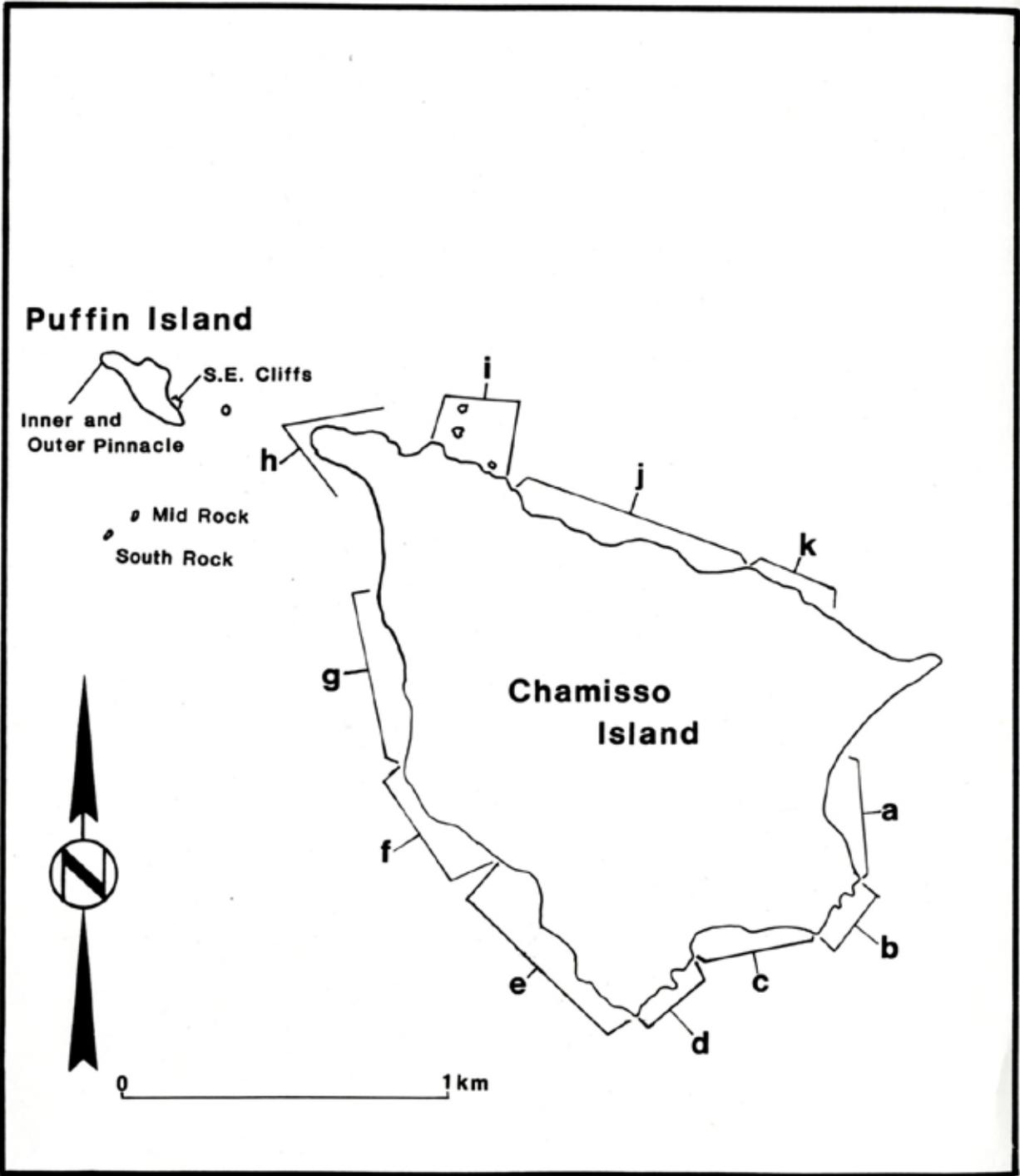


Figure 4. Map showing circumnavigation survey census areas on Chamisso Island and locations of land plots on Puffin Island, Kotzebue Sound, Alaska (from Nelson and Sowlis 1985).

FIGURES AND TABLES

Table 1. Counts of adult murre (common and thick-billed murre combined) on plots at Puffin Island, and at Mid Rock and South Rock, Alaska.

Plot	1977 Birds	1981 Birds	1987 Birds	2014 Birds
Puffin Island:				
1: Landing Beach (SE cliff)	NC ^a	405	470	351
2: Outer Pinnacle (east)	NC	475	180	575
3: Outer Pinnacle (west)	NC	245	258	890
4: Inner Pinnacle (east)	NC	450	304	630
5: Inner Pinnacle (west)	NC	285	218	310
6: North Side Pinnacle	NC	NC	192	515 ^b
Mid Rock	326	203	168	400
South Rock	225	54	70	475

^a NC = Not counted.

^b Counts were made using photographs taken between 20:36 and 20:42 (ADT) on 12 August 2014. All other 2014 counts were of birds on the plots on 7 August.

Table 2. Contents of 250 black-legged kittiwake nests on Puffin Island, determined from photographs taken on 12 August 2014.

Nest Contents					
Empty	1 egg	1 egg + 1 chick	1 chick	2 chicks	Total eggs + chicks/ nest
168	3	2	74	3	0.35

Table 3. Counts of adult black-legged kittiwakes and nests on plots at Puffin Island; and censuses of Mid Rock and South Rock, Alaska.

Plot	1977 Birds (nests)	1981 Birds (nests)	1987 Birds (nests)	2014 Birds (nests)
Puffin Island:				
1: Landing Beach (SE cliff)	NC ^a	204 (165)	217 (200)	274 (202)
2: Outer Pinnacle (east)	NC	97 (105)	115 (116)	181 (132)
3: Outer Pinnacle (west)	NC	65 (112)	137 (133)	147 (114)
4: Inner Pinnacle (east)	NC	50 (84) ^b	44 (50)	71 (NC)
5: Inner Pinnacle (west)	NC		23 (24)	66 (59)
6: North Side Pinnacle	NC	NC	81 (75)	188 (126) ^c
Mid Rock	NC (91)	101 (42)	35 (31)	250 (65)
South Rock	NC (22)	34 (53)	58 (46)	169 (54)

^a NC = Not counted.

^b Counts of plots 4 and 5 combined.

^c Counts were made using photographs taken between 20:36 and 20:42 (ADT) on 12 August 2014. All other 2014 counts were of birds and nests on the plots on 7 August.

Table 4. Counts of seabirds on plots at Puffin Island, Alaska in 2014.

Species	Plot					
	1: Landing Beach (SE cliff)	2: Outer Pinnacle (east)	3: Outer Pinnacle (west)	4: Inner Pinnacle (east)	5: Inner Pinnacle (west)	6: North Side ^b (Pinnacle)
Pelagic cormorant	NC ^a	0	2	0	0	0
Murre	351	575	890	630	310	515
Horned puffin	NC	0	41	1	0	11
Black-legged kittiwake (nests)	274 (202)	181 (132)	147 (114)	71 (NC)	66 (59)	188 (126)
Glaucous gull	NC	0	2	1	1	1

^aNC = Not counted.

^bCounts were made using photographs taken between 20:36 and 20:42 (ADT) on 12 August 2014. All other counts were of birds and nests on the plots on 7 August.

Table 5. Counts of birds and marine mammals during circumnavigation surveys around Chamisso Island on 6 August 2014.

Species	Census Area											Total A-K	
	A	B	C	D	E	F	G	G-H Gap	H	I ^a	J		K
Pelagic cormorant					1								1
Harlequin duck						6	2				4		12
Common eider													0
Unidentified eider					2			30					32
Surf scoter													0
Black scoter													0
Unidentified scoter													0
Peregrine falcon	3						1					1	5
Common murre			75							93			168
Thick-billed murre			4										4
Unidentified murre			1							1			2
Horned puffin		6	3	1	9	5			5	24			53
Tufted puffin		1							2				3
Black-legged kittiwake													0
Glaucous gull		3	3		2	2			2	4	3		19
Common raven									1				1
Spotted (largha) seal						2							2
Start time ^b	14:36	14:39	14:41	14:51	14:54	15:05	15:14	15:22	15:30	15:36	15:44	15:52	
End time ^b	14:39	14:41	14:51	14:54	15:05	15:14	15:22	15:30	15:36	15:44	15:52	15:56	

^a Area "I" includes birds counted on the offshore islets.

^b Alaska daylight time.

Table 6. Counts of birds and marine mammals during circumnavigation surveys around Chamisso Island on 7 August 2014. Counts of birds at Mid Rock and South Rock also are presented but not included in the totals.

Species	Census Area											Total A-K	Mid Rock	South Rock	
	A	B	C	D	E	F	G	G-H Gap	H	I ^a	J				K
Pelagic cormorant				4									4		2
Harlequin duck					7	9							16		
Common eider													0		
Unidentified eider													0		
Surf scoter													0	36	
Black scoter													0	1	
Unidentified scoter													0		
Peregrine falcon	2						1						3		
Common murre		2		1		4							7		
Thick-billed murre													0		
Unidentified murre			122							126			248	400	475
Horned puffin	2	1	14	3		6	1		3	38			68	8	8
Tufted puffin									2				2		
Black-legged kittiwake				36	1								37	250 (65) ^b	169 (54)
Glaucous gull	2	2	2	9	2	2	2		6	8	5	1	41	21	23
Common raven													0		
Spotted (largha) seal									12				12		
Start time ^c	12:12	12:16	12:20	12:44	12:51	13:00	13:06	--	14:06	14:16	14:28	14:43		13:14	13:42
End time ^c	12:16	12:20	12:44	12:51	13:00	13:06	13:12	--	14:16	14:28	14:43	14:44		--	--

^a Area "I" includes birds counted on the offshore islets.

^b Nest counts in parentheses.

^c Alaska daylight time.

Table 7. Counts of birds and marine mammals during circumnavigation surveys around Chamisso Island on 11 August 2014.

Species	Census Area											Total A-K	
	A	B	C	D	E	F	G	G-H Gap	H	I ^a	J		K
Pelagic cormorant													0
Harlequin duck					8	8	7			6			29
Common eider					2								2
Unidentified eider													0
Surf scoter													0
Black scoter													0
Unidentified scoter					31								31
Peregrine falcon		1					2						3
Common murre			123	2					27				152
Thick-billed murre			3										3
Unidentified murre		7	15					10		123			155
Horned puffin	26	19	41	15	69		21	3	149	56	7	7	413
Tufted puffin									2				2
Black-legged kittiwake								75		1			76
Glaucous gull	1	2	5		1		1	18	1	8		2	39
Common raven													0
Spotted (largha) seal							1		2				3
Start time ^b	19:43	19:47	19:50	19:56	20:00	20:09	20:13	20:21	20:26	20:33	20:46	20:51	
End time ^b	19:47	19:50	19:56	20:00	20:09	20:13	20:21	20:26	20:33	20:46	20:51	--	

^a Area "I" includes birds counted on the offshore islets.

^b Alaska daylight time.

Table 8. Counts of birds and marine mammals during circumnavigation surveys around Chamisso Island on 12 August 2014.

Species	Census Area											Total A-K	
	A	B	C	D	E	F	G	G-H Gap	H	I ^a	J		K
Pelagic cormorant					1								1
Harlequin duck					17					6			23
Common eider													0
Unidentified eider													0
Surf scoter													0
Black scoter													0
Unidentified scoter						75							75
Peregrine falcon		3					4						7
Common murre		1	104		2				7	76			190
Thick-billed murre			5										5
Unidentified murre										45			45
Horned puffin	13	36	36	15	49	14	16		34	57	6	2	278
Tufted puffin			1	3					5				9
Black-legged kittiwake									355				355
Glaucous gull		4	4	2			3	14	6	5		3	41
Common raven													0
Spotted (largha) seal													0
Start time ^b	22:00	21:55	21:49	21:45	21:38	21:32	21:23	21:21	19:12	19:01	18:55	18:51	
End time ^b	22:01	22:00	21:55	21:49	21:45	21:38	21:32	21:23	19:20	19:12	19:01	18:55	

^a Area "I" includes birds counted on the offshore islets.

^b Alaska daylight time.

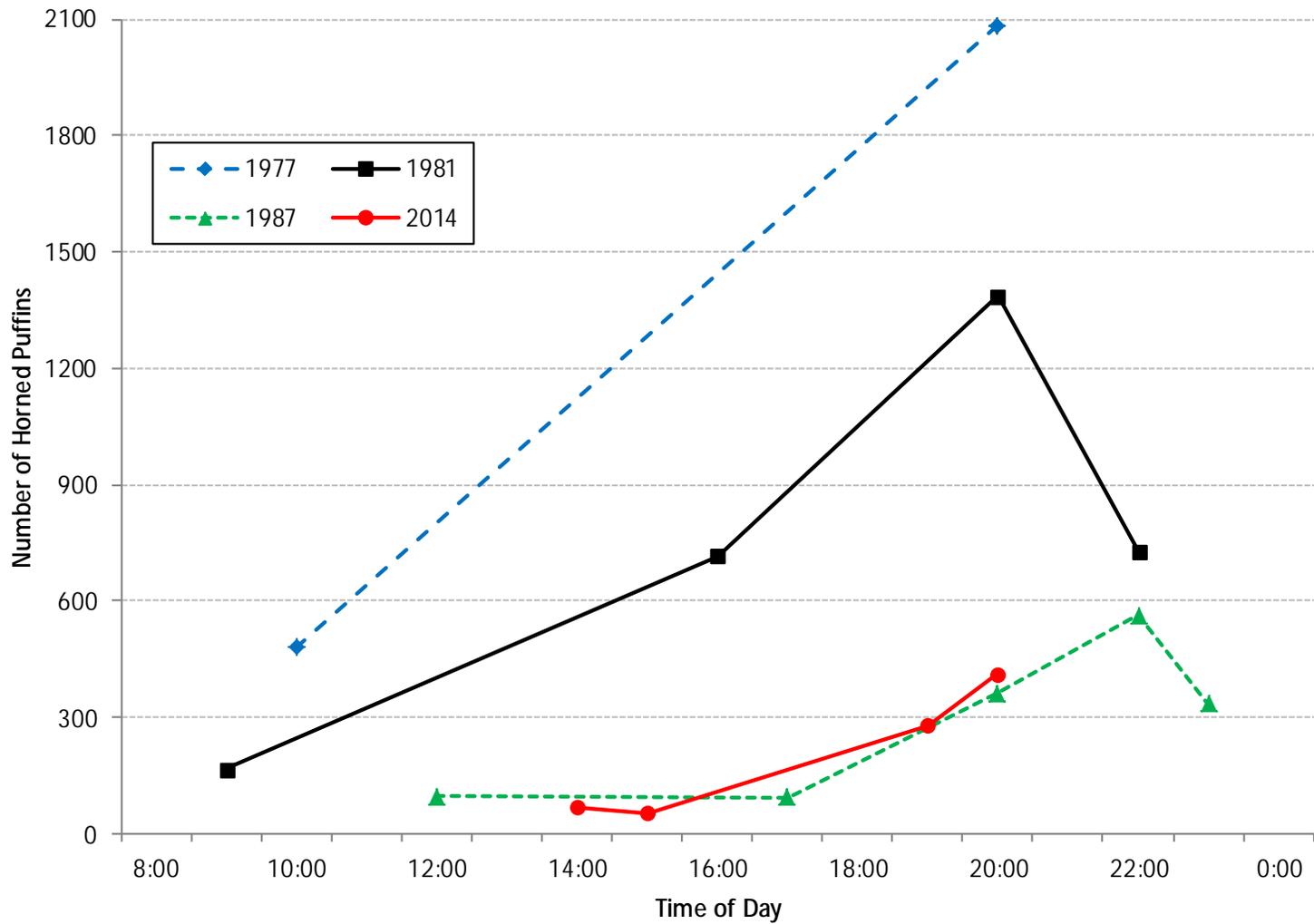


Figure 5. Total number of horned puffins seen during circumnavigation surveys at Chamisso Island, Alaska, at different times of the day.

Annotated list of wildlife observed in the Chamisso Island group, Alaska in 2014 (5-13 August).

BIRDS

White-fronted goose (greater?) (*Anser albifrons*). A flock of four was observed flying over camp on 6 August and 14 were seen over Chamisso Island on 7 August.

Canada goose (*Branta canadensis*). A flock of 13 flew over the camp on 9 August.

Common eider (*Somateria mollissima*). Individual eiders and flocks (of up to 30 birds) were seen during circumnavigations and near camp. All were female-plumaged or in eclipse plumage.

Harlequin duck (*Histrionicus histrionicus*). Single birds and small groups (4-9 individuals/group) were seen during Chamisso Island circumnavigations.

Surf scoter (*Melanitta perspicillata*). A few were observed during the 5 August crossing from the Choris Peninsula to Chamisso Island. Thirty-six were seen near Mid Rock on 7 August.

Black scoter (*Melanitta americana*). A few were observed during the 5 August crossing from the Choris Peninsula to Chamisso Island. One was seen near Mid Rock on 7 August.

Red-breasted merganser (*Mergus serrator*). Five were observed on 13 August.

Red-throated loon (*Gavia stellata*). One was seen on 8 August, and 5 on 12 August, offshore and to the north of camp.

Pacific loon (*Gavia pacifica*). One was observed on 5 and 6 August, offshore and to the north of camp..

Pelagic cormorant (*Phalacrocorax pelagicus*). A few were seen almost daily during circumnavigations or flying by the camp. No active nests were found.

Northern harrier (*Circus cyaneus*). One was seen near camp on 11 August.

Sandhill crane (*Grus canadensis*). Crane tracks were found on the landing beach at Chamisso Island on the day of our arrival (5 August). Birds were heard on 6 August and two were observed flying over camp on 8 August.

Semipalmated plover (*Charadrius semipalmatus*). Two birds were seen on Chamisso Island on 12 August.

Common murre (*Uria aalge*). Seen daily. Nested on Chamisso and Puffin islands as well as Mid and South rocks. Birds flushed a great distance from the islet near transect segment "I" as we approached in our skiff; this rock seemed accessible to humans. The ready flushing and lack of chicks led us to suspect that these birds are subject to subsistence harvest.

Thick-billed murre (*Uria lomvia*). Seen daily. Nested on Chamisso and Puffin islands as well as Mid and South rocks.

Horned puffin (*Fratercula corniculata*). Seen daily. Nested on Chamisso and Puffin islands as well as Mid and South rocks.

Tufted puffin (*Fratercula cirrhata*). Seen occasionally in singles and small numbers during circumnavigations of Chamisso Island, where they nested.

Black-legged kittiwake (*Rissa tridactyla*). Seen daily. Nested on Chamisso and Puffin islands as well as Mid and South rocks. Melees were observed several times from the Chamisso Island camp.

Glaucous gull (*Larus hyperboreus*). Adults and immatures were seen daily, usually in small numbers (tens). Gulls occasionally took part in nearshore feeding melees and apparently fed on berries at Chamisso Island.

Kestrel sp. (*Falco* sp.). A male was seen near camp on 8 August. This probably was an American kestrel (*Falco sparverius*) but could have been the Eurasian species (*F. tinnunculus*).

Peregrine falcon (*Falco peregrinus*). Adults and juveniles were observed at two different locations on Chamisso Island. As many as seven individuals (adults and juveniles combined) were seen on one day. Falcons were observed every day we were at Chamisso, except 10 August.

Common raven (*Corvus corax*). Small groups of up to four individuals were seen daily from the camp on Chamisso Island.

Bank swallow (*Riparia riparia*). Three were observed from camp on 11 August.

Northern wheatear (*Oenanthe oenanthe*). Seen repeatedly during our stay at Chamisso Island, mostly as single birds. As many as four were seen on 12 August.

American pipit (*Anthus rubescens*). One each was observed on 5 and 6 August near the camp.

Lapland longspur (*Calcarius lapponicus*). Observed near camp on 6 and 9 August.

Orange-crowned warbler (*Oreothlypis celata*). Two were seen near camp on 2 August.

Wilson's warbler (*Cardellina pusilla*). One bird was observed near camp on 10 August.

Savannah sparrow (*Passerculus sandwichensis*). Seen several times throughout our stay at Chamisso Island, usually as single birds.

Fox sparrow (*Passerella iliaca*). Single birds were observed near camp on 7 and 12 August.

White-crowned sparrow (*Zonotrichia leucophrys*). Two were seen near the camp on 10 August.

Common redpoll (*Acanthis flammea*). Species definitively identified on 10 August (recorded as redpoll sp. prior to the 10th). Flocks of up to 40 were observed near camp.

Hoary redpoll (*Acanthis hornemanni*). Species definitively identified on 10 August (recorded as redpoll sp. prior to the 10th). Flocks of up to 12 were observed near camp.

TERRESTRIAL MAMMALS

Fox. Fox tracks were seen on the beaches of Chamisso Island on numerous occasions but no foxes were actually observed. The tracks were sometimes fresh. Based on size, they probably were from red

foxes (*Vulpes vulpes*) rather than arctic foxes (*V. lagopus*). A recently-used den site was located near the camp.

Moose (*Alces alces*). No animals were seen but a pile of moose scat was found near the camp on Chamisso Island. The age of the droppings was not known but they were believed to be no more than two or three years old.

Caribou/Reindeer (*Rangifer tarandus*). No live animals were observed but three skeletons were found in very close proximity to one another near the highest point on Chamisso Island. Age of the remains was unknown.

MARINE MAMMALS

Spotted seal (*Phoca largha*). Seals frequently were seen on and near a group of low rocks between Chamisso and Puffin islands. The highest daily total was at least 12 seals on 7 August.

Table 9. Observations of birds and mammals in the Chamisso Island group, Alaska. Dashes indicate species was not recorded that year but may not necessarily indicate absence from the area during the time period (e.g., species not observed although present, or species not recorded although observed).

Species	1977	1981	1987	2014
White-fronted goose (greater?)	-	-	-	X
Canada goose	-	-	-	X
Mallard	-	-	X	-
Northern pintail	-	X	X	-
Common eider	X	X	X	X
Harlequin duck	-	-	-	X
Surf scoter	X	X	X	X
White-winged scoter	-	-	X	-
Black scoter	-	-	-	X
Red-breasted merganser	X	X	-	X
Red-throated loon	X	-	-	X
Pacific loon	-	X	-	X
Red-necked grebe	X	X	X	-
Pelagic cormorant	X	X	-	X
Northern harrier	-	-	-	X
Sandhill Crane	-	-	-	X
American golden-plover	-	X	-	-
Semipalmated plover	-	-	-	X
Whimbrel	-	X	X	-
Black turnstone	-	-	X	-
Long-billed dowitcher	-	X	X	-
Parasitic jaeger	X	-	-	-
Common murre	X	X	X	X
Thick-billed murre	X	X	X	X
Horned puffin	X	X	X	X
Tufted puffin	X	X	X	X
Black-legged kittiwake	X	X	X	X
Glaucous gull	X	X	X	X
Kestrel sp.	-	-	-	X
Merlin	-	X	-	-
Gyrfalcon	X	X	-	-
Peregrine falcon	-	X	X	X
Say's phoebe	X	-	X	-
Northern shrike	-	X	-	-

Table 9 (continued). Observations of birds and mammals in the Chamisso Island group, Alaska. Dashes indicate species was not recorded that year but may not necessarily indicate absence from the area during the time period (e.g., species not observed although present, or species not recorded although observed).

Species	1977	1981	1987	2014
Common raven	X	X	X	X
Horned lark	-	-	X	-
Tree swallow	X	-	-	-
Bank swallow	-	-	-	X
Barn swallow	-	X	-	-
Northern wheatear	X	X	X	X
Eastern yellow wagtail	X	-	X	-
American pipit	X	X	X	X
Lapland longspur	X	-	-	X
Orange-crowned warbler	-	-	-	X
Wilson's warbler	-	-	-	X
Savannah sparrow	X	X	-	X
Fox sparrow	X	X	-	X
White-crowned sparrow	X	X	X	X
Common redpoll	X	-	X	X
Hoary redpoll	-	-	-	X
Alaskan hare	S ^a	S	-	-
Unid. shrew	X	-	-	-
Unid. fox	S	-	-	S
Red fox	-	-	X	-
Pacific walrus	-	-	X	-
Spotted (largha) seal	X	X	X	X
Bearded seal	-	X	-	-
Moose	-	-	X	S
Caribou/Reindeer	S	S	-	S

^a Sign (scat, bones, tracks) was seen rather than the animal itself.

Table 10. Invertebrate specimens collected at Chamisso Island, Alaska in 2014.

Location ^a	Date collected	Time collected	Specimen collected	Preservation method	Comments ^b
66.21850° N 161.80942° W	9-Aug	15:30	marine snail (4)	air-dried	Found dead, attached to netting (debris) during coastal walk.
66.21978° N 161.80959° W	11-Aug	14:00	unidentified grasshopper	air-dried	Found at recent high tide line. Northern wheatears (<i>Oenanthe oenanthe</i>) were feeding on them during their fall migration.
66.21978° N 161.80959° W	11-Aug	14:40	unidentified grasshopper	air-dried	Found at recent high tide line. Northern wheatears (<i>Oenanthe oenanthe</i>) were feeding on them during their fall migration.
66.21978° N 161.80959° W	11-Aug	~15:00	unidentified spider	air-dried	Found near highest high tide line in sparse vegetation.
66.21850° N 161.80942° W	11-Aug	~15:30	unidentified invertebrate	air-dried	Found at vegetation line (approx. high tide line), or emerged from dead marine snail (that, in turn, was attached to marine debris or washed ashore).
66.21873° N 161.80877° W	11-Aug	~16:00	unidentified land snail	air-dried	Found under Styrofoam slab (trash) in Inuit house pit.
66.21978° N 161.80959° W	12-Aug	13:47	dragonfly (<i>Aeshna</i> spp.)	photograph	Photo enlargement sent to D. Sikes 9 Sept 2014

^a All locations were obtained using a GPS device utilizing WGS 84 except those in bold text. Bold position text indicates that the coordinates were derived from Google Earth.

^b All specimens were sent to D.S. Sikes (Curator of Insects, Assoc. Prof. of Entomology; Univ. of Alaska Museum, 907 Yukon Dr., Fairbanks , AK 99775-6960; 907-474-6278; dssikes@alaska.edu) on 10 Sept 2014.



Figure 6. Photo of *Aeshna* dragonfly taken at Chamisso Island, Alaska on 12 August 2014 (identified from the photo by D.S. Sikes).

APPENDICES

Appendix A. Photos of start and/or end points of circumnavigation Census Areas at Chamisso Island, Alaska.



Figure A1. Starting point of circumnavigation Census Area A (red line), Chamisso Island, Alaska.



Figure A2. End point of circumnavigation Census Area A and start point of Census Area B (red line), Chamisso Island, Alaska.



Figure A3. End point of circumnavigation Census Area A and start point of Census Area B (red line), Chamisso Island, Alaska.



Figure A4. End point of circumnavigation Census Area B and start point of Census Area C (red line), Chamisso Island, Alaska.



Figure A5. End point of circumnavigation Census Area B and start point of Census Area C (red line), Chamisso Island, Alaska.



Figure A6. End point of circumnavigation Census Area C and start point of Census Area D (red line), Chamisso Island, Alaska.



Figure A7. End point of circumnavigation Census Area C and start point of Census Area D (red line), Chamisso Island, Alaska.



Figure A8. End point of circumnavigation Census Area D and start point of Census Area E (red line), Chamisso Island, Alaska.



Figure A9. End point of circumnavigation Census Area E and start point of Census Area F (red line), Chamisso Island, Alaska.



Figure A10. End point of circumnavigation Census Area F and start point of Census Area G (red line), Chamisso Island, Alaska.



Figure A11. Northern end point of circumnavigation Census Area G (red line), Chamisso Island, Alaska. There is a gap between the northern end point of G and the southern start point of H.

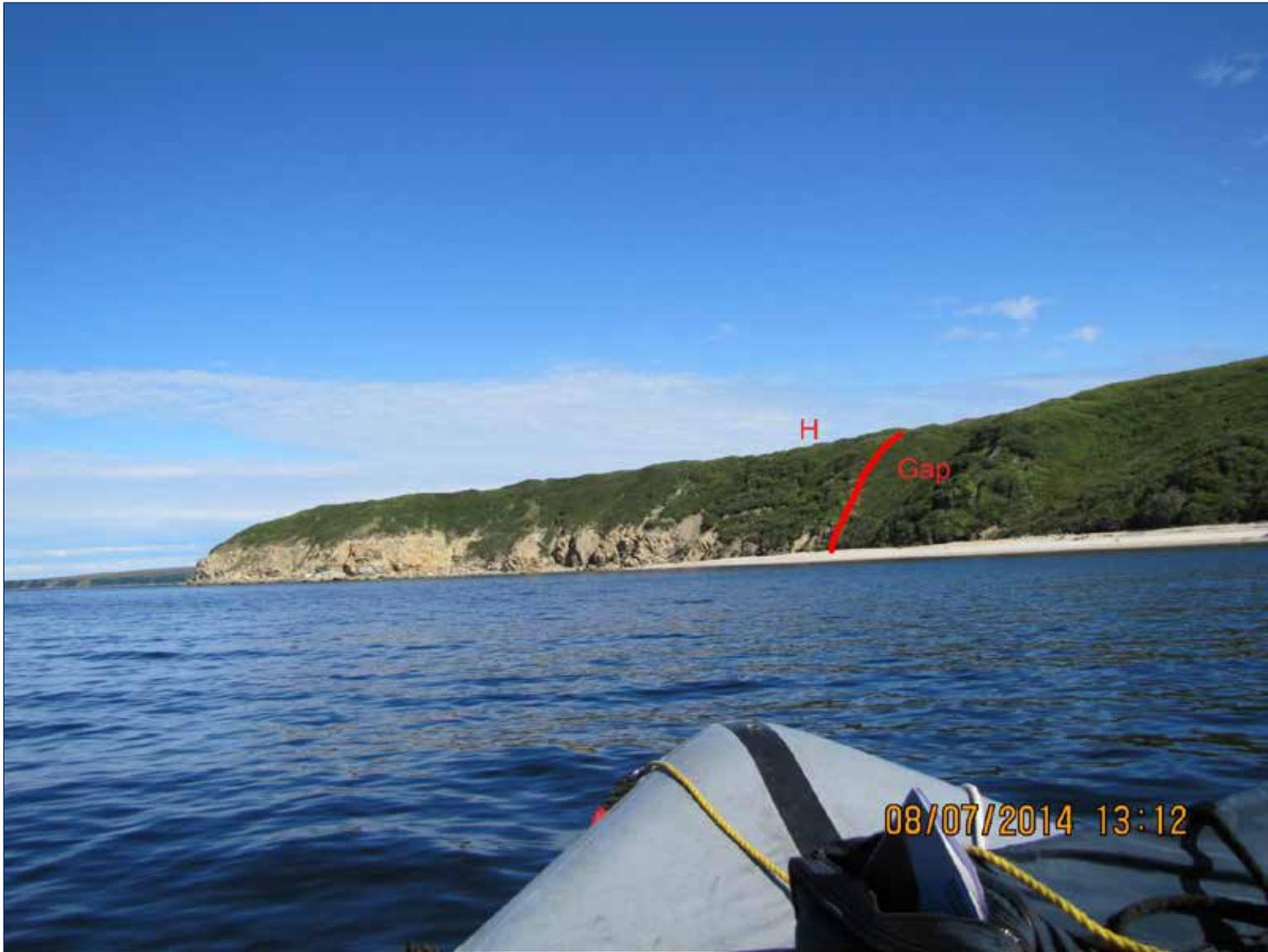


Figure A12. Southern start point of circumnavigation Census Area H (red line), Chamisso Island, Alaska. There is a gap between the northern end point of G and the southern start point of H.



Figure A13. End point of circumnavigation Census Area H and start point of Census Area I (red line), Chamisso Island, Alaska.



Figure A14. End point of circumnavigation Census Area H and start point of Census Area I (red line), Chamisso Island, Alaska.



Figure A15. End point of circumnavigation Census Area I and start point of Census Area J (red line), Chamisso Island, Alaska.



Figure A16. Southern end point of circumnavigation Census Area K (red line), Chamisso Island, Alaska.

Appendix B. Photos of Puffin Island land-based census plots.

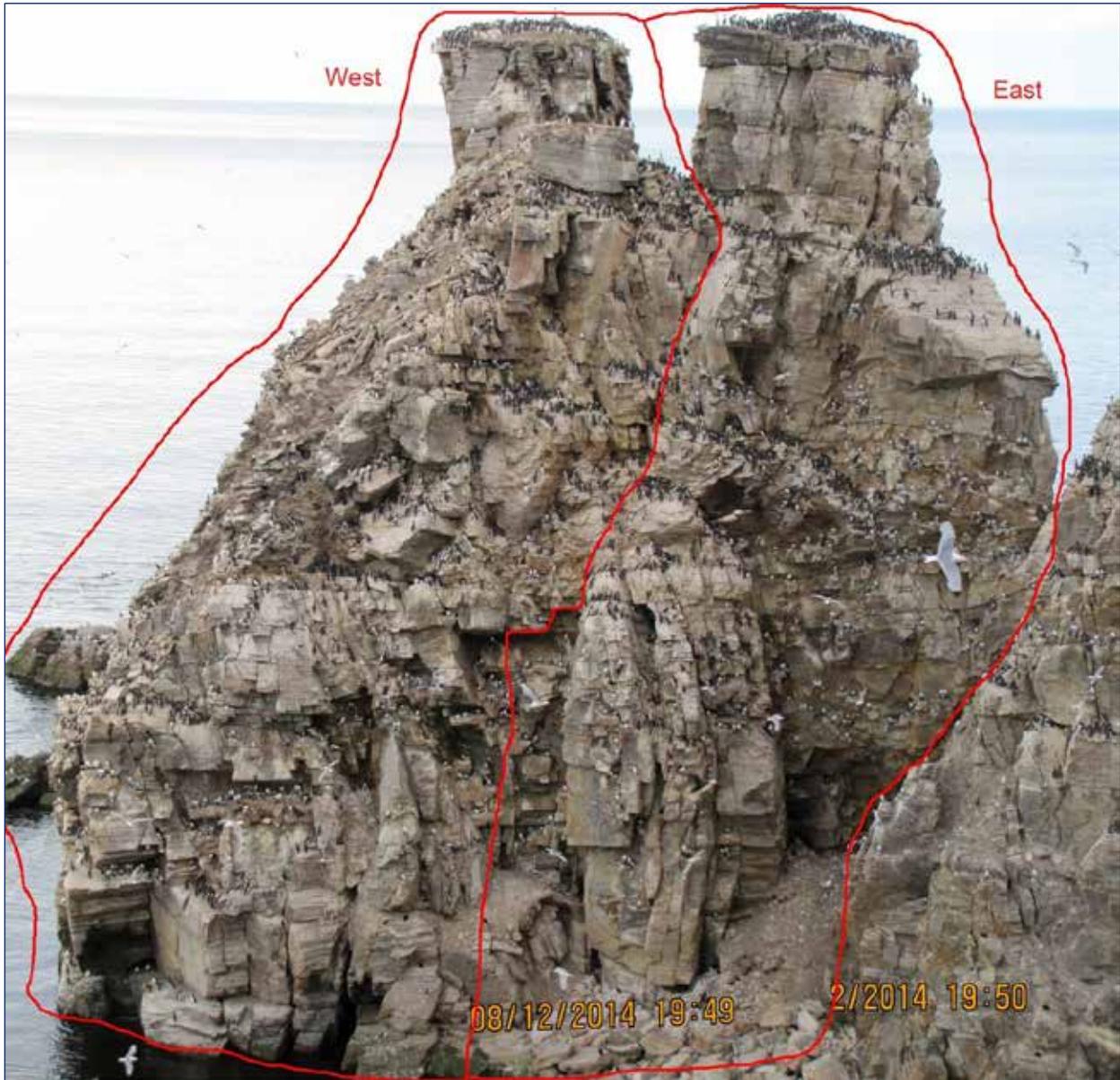


Figure B1. Outer Pinnacle plots on Puffin Island, Kotzebue Sound, Alaska in 2014.

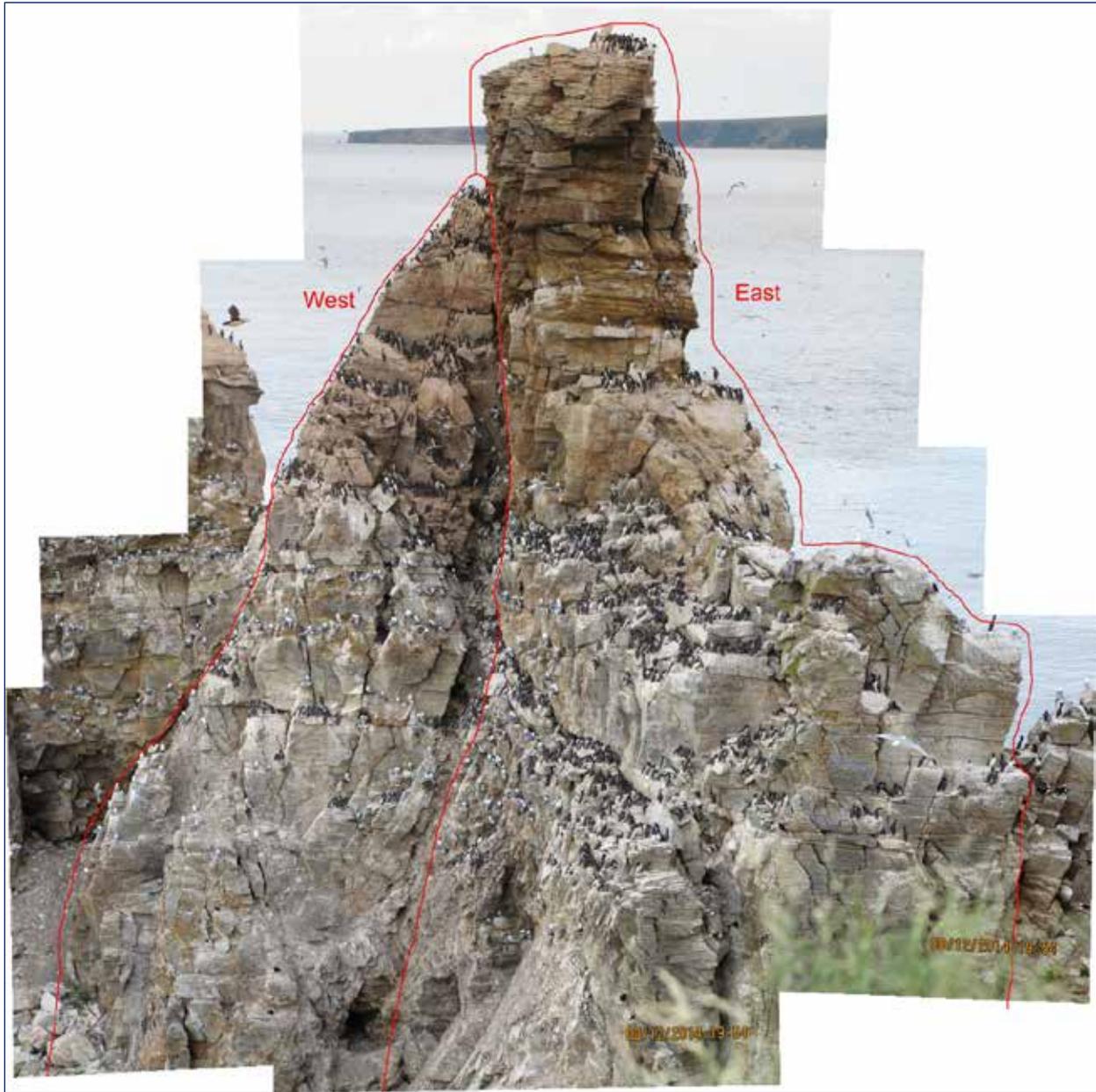


Figure B2. Inner Pinnacle plots on Puffin Island, Kotzebue Sound, Alaska in 2014.

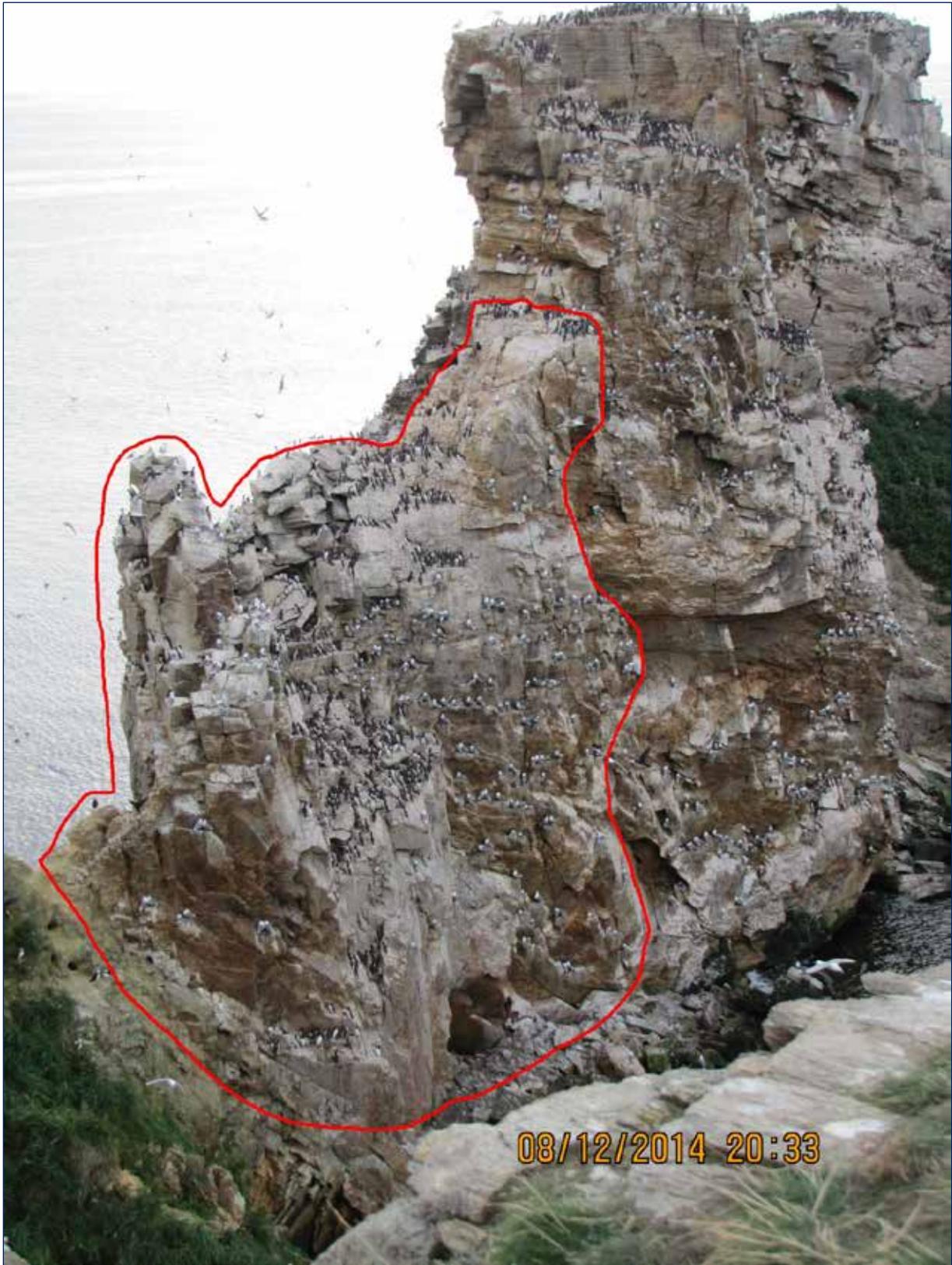


Figure B3. North Side Pinnacle plot on Puffin Island, Kotzebue Sound, Alaska in 2014.

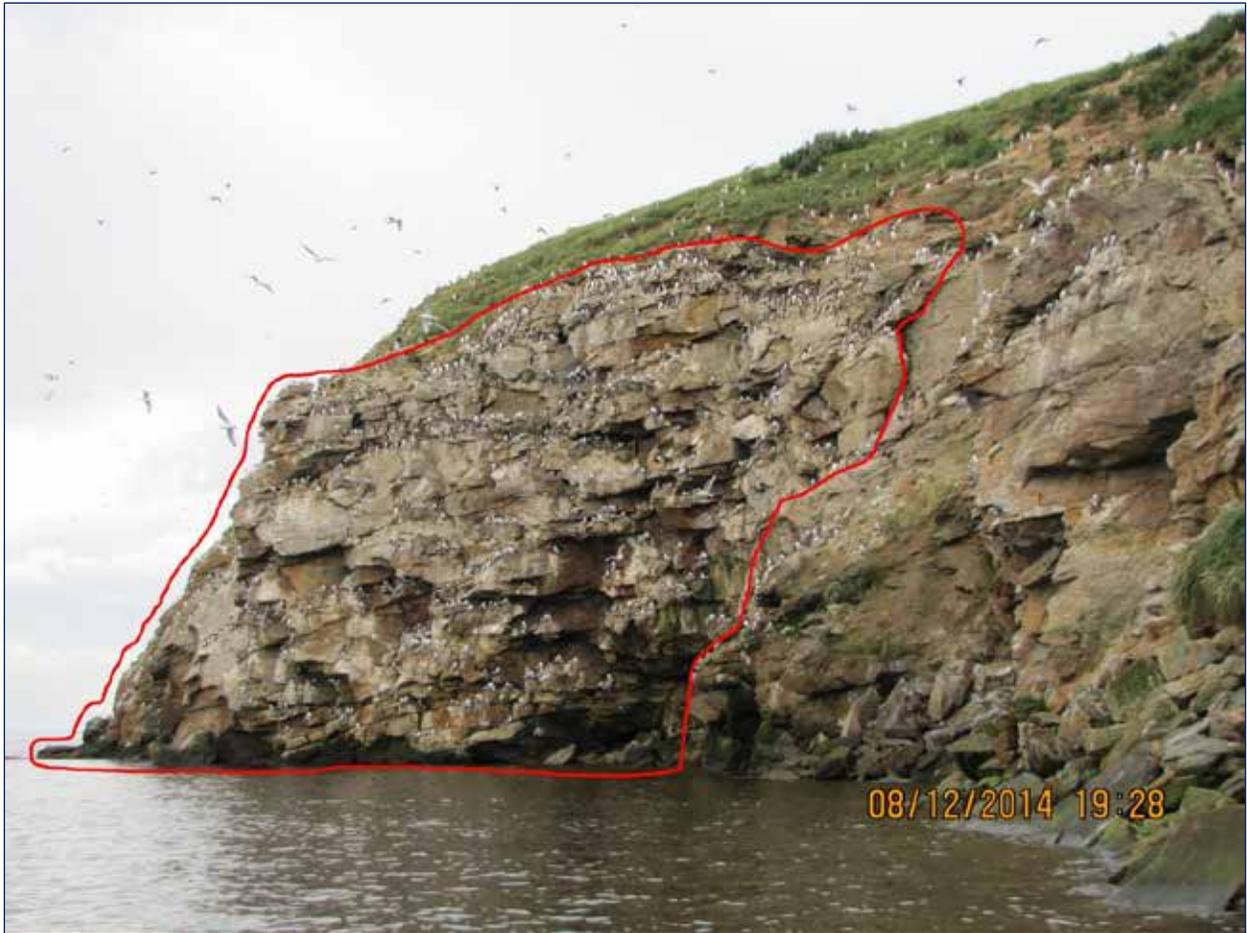


Figure B4. Landing Beach plot on Puffin Island, Kotzebue Sound, Alaska in 2014.