

RESULTS OF SEABIRD MONITORING AT CHOWIET ISLAND IN 2005:
SUMMARY APPENDICES

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INTRODUCTION

In 2002, the Alaska Maritime National Wildlife Refuge (AMNWR) established an annual ecological monitoring site at the Semidi Islands to continue long-term monitoring of selected species of seabirds that nest on the refuge. Seabirds are excellent indicators of fluctuations in the marine food web and have been monitored intensely but irregularly at the Semidi Islands group since 1976.

The objective of the monitoring program at the Semidi Islands is to detect changes in populations, reproductive performance, chronology, survival, food habits and chick growth rates of selected seabird species for comparison with similar efforts in Alaska. Collected data is used to detect trends in marine bird populations, to provide a basis for directing management and research actions, and in assessing the effects of management.

The specific goals in 2005 were to estimate 1) laying, hatching and fledging chronology for black-legged kittiwakes, common and thick-billed murres, parakeet auklets, and tufted and horned puffins 2) reproductive success indices for northern fulmars, glaucous-winged gulls, black-legged kittiwakes, common and thick-billed murres, parakeet auklets, and tufted and horned puffins, 3) population indices for northern fulmars, black-legged kittiwakes, common and thick-billed murres, and rhinoceros auklets, 4) food habits of glaucous-winged gulls, common and thick-billed murres, rhinoceros auklets, and 5) map rhinoceros auklet colony site locations.

Detailed results from 2005 are summarized and contained in these appendices and archived at the Refuge Headquarters in Homer, Alaska. For comparisons among years, we present selected historic data sets from 1976 to 1991 (Baggot et al. 1989, Dragoo et al. 1991a & 1991b, Hatch and Hatch 1980, 1981, 1983a and Leschner & Burrell 1977), unpublished data from 1993 and 1994 (Hatch unpubl. data) and data from 1995, 1998 (Nevins & Adams 1999), 2002 (Wang 2002) and 2004 (Larned 2004).

STUDY AREA

The Semidi Islands group (56° N, 156° W) consists of nine islands located on the continental shelf approximately 80 km south of the Alaska Peninsula and 160 km southwest of Kodiak Island with the local oceanography influenced by the Alaskan Coastal Current and the Alaska Stream (Hatch & Hatch 1983a, Hatch & Hatch 1989). Approximately 2.4 million seabirds consisting of twenty species, an estimated 25% of the total seabird biomass in the Gulf of Alaska, breed in the Semidis (Hatch & Hatch 1983a). A small population of Aleutian Canada geese (*Branta hutchinsii leucopareia*) breed on Kaliktagik and Anowik Islands (Hatch & Hatch 1983b). Dominant vegetation includes umbelliferous roots, beach rye-grasses, ferns and herbs and is classified as Oceanic Boreal Heath (S. Talbot Pers. Comm.). Shorelines are generally precipitous, the highest elevation is approximately 300 m with sheer cliffs rising 150 m in many areas of the islands (Hatch & Hatch 1983b). All islands are treeless except for Chowiet Island, which has a small number (<10) Sitka spruce (*Picea sitchensis*), most likely introduced by fox ranchers in the early 1900's. Fox ranching occurred on Chowiet and Aghiyuk Islands from 1885 to about 1914 (Bower and Aller 1917), after which the natural die off of the introduced arctic and red foxes (*Alopex lagopus* and *Vulpes vulpes*) took place (Hatch & Hatch 1983b). The only land

mammals that presently exist on the islands are arctic ground squirrels (*Spermophilus parryii*) and they occur on all of the Semidi Islands except for South, Suklik and Aghik (Hatch & Hatch 1983b).

METHODS

Allyson Larned and Slade Sapora were present on the Chowiet from 13 May through 2 September 2005. We followed data collection methods outlined in Williams et al. (2000) as well as protocols created during the 2002 field season, which are outlined in the 2002 Summary Appendices (Wang 2002). Any modifications are discussed below.

Population Index Counts

10 replicate population index counts of ledge-nesting seabirds were conducted and completed during the recommended census interval for each species. The census period for northern fulmars was 12 June through 12 July (Hatch 1987); black-legged kittiwakes was 12 June through 2 August (Hatch & Hatch 1988); common and thick-billed murres was 20 June through 1 August (Hatch & Hatch 1989). All counts were made in previously established study plots.

The relative abundance of rafting parakeet auklets and horned puffins in Chowiet Bay was recorded from a fixed vantage point approximately every day from 14 May to 1 June, and then every five days from 04 June through 22 August. Counts were conducted between 0730 and 0930 hours.

Three distinct rhinoceros auklet colonies are located on Chowiet Island and were censused (complete count) in 2005: Spruce Cove on 24 May, South Bay on 22 May and Landing Cove on 20 June (respectively referred to as Colonies 1, 2 and 3 in Hatch's 1977 report). Burrow entrances were counted in each colony as a means to indirectly measure the population size, and only those burrows that were considered occupied were counted in our census. We felt that there was little difficulty discerning rhinoceros auklet burrows from those of arctic ground squirrels, and we excluded the latter from our count). We used the below conventions for determining the occupancy-status of a burrow in order to clarify previous and unify future methods.

A burrow was considered occupied if it met one of the following criteria: 1) the burrow contains rhinoceros auklet feathers; 2) the entrance to burrow has a long (>0.3 meter), packed-dirt runway that contains little to no vegetation growing on it; 3) the presence of fresh and large bird feces in, at or below the entrance to burrow; 4) the burrow is located on a heavily-soiled slope in close proximity to other rhinoceros auklet burrows; 5) the burrow contains egg membrane and/or fish inside or at the entrance. A flashlight was used to look inside of burrows, and a thin layer of soil was scraped out of the burrow floor in order to look for non-readily-apparent signs of occupancy. Size alone was not a determining factor, as we found a few arctic ground squirrel burrows that were comparably large in diameter, and also a few rhinoceros auklet burrows that were notably small in diameter.

Once the rhinoceros auklet chicks hatched and adults were not attending the burrows full-time (beginning mid-July), we excavated a sample of 15 in the Spruce Cove colony and 13 in the South Bay colony in order to ascertain the accuracy of our earlier census methods.

A corrected estimate for the number of occupied burrows (breeding pairs) present on Chowiet Island is the measured occupancy rate for burrows that appeared occupied multiplied by the number of burrows counted. We calculated the Spruce and South colonies separately. Due to the small size of the Landing Cove colony, no excavation of burrows was conducted there (birds were observed attending colony at night several times over the season) and instead we used the mean of the values from the other two colonies to correct our estimate there.

Chronology

Egg-laying and hatching chronology on Chowiet Island was documented for black-legged kittiwakes, common and thick-billed murres, parakeet auklets, and tufted and horned puffins by observing eggs and chicks in nests of all species. Nest checks for black-legged kittiwakes, common and thick-billed murres were conducted every 3-5 days, and every 5 days for parakeet auklets and tufted and horned puffins.

Productivity

Black-legged kittiwake and common and thick-billed murre productivity was estimated on Chowiet Island using previously established study plots as well as new plots established during the season. Observations for black-legged kittiwakes and common and thick-billed murres commenced on 26 May. Observations were conducted every 3-5 days with the aid of a 15 – 45x spotting scope, 20 – 60x spotting scope, or 10 x 40 binoculars.

Northern fulmar productivity was not monitored intensively in 2005. In order to infer productivity, we counted chicks in population plots late in the season when the chicks were most visible, 28 August to 2 September. Two to four replicate counts were made at each plot; we present the low and high counts.

Glaucous-winged gull productivity checks were made in the entire South Bay colony every 5 days from 6 June until 18 July, when the chicks were mobile and leaving the nest sites. Due to the small number of nest initiations and the uncertainty of obtaining precise productivity and chronology data, we marked and monitored most nests within sub-colony B, which totaled 59 nests, intensively from 6 June until 24 July. This subset was then used for determining a mean hatch date.

Parakeet auklet nest searches were initiated on 25 May with a total of 31 marked and monitored every 5 days.

Tufted puffin productivity surveys were initiated on 7 June with a total of 42 nest sites marked. The sites were monitored every 5 days around reproductive events (hatching and fledging) with up to a 10-day interval right after chicks had hatched.

Horned puffin productivity surveys were initiated on 13 June with a total of 47 nest sites marked. The sites were monitored every 5 days around reproductive events (hatching and fledging) with up to a 10-day interval right after chicks had hatched.

Productivity parameters for black-legged kittiwakes, common murre and glaucous-winged gulls were calculated using the ratio estimation procedure described by Ackerman & Garton (1987).

Diet Sampling

Common and Thick-billed Murres

Prey items brought back to cliffs by murre were opportunistically identified from 13 July through 20 August. Prey items were identified using a 20-60x spotting scope and 10x40 binoculars from a distance of 50 to 200 m. In the field, prey length was recorded as bill length (i.e., a bill length of 1.5 means that the size of the prey was estimated to be one and a half times the length of the bill of the murre carrying it) and then converted into mm using 49mm as the mean bill length (Nevins & Adams 1999). Prey identification may be biased, underestimating numbers of small inconspicuous fishes less than 1.0 in bill length, due to the observer's distances from the murre colonies.

Rhinoceros Auklets

Chick meals were collected on 7 July and again on 13 July using a mist net. A single mist-net (Avinet ©, 60 mm, 120 denier, 4m x 12m) on poles was set in front of a portion of the colony. The net remained open from ~ 2330 to 0200 hours.

Glaucous-winged Gull

The contents of regurgitated gull pellets were recorded within the South Bay colony from 13 June through until 13 July. Due to the low number of chicks, regurgitations were not collected from them.

Additional Projects Conducted on Chowiet Island

Beach Passerine Transect

Censuses were conducted 5 times on South Bay Beach from 7 June to 15 June between the hours of 0830 and 1000 on route established by Wang (2002).

DISCUSSION & RECOMMENDATIONS

Northern Fulmar, *Fulmarus glacialis*

Breeding Chronology and Productivity

The productivity method used in 2005 differed from 2004. In 2004, productivity plots were used to calculate productivity values. In 2005, chicks were counted in population plots late in the season. As long as these same plots are used, these counts serve as a crude index of productivity (see adult counts at population plots for a comparison of chicks per adult).

Glaucous-winged Gull, *Larus glaucescens*

Breeding Chronology and Productivity

Our method of marking and monitoring each nest within sub-colony B is recommended for low productivity years, but in years when the number of nests is higher, a sample of 30 nests individually marked should be sufficient.

Parakeet Auklet, *Aethia psittacula*

Breeding Chronology and Productivity

A large effort was made to locate, mark and monitor nesting crevices in 2005. New locations for monitoring were discovered at South Bay and in an area west of Rough Cove, now called West Rough. Other areas were searched unsuccessfully such as the west end of South Beach and the far eastern end of Chowiet Bay—while birds are attending these areas, often in high numbers, they seem to be nesting deep-down in the talus. It is recommended that efforts to locate new colonies that can be monitored should be concentrated in large, bare talus piles along the coast; this would best be accomplished via a skiff.

Crevice nesting areas were mapped, with individual crevices drawn on maps. GPS coordinates were taken on several crevices in each area to aid in future location.

Rhinoceros Auklet, *Cerorhinca monocerata*

Breeding Chronology and Productivity

Productivity surveys within the South Bay colony was not conducted in 2005 due to concern over previous years' dismal reproductive performance and concern about the role of researcher disturbance.

Horned Puffin, *Fratercula corniculata*

Breeding Chronology and Productivity

A large effort was made to locate, mark and monitor nesting crevices in 2005. New locations for monitoring were discovered at South Bay and in an area west of Rough Cove, now called West Rough. Other areas with high nesting density were located, but too late in the season to be useful for monitoring purposes. One area of future monitoring promise lies in the eastern end of Chowiet Bay at the back of the cove. For a larger sample size, it is recommended to focus some attention on this area.

Crevice nesting areas were mapped, with individual crevices drawn on maps. GPS coordinates were taken on several crevices in each area to aid in future location.

Tufted Puffin, *Fratercula cirrhata*

Breeding Chronology and Productivity

A large effort was made to locate, mark and monitor nesting crevices in 2005. Never having been monitored before on Chowiet, all locations were new. The highest density of nesting birds with accessible nest sites was found at South Bay amidst the gull colony. Other individual nesting sites were located sporadically in Chowiet Bay and along West Rough. In order to increase future sample sizes, it is suggested to concentrate efforts at South Bay and expand the monitored area there to the east beyond the gull colony.

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LITERATURE CITED

- Ackerman, B. and O. Garton. 1987. Ration Estimation Spreadsheet, Microsoft EXCEL, Dept. Fish and Wildlife Resources, Univ. Of Idaho, Moscow, ID.
- Baggot, C.M., B.K. Bain and D.R. Nysewander. 1989. Changes in colony size, and reproductive success of seabirds at the Semidi Islands, Alaska, 1977-1989. USFWS, Homer, AK. Unpubl. Admin. Rep.
- Bower, W.T. and H.D. Aller. 1917. Alaska fisheries and fur industries in 1915. Dept. of Commerce, Bureau of Commercial Fisheries, U.S. Gov't. Printing Office.
- Brooks, W.S. 1915. Notes on birds from east Siberia and arctic Alaska. Bull. Mus. Comp. Zool. 59(5): 361-413.
- Cailliet, G.M., Love, M.S., and Ebeling, A.W. 1986. Fishes: A field laboratory manual on their structure, identification, and natural history. Waveland Press, Inc., IL.
- Dragoo, D.E., B.K. Bain and A. Perillo. 1991a. Changes in colony size and reproductive success of seabirds at the Semidi Islands, Alaska, 1976-1990. USFWS, Homer, AK. Unpubl. Admin. Rep.
- Dragoo, D.E., B.K. Bain, M.J. Melendez and C.M. Minch. 1991b. Changes in colony size and reproductive success of seabirds at the Semidi Islands, Alaska, 1976-1991. USFWS, Homer, AK. Unpubl. Admin. Rep.
- Gabrielson, I.N. and F.C. Lincoln. 1959. The birds of Alaska. The Stackpole Co., Harrisburg, Pa., and The Wildlife Management Institute, Washington, D.C.
- Hatch, M.A. 1985. Vegetation and flora of the Semidi Islands, Alaska. Unpubl. M.S. thesis, Univ. of Alaska, Fairbanks, AK.
- Hatch, S.A. 1987. Adult survival and productivity of northern fulmars in Alaska. *Condor* 89:685-696.
- Hatch, S.A. and M.A. Hatch. 1980. Breeding and population ecology of seabirds at Semidi Islands, Alaska. USFWS, Anchorage, AK. Unpubl. Admin. Rep.
- Hatch, S.A. and M.A. Hatch. 1981. Breeding and population ecology of seabirds at Semidi Islands, Alaska. USFWS, Anchorage, AK. Unpubl. Admin. Rep.
- Hatch, S.A. and M.A. Hatch. 1983a. Populations and habitat use of marine birds in the Semidi Islands, Alaska. *Murrelet* 64:39-46.

- Hatch, S.A. and M.A. Hatch. 1983b. An isolated population of small Canada Geese on Kaliktagik Island, Alaska. *Wildfowl* 34:130:136.
- Hatch, S.A. and M.A. Hatch. 1988. Colony attendance and population monitoring of Black-legged kittiwakes on the Semidi Islands, Alaska. *Condor* 90:613-620.
- Hatch, S.A. and M.A. Hatch. 1989. Attendance patterns of murrelets at breeding sites: implications for monitoring. *J. Wildl. Manage.* 53(2): 483-493.
- Hatch, S.A. and D.N. Nettleship. 1998. Northern Fulmar (*Fulmarus glacialis*). In *The Birds of North America*, No. 361 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
- Hatch, S.A. and G.A. Sanger. 1992. Puffins as samplers of juvenile Pollock and other forage fish in the Gulf of Alaska. *Mar. Ecol. Prog. Ser.* 80:1-14.
- Larned, A. L. 2004. Results of seabird monitoring at Chowiet Island in 2004: Summary Appendices. U.S. Fish and Wildl. Serv. Rep. AMNWR 04/10. Homer, Alaska.
- Leschner, L.L. and G. Burrell. 1977. Populations and ecology of marine birds on the Semidi Islands. Unpubl. Admin. Report, USFWS-OBS, Anchorage, AK.
- Nevins, H.M. and J. Adams. 1999. Seabird monitoring in the Semidi Islands, Gulf of Alaska, 1995 and 1998. U.S. Fish and Wildl. Serv. Rep. AMNWR 98/17.
- Sowls, A.L., S.A. Hatch, and C.J. Lensik. 1978. Catalog of Alaskan seabird colonies. U.S. Dept. Interior, Fish and Wildlife Serv., FWS/OBS-78/78.
- Troyer, W.A. 1972. Semidi Wilderness proposal. U.S. Fish and Wild. Serv. 22 pp.
- Wang, S.W. 2002. Results of seabird monitoring at Chowiet Island, Alaska in 2002: Summary Appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 02/07
- Williams, J.C., L. Scharf and G.V. Byrd. 2000. Ecological monitoring methods of the Aleutian Islands Unit, Alaska Maritime National Wildlife Refuge. U.S. Fish and Wildl. Serv. Rep., AMNWR 00/01

Table 1. Counts of adult northern fulmars on plots at Chowiet Island, 2005.

	1	2	3	4	5	6	7	8	9	10	mean	SD
<i>Plot</i>	21-Jun	22-Jun	29-Jun	30-Jun	2-Jul	3-Jul	4-Jul	5-Jul	11-Jul	12-Jul		
A03N01	115	100	104	123	118	134	109	64	105	112		
A04N01	19	17	11	20	20	25	20	14	25	19		
A07N01	232	203	202	219	242	249	167	133	220	223		
A10N01	60	49	50	53	51	51	29	18	42	53		
A10N02	32	34	19	23	27	29	23	24	24	32		
A12N01	74	79	52	55	73	75	55	45	76	64		
A12N02	57	55	62	55	70	63	41	22	46	61		
Totals	589	536	499	548	600	626	443	318	537	562	525	90

a – Census period: 30 days extending from 11 days after first egg to 40 days after first egg (Hatch 1987). For 2005, the census period was 12 June until 12 July.

Table 2. Northern fulmar chronology and population index counts among years at Chowiet Island, Alaska (1976 - 2005)^a.

Parameter	1976	1977	1978	1979	1980	1981	1989	1990	1991	1993	1995	1998	2002	2004	2005
Population count ^b	354	424	439	414	464	507	549	447	481	623	620	299	456	442	525
SD	-	-	-	-	-	-	-	-	-	148	126	81	55	99	90
n	-	29	20	28	30	30	6	11	7	7	7	3	12	10	10
First lay date	29-May	2-Jun	26-May	2-Jun	27-May	31-May	6-Jun	31-May	5-Jun	-	-	8-Jun	1-Jun	-	24-May
Last lay date	23-Jun	22-Jun	20-Jun	24-Jun	2-Jul	25-Jun	5-Jul	19-Jun	-	-	-	-	-	-	-
Mean	6-Jun	11-Jun	7-Jun	11-Jun	8-Jun	10-Jun	15-Jun	6-Jun	15-Jun	-	-	15-Jun	-	-	-
SD	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-
n	208	386	397	400	389	395	31	68	91	-	-	80	-	-	-
First hatch date	-	-	-	-	-	-	24-Jul	19-Jul	-	-	-	26-Jul	16-Jul	17-Jul	23-Jul
Mean	24-Jul	29-Jul	25-Jul	29-Jul	26-Jul	28-Jul	30-Jul	24-Jul	1-Aug	-	-	31-Jul	-	-	-
SD	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-
n	-	-	-	-	-	-	26	29	25	-	-	11	-	-	-

a - Data from Hatch 1987, Baggott et al. 1989, Dragoo et al. 1991a & b, Hatch unpubl. 1993-95, Nevins and Adams. 1999, Wang 2002, and Larned 2004.

b - Mean count of n replicates.

Table 3. Northern fulmar chicks counted on population plots, Chowiet Island, Alaska, 2005.^a

Plot	# of counts	Chicks	
		low count	high count
A03N01	3	12	13
A04N01	3	1	1
A07N01	3	24	28
A10N01	4	4	9
A10N02	4	5	7
A12N01	2	1	2
A12N02	2	8	8
Totals		55	68

a - Refer to northern fulmar population tables to see counts of adults in same plots.

Table 4. Clutch size of glaucous-winged gulls in South Bay colony at Chowiet Island, Alaska, 2005.

Date	Location	Total no. nests	Total no. eggs	Eggs/nest				Total no. chicks	Chicks/nest		
				0	1	2	3		1	2	3
6-Jun	Sub A	9	8	4	2	3	0	0	1	2	3
	Sub B	80	43	57	8	10	5	0			
	Sub C	24	7	20	2	1	1	0			
	Total	113	58	81	12	14	6	0	0	0	0
13-Jun	Sub A	18	19	9	3	2	4	0			
	Sub B	88	73	53	8	16	11	0			
	Sub C	10	11	5	1	2	2	0			
	Total	116	103	67	12	20	17	0	0	0	0
19-Jun	Sub A	15	25	5	0	5	5	0			
	Sub B	73	69	45	3	9	16	0			
	Sub C	10	11	5	1	2	2	0			
	Total	98	105	55	4	16	23	0	0	0	0
26-Jun	Sub A	11	24	1	1	4	5	0	0	0	0
	Sub B	24	51	1	3	6	12	4	1	0	1
	Sub C	8	8	3	1	2	1	3	0	0	1
	Total	43	83	5	5	12	18	7	1	0	2
1-Jul	Sub A	6	13	0	0	2	3	2	0	1	0
	Sub B	24	47	2	3	7	10	6	0	0	2
	Sub C	3	4	0	1	0	1	3	0	0	1
	Total	33	64	2	4	9	14	11	0	1	3
6-Jul	Sub A	7	3	0	1	1	0	12	0	3	2
	Sub B	21	31	1	1	3	8	15	2	5	1
	Sub C	3	5	0	2	0	1	0	0	0	0
	Total	31	39	1	4	4	9	27	2	8	3
13-Jul	Sub A	5	0	0	0	0	0	10	0	5	0
	Sub B	17	7	0	2	1	1	23	5	3	5
	Sub C	3	1	0	1	0	0	3	1	1	0
	Total	25	8	0	3	1	1	36	6	9	5

Table 5. Glaucous-winged gull productivity at the South Bay colony at Chowiet Island, Alaska, 2005.

Parameter	Sub-colony			Total	Statistics	
	A	B	C		n	SD
No. nests (A)	18	88	24	130		
No. nests with eggs (B)	10	35	5	50		
No. eggs (C)	25	69	11	105		
No. nests with chicks (D)	5	13	2	20		
No. of chicks (E)	12	23	3	38		
Laying Success (B/A)	0.56	0.40	0.21	0.38	3	0.74
Clutch Size (C/B)	2.50	1.97	2.20	2.10	3	0.13
Hatching Success (E/C)	0.48	0.33	0.27	0.36	3	0.04
Nesting Success (D/B)	0.50	0.37	0.40	0.40	3	0.03
Mean Hatch Date				9-Jul		
SD				6.6		
n ^a				18		

a - Sample size for calculation of mean hatch dates is a subsample of marked nests with known hatch dates where we observed ≤ 7 days apart from egg to chick.

Table 6. Reproductive performance of glaucous-winged gulls among years at the South Bay colony, Chowiet Island, Alaska.

Parameter	1976	1995	1998	2002	2004	2005
Clutch Size	2.53	2.26	2.19	2.09	1.74	2.1
SD		0.71	0.14	0.08	0.07	0.13
n ^a	90	123	3	3	3	3
Laying Success	-	-	0.47	0.72	0.66	0.38
SD	-	-	0.01	0.45	0.53	0.74
n ^a	-	-	3	3	3	3
Hatching Success	-	0.41	0.46	0.53	0.15	0.36
SD	-	0.03	0.05	0.01	0.06	0.04
n ^a	-	278	3	3	3	3

a - n = sample size, number of nests in 1995 and number of subcolonies in and after 1998.

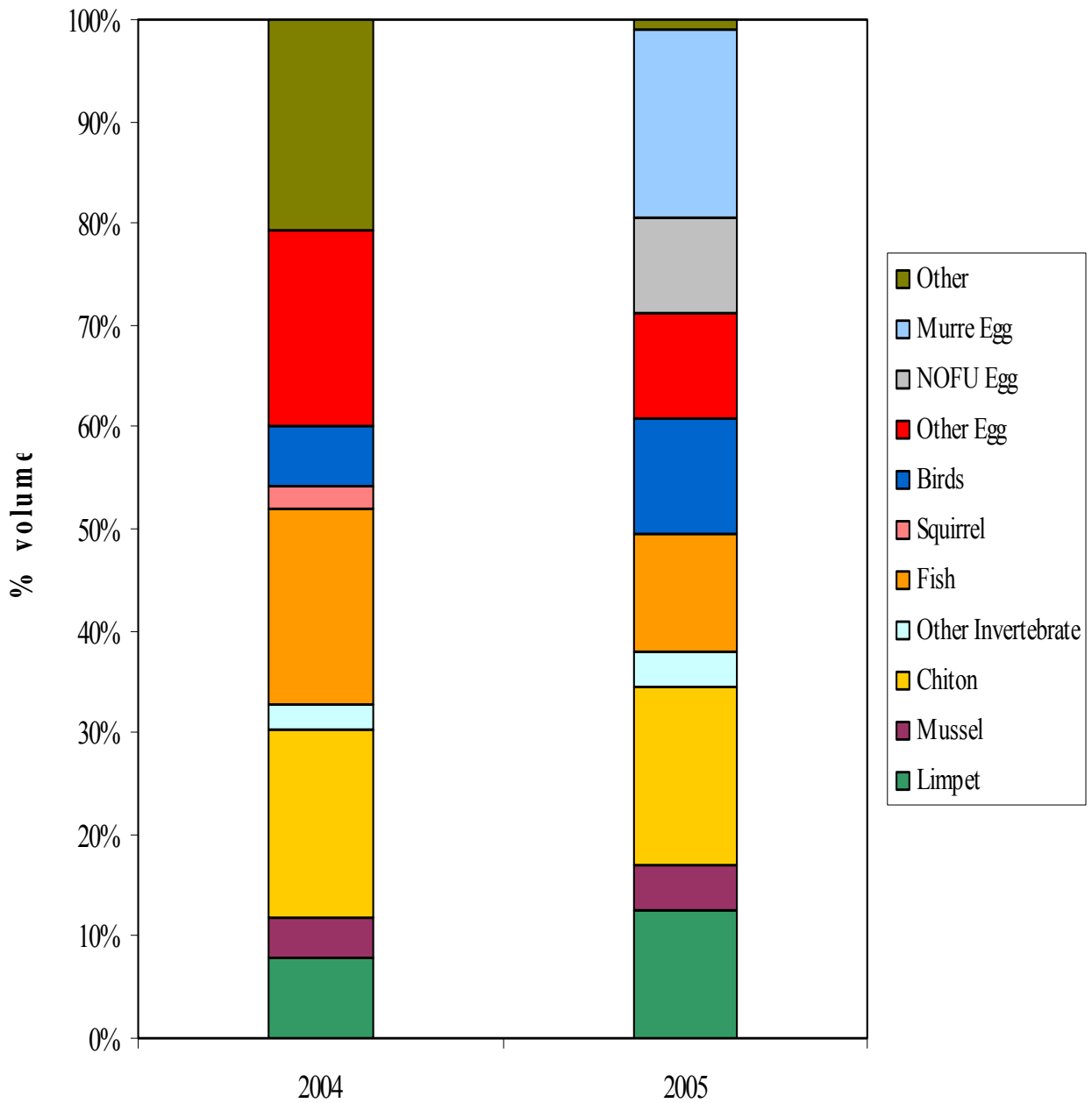


Figure 1. Estimated volume of food items in regurgitated pellets of glaucous-winged gulls at Chowiet Island, Alaska. Composite value for "Other Invertebrates" does not include Chiton, Mussel or Limpet. Composite value for "Eggs" does not include Murre or northern fulmar eggs. "Other" value is composed of plant matter and inorganic material such as rocks.

Table 7. Occurrence of food items in regurgitated pellets of glaucous-winged gulls in South Bay colony of Chowiet Island, Alaska in 2005.

	No. of Samples	% Occurrence ^a
Invertebrate (total)	91	43.8
Limpet	30	14.4
Mussel	11	5.3
Chiton	42	20.2
Crab	4	1.9
Clam	4	1.9
Vertebrate (total)	135	64.9
Fish	28	13.5
Unidentified Bird	10	10.6
HOPU	2	1
MURRE	1	0.5
PAAU	1	0.5
NOFU	1	0.5
Unidentified Egg	23	11.1
NOFU Egg	22	10.6
MURRE Egg	45	21.6
GWGU Egg	2	1
Other (total)	2	1
Kelp	2	1
Total no. of pellets	208	

a - All values represent occurrence in total sample. Values in bold are composite for invertebrates, vertebrates, and other. Percent occurrence (i.e. 14.4% limpet) equals the number of individual identities (i.e. 30 limpets) divided by the total number of pellets (i.e. 208). Summation of "% occurrence" column exceeds 100% because of overlap (i.e. occurrence of more than one prey species per pellet).

Table 8. Occurrence^a of food items in regurgitated pellets of glaucous-winged gulls among years in South Bay colony of Chowiet Island, Alaska.

	2004	2005
<i>Number of pellets</i>	577	208
Invertebrate (total)	54.1	43.75
Limpet	13.2	14.42
Mussel	6.4	5.29
Chiton	30.3	20.19
Crab	2.4	1.92
Clam	-	1.92
Sea Urchin	0.2	-
Bryozoans	0.5	-
Snail	0.2	-
Unidentified Shellfish	0.9	-
Vertebrate (total)	45.2	64.9
Fish	31.7	13.5
Squirrel	3.8	-
Unidentified Bird	7.8	10.6
HOPU	-	1
Murre	0.35	0.5
PAAU	1	0.5
FTSP	0.2	-
GWGU	0.2	-
NOFU	0.2	0.5
Unidentified Egg	31.4	11.1
GWGU Egg	-	1
NOFU Egg	-	10.6
Murre Egg	-	21.6
Other (total)	34.3	1
Kelp	1.6	1
Grass	0.9	-
Small Rocks	0.5	-

a - All values represent occurrence in total sample. Values in bold are composite for invertebrates, vertebrates, and other. Percent occurrence (i.e. 14.4% limpet) equals the number of individual identities (i.e. 30 limpets) divided by the total number of pellets (i.e. 208). Summation of columns exceeds 100% because of overlap (i.e. occurrence of more than one prey species per pellet).

Table 9. Counts of adult black-legged kittiwakes on plots at Chowiet Island, 2005.

	1	2	3	4	5	6	7	8	9	10	mean	SD
<i>Plot</i>	21-Jun	29-Jun	30-Jun	2-Jul	3-Jul	4-Jul	5-Jul	11-Jul	23-Jul	25-Jul		
A02B01	43	43	35	53	45	46	33	36	28	31		
A02B02	70	82	62	84	96	94	57	65	37	42		
A03B01	16	25	26	36	30	33	23	30	16	18		
A03B02	22	39	30	37	43	32	31	36	21	20		
A03B03	0	2	1	1	4	1	1	2	0	0		
A06B01	36	32	44	49	46	47	26	25	21	22		
A06B02	14	22	30	41	36	35	22	20	8	12		
A09B01	11	14	22	23	23	20	15	7	7	10		
A09B02	72	73	81	110	93	109	62	60	37	44		
Totals	283	332	331	432	415	416	269	280	175	199	313	89

a - Census period: 50 days extending from first egg through final hatching (Hatch & Hatch 1988). For 2005, census period was 12 June - 02 Aug.

Table 10. Counts of adult black-legged kittiwake nests on plots at Chowiet Island, 2005.

	1	2	3	4	5	6	7	8	9	10	mean	SD
<i>Plot</i>	21-Jun	29-Jun	30-Jun	2-Jul	3-Jul	4-Jul	5-Jul	11-Jul	23-Jul	25-Jul		
A02B01	3	7	7	12	12	16	16	11	8	8		
A02B02	0	5	5	11	16	18	18	14	11	11		
A03B01	3	7	9	13	13	15	15	9	6	6		
A03B02	2	8	9	11	11	13	13	10	6	6		
A03B03	0	0	0	0	0	0	0	0	0	0		
A06B01	4	9	9	10	10	11	11	7	7	6		
A06B02	0	2	2	5	5	6	6	5	4	4		
A09B01	4	4	4	5	8	10	8	7	3	3		
A09B02	4	5	5	19	20	23	22	21	15	10		
Totals	20	47	50	86	95	112	109	84	60	54	72	30

a - Census period: 50 days extending from first egg through final hatching (Hatch & Hatch 1988). For 2005, census period was 12 June - 02 Aug.

Table 11. Black-legged kittiwake productivity and population counts among years, Chowiet Island, Alaska.

Parameter	Year ^a															
	1976	1977	1978	1979	1980	1981	1989	1990	1991	1993	1994	1995	1998	2002	2004	2005
Productivity ^b	0.18	0.7	0	0.51	0.34	1.15	0	0.01	0	0	0.56 ^b	0.19	0.16	0.48	0.08	0.07
SD ^c	0.08 ^c	0.06 ^c	0	0.05 ^c	0.06 ^c	-	0	0.01 ^c	0	0	0.04 ^c	0.04	0.08	0.06	0.03	0.08
n ^d	27	54	46	99	67	-	9 ^d	131	17	5	7	7	8	7	11	2
Population count ^e	-	485	406	383	377	438	436	456	268	353	-	288	300	270	298	313
SD	-	-	-	-	-	-	-	-	78	69	-	22	27	14	68	89
n	-	-	-	-	-	-	3	4	10	8	-	8	5	13	12	10
Mean clutch size	1.81	1.63	1.48	1.49	1.79	-	1.24	1.47	1.06	1.08	-	1.19	1.17		1.5	1.05
n	27	54	46	99	67	-	192	131	17	26	-	7	8	7	11	2
Nest count ^f	-	-	256	305	381	411	219	279	102	-	-	348	230	217	160	112
Date	-	-	27-Jun	8-Jul	3-Jul	4-Jul	5-Jul	2-Jul	7-Jul	-	-	4-Jul	6-Jul	4-Jul	4-Jul	4-Jul
n	-	-	1	1	1	1	1	1	1	-	-	1	1	1	1	1

a - Data from Hatch & Hatch 1978, 1981, 1988 & 1990, Baggot et al. 1989, Dragoo et al. 1991a & 1991b, Hatch unpubl. 1995, Nevins & Adams 1999, Wang 2002, and Larned 2004.

b - Chicks fledged/ nests w/eggs; except in 1994 = chicks/nest, based on one visit method.

c - SD= standard deviation, calculated by Nevins & Adams 1999 where not reported.

d - n = sample size: # of nests 1976-1980, 1990-1991; # of plots in 1989 and after 1993.

e - Mean count of n replicates.

f - Total count of nests in nine population index plots, includes all structures to which vegetation was added in the current year.

Table 12. Breeding chronology dates for black-legged kittiwakes at Chowiet Island, Alaska in 2005.

Parameter	n ^a	Value ^b	SD
Mean lay	37	6-Jul	5.4
Median lay		5-Jul	
Mean hatch	25	31-Jul	4.9
Median hatch		29-Jul	
Mean fledge	3	-	-
Median fledge		-	
# of nests monitored		62	
Mean # of days E1 incubated before hatching	26	25	3.4
Mean age of C1 at fledging	3	39	2.3
First lay		27-Jun	
Last lay		14-Jul	
First hatch		25-Jul	
Last hatch		12-Aug	
First fledge		>4-Sep	
Last fledge		-	

a - Sample sizes are different for calculation of mean and median lay dates, hatch dates and fledge dates. These are a subsample for which we have observations ≤ 7 days apart from an empty nest to the first egg, from egg to chick and from chick to empty nest (where chick age is ≥ 36 days), respectively.

b - Second egg and chick dates are not included in chronology calculations.

Table 13. Breeding chronology for black-legged kittiwakes at Chowiet Island, Alaska.

	Year ^a													
	1976	1977	1978	1979	1980	1981	1989	1990	1991	1995	1998	2002	2004	2005
Laying ^b														
First date	10-Jun	9-Jun	5-Jun	17-Jun	5-Jun	5-Jun	27-Jun	4-Jun	23-Jun	17-Jun	19-Jun	1-Jun	8-Jun	27-Jun
Last date	30-Jun	30-Jun	27-Jun	9-Jul	3-Jul	5-Jul	7-Jul	29-Jun	5-Jul	8-Jul	18-Jul	28-Jun	26-Jun	14-Jul
Mean date	20-Jun	19-Jun	15-Jun	24-Jun	14-Jun	14-Jun	1-Jul	17-Jun	28-Jun	24-Jun	1-Jul	11-Jun	16-Jun	5-Jul
SD	-	-	-	-	-	-	-	-	-	4	7	5	4	5
n	41	54	46	99	129	126	32	98	17	49	69	122	161	37
Hatching														
First date	-	-	-	-	-	-	-	3-Jul	-	-	20-Jul	28-Jun	4-Jul	24-Jul
Last date	-	-	-	-	-	-	-	24-Jul	-	-	-	25-Jul	24-Jul	12-Aug
Mean date	16-Jul ^c	15-Jul ^c	11-Jul ^c	20-Jul ^c	10-Jul ^c	10-Jul ^c	-	13-Jul	26-Jul	-	31-Jul	8-Jul	24-Jul	11-Aug
SD	-	-	-	-	-	-	-	-	-	-	7	4	6	5
n	-	-	-	-	-	-	0	15	3	-	44	108	42	25
Fledging														
First date	-	-	-	-	-	-	-	15-Aug	-	-	4-Aug	10-Aug	11-Aug	>4-Sep
Last date	-	-	-	-	-	-	-	-	-	-	-	1-Sep	14-Aug	-
Mean date	27-Aug ^c	26-Aug ^c	22-Aug ^c	31-Aug ^c	21-Aug ^c	21-Aug ^c	-	15-Aug	-	-	5-Sep ^d	21-Aug	14-Aug	-
SD	-	-	-	-	-	-	-	-	-	-	12	4	2	-
n	9	-	-	-	-	-	0	1	0	-	12	60	2	3

a - Data from Hatch & Hatch 1990, Baggot et al. 1989, Dragoo et al. 1991a & 1991b, Hatch unpubl. 1995, Nevins & Adams 1999, Wang 2002, and Larned 2004.

b - Does not include relay attempts.

c - Dates extrapolated by Dragoo et al. 1991b.

d - Six fledge dates extrapolated for young chicks alive at last visit (4 Sep), using 42 day chick departure (after Dragoo et al. 1991b).

Table 14. Reproductive performance of black-legged kittiwakes on Chowiet Island, Alaska in 2005.

Parameter	Plots ^a		Total	Statistics	
	P03	P06/09/11	n	Mean	SD
Total nests (A)	25	37	62		
# of nests w/ ≥ 1 egg (B)	15	22	37		
Total eggs (C)	16	23	39		
# of nests w/ ≥ 1 chick (D)	11	15	26		
Total chicks (E)	11	16	27		
# of nests where ≥ 1 chick fledged (F)	0	3	3		
Total chicks fledged (G)	0	3	3		
# of nests with 1 egg	14	21	35		
# of nests with 2 eggs	1	1	2		
Laying success (B/A)	0.60	0.59	2	0.60	0.06
Clutch size (C/B)	1.07	1.05	2	1.06	0.18
Egg success (F/C)	0.00	0.13	2	0.07	0.15
Nesting success (D/B)	0.73	0.68	2	0.71	0.11
Brood size (E/D)	1.00	1.07	2	1.03	0.21
Hatching success (D/C)	0.69	0.65	2	0.67	0.09
Chick success (F/E)	0.00	0.19	2	0.09	0.18
Fledging success (F/D)	0.00	0.20	2	0.10	0.18
Reproductive success (F/B)	0.00	0.14	2	0.07	0.08
Overall productivity (F/A)	0.00	0.08	2	0.04	0.12

a - All plots were combined at each stake due to small sample size/egg laying effort by 2005 BLKI's; stakes 6, 9 & 11 were also combined for said reasons.

Table 15. Counts of adult common murres on plots at Chowiet Island, 2005.

	1	2	3	4	5	6	7	8	9	10		
Plot	21-Jun	29-Jun	4-Jul	11-Jul	23-Jul	25-Jul	26-Jul	27-Jul	28-Jul	31-Jul	Mean	SD
A03M01	141	163	165	204	176	162	154	192	155	165		
A03M02	94	98	117	130	112	114	129	116	118	116		
A03M03	66	82	90	97	85	88	77	90	77	89		
A03M04	189	191	207	245	210	247	233	240	234	231		
A03M05	31	39	43	50	48	40	34	37	34	32		
A06M01	243	256	268	303	299	322	299	314	303	280		
A09M01	75	66	64	65	78	76	72	76	68	70		
A09M02	578	631	669	627	692	688	713	681	653	696		
A10M01	1130	1189	1183	1212	1243	1206	1221	1223	1145	1166		
A10M02	578	633	623	692	626	614	686	654	675	640		
Total	3122	3348	3428	3623	3568	3554	3617	3621	3460	3484	3482	157

Table 16. Counts of adult thick-billed murres on plots at Chowiet Island, 2005.

	1	2	3	4	5	6	7	8	9	10		
Plot	21-Jun	29-Jun	4-Jul	11-Jul	23-Jul	25-Jul	26-Jul	27-Jul	28-Jul	31-Jul	Mean	SD
A03M04	20	17	17	20	26	24	30	28	18	25		
A03M05	6	9	9	9	6	9	7	7	10	11		
A06M01	2	0	2	2	2	3	3	2	2	3		
A09M02	69	48	80	61	76	83	90	70	85	73		
Total	96	73	108	92	109	119	130	107	115	112	106	16

Table 17. Murre productivity and population index counts among years at Chowiet Island, Alaska.

Parameter	Year ^a													
	1977	1978	1979	1980	1981	1989	1990	1991	1993	1995	1998	2002	2004	2005
<i>Common Murre</i>														
Productivity ^b	-	-	0.48	0.64	0.59	0.58	0.54	0.52	0.51	0.49	0.21	0.57	0.45	0.54
SD	-	-	0.06 ^c	-	-	0.13 ^c	0.04	0.07	0.14 ^c	0.05	0.05	0.04	0.04	0.026
n ^d	-	-	65	-	-	16	7	7	13	13	13	13	10	10
Population count ^e	-	-	-	-	-	2705	2835	2976	-	3423	3597	2412	3429	3482
SD	-	-	-	-	-	-	201	123	-	99	350	157	154	157
n	-	-	-	-	-	10	10	10	-	6	5	10	10	10
<i>Thick-billed Murre</i>														
Productivity ^b	-	-	0.48	0.46	0.63	0.43	0.42	0.47	0.43	0.4	0.24	0.36	0.27	0.39
SD	-	-	0.05 ^c	-	-	0.12 ^c	0.04	0.06	0.05 ^c	0.05	0.06	0.04	0.03	0.05
n ^d	-	-	102	-	-	17	4	4	93	100	59	97	7	7
Population count ^e	-	-	-	-	-	118	145	141	-	155	96	72	91	106
SD	-	-	-	-	-	-	19	15	-	31	23	8	11	16
N	-	-	-	-	-	4	10	10	-	6	5	10	10	10
Murres^f														
Population count	2816	2635	2308	2451	2856	2823	2980	3117	2784	3578	3693	2483	3521	3588
SD	-	-	-	-	-	-	213	124	94	86	367	157	160	165
N	-	-	-	-	-	13	10	10	10	6	5	10	10	10

a - Data from Hatch & Hatch 1981, Baggot et al. 1989, Dragoo et al. 1991a & 1991b, Hatch unpubl. 1993-95, Nevins & Adams 1999, Wang 2002, and Larned 2004.

b - Chicks fledged/eggs laid.

c - Stdev = standard deviation, calculated by Nevins & Adams 1999 where not reported.

d - n = sample size, # of plots in 1990-2005, n = # of nest sites > 1990.

e - Mean count of n replicates.

f - Murre species combined in population index counts until 1989.

Table 18. Breeding chronology dates for common murrelets at Chowiet Island, Alaska, 2005.

Parameter	n ^a	Value	SD
Mean lay	249	12-Jun	5.9
Median lay		12-Jun	
Mean hatch	165	13-Jul	5.7
Median hatch		14-Jul	
Mean fledge	129	6-Aug	6.5
Median fledge		4-Aug	
Total # of nests monitored		283	
Mean # of days egg incubated before hatching	158	32	3.1
Mean age of chick at fledging	129	24	4.2
First lay		30-May	
Last lay		10-Jul	
First hatch		29-Jun	
Last hatch		4-Aug	
First fledge		23-Jul	
Last fledge		22-Aug	

a - The sample size for mean and median lay dates, hatch dates and fledge dates are a subsample of nests where we observed ≤ 6 days apart from egg to chick and chick to empty nest (fledged).

Table 19. Breeding chronology dates for thick-billed murrelets at Chowiet Island, Alaska in 2005.

Parameter	n ^a	Value	SD
Mean lay	131	13-Jun	5.4
Median lay		12-Jun	
Mean hatch	75	16-Jul	4.9
Median hatch		14-Jul	
Mean fledge	58	8-Aug	5.7
Median fledge		7-Aug	
Total # of nests monitored		158	
Mean # of days egg incubated before hatching	71	33	3.2
Mean age of chick at fledging	58	23	3.8
First lay		7-Jun	
Last lay		14-Jul	
First hatch		8-Jul	
Last hatch		11-Aug	
First fledge		28-Jul	
Last fledge		21-Aug	

a - The sample size for mean and median lay dates, hatch dates and fledge dates are a subsample of nests where we observed ≤ 6 days apart from egg to chick and chick to empty nest (fledged).

Table 20. Chronology of common murres among years at Chowiet Island, Alaska.

Parameter	Year ^a										
	1979	1980	1981	1989	1990	1991	1995	1998	2002	2004	2005
Laying ^b											
First date	7-Jun	7-Jun	5-Jun	15-Jun	5-Jun	10-Jun	18-Jun	13-Jun	5-Jun	-	7 Jun
Last date	-	-	-	6-Aug	21-Jul	-	-	-	10-Jul	-	14-Jul
Mean date	18-Jun	16-Jun	16-Jun	25-Jun	21-Jun	24-Jun	26-Jun	26-Jun	17-Jun	-	12-Jun
SD	-	-	-	9	-	-	7	8	7	-	6
n	69	83	83	144	214	205	96	180	166	-	249
Hatching											
First date	-	-	-	17-Jul	12-Jul	-	22-Jun	17-Jul	6-Jul	9-Jul	29-Jun
Last date	-	-	-	10-Aug	22-Aug	-	-	-	11-Aug	9-Aug	4-Aug
Mean date	20-Jul ^c	18-Jul ^c	18-Jul ^c	25-Jul	25-Jul	25-Jul	30-Jul	29-Jul	19-Jul	19-Jul	13-Jul
SD	-	-	-	5	-	-	7	10	6	6	6
n	-	-	-	113	145	121	58	66	107	118	165
Fledging											
First date	-	-	-	6-Aug	1-Aug	-	10-Aug	1-Aug	26-Jul	28-Jul	23-Jul
Last date	-	-	-	20-Aug	22-Aug	-	-	-	29-Aug	-	22-Aug
Mean date	12-Aug ^c	10-Aug ^c	10-Aug ^c	14-Aug	14-Aug	18-Aug	17-Aug	17-Aug	11-Aug	9-Aug	6-Aug
SD	-	-	-	4	-	-	7	7	6	4	7
n	-	-	-	65	97	-	28	42	121	70	129

a - Data from Hatch & Hatch 1990, Baggot et al. 1989, Dragoo et al. 1991a & 1991b, Nevins & Adams 1999, Wang 2002, and Larned 2004.

b - Does not include relay attempts.

c - Dates extrapolated by Dragoo et al. 1991b.

Table 21. Chronology of thick-billed murres among years at Chowiet Island, Alaska.

Parameter	Year ^a									
	1978	1979	1980	1981	1989	1990	1991	2002	2004	2005
Laying ^b										
First date	9-Jun	7-Jun	7-Jun	5-Jun	9-Jun	9-Jun	10-Jun	5-Jun	-	6-Jun
Last date	-	-	-	-	17-Jul	13-Jul	-	10-Jul	-	14-Jul
Mean date	17-Jun	18-Jun	17-Jun	15-Jun	23-Jun	19-Jun	19-Jun	14-Jun	-	13-Jun
SD	-	-	-	-	7	-	-	7	-	5
n	43	107	105	108	95	121	132	80	-	131
Hatching										
First date	-	-	-	-	11-Jul	12-Jul	-	8-Jul	8-Jul	8-Jul
Last date	-	-	-	-	10-Aug	8-Aug	-	8-Aug	13-Aug	11-Aug
Mean date	19-Jul ^c	19-Jul ^c	19-Jul ^c	17-Jul ^c	23-Jul	21-Jul	23-Jul	17-Jul	18-Jul	16-Jul
SD	-	-	-	-	6	-	-	6	6	5
n	-	-	-	-	85	73	84	36	46	75
Fledging										
First date	-	-	-	-	6-Aug	4-Aug	-	1-Aug	27-Jul	28-Jul
Last date	-	-	-	-	20-Aug	22-Aug	-	23-Aug	-	21-Aug
Mean date	11-Aug ^c	11-Aug ^c	11-Aug ^c	9-Aug ^c	12-Aug	12-Aug	15-Aug	9-Aug	9-Aug	8-Aug
SD	-	-	-	-	4	-	-	5	4	6
n	-	-	-	-	47	46	60	30	23	58

a - Data from Hatch & Hatch 1990, Baggot et al. 1989, Dragoo et al. 1991a & 1991b, Nevins & Adams 1999, Wang 2002, and Larned 2004.

b - Does not include relay attempts.

c - Dates extrapolated by Dragoo et al. 1991b.

Table 22. Reproductive performance of common murrelets at Chowiet Island, Alaska in 2005.

Parameter	Plots										Statistics ^a			
	P03M01	P03M02	P03M03	P03M04	P03M05	P03M06	P03M07	P03M09	P09M03	P03M13	Total	n	Mean	SD
# of sites with an egg (A)	24	31	30	9	21	20	23	32	49	45	284			
# of sites with a chick (B)	19	16	22	5	17	16	18	22	33	34	202			
# of sites where chick fledged (C)	12	13	19	4	11	14	13	14	26	26	152			
Hatching success (B/A)	0.79	0.52	0.73	0.56	0.81	0.80	0.78	0.69	0.67	0.76		1	0.71	0.03
Fledging success (C/B)	0.63	0.81	0.86	0.80	0.65	0.88	0.72	0.64	0.79	0.76		1	0.75	0.03
Reproductive success (C/A)	0.50	0.42	0.63	0.44	0.52	0.70	0.57	0.44	0.53	0.58		1	0.54	0.03

a – Statistics calculated with ratio estimation procedure (Ackerman and Garton 1987)

Table 23. Reproductive performance of thick-billed murrelets at Chowiet Island, Alaska in 2005.

Parameter	Plots							Statistics ^c			
	P03M01 ^a	P03M05 ^b	P03M07	P03M08	P03M09	P03M10	P09M01	Total	n	Mean	SD
# of sites with an egg (A)	23	20	22	16	37	26	14	158			
# of sites with a chick (B)	14	8	13	6	20	22	5	88			
# of sites where chick fledged (C)	9	5	8	5	15	16	4	62			
Hatching success (B/A)	0.61	0.40	0.59	0.38	0.54	0.85	0.36		7	0.56	0.06
Fledging success (C/B)	0.64	0.63	0.62	0.83	0.75	0.73	0.80		7	0.70	0.03
Reproductive success (C/A)	0.39	0.25	0.36	0.31	0.41	0.62	0.29		7	0.39	0.05

a - P03M01 = P03M01 + P03M03 + P03M04.

b - P03M05 = P03M05 + P03M06 + P03M07.

c - Statistics calculated with ratio estimation procedure (Ackerman and Garton 1987)

Table 24. Occurrence of prey species brought to breeding sites by common and thick-billed murres at Chowiet Island, Alaska in 2005^a.

Species	n ^b	Average Length (mm)	% of total items
Capelin, <i>Mallotus villosus</i>	36	60.4	83.7%
Eulachon, <i>Thaleichthys pacificus</i>	1	63.7	2.3%
Pacific sand lance, <i>Ammodytes hexapterus</i>	1	68.6	2.3%
Prowfish, <i>Zaprora silenus</i>	2	68.6	4.7%
Squid	1	68.6	2.3%
Surf Smelt, <i>Hypomesus pretiosus</i>	1	63.7	2.3%
Unidentified flat fish	1	58.8	2.3%
Total	43		

a - prey length was recorded as bill length in the field.

b - # of prey items seen.

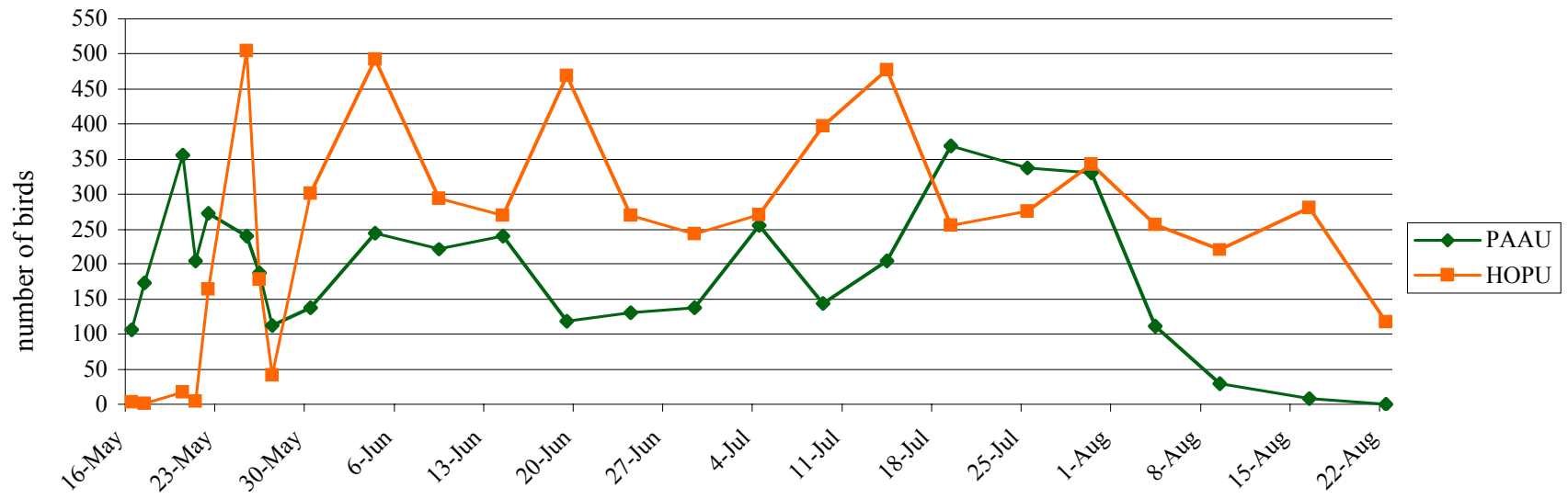


Figure 2. Number of parakeet auklets (PAAU) and horned puffins (HOPU) counted in Chowiet Bay raft-count plot (0730 to 0930 hrs). Chowiet Island, AK 2005.

Table 25. Parakeet auklet (PAAU) and horned puffin (HOPU) raft counts at Chowiet Island, 2005.^a

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
<i>Species</i>	16-May	17-May	20-May	21-May	22-May	25-May	26-May	27-May	30-May	4-Jun	9-Jun	14-Jun	19-Jun	24-Jun	29-Jun	4-Jul	9-Jul	14-Jul	19-Jul	25-Jul	30-Jul	4-Aug	9-Aug	16-Aug	22-Aug
PAAU	106	173	356	204	273	241	187	112	138	245	221	241	119	131	137	256	144	205	370	338	331	112	30	8	0
HOPU	3	1	18	4	164	504	178	42	302	493	294	270	469	270	244	271	398	477	256	276	343	257	220	281	117

a - Counts were conducted between 0730 and 0930 in Chowiet Bay.

Table 26. Breeding chronology dates for parakeet auklet at Chowiet Island, Alaska, 2005

Parameter	Value
Mean hatch	5-Jul
SD	4.3
n	12
Median hatch	4-Jul
Mean fledge	5-Aug
SD	1.9
n	8
Median fledge	6-Aug
No. nests monitored	31
First hatch	23-Jun
Last hatch	13-Jul
First fledge	2-Aug
Last fledge	6-Aug

Table 27. Parakeet auklet reproductive chronology, Chowiet Island, Alaska.

	Years		
	1976	2002	2005
First hatch	25-Jun	28-Jun	23-Jun
Last hatch	19-Jul	1-Jun	13-Jul
Mean hatch date	10-Jul	-	5-Jul
SD	-	-	4.3
n	5	2	12
First fledge	-	-	2-Aug
Last fledge	-	-	6-Aug
Mean fledge date	-	-	5-Aug
SD	-	-	1.9
n	-	-	8

Table 28. Reproductive performance of parakeet auklet at Chowiet Island, Alaska, 2005

Parameter	Value
No eggs found (A)	31
No. eggs lost to:	
disappearance	1
abandonment	6
breakage	3
No. eggs hatched (B)	21
No. chicks lost to:	
disappearance	3
death	5
No. chicks fledged C	13
Hatching Success (B/A)	0.68
Fledging Success (C/B)	0.62
Reproductive Success (C/A)	0.42

Table 29. Parakeet auklet productivity among years, Chowiet Island, Alaska.

	Years		
	1998	2002	2005
Total eggs (A)	12	2	31
Total chicks (B)	10	2	21
Total fledge (C)	3	0	13
Hatch success (B/A)	0.84	1	0.68
SD	0.03	-	-
n	12	2	31
Fledge success (C/B)	0.30	0	0.62
SD	0.05	-	-
n	10	-	21
Reproductive success (C/A)	0.25	0	0.42
SD	0.04	-	-
n	12	-	31

Table 30. Census of rhinoceros auklet burrows, Chowiet Island, Alaska, 2005^a.

Colony	Sub-colony	Date	# of burrows
Spruce Cove (1)	A	24-May	293
Spruce Cove (1)	B	24-May	408
Spruce Cove (1)	C	24-May	178
<i>Total (1)</i>			879
South Bay (2)	A	22-May	110
South Bay (2)	B & C	22-May	265
<i>Total (2)</i>			375
Landing Cove (3)		20-Jun	33
Total for Chowiet Island			1287

Table 31. Rhinoceros auklet-burrow occupancy, Chowiet Island, Alaska, 2005^a.

	Colony	
	Spruce Cove (1)	South Bay (2)
<i>Apparently occupied</i>		
# excavated	8	10
# occupied	6	8
% occupied	75%	80%
<i>Apparently unoccupied</i>		
# excavated	5	5
# occupied	0	0
% occupied	0%	0%

a - burrows were classified as either *occupied* or *unoccupied* using new protocol described in methods section.

Table 32. Estimate of burrows occupied by rhinoceros auklets on Chowiet Island, Alaska, 2005.

	Colony		
	Spruce Cove (1)	South Bay (2)	Landing Cove (3)
Burrows counted (A)	879	375	33
% occupied (B)	75%	80%	77.5% ^b
Burrows occupied (A x B)	659	300	26

Estimate of RHAU burrows occupied on Chowiet Island^a 985

a - Estimate of total burrows based on burrow occupancy check done in 2005.

b - No burrows were excavated at the Landing Cove colony due to its small size; the % occupied is then an average of the values for colonies 1 and 2.

Table 33. Summary of burrow counts among years, Chowiet Island, Alaska, 2005^a. Counts include both occupied and unoccupied burrows.

Colony	Sub-colony	# of burrows				
		1976	1993 ^b	1998	2003	2005
Spruce Cove (1)	A	57	~	364	612	293
Spruce Cove (1)	B					408
Spruce Cove (1)	C	285	430	418	385	178
Total (1)		342	430	782	997	879
South Bay (2)	A	179	531	565	329	110
South Bay (2)	B & C				501	265
Total (2)		179	531	565	830	375
Landing Cove (3)		45	116	204	112	33
Total for Chowiet Island		566	>1077	1551	1939	1287

a - methods for including and excluding burrow entrances in counts have varied slightly over years

b - one Spruce Cove subcolony was not counted

Table 34. Rhinoceros auklet reproductive chronology, Chowiet Island, Alaska.

	Years					
	1976	1977	1979	1998	2002	2004
Mean lay	2-Jun	25-May	19-May	17-May ^a	10-May ^a	17-May ^a
n	32	17	23	24	14	13
First hatch	-	-	-	-	16-Jun	28-Jun
Last hatch	-	-	-	-	6-Jul	8-Jul
Mean hatch date	-	-	-	2-Jul ^b	25-Jun	2-Jul
SD	-	-	-	8	7	4
n	-	-	-	24	14	13
First fledge	-	-	-	-	1-Aug	-
Last fledge	-	-	-	-	-	-
Mean fledge date	-	-	-	22-Aug	-	-
SD	-	-	-	7	-	-
n ^a	-	-	-	21	1	-

a - dates back calculated 46 days from hatch date (Hatch and Hatch 1990a).

b - 8 of 24 dates back calculated 42 days from fledge date (Hatch and Hatch 1990a).

Table 35. Rhinoceros auklet productivity among years, Chowiet Island, Alaska.

	Years				
	1976	1977	1998	2002	2004
Total eggs (A)	45	17	34	28	35
Total chicks (B)	32	13	25	20	27
Total fledge (C)	23	3	20	1	0
Hatch success (B/A)	0.71	0.76	0.74	0.71	0.77
SD	0.07 ^a	0.11 ^a	0.09	0.09	0.13
n	45	17	34	28	35
Fledge success (C/B)	0.72	0.25	0.8	0.05	0
SD	0.08 ^a	0.13 ^a	0.08	-	-
n	32	13	25	20	27
Reproductive success (C/A)	0.51	0.18	0.59	0.04	0
SD	0.08 ^a	0.1 ^a	0.08	-	-
n	45	17	34	28	35

a - SD calculated by Nevins, M. and Adams, J. 1999

Table 36. Importance of prey items in rhinoceros auklet chick meals at Chowiet Island, Alaska in 2005. Prey types by frequency of occurrence (%FO), numerical abundance (%N), by weight (%Wt), and by overall relative importance (I.R.I.).

Species ^a	Occurrence ^b	Number ^c	Wt. (g)	% FO	% N	% Wt.	I.R.I. ^d	Fork Length (mm)		
								Mean	n ^e	Range
Pacific sandlance, <i>Ammodytes hexapterus</i>	8	43	239.5	66.7%	76.8%	84.9%	10785	112.0	43	54.0 - 145.5
Capelin, <i>Mallotus villosus</i>	1	1	7.3	8.3%	1.8%	2.6%	37	107.0	1	107
Surf smelt, <i>Hypomesus pretiosus</i>	3	12	35.5	25.0%	21.4%	12.6%	850	65.8	12	52.5 - 77.1
Totals	12	56	282.3							

a - In order of decreasing importance using I.R.I.

b - Presence of a prey type in a given sample, n = 9; bill-loads (9).

c - Total number of individuals of a prey item in samples.

d - Index of relative importance (I.R.I.) = (%N + %Wt.)(%FO), after Caliet et al. 1986.

e - includes whole fish collected.

Table 37. Breeding chronology dates for horned puffins at Chowiet Island, Alaska, 2005

Parameter	Value
Mean hatch	27-Jul
SD	6.3
n	37
Median hatch	24-Jul
Mean fledge	-
SD	-
n	-
Median fledge	-
No. nests monitored	47
First hatch	17-Jul
Last hatch	14-Aug
First fledge	>2-Sep
Last fledge	-

Table 38. Horned puffin reproductive chronology, Chowiet Island, Alaska.

	Years		
	1976	2002	2005
First hatch	23-Jul	18-Jul	17-Jul
Last hatch	17-Aug	3-Aug	14-Aug
Mean hatch date	31-Jul	25-Jul	27-Jul
SD		4.5	6.3
n	56	12	37
First fledge	>4-Sep	>15-Aug	>2-Sep
Last fledge	-	-	-
Mean fledge date	-	-	-
SD	-	-	-
n ^a	3	1	22

a - Number of birds of fledging age still present in nest on last check

Table 39. Reproductive performance of horned puffins at Chowiet Island, Alaska, 2005

Parameter	Value
No eggs found (A)	47
No. eggs lost to:	
disappearance	2
abandonment	1
breakage	5
No. eggs hatched (B)	39
No. chicks lost to:	
disappearance	5
death	9
No. chicks "successful" (C)	25
chicks fledged	0
chicks present at last visit	25
Hatching Success (B/A)	0.83
Fledging Success (C/B)	0.64
Reproductive Success (C/A)	0.53

Table 40. Horned puffin productivity among years, Chowiet Island, Alaska.

	Years		
	1976	2004	2005
Total eggs (A)	48	12	47
Total chicks (B)	32	12	39
Total fledge (C) ^a	19	1	25
Hatch success (B/A)	0.66	1	0.83
SD	-	-	-
n	48	12	47
Fledge success (C/B)	0.59	0.08	0.64
SD	-	-	-
n	32	1	39
Reproductive success (C/A)	0.39	0.08	0.53
SD	-	-	-
n	48	12	47

a - Value is all chicks that fledged (disappeared at ≥ 34 days) and/or still present at last visit.

Table 41. Breeding chronology dates for tufted puffins at Chowiet Island, Alaska, 2005

Parameter	Value
Mean hatch	17-Jul
SD	4.9
n	27
Median hatch	16-Jul
Mean fledge	29-Aug
SD	2.9
n	3
Median fledge	31-Aug
No. nests monitored	41
First hatch	9-Jul
Last hatch	27-Jul
First fledge	26-Aug
Last fledge	>2-Sep

Table 42. Tufted puffin reproductive chronology, Chowiet Island, Alaska.

	Years	
	1976	2005
First hatch	9-Jul	9-Jul
Last hatch	14-Aug	27-Jul
Mean hatch date	19-Jul	17-Jul
SD	-	4.9
n	48	27
First fledge	4-Sep	26-Aug
Last fledge	-	>2-Sep
Mean fledge date	-	29-Aug
SD	-	2.9
n	48	3

Table 43. Reproductive performance of tufted puffins at Chowiet Island, Alaska, 2005

Parameter	Value
No eggs found (A)	41
No. eggs lost to:	
disappearance	4
abandonment	0
breakage	5
No. eggs hatched (B)	32
No. chicks lost to:	
disappearance	1
death	5
No. chicks "successful" (C)	26
chicks fledged	3
chicks present at last visit	23
Hatching Success (B/A)	0.78
Fledging Success (C/B)	0.81
Reproductive Success (C/A)	0.63

Table 44. Tufted puffin productivity among years, Chowiet Island, AK.

	Years	
	1976	2005
Total eggs (A)	38	41
Total chicks (B)	16	32
Total fledge (C) ^a	9	26
Hatch success (B/A)	0.42	0.78
SD	-	-
n	38	41
Fledge success (C/B)	0.56	0.81
SD	-	-
n	16	32
Reproductive success (C/A)	0.24	0.63
SD	-	-
n	38	41

a - Value is all chicks that fledged (disappeared at ≥ 38 days) and/or still present at last visit.

Table 45. Beach passerine surveys conducted on South Bay Beach, Chowiet Island, Alaska, 2005.

Weather: overcast. Wind: southwest 5

Species	Detections				Date	7-Jun
	Visual	Aural	Both	TOTAL		
Fox Sparrow		1		1	Time Start	1003
Savannah Sparrow		1		1	Time Stop	1021
Song Sparrow	3	5	2	10		
Winter Wren	3	1	1	5		

Weather: overcast, fog. Wind: calm

Species	Detections				Date	10-Jun
	Visual	Aural	Both	TOTAL		
Song Sparrow	5	2		7	Time Start	950
Winter Wren	2	2		4	Time Stop	1002

Weather: clear. Wind: west 15

Species	Detections				Date	11-Jun
	Visual	Aural	Both	TOTAL		
Gray-crowned Rosy-Finch	2			2	Time Start	941
Savannah Sparrow		1		1	Time Stop	952
Song Sparrow	2		2	4		
Wilson's Warbler	1			1		
Winter Wren	2	1		3		

Weather: partly cloudy

Species	Detections				Date	13-Jun
	Visual	Aural	Both	TOTAL		
Song Sparrow	3	2		5	Time Start	945
Winter Wren	2	1		3	Time Stop	1004

Weather: clear. Wind: south 5

Species	Detections				Date	15-Jun
	Visual	Aural	Both	TOTAL		
Savannah Sparrow		1		1	Time Start	915
Song Sparrow	1	2	2	3	Time Stop	933
Winter Wren		2	2	1		

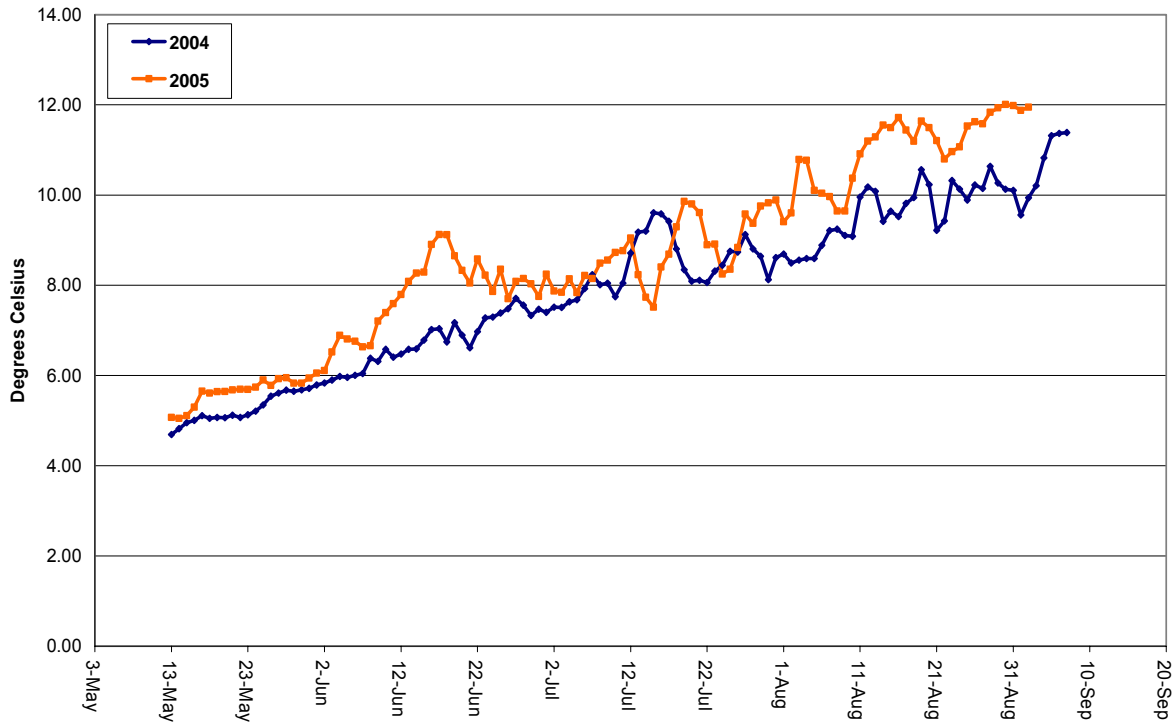


Figure 3. Mean daily sea surface temperatures (°C) at Chowiet Island, Alaska.

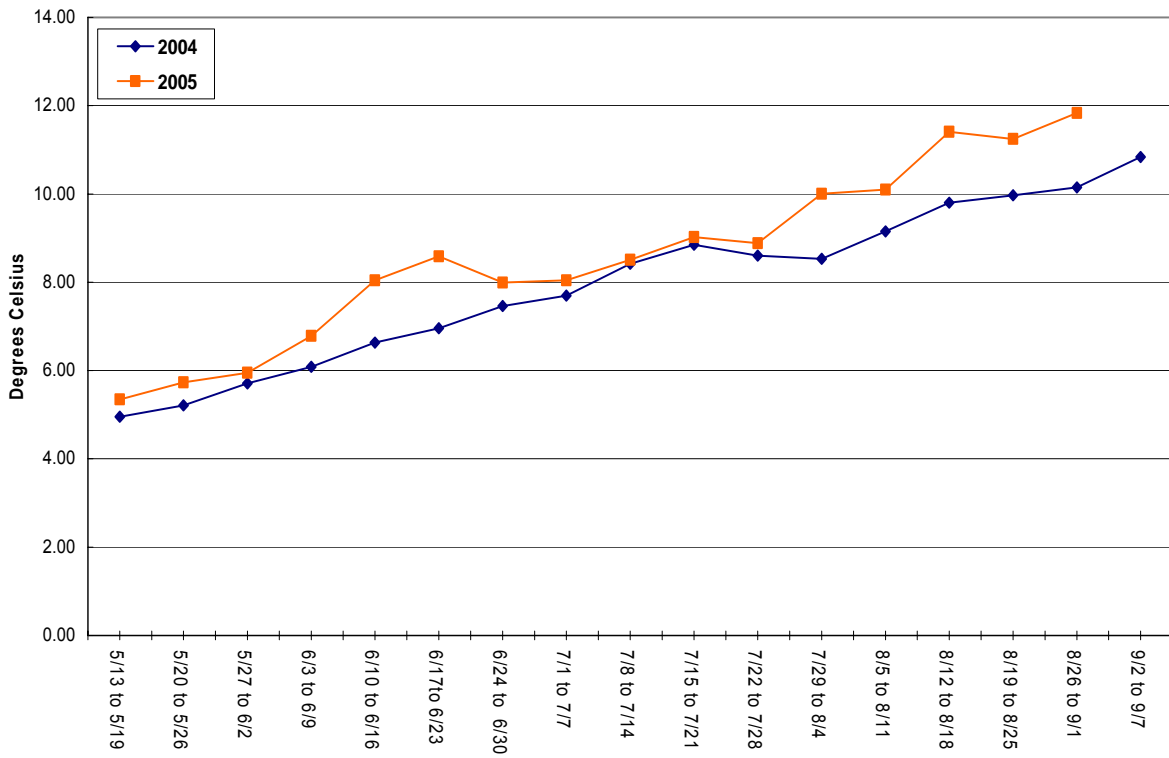


Figure 4. Mean weekly sea surface temperatures (°C) at Chowiet Island, Alaska.

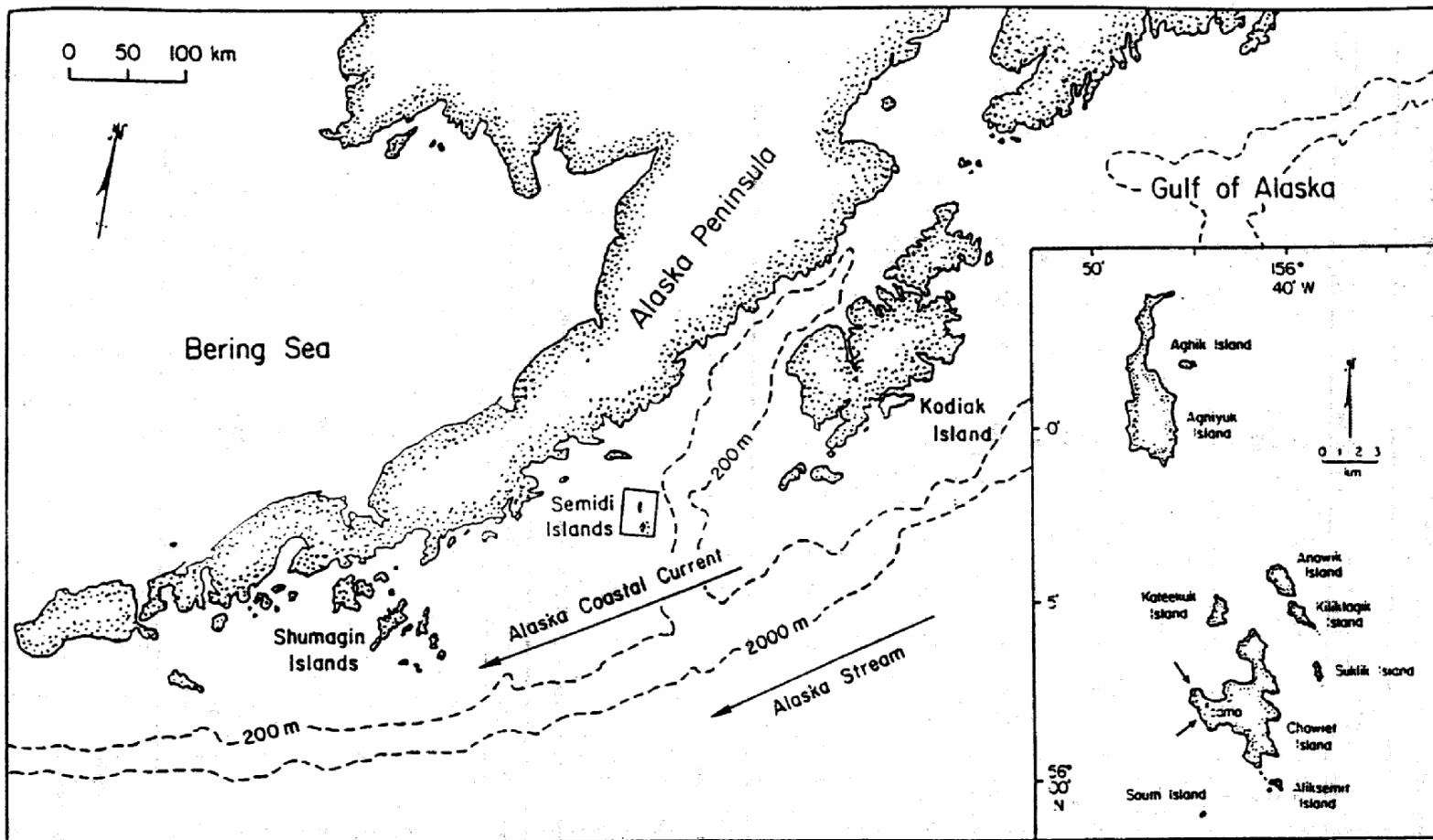


Figure 5. Location of the Semidi Islands in the Western Gulf of Alaska.

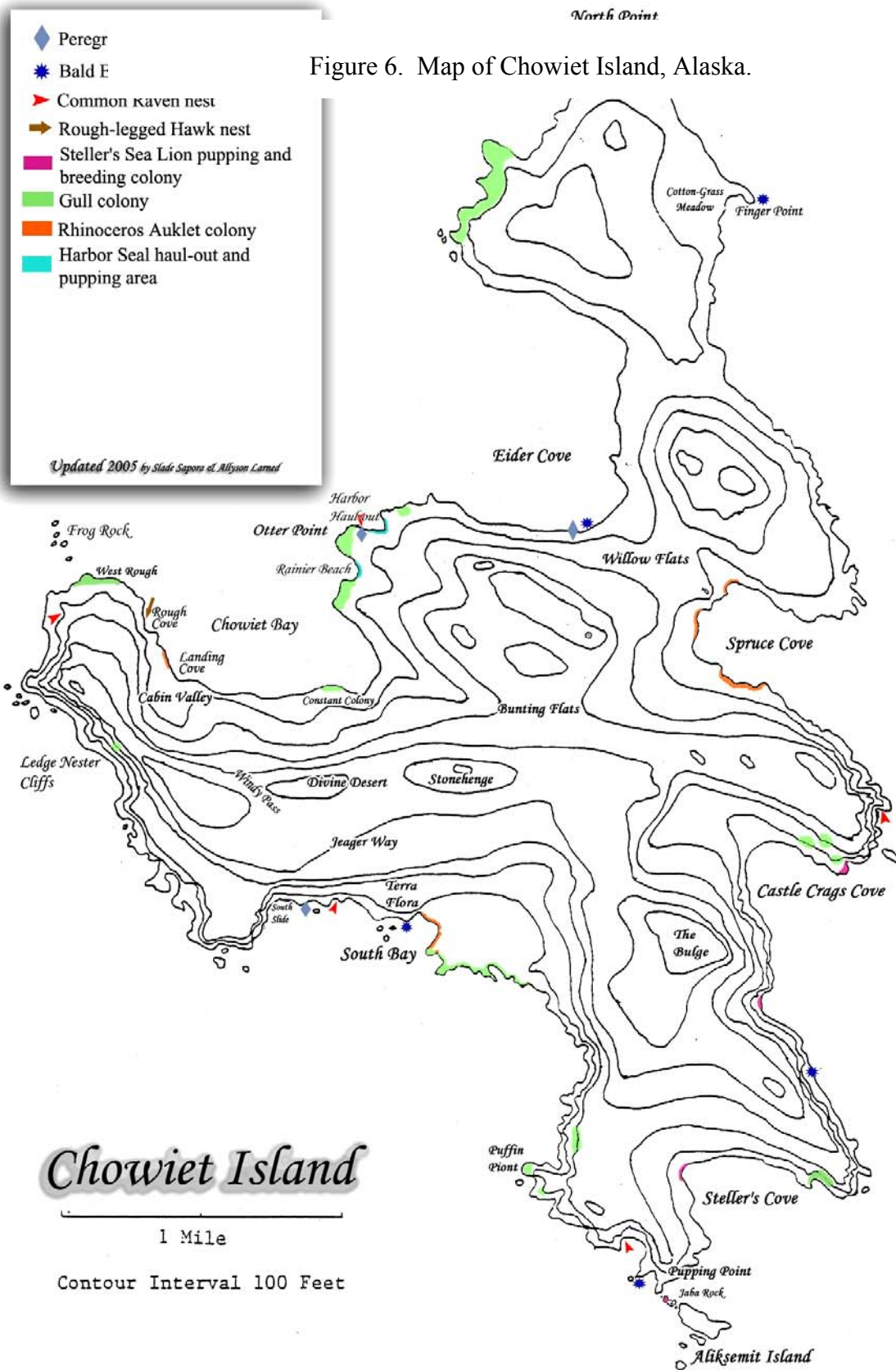


Figure 6. Map of Chowiet Island, Alaska.

Figure 5. Map of Chowiet Island.

Flowering chronology for Chowiet Island, AK.

Family ^a	Scientific Name	date first seen blooming		
		2004	2005	2005 notes
Lycopodiaceae	<i>Lycopodium selago</i> subsp. <i>Selago</i>		18-May	
Equisetaceae	<i>Equisetum arvense</i>		13-May	heading-up on arrival
Ophioglossaceae	<i>Botrychium lunaria</i>		2-Jun	found commonly growing alongside <i>Dactylorhiza</i>
Thelypteridaceae	<i>Thelypteris phegopteris</i>		25-May	
Dryopteridaceae	<i>Gymnocarpium dryopteris</i>	24-Jun		
	<i>Athyrium filix-femina</i>	<4-Jun	23-May	fiddle-heads beginning to poke-out en-masse
	<i>Cystopteris mantana</i>		31-May	
	<i>Woodsia ilvensis</i>		31-May	
Polypodiaceae	<i>Polypodium vulgare</i> subsp. <i>occidentale</i>	24-Jun		
Ranunculaceae	<i>Anemone narcissiflora</i> subsp. <i>Villosiissima</i>		16-Jun	Bunting Flats & between Steller's and South Bay
	<i>Aconitum delphinifolium</i> subsp. <i>Chamissonianum</i>	23-Jul	12-Jul	
	<i>Caltha palustris</i> subsp. <i>Asarifolia</i>	4-Jun	19-May	camp valley and south beach meadow
	<i>Ranunculus occidentalis</i> subsp. <i>Insularis</i>	<5-Jun	13-May	peak bloom began on May 19
Urticaceae	<i>Urtica lyallii</i>	5-Aug	25-Jun	
Portulacaceae	<i>Claytonia siberica</i>	12-Jun	14-May	still blooming strong on 30 May
Caryophyllaceae	<i>Honkenya peploide</i> subsp. <i>major</i>	23-Jul	27-Jun	
	<i>Minuartia arctica</i>		16-Jun	
	<i>Moehringia lateriflora</i>	24-Jun	6-Jun	South Beach
	<i>Silene acaulis</i> subsp. <i>acaulis</i>	5-Jun	10-Jun	
Polygonaceae	<i>Polygonum viviparum</i>	10-Jul	8-Jul	Alpine
	<i>Rumex fenestratus</i>	15-Jun	6-Jun	
	<i>Rumex transitorius</i>		19-Jun	Terra Flora
Violaceae	<i>Viola lansdorffii</i>	late May	14-May	
Salicaceae	<i>Salix arctica</i> subsp. <i>Arctica</i>		26-May	not shown on range map (Hultén) but abundant here
	<i>Salix arctica</i> subsp. <i>Crassijulis</i>		18-May	
	<i>Salix arctica</i> subsp. <i>Crassijulis/pulchra</i>		31-May	hybrid form common in Spruce Cove
	<i>Salix barclayi/pulchra</i>		31-May	hybrid seen with distinct characteristics of both
	<i>Salix pulchra</i>		26-May	prostrate here and trailing (not an upright shrub)
	<i>Salix rotundifolia</i>		30-May	catkins very pubescent (differs from Hultén desc.)
	<i>Salix stolonifera</i>		30-May	
Brassicaceae	<i>Barbarea orthoceras</i>	8-Jun	22-May	Spruce Cove and behind cabin peaking 6/12
	<i>Cardamine umbellata</i>		14-May	small, common around cabin in disturbed soil
	<i>Cochlearia officinalis</i> subsp. <i>oblongifolia</i>		6-Jun	South Bay
	<i>Draba borealis</i>		30-May	seen only in Castle Crags Cove
Ericaceae	<i>Arctostaphylos alpina</i>		30-May	just a few on Peregrine's Perch
	<i>Cassiope stellariana</i>	June		
	<i>Empetrum nigrum</i>	bry 21-Jul		not observed in bloom~ berries present in late July
	<i>Ledum palustre</i> subsp. <i>decombens</i>	20-Jun	2-Jun	many opening by mid June
	<i>Loiseleuria procumbens</i>		18-May	peaking around 25 May
	<i>Rhododendron camtschaticum</i> sub <i>camtschchat</i>	1-Jul	16-Jun	
	<i>Vaccinium uliginosum</i> subsp. <i>alpinum</i>		16-Jun	

	<i>Vaccinium vitis-idaea</i>		24-May	30 May still has not peaked
Pyrolaceae	<i>Pyrola minor</i>	4-Jul		
Primulaceae	<i>Androsace chamaejasme subsp. Lehmanniana</i>		18-May	peaking on 25 May
	<i>Dodecatheion pulchellum</i>	8-Jun	22-May	
	<i>Trientalis europea subsp artica</i>	15-Jun	6-Jun	
Crassulaceae	<i>Sedum rosea subsp. Integrifolium</i>	<5-Jun	22-May	everywhere
Saxifragaceae	<i>Parnassia palustris</i>	18-Jul	1-Jul	South Beach
	<i>Saxifraga bracteata</i>	mid-Jul	25-May	
	<i>Saxifraga punctata subsp. pacifica</i>	mid-Jul		
Rosaceae	<i>Geum macrophyllum subsp macrophyllum</i>	20-Jun	6-Jun	camp valley
	<i>Potenilla palustris</i>		9-Jul	North shores
	<i>Potentilla anserina</i>		20-Jun	South Beach
	<i>Potentilla egedii subsp grandis</i>	21-Jun	6-Jun	South Beach
	<i>Potentilla villosa</i>		22-May	
	<i>Rubus acrticus subsp. Stellatus</i>	9-Jun	22-May	30 May still not peaking
	<i>Rubus chamaemorus</i>		2-Jun	common around camp and South Bay
	<i>Rubus spectabilis</i>			
	<i>Sanguisorba stipulata</i>	6-Jun	1-Jul	
Fabaceae	<i>Lupinus nootkatensis</i>	4-Jul	7-Jun	eastern edge of Terra Flora
Onagraceae	<i>Epilobium angustifolium subsp angustifolium</i>	25-Jul	10-Jul	
	<i>Epilobium angustifolium subsp macrophyllum</i>		10-Jul	
	<i>Epilobium behringianum</i>	5-Jul	6-Jun	
	<i>Epilobium glandulosum</i>	6-Jul		
	<i>Epilobium hornemannii</i>	5-Jul		
	<i>Epilobium sertulatum</i>		25-Jun	Terra Flora
Cornaceae	<i>Cornus suecica</i>	<5-Jun	22-May	reaching peak week of 6/5
Geraniaceae	<i>Geranium erianthum</i>	9-Jun	28-May	just a few popping early on 28th
Apiaceae	<i>Angelica lucida</i>	21-Jun	13-Jun	
	<i>Conioselinum chinense</i>	late Jul		
	<i>Heracleum lanatum</i>	20-Jun	8-Jun	
	<i>Ligusticum scoticum subsp Hultenii</i>	5-Jul	26-Jun	
Gentianaceae	<i>Gentiana algida</i>	mid-Aug	early Aug	
	<i>Gentiana amarella subsp. acuta</i>	18-Jul	late June	
Polemoniaceae	<i>Polmonium acutiflorum</i>	1-Aug		
Plantaginaceae	<i>Plantago maritima subsp juncooides</i>		26-Jun	South Bay
Scophulariaceae	<i>Veronica americana</i>	11-Jul	25-Jun	
	<i>Castilleja unalaschensis</i>	12-Jun	6-Jun	South Beach
	<i>Pedicularis langsdorffii subsp. Langsdorffii</i>	20-Jun	22-May	South Beach on bank/Rhino colony
Orobanchaceae	<i>Orobanche fasciculata</i>	early Aug	mid July	
Campanulaceae	<i>Campanula lasiocarpa subsp lasiocarpa</i>	18-Jul	1-Jul	
Rubiaceae	<i>Galium trifidum subsp columbianum</i>	17-Jul	16-Jul	Cabin Valley
Caprifoliaceae	<i>Sambuca racemosa subsp. pubens</i>			
Asteraceae	<i>Achillea borealis</i>	5-Jul	27-Jun	
	<i>Antennaria monocephala var exilis</i>		9-Jun	Alpine
	<i>Artemisia arctica subsp arctica</i>		1-Jul	
	<i>Artemisia tilesii subsp elatior</i>	14-Jul	1-Jul	
	<i>Chrysanthemum articum</i>		16-Jun	

	<i>Chrysanthemum articum subsp articum</i>	July	20-Jun	
	<i>Petasites hyperboreus</i>	20-Jun	13-May	blooming upon arrival
	<i>Prenanthes alata</i>	July		
	<i>Senecio pseudo-Arnica</i>	9-Jul	1-Jul	
	<i>Senecio resedifolius</i>		26-Jun	Windy Pass
	<i>Solidago multiradiata var multiradiata</i>	5-Jul	26-Jun	
Liliaceae	<i>Fritillaria chamschatensis</i>	12-Jun	3-Jun	
Iridaceae	<i>Iris setosa subsp setosa</i>	5-Jul	20-Jun	Otter Point & South Bay
Orchidaceae	<i>Coeloglossum viridae subsp viridae</i>		16-Jun	
	<i>Dactylorhiza aristata</i>	12-Jun	6-Jun	Terra Flora
	<i>Platanthera convallariaefolia</i>	20-Jun	11-Jun	Terra Flora and east of camp valley

a - Phylogeny taken from *Flora of North America*: <http://hua.harvard.edu/FNA/families.shtml>

Annotated Species List for Chowiet Island, 13 May – 2 September 2005

Abundance categories defined as follows:

Abundant: >50 individuals per day or 6 per hour

Common: 10-49 individuals per day or 2-5 per hour

Fairly common: 5-9 individuals per day or 1 per hour

Uncommon: 2-4 individuals per day or <1 per hour

Rare: 1 individual per day or once during season

Northern Fulmar (*Fulmarus glacialis*)

Abundant. Confirmed breeder. On 14 May, many pairs were observed on nest sites and copulations were observed. On 22 May, common raven observed over northern fulmar nesting area with large white egg in its mouth. On 24 May, first egg observed in a nest. On 25 May, many birds observed on nests along south coast. On 1 June, egg seen at Stake 3—also a pair seen fighting most vigorously, tearing each other off of cliff repeatedly and puking on each other. On 3 June, common raven observed landing next to nesting northern fulmar, calling loudly in birds face causing bird to flush, and then making away with birds egg. On 5 June, two birds were observed on eggs at Stake 3, but overall attendance was still highly variable and peak laying had not yet occurred. On 10 June, many birds now remaining on nest and many of those flushed from around Stake 3 were on eggs. On 13 June, many birds observed on eggs in South Bay area. On 6 July, several glaucous-winged gull nests at South Bay colony that contained chicks were littered with spent NOFU eggshells—one nest contained up to eight northern fulmar eggs, while only two murre eggs were present. On 23 July, many egg fragments and membranes near hunkered-down adults nesting around Stake 3. On 25 July, a chick was observed near Stake 3. On 27 July, glaucous-winged gull observed to be actively trying to flush brooding adult off of nest—adult hung-in-there and attempted to puke on gull, and gull thus retreated. By 3 August many chicks were observed around the island on nest ledges.

Leach's Storm-Petrel (*Oceanodroma leucorhoa*)

Fairly common. On 7 June, individuals were observed over South Bay Beach into the early morning hours around 0200. On 25 June, over six birds were heard from different ground locations around camp valley—at least six nesting pairs. Birds also observed flying about in the valley.

Pelagic Cormorant (*Phalacrocorax pelagicus*)

Fairly common. Confirmed breeder. Two individuals were observed in Chowiet Bay during morning raft count on 16 May. On 18 May, a single individual was observed near Jaba Rock on cliff in future nest site. Some plant material was on the rock and a lot of guano on the rock face below. The bird was observed bringing new nesting material to spot. On 22 May, one adult was observed with nesting material in bill. Two individuals were observed foraging below raft count stake on 27 May. On 2 June, one individual observed in Chowiet Bay – one or two commonly observed in bay on daily basis. Several (five plus) observed off North Point on 9 July. A deceased cormorant of unknown species - possibly a fledgling - observed in nest of bald eagle at North Point on 9 July.

Red-faced Cormorant (*Phalacrocorax urile*)

Fairly common. On 18 May, five individuals were observed near mouth of Steller's Cove. One was observed flying in Chowiet Bay on 2 June. Throughout the season one to two individuals were observed in water off Rough Cove.

Brant (*Branta bernicla*)

Rare. On 24 May, one individual was observed foraging in Spruce Cove and was in very close proximity to male greater scaup.

Harlequin Duck (*Histrionicus histrionicus*)

Common. From 14 May until the end of the season up to nine females and up to two males were observed in Chowiet Bay. On 18 May, two males and one female were observed in Steller's Cove. Two males, two females, and one immature male were being chased off by mature male on 22 May in South Bay. On 24 May, several adults observed in Spruce Cove. A single male was observed vigorously chasing and harassing a female. From 24 June a group of up to ten, female and male, were observed off shore of glaucous-winged gull colony at South Bay. On 9 August, two females were observed in molt near Rough Cove. Both were flightless with primaries less than halfway grown out.

Common Eider (*Somateria mollissima*)

Fairly common. Confirmed breeder. On 14 May, three males and four females were observed in Chowiet Bay. The males were displaying. On 29 May, five adult males, one juvenile male, and six females were observed on rocks at Otter Point. Throughout the beginning and middle of June up to four males and three females were observed in Chowiet Bay, usually in a group or in close proximity. On 25 June, a single male was observed on rocks below Constant Colony. On 30 June, a well-lined nest was observed in Constant Colony containing five, teal-green eggs; the female flushed vigorously and left the customary stinking feces across the eggs. On 5 July, three females were observed on rocks below Constant Colony. On 9 July, three females with four ducklings observed in Chowiet Bay. On 15 July, all eggs in nest in Constant Colony were pipped and the ducklings were beginning to crack egg around the top. The female held tight until we were a couple feet away and then flushed; she stayed in the area just off-shore making a gruff growl sound at us and was also accompanied by another female. On 20 July, three plus small eider ducklings were observed in water with three females near Constant nest.

Mallard (*Anas platyrhynchos*)

Rare. On 22 May, two males and one female were observed on rocks at east end of South Bay and then flew out to the water.

Green-winged Teal (*Anas crecca*)

Rare. On 22 May, one male was observed flying out from rocks on beach in South Bay. On 28 May, feathers of what appeared to be a deceased adult male found in cabin valley stream side.

Greater Scaup (*Aythya marila*)

Rare. On 14 May, single female was observed in Chowiet Bay. A single male was observed foraging below raft count stake on 16 May. On 22 May, a single male was observed in Spruce Cove. On 24 May, two males and one female were observed in Spruce Cove. Two females and one male were also observed on 24 May in Eider Cove. On 29 May and again on 4 June, a pair was observed in Chowiet Bay.

Bald Eagle (*Haliaeetus leucocephalus*)

Fairly common. Confirmed breeder. On 14 May, one juvenile and one adult were observed near Stonehenge and another near Stake 1. A nest was observed near Popping Point on a sea stack off the south coast west of nest site from 2004 on 18 May. A pair was observed circling above and scolding. On 22 May, an adult was observed in nest on sea stack of western shore of South Bay. The bird appeared to be incubating and didn't flush when approached. Second adult was later observed roosting nearby. A glaucous-winged gull flew near the nest and second adult gave a serious chase. On 7 June, an adult was observed looking below its chest and "talking" to something in the nest. The adult was observed incubating whenever we were in South Bay, until 13 June when both adults were observed off of the nest but within three to four meters of it. The adults were not observed in the nest bowl again, and by 14 August the nest was overgrown with vegetation and no longer visible. On 24 May, a nest on rock platform of the eastern shore of Eider Cove was observed with two eggs and one newly hatched chick flopping around—chick made weak call but was very tiny, pale, and unable to sit up. Adults stayed near the nest calling constantly, and immediately upon our retreat were observed back on the nest. On 25 May, two eggs were observed in the nest off south coast. Both adults were present and scolding. Four juveniles were observed flying above Spruce Cove on 31 May. On 15 June, pair from nest in South Bay observed flying close to nest and scolding upon approach; the nest-bowl was not visible so no eggs or chicks observed. On 16 June, nest near Popping Point was observed with at least one fuzzy-gray chick. The chick was lying completely flat at edge of nest bowl and both adults were mobbing and scolding observers. On 9 July, the nest in Eider Cove was observed with three large, fully feathered chicks. Also on 9 July, a nest on North Point was found with three large, fully feathered chicks and an adult was observed carrying an arctic ground-squirrel in its talons to chicks in the nest. Another pair was observed off of Finger Point scolding as if a nest was in vicinity but no nest was observed. On 3 August, a nest with one large, fledged chick nearby was observed on SE corner of Castle Crag Cove—one adult was nearby and was vociferously scolding us.

Rough-legged Hawk (*Buteo lagopus*)

Uncommon. Confirmed breeder. One adult individual was observed being harassed by three peregrine falcons on 13 May. On 16 May, a female was observed in a nest located in the same nest site as previous years nest on a western cliff ledge in Rough Cove. On 19 May, three eggs were observed in nest with both adults present. On 20 June, one plus downy chick were observed in nest with adult present. On 15 July, three, feathered chicks were observed in nest and adults were calling from above. On 21 July, two fully-feathered chicks were observed in nest and one was observed flying about begging from adult who had an arctic ground-squirrel in

its talons. On 25 July, two fledglings were observed perched above nest and calling. By 30 July, nest site was empty and no birds were observed in the vicinity.

Peregrine Falcon (*Falco peregrinus*)

Fairly common. Confirmed breeder. On 13 May, three individuals were observed near Cabin Valley harassing a rough-legged hawk. On 14 May, a first year juvenile was observed perched on rocks at raft count stake. On 29 May, an adult was observed near common raven nest above Harbor Haul-out beach on Otter Point; common ravens were acting aggressively towards individual. On 2 June, a nest with four eggs was found on a cliff-top ledge, eight meters above the common raven nest observed on 29 May in Harbor Haul-out. Three of the four eggs were starred and chick movements were felt within the eggs. Female flushed from the nest when observers came within a few meters of it and proceeded to mob common raven that was in the vicinity and also upset by the commotion near its own nest. The eggs were a rusty-red color with some darker bluish spotting and swirls overtop. On 3 June, an adult was observed scolding near stake 6. On 8 June, four chicks were observed in nest located on Otter Point—the chicks were covered with white down. One chick was larger and had a bluish and stout bill and was notably more energetic than the other three. Two adults were present with one brooding before it was flushed from nest. On 15 June, pair was observed scolding in vicinity of a common raven nest on west side of South Bay and close to The Slide. The pair was persistent and an attempt was made to locate presumed nest but proved unsuccessful. On 16 June, an individual was heard scolding near a bald eagle nest and common raven nest on south coast near Popping Point. On 20 June, nest on Otter Point still had four chicks—all still with white down but much larger and tremendously huge feet. One chick was still very much larger and more developed than the other three and was also the only one vocalizing—two of the chicks were sitting up while the other two were lying down. On 9 July, one chick in juvenile plumage observed in nest on Otter Point. No other chicks were observed but a complete view of nest area wasn't obtained. Also on 9 July, a pair was observed and heard flying around and scolding near bald eagle nest in Eider Cove. On 24 July, a group of four with at least two juveniles was observed west of South Bay on south coast. On 27 July, a fledgling was observed flying over stake 6 and two adults were observed roosting on sea-stack nearby. On 18 August, a juvenile making residence in Cabin Valley observed in hot pursuit of scolding belted kingfisher. Both birds flew towards Landing Cove and after the peregrine did a steep dive the kingfisher was heard no more. Later, the same juvenile was observed tailing a horned puffin as it flew down from talus behind the cabin. The horned puffin jetted away unharmed and the peregrine disengaged its pursuit.

Sandhill Crane (*Grus Canadensis*)

Rare. On 18 May, three individuals were observed calling and flying over Chowiet, coming from the south and heading north.

Semipalmated Plover (*Charadrius semipalmatus*)

Rare. On 8 August, a juvenile or non-breeding adult was observed at Landing Cove beach.

Black Oystercatcher (*Haematopus bachmani*)

Common. Confirmed breeder. On 21 May, a pair was observed at Landing Cove beach vocalizing together and chased a third bird out of the area. On 22 May, at least four pairs were observed at South Bay beach and vicinity. On 24 May, many were observed in Spruce Cove (5+) and a single nest with two eggs was found. Two nests found each with one egg on 6 June. One nest was found on South Bay beach near beginning of gull colony sub A and one near within sub B. Six individuals were observed near nest in sub B. A newly depredated eggshell was observed in sub A. On 10 June, nest at east end of South Bay beach had three eggs. On 15 June, nest with one egg was located at Constant Colony. By 20 June, the nest with one egg in Constant Colony had been depredated and eggshell was found a few meters from the nest site. On 25 June, nest with one egg was observed west of Rough Cove about one meter from a gull nest and incubating adults flushed from both nests. On 26 June, a new nest with three eggs was observed on South Bay beach a few meters from first nest located on beach. By 1 July, nest found on 26 June had no eggs and no eggshells were observed in the vicinity. On 5 July, the nest west of Rough Cove had two eggs. On 6 July, three dry chicks were observed in nest at east end of South Bay beach. On 20 July, one of the two eggs was observed pipped in nest west of Rough Cove.

Wandering Tattler (*Heteroscelus incanus*)

Rare. On 18 May, a single bird was observed in Steller's Cove. On 4 June, an individual was observed in Chowiet Bay near Constant Colony, and on 6 June an individual was seen in South Bay. Through July individual birds were seen intermittently in both Landing Cove and in South Bay. On 27 August, a single bird was seen flying over the center, alpine area of Chowiet Island.

Spotted Sandpiper (*Actitis macularius*)

Rare. On 8 August, a juvenile was observed poking about in kelp on Landing Cove beach.

Rock Sandpiper (*Calidris ptilocnemis*)

Uncommon. A small group of six individuals was observed at South Beach on tidal rocks on 18 July, all were in breeding plumage. On 25 July, two birds observed on tidal rocks at constant colony; one bird was light in color with a distinct reddish cap and a dark belly, while the other was much darker and grayer in color overall. On 14 August a group of seventeen birds—either juveniles or molting adults—were seen at South Bay. On 27 August, a small group (five plus) were observed wandering about the alpine area atop Chowiet.

Parasitic Jaeger (*Stercorarius parasiticus*)

Fairly common. Confirmed breeder. Three birds were seen on ridge behind cabin on 14 May. On 18 May, four birds were observed chasing each other about swiftly through the air and several times two birds collided and crashed unharmed to the ground. Two birds were seen out in Spruce Cove bathing in the water on 22 May. Up to seven birds were observed on tundra over Bunting Flats area on 30 May. A pair of birds was observed on 5 June out over the ocean from Stake 9 pirating food from murre and tufted puffins. The jaeger would circle high up above incoming seabirds and then go into a rapid dive once it found its mark. Murre were either hit or nearly hit by diving jaeger, as the murre appeared to tumble in air and drop food, which the

jaeger then swooped-up. A nest was located on 16 June between Stonehenge and Divine Desert, both adults were in attendance and acting as if their wings were broken flopping about on the ground. Nest contained two eggs. A light morph adult with a very white underside and chin was observed over Steller's Cove on 16 June. On 1 July, both eggs were still at nest site discovered in mid June. On 6 July, nest site contained on pipped egg and one fluffy chick. Fifteen adults were counted on 9 July and one adult doing broken wing display on North Point. Fifteen adults in one large, loose group over The Bulge area just north of Steller's Point. A light-morph juvenile was seen on ground and flying about on top of high ridge behind cabin on 18 August. Parents of light-morph were both dark to chocolate colored morphs.

Glaucous-winged Gull (*Larus glaucescens*)

Abundant. Confirmed breeder. Individuals were observed attending colony area around Stake 3 on 14 May. A colony was observed on top of cliffs southeast of South Bay on 18 May. Around one hundred pairs were in the area and many small nest bowls were observed but none of the nests were completed and no eggs were found. On 22 May, no nest bowls were observed in South Bay colony but two hundred plus adults were observed in vicinity. On 25 May, a nest with one egg was observed in the colony southeast of South Bay. A broken egg outside of a nest was also observed. Two nests with two eggs were observed in colony between Chowiet Bay and Eider Cove on 29 May. A few nests with one egg were also observed but most nest sites just had scrapes. A large gull colony (200+ individuals) was found above Castle Crag Cove on 30 May. One nest was observed with one egg. On 1 June, the small colony around stake three had several nests with one egg and birds were very vocal and active at our approach, which they weren't a couple of days prior. On 6 June, nest searching and productivity was initiated at the South Bay colony. Most nests had no eggs but a couple had up to three. By 13 June, a lot of eggs were observed at the South Bay colony. On 25 June, a small colony was observed west of Rough Cove with only a few nests containing eggs. On 26 June, the first chicks were observed at the South Bay colony and by 6 July, most had hatched. On 9 July, a large colony with three hundred plus adults was observed at the tip of the North Point. A few (five plus) chicks were observed. On 30 July, a nest was observed with at least four artic ground-squirrel carcasses scattered about. On 5 and 6 August, a marauding group of adults were observed at the base of stake three awaiting and then pouncing on murre chicks as they tried to make it to the water and their calling parents. The gulls were quite territorial and chased off invaders as they tried to move in on the area they were patrolling. On 14 August, two fledglings were observed in the water at South Bay. On 18 August, two juveniles were observed in Chowiet Bay.

Black-legged Kittiwake (*Rissa tridactyla*)

Abundant. Confirmed breeder. On 14 May, many were observed on the cliffs at Stake 3 in old nest sites. Adults were observed from Stake 3 on the cliffs but not actively nest building on 1 June. On 10 June, a few sites at Stake 3 had begun nest building. On 16 June, kittiwakes near Tufted Point were observed on nests but had no nests built. On 18 June, two nests at Stake 3 in plot P03B04 had eggs. On 2 July, nest building was observed at ledgenester cliffs. By 12 July, eggs were observed in nests at Stakes 9, 6, and 3. Only one nest was observed to have two eggs. On 27 July, the first chicks were observed in plots. On 6 August, a few nest failures were recorded at Stakes 3 and 9.

Common Murre (*Uria aalge*)

Abundant. Confirmed breeder. On 14 May, thousands were observed on the cliffs and some were observed copulating at Stake 3. On 1 June, a single individual was observed with an egg at Stake 3 on the large flat platforms at the base of cliffs. By 3 June, four more birds were observed to have eggs and they were still only on the lower ledges. On 2 July, first chick was observed at Stake 3 in plots. By 6 July, many chicks were observed on the lower platforms but most on the cliffs still had eggs. On 5 and 6 August, many chicks were observed jumping from the cliffs and platforms. Many chicks made it but a large percentage also were quickly picked up and eaten by the glaucous-winged gulls that were waiting at the water's edge. On 20 August, the cliffs and ledges at Stake 3 had drastically fewer murre still attending, and by 28 August most of the birds had left. On 23 August, a flotilla of more than 150 murre chicks was observed below Stake 6 in between sea stacks and mainland. Sixteen plus foot swells and 40-50 knot winds occurred the night before and thirty to forty knots on the day the flotilla was observed.

Thick-billed Murre (*Uria lomvia*)

Abundant. Confirmed breeder. Many birds were observed on the cliffs at Stake 3 on 14 May. On 9 June, the first eggs were observed in plots. On 12 July, the first chicks were observed at Stakes 3 and 9. By 5 August, a lot of the chicks were missing from plots and assumed to be fledged.

Pigeon Guillemot (*Cepphus columba*)

Fairly common. Confirmed breeder. On 14 May, a single individual was observed in Chowiet Bay and at least one was observed there through out the entire season. On 22 May, three pairs were observed at South Beach. On 9 July, eight adults in a group were observed in Eider Cove and ten plus adults on north side of North Point. Two adults had fish in their bills. On 25 July, an adult with fish in its bill was observed paddling towards shore west of Rough Cove. On 27 July, a fledgling was observed in Steller's Cove.

Ancient Murrelet (*Synthliboramphus antiquus*)

Uncommon. Confirmed breeder. On 25 June, a fledgling was found dead on a rock below the raft count Stake in Chowiet Bay. The meat and bones were gone but a completely intact skin that was still attached to the head was found. The feet and tarsus were ripped from the body and lying next to skin and the eyes were still moist and not sunken-in. Fresh squirrel feces were all around vicinity. On 26 June, quite a few adults were heard calling from two to four a.m. in Cabin Valley; adults were heard in the water and on the beach. On 6 July, several birds were heard on South Bay beach calling from the water or close to it. On 9 July, a pair was observed diving and calling in Chowiet Bay amongst parakeet auklets below raft count Stake. On 4 August, a single egg that was cold and dead was found in rocks within South Bay gull colony.

Cassin's Auklet (*Ptychoramphus aleuticus*)

Rare. On 24 May, an adult head was found on a roost above Spruce Cove. A lot of good burrowing habitat is around the area at back of cove near where head was found.

Parakeet Auklet (*Aethia psittacula*)

Abundant. Confirmed breeder. Beginning on 14 May and lasting up until around 20 August rafts of fifty plus individuals were observed and heard consistently in Chowiet Bay. On 22 May, many individuals were observed flying to and from rocks in Chowiet Bay. Beginning on 3 June, crevices were found for productivity monitoring east and west of Landing Cove beach, west of Rough Cove, South Bay beach area and within the gull colony, as well as around Constant Colony in Chowiet Bay. On 11 June, three adults were observed depredated in crevices by arctic ground-squirrels—one still had an egg next to the carcass. The bodies were stripped bare and feathers and skin had been pulled back; the soft bones of pelvic girdle were eaten as well as all meat and fat. All the depredated birds were in crevices east of Landing Cove and within an area of about ten by five meters. On 15 June, one adult was found dead and devoured (arctic ground-squirrel culprit most likely) in crevice at South Beach. On 16 June, many individuals were observed rafting off coast north of Tufted Point. One adult individual was observed dead and devoured in crevice on 19 June in South Bay. Between 20 and 25 June, the first chick hatched in productivity crevices. By 5 July, the majority of our productivity crevices had chicks. By 4 August, the first chicks had fledged from productivity crevices.

Rhinoceros Auklet (*Cerorhinca monocerata*)

Uncommon. Confirmed breeder. On 24 May, one individual observed in water with puffins at Spruce Cove. Throughout season up to three individuals were observed rafting with puffins in Chowiet Bay. On 19 July, fifteen burrows were excavated at South Bay colony and one bird was still found incubating an egg, one live chick was found on productivity burrow from 2004, two dead chicks were found, and one dead adult was found. The dead chicks were in burrows and not scavenged by arctic ground-squirrels. The live chick was around ten days old with pin feathers just beginning to erupt on wings. On 29 July, excavated burrows in Spruce Cove colony—only two chicks present out of ten excavations with one of them very close to fledging condition. Two adults were found in burrows.

Horned Puffin (*Fratercula corniculata*)

Abundant. Confirmed breeder. Beginning on 20 May, large rafts of one hundred plus adults observed close to shore in Chowiet Bay. Beginning on 24 May, adults observed in crevices and flying out of rocks as approached coasts around island. Starting on 30 May, adults observed flying around Chowiet Bay and Cabin Valley as well as attending cliffs regularly. On 11 June, found first adult on an egg in crevice. Productivity crevices were found throughout June and early July east and west of Landing Cove, along coast east of Landing Cove, west of Rough Cove, and South Bay within glaucous-winged gull colony. On 20 July, first chick was observed in productivity crevice. On 14 August, a dead partially eaten fledgling was found in gull colony at South Bay. The chick was mostly feathered but wing primaries were still at pinfeather stage.

Tufted Puffin (*Fratercula cirrhata*)

Abundant. Confirmed breeder. On 14 May, a single individual was observed on rocks above Stake 3. On 22 May, an adult was observed in crevice with nesting material but no egg in Spruce Cove. Adults observed copulating in Chowiet Bay also on 22 May. Beginning on 7 June, productivity crevices were found in South Bay gull colony, east of Landing Cove, and west

of Rough Cove. On 5 July, a chick was heard within an unmonitored crevice. By 20 July, most of the monitored crevices and burrows had chicks. On 25 July, a chick in productivity crevice depredated or scavenged by arctic ground-squirrels just east of Landing Cove—nesting material scattered and only the chick tarsus and foot, which appeared to be bitten off was left in crevice.

Rufous Hummingbird (*Selasphorus rufus*)

Rare. An adult female individual was observed perched on an antennae guy wire on 4 July. On 6 August, a female adult was observed near the outhouse feeding on fireweed blossoms and then being chased by a savannah sparrow.

Belted Kingfisher (*Ceryle alcyon*)

Rare. On 29 July, a single female adult individual was observed on spruce tree at Spruce Cove. The bird flew from the tree to cliffs above water and was observed again later in same area. On 19 August, the individual was heard and observed at Landing Cove beach area. On 18 August, the bird was heard and then observed flying quickly over cabin towards Landing Cove while being pursued by a juvenile peregrine falcon.

Common Raven (*Corvus corax*)

Common. Confirmed breeder. On 25 May on the south coast near Pupping Point, an adult was observed acting very territorial and squawking loudly with throat feathers puffed up. A nest was found close by with six fully feathered nestlings in it—the fledglings had red gapes and slight down on neck and bellies but most of the flight feathers were present and developed. Adult was perched nearby and flinging dirt and vegetation off cliff aggressively and then moving to a new perch and repeating the behavior. Both adults were present but one was doing most of the displaying. On 29 May, observed a pair doing territorial display above Harbor Haul-out and a nest was found on a cliff with a rock overhanging the nest, at least two nestlings were present. On 30 May, a nest with four nestlings was observed on east coast in between Castle Crag Cove and Spruce Cove—adults were in the area. Chicks had grown rectrices and remiges but still some body down. On 2 June, the nest above Harbor Haul-out was found to have three plus nestlings and a peregrine falcon nest with four eggs was found about eight meters directly above nest on cliff top. On 3 June, a nest near Stake 11 was found and four fledglings were observed out of the nest and on cliffs nearby begging from parents. One of the adults was observed feeding a fledgling a fulmar egg. A nest was discovered just west of bald eagle nest at western end of South Bay. Three young chicks with pinfeathers and gray down that were vocalizing and just able to stand were observed. Upon our approach and the chicks seeing our movement they quickly opened their mouths and started begging. Parents weren't very attentive. On 10 June, a fledgling raven observed calling for over an hour behind cabin. Adult appeared and approached the fledgling on the ground, which started to beg with an open mouth. The adult pecked at the fledgling's mouth and face forcefully and kept pecking until the juvenile hopped away. The fledgling flew and the adult took after it pecking it in the air until the fledgling landed and then finally fled towards the beach at Landing Cove; it landed in the grass and started calling again, but the adult flew off towards ledgenester cliffs. By 16 June, the nest on the south coast near Pupping Point had no birds in it and was falling apart. On 18 June, observed an adult pull a common murre off of the cliffs by its tail. The raven also was pulled off the cliff but quickly

returned and grabbed the egg the common murre had been incubating. On 27 July, a group of eight ravens were observed flying together over ledgenester cliffs.

Bank Swallow (*Riparia riparia*)

Common. Confirmed breeder. On 2 June, individual were observed in Cabin Valley and a second individual at east end of Chowiet Bay. Beginning on 10 June and continuing throughout the month of July and beginning of August, up to ten individuals were observed flying around Cabin Valley and swooping low over streams. On 9 July, nests observed in dirt bank on west side of North Point. No chicks were observed in nests but adults flushed out of the burrows.

Barn Swallow (*Hirundo rustica*)

Rare—vagrant. On 11 June, single individual was observed in cabin and then flying around cabin outside before disappearing.

Winter Wren (*Troglodytes troglodytes*)

Common. Individuals seen and heard singing around island on 14 May. On 10 June, a nest was located with four plus chicks at South Beach; nest was constructed in the rotted out heartwood cavity of a driftwood log in large wood pile at back of beach. Both adults were seen bringing insects to young. Three fledged chicks were seen around South Beach nest on 19 June, and a separate nest was located at western end South Beach in grassy bank with three chicks. On 26 June, chicks were gone from nest at western end of South Beach, and fledglings in area were seen begging to adults. Two fledglings were observed around cabin on 11 August.

Hermit Thrush (*Catharus guttatus*)

Uncommon. Probable breeder. On 14 May, a single bird was observed in rocky, alpine area around Stonehenge. At least two individuals were heard on crowberry-talus slopes behind cabin on 20 May, and on 27 May one bird was heard singing vigorously behind cabin and another was heard singing on talus above east Chowiet Bay. On 23 June, a single bird was heard and observed in alpine area. An individual was observed on Landing Cove beach carrying a bill-full of insects into valley on 26 June.

American Pipit (*Anthus rubescens*)

Uncommon. Confirmed breeder. On 14 May, individuals were seen and heard on talus slopes at mid elevations and also in alpine areas around Stonehenge. One individual observed doing aerial display—flying high and then dropping down swiftly while calling. On 29 July, a fledgling was seen in Stonehenge area with adult nearby.

Cedar Waxwing (*Bombycilla garrulus*)

Rare—vagrant. On 9 July, a single, adult bird was observed on the north side of the island between Finger and North Point. Bird was first seen perching on bluff over water and then began to actively avoid us. Bird was located again perching and observed for several minutes as it preened. Bird remained on coast and did not attempt to fly inland at any point.

Yellow Warbler (*Dendroica petechia*)

Uncommon. Probable breeder. First individual of the season seen on 22 May at Spruce Cove. On 3 June, a single bird was seen around cabin and on 10 June, an individual was heard singing on slope to west of cabin. On 11 June, a few individuals (five plus) were observed in cabin valley singing and chasing each other. Again on 23 June, five plus individuals heard and observed around cabin. A lull occurred between 7 July and 3 August, where no birds were heard or seen. On 6 August an adult female was seen perching on the wall tent next to cabin and on 13 August, two plus juveniles were observed around camp. On 27 August, one bird was seen at Spruce Cove.

Wilson's Warbler (*Wilsonia pusilla*)

Uncommon. Probable breeder. On 24 May, an individual was heard around the cabin in early morning and on 27 May, a single bird was seen on the west slope of cabin valley and heard singing loudly. On 3 June, four plus birds were observed in cabin valley. Several birds were observed in South Bay area (Terra Flora and Jaeger Way) on 11 June. A lull occurred between late June and early August, where no birds were seen or heard. On 13 August, two plus juveniles were observed around camp.

Savannah Sparrow (*Passerculus sandwichensis*)

Common. Confirmed breeder. On 14 May many individuals were observed around the island singing. Many birds were seen chasing each other and singing all about the island on 25 May. A nest with five eggs was found in crowberry in Jaeger Way area on 6 June. On 16 June, a nest with six eggs was observed in Steller's Cove area. Five chicks were observed in nest at Jaeger Way on 19 June. A fledgling was caught on trail to South Bay on 23 June. Jaeger Way nest had five fully-feathered chicks in it on 26 June.

Fox Sparrow (*Passerella iliaca*)

Common. Confirmed breeder. On 14 May many individuals were observed singing all around island. A nest with three eggs was observed on 22 May east of Cabin Valley in crowberry on low talus. A new with four eggs was observed on 29 May in Castle Crag Cove. On 2 June, a nest with four eggs was found 75 meters from nest with (still) three eggs located on 22 May. Pair near cabin observed carrying nesting material on 2 June. On 3 June, nest under construction near cabin is almost completed within a 24 hour period! On 7 June nest near cabin observed with one egg. On 8 June, three separate nests were observed with chicks (3, 4, and 3 chicks respectively), all 2 to 4 days old, on hike to Otter Point. On 10 June, nest near cabin now with four eggs. Nest near cabin with three chicks and one egg on 21 June; fourth chick present on 23 June. On 25 June, a small fledgling was observed in the grass near outhouse and both parents were seen taking food to it.

Song Sparrow (*Melospiza melodia*)

Common. Confirmed breeder. Many a bird observed singing all about island on 14 May. Many observed on tidal rocks and all about beach area at South Beach on 22 May. A nest with no eggs was observed in a clump of *Lymus* beside cabin on 26 May; first egg observed in this nest on 27 May, second on 28 May, and third egg on 29 May. Male of nesting pair observed with

persistent, wheezing cough/sneeze. Nest beside cabin observed with three eggs on 9 June and then with three chicks on 10 June. First fledgling observed in South Bay area on 8 June, and several more observed on beach at South on 13 June. Chicks fledged from nest near cabin by 23 June, seen around cabin begging for food from adults. On 24 June, an adult song sparrow was observed feeding a begging golden-crowned sparrow fledgling behind cabin. Several adults were observed sans tails on 20 July. Many fledglings (twenty-five plus) observed around the cabin on 2 September.

Golden-crowned Sparrow (*Zonotrichia atricapilla*)

Common. Confirmed breeder. Several individuals observed singing and flitting about around island 14 May. By 22 May, number of birds present around camp and on island greatly increased, with birds territorially singing all about—a dominant presence along with song sparrow and fox sparrow in Cabin Valley. A nest with four eggs was observed on 4 June located in crowberry-talus area behind cabin. Another nest with four eggs was observed on 4 June in NE Chowiet Bay. On 8 June, nest located in NE Chowiet Bay contained only a single, freshly-dead chick in it; no egg shells or other signs of carnage present and no adult observed in area. Nest behind cabin contained two chicks and two eggs on 9 June, and on 11 June the nest was now home to four chicks. By 18 June, the nest behind the cabin contained four, fully-feathered chicks. First fledglings observed around cabin on 24 June begging from adults. “Philip” our local camp visiting adult with three missing toes, was observed with two fledglings in tote on 8 July. By the end of August, very few to no adults were seen around island, yet fledglings still abundant.

Lapland Longspur (*Calcarius lapponicus*)

Rare. Possible breeder. Four to five individuals were observed in alpine area between camp and Steller’s Cove on 18 May. A male-female pair was observed on 29 May above Eider Cove. Three plus individuals were observed en-route to Steller’s Cove on 3 August.

Snow Bunting (*Plectrophenax nivalis*)

Rare. Two individuals were observed on 2 May near Stonehenge. On 24 May, a single female was observed in alpine area.

Gray-crowned Rosy-finch (*Leucosticte tephrocotis*)

Common. Confirmed breeder. Several birds were observed in alpine areas of island on 14 May. A large group (fifteen plus) was observed above Eider Cove on 24 May. Thirty plus birds were observed on rock-pile in tundra above Rainier Beach on 2 June. On 20 June, fledglings were observed at South Bay. On 5 July, adults were observed displaying with wings held out and head back slightly on beach and also on talus slopes up high. Juveniles were observed around camp on 13 August.

Fin Whale (*Balaenoptera physalus*)

On 3 June, at least six individuals were observed from Stake 6 west of Chowiet Island in currents offshore. On 6 June, a group of six plus individuals was observed a couple of miles out from South Bay. On 9 June, several were observed only 300 meters offshore from Stake 9; observer

could hear exhalations. On 10 June, a large group of fifteen plus was observed within half a mile of the coast; group remained in same relative area for four hours. On 11 June, two individuals were observed in Chowiet Bay swimming west in heavy current.

Harbor Seal (*Phoca vitulina*)

Fairly common. Confirmed breeder. On 29 May, four adults were seen hauled-out on Rainier Beach. A group of ten adults and four pups were observed hauled-out on Harbor Haul-out beach on 29 May. Pups were small and when in water attempted to climb onto parents back. On 2 June, a total of nineteen individuals were counted in and around Rainier Beach and Harbor Haul-out. On 8 June, four individuals were observed in Harbor Haul-out and eight on Rainier Beach. On 20 June, two adults were observed in waters just off of West Rough—one adult continually slapped waters surface loudly with its pectoral flippers and then dove immediately after slap. This was repeated many times in kelp beds just offshore (fishing technique?). Again on 25 June, an adult was slapping the water and diving just off of West Rough. On 23 July, an adult was observed hauled-out and snoozing on rocks below Stake 10.

Northern Sea Lion (*Eumetopias jubatus*)

Abundant. Confirmed breeder. On 18 May, forty-four males were observed on Jaba Rock spaced-out presumably in territories. A few were observed acting aggressive towards others as they tried to enter each others territories—one male was observed bloodied. On 22 May, a single, large male was observed on rocks just offshore from South Beach. On 25 May, seventeen pups were observed on Jaba Rock—all were very small. One pup was still wet and bloody when observers arrived and another pup was born while observers were present; the rest of the pups were only slightly larger than these newborns. Fifty-four males were observed acting territorial, even towards mobile females, and forty-three females were observed on Jaba Rock. On 30 May, six males, ten females, and one pup were observed on flat rock at northern end of Castle Crag Cove. Males were very aggressive and combative and most had fresh, bleeding wounds about their chest and back. The only pup present was small, with umbilical still attached. On 28 June, National Marine Fisheries Service weighed, measured, and took fat and blood samples from fifty pups located on a small beach on the SE side of Castle Crag Cove. About sixty pups were present on this beach, a few with umbilical chords still attached. On 3 and 5 June, a solitary female was observed hauled-out on Frog Rock. On 13 June, a noisy male was observed on rocks just off of South Bay. On 7 July, an individual was observed with a large salmon in its mouth from Stake 9, and on July 25 another was observed from West Rough with a salmon in its mouth. On 13 July, thirteen plus adults were observed on Frog Rock. On 27 August, sixty-two pups were counted on a beach at Steller's Cove. Pups were swimming in water confidently and vigorously. One to two adults were seen frequently throughout the summer in Chowiet Bay fishing. In August, groups of adults up to fifteen strong were observed in waters just off of West Rough.

Sea Otter (*Enhydra lutris*)

On 18 May, two individuals were observed in Steller's Cove, one individual at southern end of South Bay, and one observed in Chowiet Bay. On 22 May, an adult with a small pup was observed in Spruce Cove. An adult with a small pup was observed in the evening in Landing

Cove on 23 May; adult was letting pup drift freely in calm waters while it dove for food—adult would swim back to pup and then haul it a short distance to a new location and set it adrift again while adult proceeded to feed. On 24 May, two adults and one juvenile were observed in Spruce Cove and four adults with one pup observed in Eider Cove. On 28 May, an adult and pup were observed below Stake 1 feeding, and a single adult was observed below Stake 7. On 29 May, a total of seventeen individuals were seen in Chowiet Bay: three females, one pup and one male just east of Landing Cove; four females, four pups, one juvenile, and one male one Eider Cove side of Otter Point all in very close proximity to one another. On 30 May, an individual was observed eating a large, purple urchin in Castle Crag Cove. On 2 June, a female and a large pup were observed napping atop a kelp-covered rock in east Chowiet Bay; pup was frisky and entered water to play by itself while mom slept. A large male approached and climbed atop rock with both female and pup and then all three entered water and began to play together. On 4 June, a female was observed leaving her pup to float while she fed in Landing Cove. On 8 June, a very blonde (full body yellow colored) pup and mom were seen off of Otter Point (this was second time this blonde pup was seen in area). On 20 June, four adults and two mother-pup pairs were observed off of West Rough. On 26 June, a female and pup were observed at South Beach, and on 6 July three adults were observed just past breakers at South Beach. On 9 July, a mother and pup were observed in sheltered, deep-water area off of North Point wrapped in kelp. On 24 July, two mother-pup pairs observed at South Beach, and one single adult interacted with mother-pup pair for some time—pup would become distressed as mother and other adult became engaged in vigorous, physical activity (?) and would start crying out. On 29 July, two adults were very curious about observer's behavior on banks over Spruce Cove—otters would swim very close to shore and rise half-out of water, staring at observers for over a minute at a time. On 3 August, an adult was observed eating a large orangish-red chiton in Steller's Cove. On 14 August, three individuals were observed in South Bay.

Arctic Ground Squirrel (*Spermophilus parryii*)

On 19 May, three very small and young (about $\frac{1}{4}$ the size of an adult) were observed playing near burrow entrance below Stake 1. Many individuals were observed on rock piles on hike to South Bay on 22 May. On 3 June, an individual was observed in beach rocks in parakeet auklet nesting area in east Landing Cove. On 11 June, an individual was heard in same parakeet auklet nesting area and three depredated parakeet auklets were found in their crevices, apparently devoured by an ARGS. On 19 June, several young individuals were observed playing together near burrow entrances. On 5 July, two individuals were observed foraging on plants (Lady-Ferns, etc.) around cabin and fleeing to a hole the led beneath wall tent. By 8 July, three individuals were commonly observed around cabin. On 9 July, a dead and dangling individual was observed in the talons of bald eagle. On 30 July, a corpse was observed at a glaucous-winged gull nest at West Rough. On 14 August, a corpse was observed in trail, no apparent cause of death readily available—no signs of predation and not emaciated. Over the season, many individuals were observed being carried to rough-legged hawk nest by adult.

History of Referenced Visits and Studies Conducted in the Semidi Islands

Date	Species Monitored/ Data referenced	Source
1845 - 1914	Fox ranching - Chowiet and Aghiyuk.	Bower, W. T. & H. D. Aller. 1917.
1913	First ornithological data	Brooks, W. S. 1915
1940	Notes on avifauna	Gabrielson, I. N. & F. C. Lincoln. 1959.
1945	Notes on avifauna	Gabrielson, I. N. & F. C. Lincoln. 1959.
1946	Notes on avifauna	Gabrielson, I. N. & F. C. Lincoln. 1959.
1972	Population estimates of seabirds	Troyer (unpubl. Data).
1976, 24 May - 4 Sept	All species of seabirds	Hatch, S. A. 1978. Leschner, L. L. & G. Burrell. 1977.
1977	NOFU, BLKI, COMU, TBMU, RHAU	Hatch, S.A. 1978. & 1988.
1978	NOFU, BLKI, COMU, TBMU, RHAU	Hatch, S.A. 1978. & 1988.
1979	NOFU, BLKI, COMU, TBMU, RHAU	Hatch, S. A. & M. A. Hatch. 1979.
1980	NOFU, BLKI, COMU, TBMU	Hatch, S. A. & M. A. Hatch 1983.
1981	NOFU, BLKI, COMU, TBMU	Hatch, S. A. & M. A. Hatch 1983.
1985	HOPU, TUPU - Suklik	Hatch, S. A. & G. A. Sanger. 1992.
1986	HOPU, TUPU - Suklik	Hatch, S. A. & G. A. Sanger. 1992.
1987	HOPU, TUPU - Suklik	Hatch, S. A. & G. A. Sanger. 1992.
1989, 17 Jun - 20 Aug	NOFU, BLKI, COMU, TBMU	Baggot et. al. 1989.
1990, 15 May - 26 Aug	NOFU, BLKI, COMU, TBMU	Dragoo et. al. 1991a.
1991, 21 May - 31 Aug	NOFU, BLKI, COMU, TBMU	Dragoo et. al. 1991b.
1995, 10 Jun - 15 Aug	NOFU, BLKI, COMU, TBMU, GWGU - Chowiet. HOPU, TUPU - Suklik. CAGO - Anowik.	Nevins, H. M. & J. Adams. 1999
1998, 10 May - 5 Sept	NOFU, BLKI, COMU, TBMU, GWGU, RHAU, PAAU - Chowiet. HOPU, TUPU - Suklik. CAGO - Anowik.	Nevins, H. M. & J. Adams. 1999.
2002, 5 May - 15 Sept	NOFU, BLKI, COMU, TBMU, GWGU, RHAU, PAAU - Chowiet. HOPU, TUPU - Suklik.	Wang, S. W. 2002.
2004, 5 Jun - 15 Aug	NOFU, BLKI, COMU, TBMU, GWGU, RHAU - Chowiet. HOPU, TUPU - Suklik.	Larned, A. 2004.
2005, 13 May - 2 Sept	NOFU, BLKI, COMU, TBMU, GWGU, RHAU, PAAU, HOPU, TUPU	Larned, A. L. & S. F. Sapora. 2005