

AERIAL SURVEY OF EMPEROR GEESE AND OTHER WATERBIRDS
IN SOUTHWESTERN ALASKA, SPRING 2011

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Abstract: The 31st consecutive spring aerial emperor goose survey was conducted on 27 and 29 April-1 May. The survey area included coastline and estuarine habitats from Jacksmith Bay to Wide Bay, including the north and south sides of the Alaska Peninsula. The total of 74,166 emperor geese observed was 14.9% greater than the 2010 count of 64,562 and 13.9% greater than the long-term average (1981-2010) of 65,128. The current management index (recent 3-year average) is 76,892 (up 4.2% from the previous 3-year average of 73,818). Other species of emphasis included Pacific brant and Steller's eider with observed populations of 45,789 and 30,186, respectively. The survey was flown in an amphibious configured Quest Kodiak aircraft (N700FW) at 45m (150 feet) above sea level and at an airspeed of approximately 175km/hr (95 kts).

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INTRODUCTION

This survey has annually monitored spring distribution, abundance and population trends of emperor geese and other waterbirds at migratory staging areas throughout southwestern Alaska since 1981. The traditional survey route included coastline and estuarine habitats from the Yukon-Kuskokwim Delta (YKD) south and west along the north side of the Alaska Peninsula to Unimak Island, and the south side of the Alaska Peninsula east to Wide Bay. Earlier survey timing in recent years precedes the arrival of emperor geese on the YKD so the survey is now begun in southern Kuskokwim Bay. Coverage along the south side of the Alaska Peninsula emphasizes known emperor goose staging areas and omits other habitats where birds have not been observed staging during previous surveys. A 3-year moving average of survey totals is used as the population index for management in accordance with the Pacific Flyway Emperor Goose Management Plan (2006). These data also assess annual and long-term variation in seasonal migratory phenology and determine trends in distribution and habitat use for emperor geese.

METHODS

The survey area (Figures 1-2) includes 143 shoreline/estuarine segments. The segments are identified in the aircraft by referencing 1:500,000 scale aeronautical and 1:250,000 topographical maps and were previously described by Mallek and Dau (2000). Due to fuel availability, some segments along the south side of the Alaska Peninsula have been omitted. Omitted segments were used by few or no emperor geese during initial survey years when all segments were flown. General observations of habitat and survey conditions each year include wind speed and direction, temperature, sky condition, visibility and tide stage.

An amphibious configured Quest Kodiak aircraft (N700FW) flown at an airspeed of approximately 175

km/hr (95 kts) and an altitude of 45m (150 feet) above sea level was used to conduct the survey. In recent years, the planned route of flight has been from Jacksmith Bay (Segment 14) south to Bechevin Bay (Segments 67-68) including the north side of the Alaska Peninsula, and then eastward along the south side of the Alaska Peninsula to Wide Bay (Segment 137). Estuaries were covered in their entirety and the flight path was approximately 100 meters offshore of exposed shorelines with deviations (normally within 1.6 km), to confirm species identifications and estimate numbers. Whenever possible, flights were conducted with winds of <20 knots and most important estuaries were flown at or near high tide when geese were concentrated near shore. Observations were made from both sides of the aircraft and voice recorded into two laptop computers using remote microphones. Computers received input from the aircraft Global Positioning System (GPS) and saved coordinates for each observation. Specialized record and transcribe programs created by J. Hodges (MBM-Juneau) were used to process the data.

SURVEY CONDITIONS

Climatic conditions in 2011 indicated a cold and delayed spring that was slightly earlier than in 2010. Sea ice was absent from Kuskokwim Bay, except in the most northern portion. Estuarine ice cover was extensive in most southern Kuskokwim Bay estuaries. Snow cover in coastal lowlands was variable south to the Nushagak Peninsula and more extensive than coverage in 2010. Bristol Bay and associated estuaries and those along the Alaska Peninsula were ice free. Lowlands along northern Kvichak Bay and along the Alaska Peninsula were snow free (Table 1).

April 27:

Jacksmith Bay to King Salmon (Segments 14-34). Southeasterly winds were 10-25 kts. Sky condition was high scattered to overcast and visibility was unrestricted providing good survey conditions. Turbulence precluded coverage of Segments 27 and 28 northwest of the Nushagak Peninsula. Ice cover was extensive in most estuaries in southern Kuskokwim Bay and absent in northern Bristol Bay. Estuarine ice cover was as follows: Jacksmith Bay ice free; Carter Bay 95%; Goodnews Bay 70 %; Chagvan Bay 90%; and Nanvak Bay 99%. Freshwater ponds were 50% ice covered to the Nushagak Peninsula and ice free south to King Salmon. Snow cover was as follows: Segments 14-19 20%; Segment 20 95%; Segments 22-28 50%; Nushagak Peninsula (Segments 29-30) 60%; and absent from Segment 31 south. The air temperature increased from 38°F to 45°F throughout the day.

April 29:

King Salmon to Moffet Point (Segments 35-59). Survey conditions were good with a south wind of 10-20 kts and high broken ceilings. Moderate sun glare was encountered from Port Moller south. Tide conditions were as follows: Egegik Bay to Cinder River Lagoon tides were high; Port Heiden tide level was approximately 3/4 and ebbing; and Seal Island Lagoon to Port Moller/Nelson Lagoon tides were low. Snow cover was absent in lowland habitats and freshwater ponds were ice free. The air temperature decreased from 44°F to 35°F throughout the day.

April 30:

Izembek Lagoon to Bechevin Bay and Morzhovoi Bay to Cold Bay (Segments 60-85). Survey conditions were good with a southeast wind of 10 kts along with high broken ceilings. The air temperature was near 40° F throughout the day.

May 1:

Cold Bay to Wide Bay (Segments 86-137). Survey conditions were good with a south wind of 10 kts and high overcast to scattered ceilings. The air temperature decreased during the day from 44°F to 39°F. Estuaries and freshwater ponds were ice free.

RESULTS/DISCUSSION

The survey began on 27 April and was completed on 1 May. Ice conditions along with cold temperatures appeared to delay migration of emperor geese. Most of the population occupied traditionally used estuaries along the central and western Alaska Peninsula however, larger than average numbers were observed along the south side of the Alaska Peninsula, confirming a delayed migration. Otherwise, the distribution of emperor geese in 2011 was comparable to previous years. Few were seen at the northern and western extremes of the survey area suggesting the survey was timed appropriately to capture the population after departing the Aleutian Islands and before arrival on the YKD. Observations at Unalaska, in the eastern Aleutian Islands, provide confirmation in that most emperor geese departed by 12 April and only “a dozen” were reported on 16 April (S. Golodoff/R. MacIntosh, pers. comm.). At Chiniak Bay on Kodiak Island, the spring exodus of emperor geese was reported on 24 April with peak departures from 6-9 May (R. MacIntosh, pers. comm.). The first emperor goose sighting on the Tutakoke River (YKD) was on 6 May (peak influx 14 May) which is similar to 2010 (5/9 first, 5/16 peak; J. Sedinger, pers. comm.).

Emperor Goose

The 2011 emperor goose count of 74,166 is 14.9% above the 2010 estimate of 64,562 (Table 2) and 13.9% above the long term average of 65,128 (1981-2010). The current 3-year average of 76,892 birds is 4.2% above the previous average of 73,818 (2008-2010; Table 2). The primary staging estuaries along the north side of the Alaska Peninsula held 91.1% of the emperor geese in 2011 versus the long-term average 91.6% (1981-2010). A total of 337 emperor geese were observed from Jacksmith Bay to Cape Pierce (Segments 14-22) compared to the 1981-2010 average of 1,325 emperor geese. The 5,795 emperor geese observed along the south side of the Alaska Peninsula (Segments 88-137) was the largest departure from normal distribution and 82.3% above the average 3,179 birds (1981-2010).

Pacific Brant

A total of 45,789 Pacific brant (hereafter brant) was observed during the 2011 survey (Table 2). Izembek Lagoon and adjacent areas (Segments 60-68, 80-85) accounted for 39,533 (86.3%) of the total. Distribution was comparable to previous years despite the fact that fewer birds were observed. The 2011 brant total is 10.4% above the 2010 total of 41,484 and 36.5% below the long-term average of 72,158 (1981-2010). North of Cape Pierce (Segments 14-22) brant numbers were below average (2,688 birds; 1981-2010 average 13,117 birds), while along the south side of the Alaska Peninsula (Segments 88-137) brant numbers were above average (3,496 birds; 1981-2010 average 2,267 birds). Migratory chronology of brant was delayed in 2011 based on a lower total and the presence of larger numbers along the south side of the Alaska Peninsula. The first brant sighting at the Tutakoke River (YKD) was on 9 May with peak influx on 16 May, within one day of 2010 (J. Sedinger, pers. comm.).

Steller's Eider

We observed 30,186 Steller's eiders (Table 2), a 24.6% decrease from the 2010 count of 40,008 and 38.8% below the long-term average of 49,359 (1981-2010). The majority of Steller's eiders were distributed from Port Heiden to Izembek Lagoon (20,115 birds, 66.6% of the total).

Steller's eider flock composition was recorded by the right seat observer and 92 of 93 flocks observed (98.9%) were of equal ratios (i.e. adult males and brown-plumaged birds). One flock of 1 male and 19 females at Izembek Lagoon was the only flock of unequal sex ratio observed (1.1% of the total). Our observations suggest migratory chronology was delayed in 2010.

CONCLUSIONS

The 2011 emperor goose population estimate of 74,166 is 13.9% below the long term average of 65,128 (1981-2010). The current 3-year average population of 76,892 (2009-2011) is 4.2% above the previous 3-year average of 73,818 (2008-2010).

The trends in annual and 3-year population indices for emperor geese have remained flat for the past 25 years (Figure 3). Productivity and survival of emperor geese, impacted by chronic adverse factors, continue to prevent recovery of the population. We have stressed previously and continue to feel that reducing losses from predation during summer and human harvest year-round are the only two realistic options for increasing recruitment and attaining population management goals. On the YKD, where most emperor geese breed, predation on goslings is high (Bowman et al. 1997) and is caused primarily by glaucous gulls. The current estimate of gosling growth rate remains low, compared to levels observed in the 1990's, and certainly contributes to low survival. Primary factors affecting habitat quality and related gosling growth rates are goose grazing pressure, storm surge flooding, and sedimentation (J. Schmutz, pers. comm.).

The primary measures of gosling survival and fledging success come from fall productivity surveys along the Alaska Peninsula. The proportion of juveniles in the fall population at the Izembek area averaged 23.7% (1966-2010) with an increasing long-term trend of 0.3%/year (Peterson 2011). Aerial photographic surveys of all primary Alaska Peninsula staging sites conducted annually since 1985 indicate a long-term average of 19.1% juveniles with a declining trend of 1.2%/year (R. Stehn, MBM file data). The impact of gosling survival on these indices of fall age ratio is unknown.

Hunting of emperor geese has been illegal since 1986 but illegal harvest continues (Wolfe and Paige 2002, USFWS-MBM file data). Most reported hunting occurs in spring and summer when most of the impact is on breeding age adults. However, accurate estimates of range wide harvest and age composition of the harvest are lacking. Since breeding begins at age three and recruitment is low, any harvest of adults presents a major stumbling block to recovery of the population. Estimates of harvest alone approach or exceed estimates of the number of juveniles surviving their first year and additive factors of crippling loss and incidental take are unknown. The slow rate of change observed in the spring population size (+0.7%/year, Figure 3) supports our belief that annual recruitment of breeding-aged adults into the population is essentially compensated for by loss due to harvest and natural mortality. However, emperor geese exhibit high rates of egg production and nest success (Fischer et al. 2010) showing there is good potential for population recovery if adequate management procedures are initiated.

Below we restate what our views of the primary problems limiting recovery of emperor geese to desired management levels and strategies for addressing these factors:

- 1) **Problem:** Illegal hunting in spring, summer, fall and winter. Comprehensive harvest surveys are needed in Alaska and Russia to assess temporal and spatial distribution and age composition of the harvest. **Management option:** Eliminate or greatly reduce harvest and initiate surveys to accurately measure take and facilitate compliance with regulations.
- 2) **Problem:** Predation during brood rearing (Bowman et al. 1997), as indicated by low productivity, and chronic low survival of juveniles from pre-fledging through winter (Schmutz et al. 1997). **Management option:** Predator management of foxes and gulls on the Y-K Delta should be initiated and monitored for effectiveness in increasing recruitment of breeding birds into the population (Bowman et al. 1997). Monitoring of age and season specific survival rates should be continued. Increase efforts to measure quantity and quality of nesting and brood rearing habitats as impacts from climate-change related factors advance.
- 3) **Problem:** Wintering ecology of emperor geese is poorly understood and survival of juveniles is low. **Management option:** Marking and satellite tracking studies of emperor geese have suggested the importance of further research to quantify mortality factors and determine if manageable options exist to reduce them.

The spring emperor goose survey continues to monitor population size and trend as required by the species management plan. This survey should continue and, although there are phenological constraints on its completion, we suggest consideration of obtaining replicate counts of high density staging sites. Replicate counts may 1) help qualify the accuracy of the population index and 2) provide useful measures of timing and duration of use of most important sites.

The findings and conclusions in this article are those of the author(s) and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

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REFERENCES

- Dau, C.P. and E.J. Mallek. 2007. Aerial survey of emperor geese and other waterbirds in southwestern Alaska, spring 2007. Unpubl. Rept. USFWS, MBM, Anchorage, AK. 19 pp.
- Bowman, T.D., R.A. Stehn, and K.T. Scribner. 1997. Glaucous gull predation of goslings on the Yukon-Kuskokwim Delta, Alaska. Unpubl. Rept. USFWS, MBM, Anchorage, AK. 59 pp.
- Fischer, J.B., R.A. Stehn, and G. Walters. 2010. Nest population size and potential production of geese

and spectacled eiders on the Yukon-Kuskokwim Delta, Alaska, 1985-2010. Unpubl. Rept. USFWS, MBM, Anchorage, AK. 43 pp.

Mallek, E.J. and C.P. Dau. 2000. Aerial survey of emperor geese and other waterbirds in southwestern Alaska, fall 1999. Unpubl. Rept., USFWS, MBM, Fairbanks, AK. 19 pp.

Peterson, C. 2011. Ground based production counts of emperor geese (*Chen canaagica*) at Izembek National Wildlife Refuge, 2010. Unpubl. Rept., USFWS, INWR, Cold Bay, AK. 9 pp.

Pacific Flyway Council. 2006. Pacific Flyway Management Plan for Emperor Geese. Emperor Goose Subcommittee, Pacific Flyway Subcommittee [c/o USFWS], Portland, OR. Unpubl. Rept. 24 pp + appendices.

Schmutz, J.A., R.F. Rockwell and M.R. Petersen. 1997. Relative effects of survival and reproduction on the population dynamics of emperor geese. *J. Wildl. Manage.* 61(1): 191-201.

Wolfe, R.J. and A.W. Paige. 2002. The subsistence harvest of black brant, emperor geese and eider ducks in Alaska. Alaska Dept. of Fish and Game, Div. of Subsistence, Tech. Paper No.234. Juneau, AK. 112 pp.

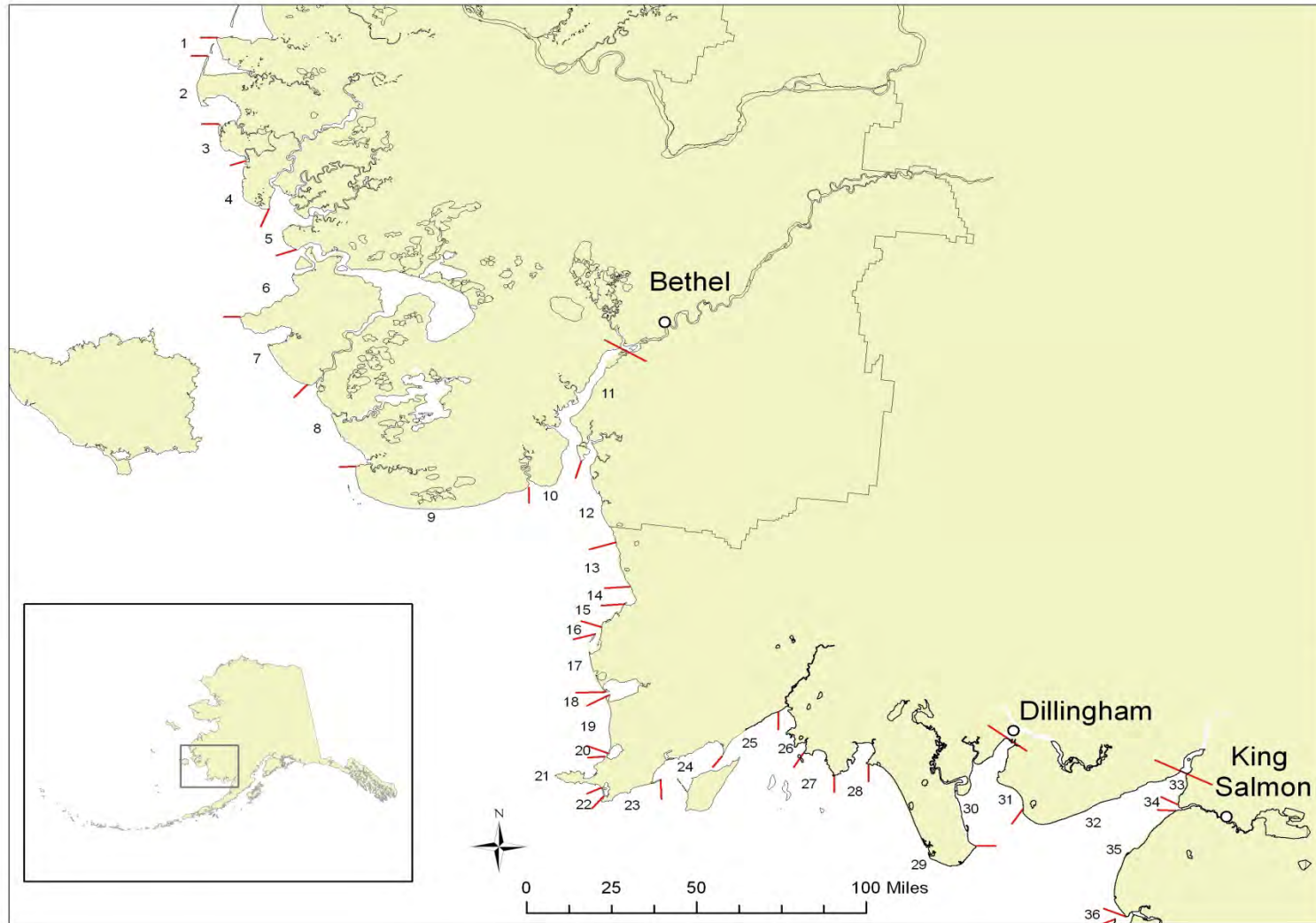


Figure 1. Emperor goose aerial survey segments 1-35, southwest Alaska.

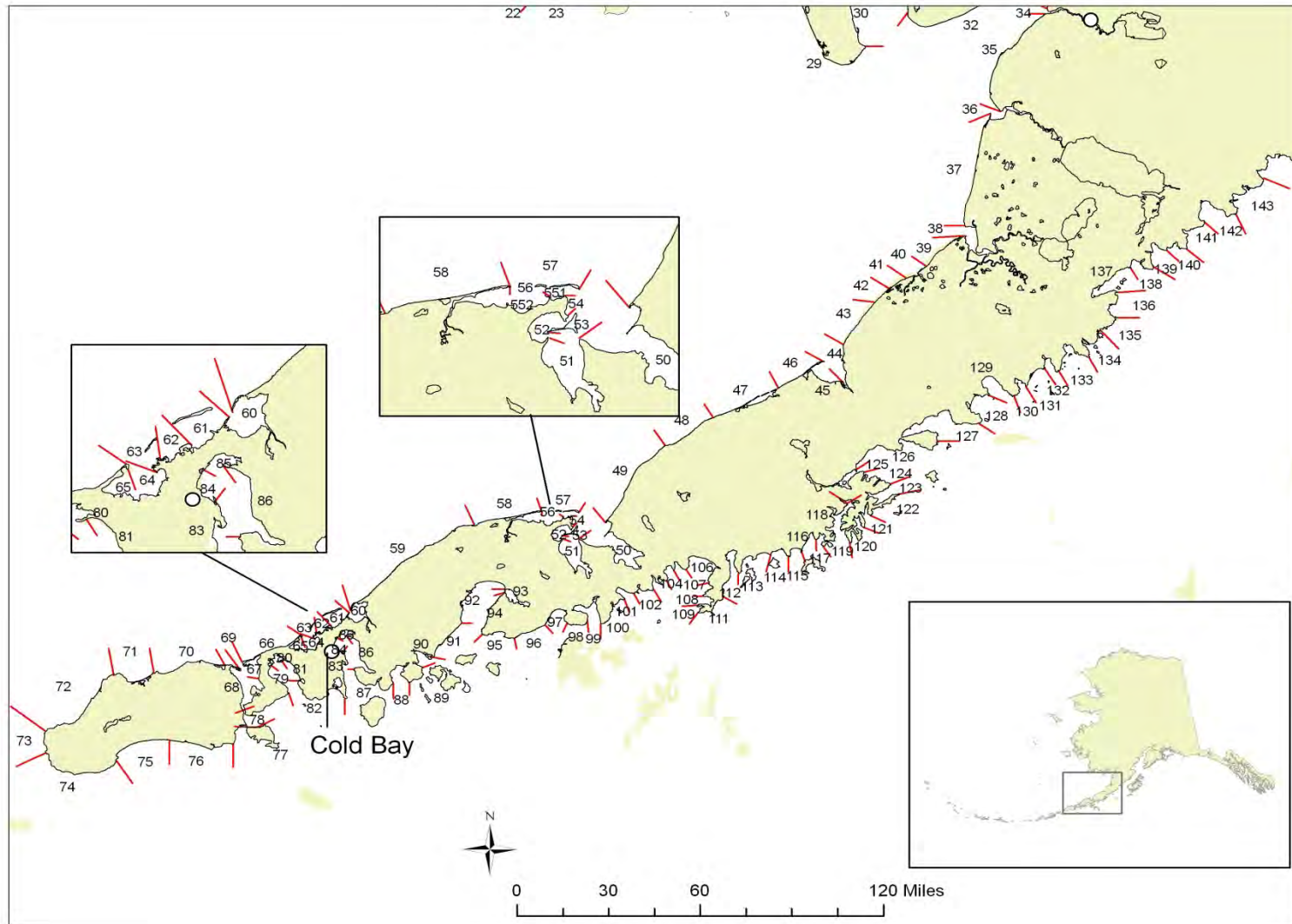


Figure 2. Emperor goose aerial survey segments 35-143, southwest Alaska.

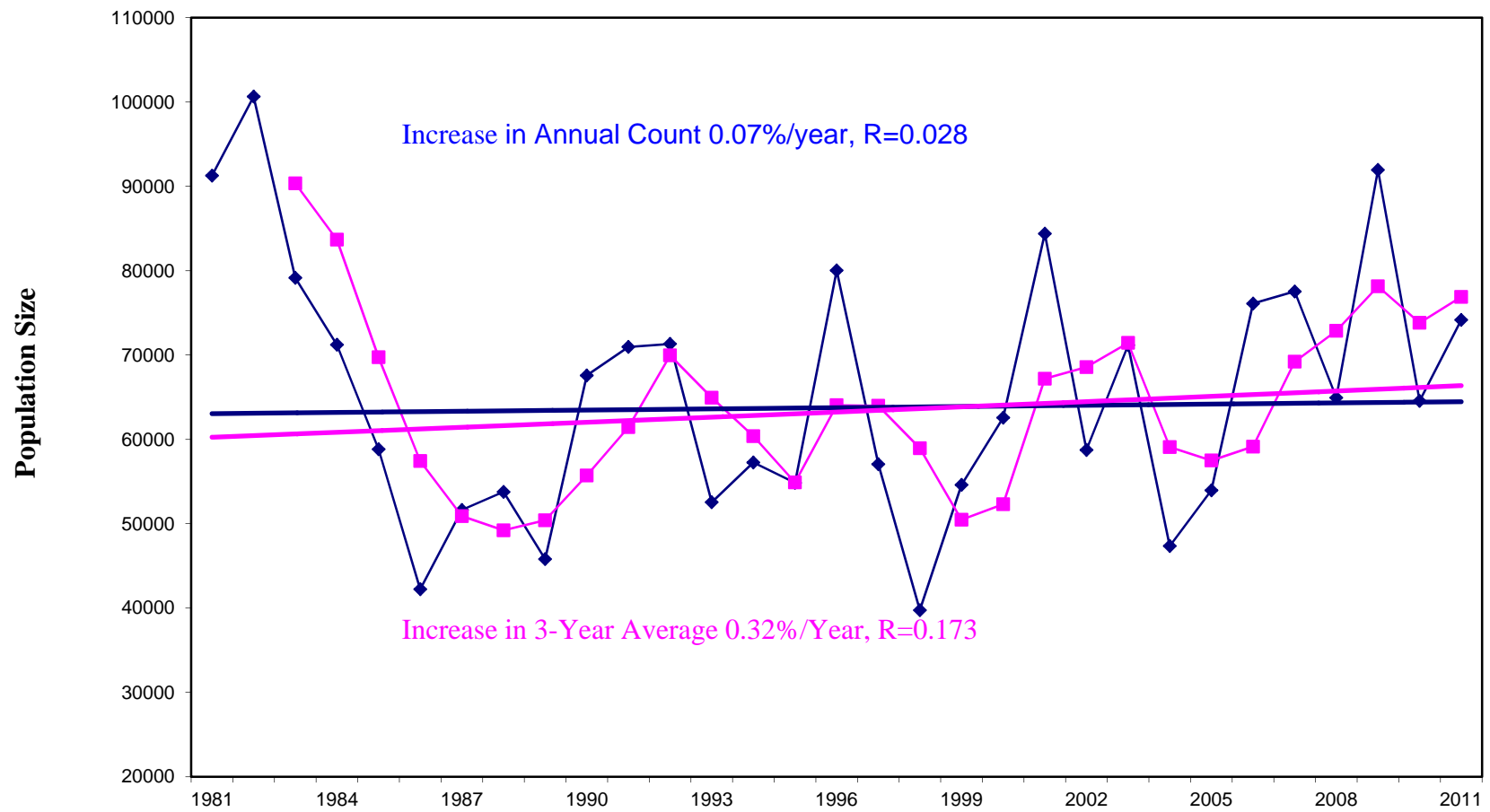


Figure 3. Trends in Spring Emperor Goose Population Count and 3-Year Averages, 1981-2011.

Table 1. Snow and ice conditions during spring emperor goose survey in southwest Alaska, 27 and 29 April-1 May 2011.

AREA	SNOW COVER ¹	MARINE ICE COVER ²
Kokechik Bay	NS	NS
Hooper Bay	NS	NS
Hazen Bay	NS	NS
Carter Bay	20	95
Goodnews Bay	20	70
Chagvan Bay	95	90
Nanvak Bay	50	99
Relative Phenology³	Late	Late

¹ Percent snow cover on near-shore freshwater marshes. NS= Not Surveyed.

² Percent of marine ice cover in estuary.

³ Subjective habitat conditions (early, average, late) based on ice and snow cover.

Table 2. Waterbird and mammal observations by segment, southwest Alaska, 27 and 29 April - 1 May 2011.

Species	14	15	16	17	18	19	20	22	23	24	25	26	27	29
Bald Eagle(ad)									1			1		2
Bald Eagle(juv)												1		
Pacific Brant							2551	137		2				
Black-legged Kittiwake								2070	20	2	244	3		
Black Scoter					1	2		1	4	19	1			316
Bufflehead					2									
Common Eider						4				3				
Common Raven										2				
Emperor Goose	8	4					325			35	4			
Goldeneye spp.		10										2		
Greater Scaup	50				65					5		72		
Harbor Seal											12			
King Eider					10	2				20				
Large gull spp.	142	705	1	162	11	18	100	4	23	317	374	1016	35	1910
Long-tailed Duck				5	39	13		12		34	50	16		
Mallard										2				
Mew Gull	374	210		38	6	1	5	12		60	97	231	50	1280
Northern Pintail	691	233			50	3				140		100		30
Pacific Loon					1									
Pelagic Cormorant				2	2				1	4	11	5	1	
Red-breasted Merganser	32	17	35		18	8	4	15		77	23	510		2
Red-throated Loon												4		3
Small shorebird spp.				10						20	8			
Steller's Eider		400	7	39	1923	38	7527			37				
White-fronted Goose	2													3
White-winged Scoter					26	3			4	2		1		1189

Empty cell indicates zero (0).

Table 2. (continued) Waterbird and mammal observations by segment, southwest Alaska, 27 and 29 April - 1 May 2011.

Species	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Amer. Green-winged Teal		1														
Amer. Wigeon					2											
Arctic Tern			1						7			1	12			100
Bald Eagle(ad)					1	2					5	1		1		
Black-bellied Plover			1													
Beluga Whale					11											
Black-legged Kittiwake						400					25					
Black Scoter	22	61	376	16	5	175	138	67	25	581		6	4	224	42	5
Canada Goose			6					57								
Common Merganser					290				1							
Common Raven				1												
Emperor Goose						2	1739	25	2165		5040		6		2222	18260
Goldeneye spp.					55											
Greater Scaup	27	270	1903	175	30	102	142		404		20			5		155
Gray Whale						1	1			1				1		
Harbor Seal																1475
Harlequin Duck	8													20		
King Eider										100						
Large gull spp.	236	314	1739	60	420	568	886	48	145	19	334	31	66	30	65	117
Long-tailed Duck				250		10				3						
Mallard	7	17	30		18	3	5									
Mew Gull	233	43	525	25		719	96	8	267	7	408	1		3	150	182
Northern Pintail			3	10	135		77	54	3						0	0
Parasitic Jaeger						1		1								
Porpoise spp.											1					
Red-breasted Merganser	15	34	8		367	57	5	2	18		5		30			
Red-necked Grebe						1										
Red-throated Loon	2	1	6			5	1	6	6	2						
Sandhill Crane							4	17	1							
Sabine's Gull						1					2		2			
Sea Otter											150					150
Small shorebird spp.	60			50	22	200		15					150			
Steller's Eider							50									
Surf Scoter			8													
Tundra Swan					20						2					
Walrus																
White-fronted Goose			380				65									
White-winged Scoter	4		4			10		66	16	6	1			10	1	10

Empty cell indicates zero (0).

Table 2. (continued) Waterbird and mammal observations by segment, southwest Alaska, 27 and 29 April - 1 May 2011.

Species	46	47	48	49	50	51	52	53	54	551	552	56-57	58	59
Arctic Tern		40										700		
Bald Eagle(ad)	1	2		4	3	2	2					2	6	3
Bald Eagle(juv)				9	2		2		1			1		
Pacific Brant					20					50				
Black-legged Kittiwake			1602	770					200					
Black Scoter	711		1277	1905		46	2375	60	363	5			713	2270
Common Loon			1											
Common Raven				5										
Emperor Goose	89	14182			333		3	307	2422	3284	11392	690	510	
Goldeneye spp.														
Greater Scaup		150					375							
Gray Whale		3		1									3	5
Harlequin Duck				45										18
Harbor Seal		435	1		50				650		200			60
King Eider	150			305									50	
Large gull spp.	82	310	118	374	955	106	366	1662	2240	3010	2037	420	802	384
Long-tailed Duck	5			150					100					
Mallard		150												
Mew Gull	17	790	12	36	320	99	552	102			50		102	315
Northern Pintail		60	2		30						1310			
Pelagic Cormorant				2										4
Red-breasted Merganser		10			25	1	150			4	10			1
Red-necked Grebe			1	6	1									11
Sea Otter				1	111	2	1	15	555			212	10	36
Small shorebird spp.	30	120		90	60	25	25							
Steller's Eider		5725	65	203				1000	2850	2300	760	10	1550	70
Surf Scoter			5											
Walrus			1											
White-winged Scoter	172		20		2								18	42

Empty cell indicates zero (0).

Table 2. (continued) Waterbird and mammal observations by segment, southwest Alaska, 27 and 29 April - 1 May 2011.

Species	60	61	62	63	64	65	66	67	68	80	81	82	83	84	85
Amer. Wigeon					3					75					
Bald Eagle(ad)	3			2		1					2	4			
Bald Eagle(juv)				1	1				2	1	1				
Pacific Brant	2687	7064	445	165	22670	5700		658		65			3		76
Black-legged Kittiwake															
Black Oystercatcher												22			
Black Scoter	15	85					76	5				20	4		
Canada Goose	2														
Common Eider														21	
Common Loon												2			
Common Raven				1								1			1
Emperor Goose	4301	380	5	187		18	31	22	40			18	212		
Goldeneye spp.										2					
Greater Scaup	87	3													
Gray Whale							6								
Harlequin Duck		5					17	10				43	33	4	100
Harbor Seal			240		450	200									
Large gull spp.	1429	1337	2297	2495	2180	672	303	145	630	1249	143	126	335	32	1354
Mallard	50		77		450				20						
Mew Gull	30		500	95			45		600			12			22
Northern Pintail	20	550	10		570					67					2
Pelagic Cormorant							6		2			28			
Pigeon Guillemot														15	
Red-breasted Merganser	74	11	110	12	62		164	5	12	2	65	11	13	11	5
Sea Otter	29	70					1	15	50						5
Small shorebird spp.	790														
Steller's Eider	2278	3189			115		50								
Surf Scoter							10								
Tundra Swan										2					
White-winged Scoter							20					5	2		

Empty cell indicates zero (0).

Table 2. (continued) Waterbird and mammal observations by segment, southwest Alaska, 27 and 29 April - 1 May 2011.

Species	86	88	90	91	92	93	97	99	101	102	103	104	105	106	107	112	113	114
Bald Eagle(ad)		2		1	4	3	1	1	1				1	2		1	3	
Bald Eagle(juv)		1				1												1
Pacific Brant		80	533			3				3	1							
Black-legged Kittiwake									2				60		5	300	220	60
Black Oystercatcher					40					3			1				1	1
Black Scoter			26	9	195		50	35	50	58			20		7	50	60	1
Brown Bear						1												
Common Eider	45																	
Common Loon		8	1	1	13	3	2	6	4	2				3				1
Common Raven		22				2												
Double-crested Cormorant										1								
Emperor Goose	110		39		90										20			
Goldeneye spp.																		
Gray Whale																		1
Harlequin Duck	147	172	211	8	119	443		131	64	81		63	25		2	187	23	10
Harbor Seal						25							3					13
Large gull spp.	47	20	661	42	139	184	8	41	10	73		10	46	44	70	91	142	11
Mew Gull	1				23	271		20				35	20			160	60	20
Northern Pintail						100									35	25		
Pacific Loon		1			1	4												4
Pelagic Cormorant	3	1	9		1	14		1	6	12			12	5	1	1	19	9
Red-breasted Merganser	17	27	143	5	49	113		43							26	54	4	
Red-throated Loon															2			
Red-necked Grebe	1				1	3												
Sea Otter	2		1		17	32										1		
Small shorebird spp.					9													
Surf Scoter		1		15					8						4			15
Tundra Swan							2	2										
White-winged Scoter		42			3		15			5		2	20				12	10

Empty cell indicates zero (0).

Table 2. (continued) Waterbird and mammal observations by segment, southwest Alaska, 27 and 29 April - 1 May 2011.

Species	115	116	118	125	126	127	128	129	130	131	132	133	134	135	136	137
Bald Eagle(ad)		3		1	8	12	5	5	5	3	2	5	2	3	4	5
Bald Eagle(juv)							2	1	1		1	2			2	
Pacific Brant				1541	12	329	70	20	20	3				25	115	741
Black-legged Kittiwake	111	169	4		315	4	10					21				
Black Oystercatcher		6				14		28				7		10		
Black Scoter	4	1	8	155	111	45	41	253				12		15		808
Brown Bear								1				1				3
Bufflehead																10
Common Eider																10
Common Loon		2			2	1			1				1			4
Common Murre		50														
Common Raven							1	2	4	1	1					3
Double-crested Cormorant					1											
Emperor Goose				163	8	80	337	392	120	459		370	3	15	488	3211
Greater Scaup				40												
Harlequin Duck		5		402	8	48	98	2		12	10	13				35
Harbor Seal												100				
Large gull spp.	44	95	155	460	519	267	46	135	6	25	7	41	92	122	62	429
Mallard				105												
Mew Gull	12	69	105	691	161	300	100	157		60		60		20		11
Northern Pintail																50
Pacific Loon																1
Pelagic Cormorant	13	63	10	28	33	5	1	10	2	1	13	14		1	10	37
Red-breasted Merganser				339			64					3				
Red-necked Grebe						1	2									
Sea Otter				2	61	84	8	49	1	25	1			10		27
Small shorebird spp.																15
Surf Scoter												25			20	44
Tundra Swan										2						
White-winged Scoter	40				78	3	9			4		4			20	74

Empty cell indicates zero (0).

Table 2. (continued) Waterbird and mammal observations by totals, southwest Alaska, 27 and 29 April - 1 May 2011.

Species	Grand Total
Amer. Green-winged Teal	1
Amer. Wigeon	80
Arctic Tern	861
Bald Eagle(ad)	134
Bald Eagle(juv)	34
Black-bellied Plover	1
Beluga Whale	11
Pacific Brant	45789
Black-legged Kittiwake	6617
Black Oystercatcher	133
Black Scoter	14035
Brown Bear	6
Bufflehead	12
Canada Goose	65
Common Eider	83
Common Loon	58
Common Merganser	291
Common Murre	50
Common Raven	47
Double-crested Cormorant	2
Emperor Goose	74166
Goldeneye spp.	69
Greater Scaup	4080
Gray Whale	23
Harlequin Duck	2634

Species	Grand Total
Harbor Seal	3902
King Eider	637
Large gull spp.	41633
Long-tailed Duck	689
Mallard	934
Mew Gull	11086
Northern Pintail	4360
Parasitic Jaeger	2
Pacific Loon	12
Pelagic Cormorant	403
Pigeon Guillemot	15
Porpoise spp.	1
Red-breasted Merganser	2927
Red-necked Grebe	28
Red-throated Loon	38
Sandhill Crane	22
Sabine's Gull	5
Sea Otter	1734
Small shorebird spp.	1699
Steller's Eider	30186
Surf Scoter	155
Tundra Swan	30
Walrus	1
White-fronted Goose	450
White-winged Scoter	1975

Table 3. Spring Emperor Goose Survey Results, Southwest Alaska, 1981-2011.

YEAR	DATES	POPULATION SIZE		3-YEAR AVG	% CHANGE	OBSERVERS
		NUMBER	% CHANGE			
1981	4/23-4/27	91267				R.King/C.Dau
1982	5/2-5/4	100643	10			"
1983	4/25-4/29	79155	-21	90355		"
1984	4/26-5/4	71217	-10	83672	-7	"
1985	5/12-5/16	58833	-17	69735	-17	"
1986	5/4-5/7	42231	-28	57427	-18	"
1987	4/30-5/4	51633	22	50899	-11	"
1988	5/2-5/6	53784	4	49216	-3	"
1989	5/3-5/6	45800	-15	50406	2	"
1990	4/28-5/4	67581	48	55722	11	"
1991	5/2-5/7	70972	5	61451	10	"
1992	4/30-5/5	71319	<1	69957	14	"
1993	4/30-5/5	52546	-26	64946	-7	"
1994	4/29, 5/2-6	57267	9	60377	-7	"
1995	5/3-5/6	54852	-5	54888	-9	"
1996	4/27-4/30	80034	46	64051	17	"
1997	4/25-4/28	57059	-29	63982	<-1	"
1998	5/4-5/7	39749	-30	58947	-8	"
1999	4/27-5/1	54600	37	50469	-14	"
2000	4/28-5/3	62565	15	52305	4	E.Mallek/C.Dau
2001	4/29-5/4	84396	35	67187	29	"
2002	5/3-5/6	58743	-30	68568	2	"
2003	4/29-5/3	71160	21	71433	4	"
2004	4/30-5/3	47352	-34	59085	-17	"
2005	4/20-4/23	53965	14	57492	-3	"
2006	4/27-5/2	76108	41	59142	3	"
2007	4/24-4/29	77541	2	69205	17	"
2008	4/29-4/30	64944	-16	72864	5	"
2009	5/1-5/3	91948	42	78144	7	"
2010	4/27, 5/2-5/3	64562	-30	73818	-6	"
2011	4/27, 4/29-5/1	74166	15	76892	4	"

Table 4. Proportions of emperor geese in primary spring staging sites, 2011.

Location (Segment/s)	2011	Average thru 2010
	Number (%)	Number (%)
Yukon-Kuskokwim Delta (1-10)	NS ¹	537 (1)
Kuskokwim Bay (11-17)	12 (<1)	186 (<1)
Chagvan Bay/Nanvak Bay (20, 22)	325 (<1)	1138 (2)
Egegik Bay (36-37)	1761 (2)	910 (1)
Ugashik Bay (38)	1726 (3)	1654 (3)
Cinder River Estuary (39-43)	5040 (7)	6007 (10)
Port Heiden (44-45)	20482 (28)	18785 (30)
Seal Islands Lagoon (46-47)	14271 (20)	7858 (12)
Port Moller/Nelson Lagoon (50-54, 56-58, 551-552)	18941 (26)	19713 (31)
Izembek Lagoon (60-65)	4891 (7)	3385 (5)
Pavlof Bay (91-92)	90 (<1)	280 (<1)
Ivanof Bay (112)	0 (0)	452 (1)
Chignik Bay (125)	163 (<1)	213 (1)
Wide Bay (136-137)	3699 (5)	1286 (2)

¹ NS= Not surveyed.