

BIOLOGICAL MONITORING AT AIKTAK ISLAND, ALASKA IN 2005: SUMMARY
APPENDICES



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Key words: Aiktak Island, Alaska, Aleutian Islands, ancient murrelet, *Cephus columba*, common murre, double-crested cormorant, fork-tailed storm-petrel, *Fratercula cirrhata*, *Fratercula corniculata*, glaucous-winged gull, horned puffin, *Larus glaucescens*, Leach's storm-petrel, *Oceanodroma leucorhoa*, *Oceanodroma furcata*, pelagic cormorant, *Phalacrocorax auritus*, *Phalacrocorax pelagicus*, *Phalacrocorax urile*, pigeon guillemot, population trends, productivity, red-faced cormorant, *Synthliboramphus antiquus*, thick-billed murre, tufted puffin, *Uria aalge*, *Uria lomvia*

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TABLE OF CONTENTS

INTRODUCTION	1
STUDY AREA.....	1
METHODS.....	1
ACKNOWLEDGEMENTS.....	2
LITERATURE CITED	2
FIGURE AND TABLES.....	3
Leach's Storm-petrels.....	4-13
Breeding Chronology	4
Reproductive Performance	6
Chick Growth.....	13
Fork-tailed Storm-petrels.....	14-23
Breeding Chronology	14
Reproductive Performance	16
Chick Growth	23
Unspecified Storm-petrel.....	24-35
Reproductive Performance	24
Density/Occupancy	31
Adult Measurements	33
Band Re-sightings.....	35
Black Oystercatcher	36-39
Breeding Chronology	36
Reproductive Performance	37
Populations	39
Glaucous-winged Gull	40-50
Breeding Chronology	40
Reproductive Performance	42
Populations	45
Fledgling Index.....	48
Density	49
Thick-billed Murres	51
Reproductive Performance	51
Common Murre.....	52
Reproductive Performance	52
Murre Species.....	53-55
Populations	53
Pigeon Guillemot.....	56-59
Populations	56
Ancient Murrelet.....	60-62
Breeding Chronology	60
Reproductive Performance	61
Horned Puffin.....	63-68
Breeding Chronology	63
Reproductive Performance	64
Populations	65
Chick Growth.....	68
Tufted Puffin	69-74
Breeding Chronology	69
Reproductive Performance	71
Chick Growth.....	73
Density/Occupancy	74
Miscellaneous.....	75-94
Boat-based Circumnavigations	75
Off-road Point Count Route	77
Passerine Transects	79
Annotated List	80

Breeding Status.....	87
Breeding Chronology	89
Flower Chronology.....	90
Sea Surface Temperature.....	92

INTRODUCTION

The Alaska Maritime National Wildlife Refuge (AMNWR) annually monitors selected species of seabirds at nine ecological monitoring sites throughout Alaska. The objective of this long term project, is to collect baseline status and trend data for a suite of species representing piscivorous and planktivorous trophic guilds. Members of these guilds include species which feed in both nearshore and offshore waters and include key species that serve as indicators of ecosystem health. By correlating data with environmental conditions and information from other sites, ecosystem processes may be better understood.

The specific monitoring goals in 2005 were to estimate population and/or productivity parameters for 11 indicator species representing 3 major feeding guilds: diving fish-feeders (pelagic, red-faced and double-crested cormorants [*Phalacrocorax pelagicus*, *P. urile*, and *P. auritus* respectively], common and thick-billed murrets [*Uria aalge* and *U. lomvia* respectively] pigeon guillemots [*Cepphus columba*], horned and tufted puffins [*Fratercula corniculata* and *F. cirrhata* respectively]), diving plankton feeders (ancient murrelets [*Synthliboramphus antiquus*]), and surface plankton feeders (Leach's and fork-tailed storm-petrels [*Oceanodroma leucorhoa* and *O. furcata* respectively]). Additional species monitored at Aiktak Island include glaucous-winged gulls (*Larus glaucescens*) and black oystercatchers (*Haematopus bachmani*). In addition, food habits, chick growth, and populations were described for one or more of the above species.

Detailed results of the 2005 monitoring program are contained in these appendices and archived at the AMNWR office in Homer, AK.

STUDY AREA

Aiktak Island (N 54° 11' 10", W 164° 50' 00") is located in the eastern Aleutians Islands on the west side of Unimak Pass, directly south of Ugamak Island. Unimak pass is the main shipping route between the North Pacific Ocean and the Bering Sea. Aiktak Island is approximately 2 km by 1 km, with an area of 155 ha, a circumference of about 7.3 km, and a maximum elevation of 170m. The breeding bird community at Aiktak Island is one of the most diverse of any island in the eastern Aleutian Islands, and for that reason Aiktak Island has been designated as the annual monitoring site in the eastern Aleutian Island portion of the Alaska Maritime National Wildlife Refuge seabird monitoring system.

METHODS

Personnel—Joel Helm and Tyra Zeman were the U.S Fish and Wildlife Service Biological Technicians on Aiktak from 10 May through 10 September.

Data collection and analysis—Researchers followed data collection and analysis methods outlined in the Aiktak Island Protocols, archived at Alaska Maritime National Wildlife Refuge, in Homer, Alaska with the following exceptions:

- Dashes in tables indicate data are either unavailable or not yet summarized.
- Storm-petrels.
 - Plot 26 was included when analyzing productivity, but not included when determining occupancy due to the presence of artificial burrows. All artificial burrows remained empty throughout the season.
 - Only adults in non-chronological burrows were measured in order to minimize disturbance of chronological birds.
 - The analysis of storm petrel data was separated by visitation regime.
- Black oystercatchers.
 - Data analysis includes all nest attempts. Early nest attempts were destroyed by a strong storm on 5/27/05, which covered beaches with kelp forcing the majority

of birds to relay. Subsequent nests were also monitored for productivity and chronology.

- Murres.
 - Population counts were affected by irregular cliff attendance.
 - Counts of rafting birds are listed in the annotated list.
- Pigeon guillemot.
 - Boat-based population counts were conducted simultaneously with general circumnavigations.
- Horned puffins.
 - Burrows were monitored following guidelines set forth by the Ecological Methods of the Aleutian Islands Unit, AMNWR (Williams et al 2002).
- Tufted puffins.
 - Data analysis for productivity includes all burrows monitored, since visitation intervals were identical creating equal disturbance. The first thirty chicks hatching in 2005 were used for chick growth analysis.
- Data loggers.
 - One data logger was lost due to strong current and storms.

ACKNOWLEDGMENTS

We would like to thank the crew of the *M/V Tiglax* for providing transportation, morale, and expert advice with regards to working in the Unimak Pass Area. In addition, we would like to thank Jeff Williams, Kent Sundseth, Vernon Byrd, Steve Ebbert and Lisa Scharf for providing a clear mode of radio communications throughout the year, as well as logistical support in relation to the research and data analysis completed in 2005.

LITERATURE CITED

Williams, J.C., L. Scharf, and G.V. Byrd. 2002. Ecological monitoring methods of the Aleutian Islands Unit, Alaska Maritime National Wildlife Refuge – revised edition 2. U.S. Fish and Wildl. Serv. Rep., AMNWR 00/01. Adak, Alas. 351pp.

FIGURES AND TABLES

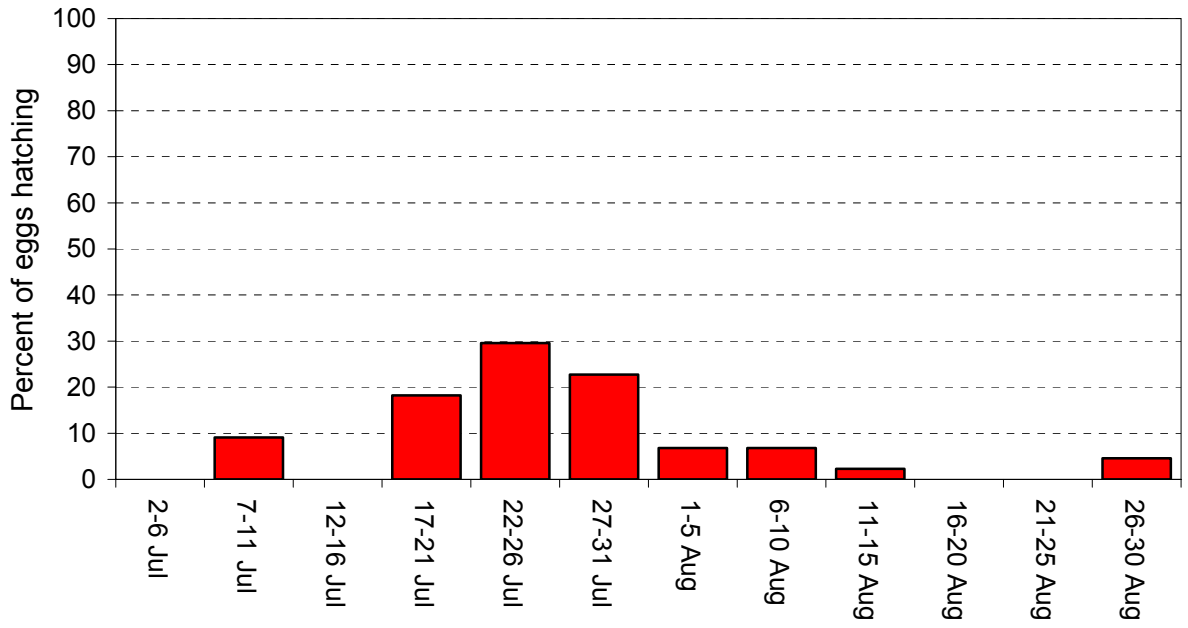


Figure 1. Hatching chronology of Leach's storm-petrels at Aiktak Island, Alaska, in 2005.

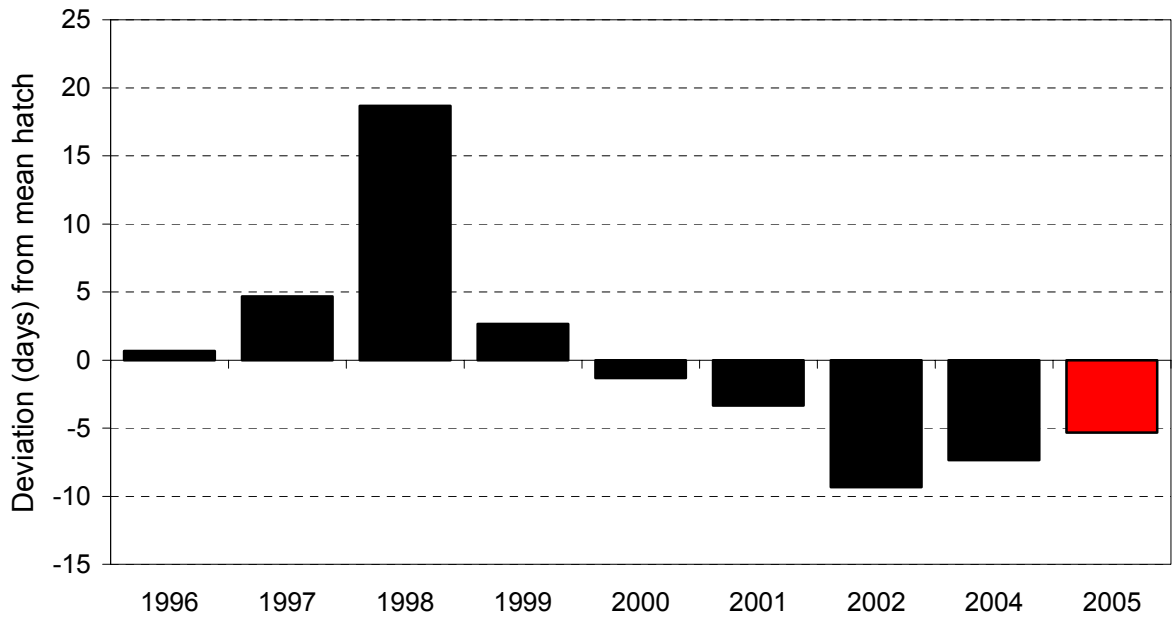


Figure 2. Yearly hatch date deviation (from the 1996-2005 average of 31 July) of Leach's storm-petrels at Aiktak Island, Alaska. Numbers below the mean indicate earlier hatch dates, while those above indicate later hatch dates.

Table 1. Breeding chronology dates of Leach's storm-petrels at Aiktak Island, Alaska. Chronology burrows were monitored on an interval of ≤ 7 days.

Year	Mean hatch	SD	n	median hatch	mean fledge	SD	n	median fledge	no. nests monitored	first hatch	last hatch	first fledge
1995 ^a	--	--	--	--	--	--	--	--	--	--	--	--
1996	1 Aug	7.40	33	29 Jul	--	--	--	--	64	6 Jul	18 Aug	--
1997	6 Aug	9.11	62	5 Aug	--	--	--	--	98	20 Jul	30 Aug	--
1998	20 Aug	4.35	23	20 Aug	--	--	--	--	83	14 Jul	1 Sep	--
1999	4 Aug	9.39	35	1 Aug	--	--	--	--	109	11 Jul	29 Aug	--
2000	30 Jul	10.89	42	28 Jul	--	--	--	--	114	9 Jul	4 Sep	--
2001	29 Jul	7.30	27	29 Jul	--	--	--	--	83	10 Jul	26 Aug	--
2002	23 Jul	6.53	10	23 Jul	--	--	--	--	15	9 Jul	31 Jul	--
2003 ^b	--	--	--	--	--	--	--	--	--	--	--	--
2004	24 Jul	8.67	37	24 Jul	--	--	--	--	78	5 Jul	16 Aug	--
2005	27 Jul	10.69	44	23 Jul	--	--	--	--	123	11 Jul	30 Aug	--

^a1995 data were collected on a ≥ 14 day interval and are not comparable.

^bThere are no chronology data for 2003.

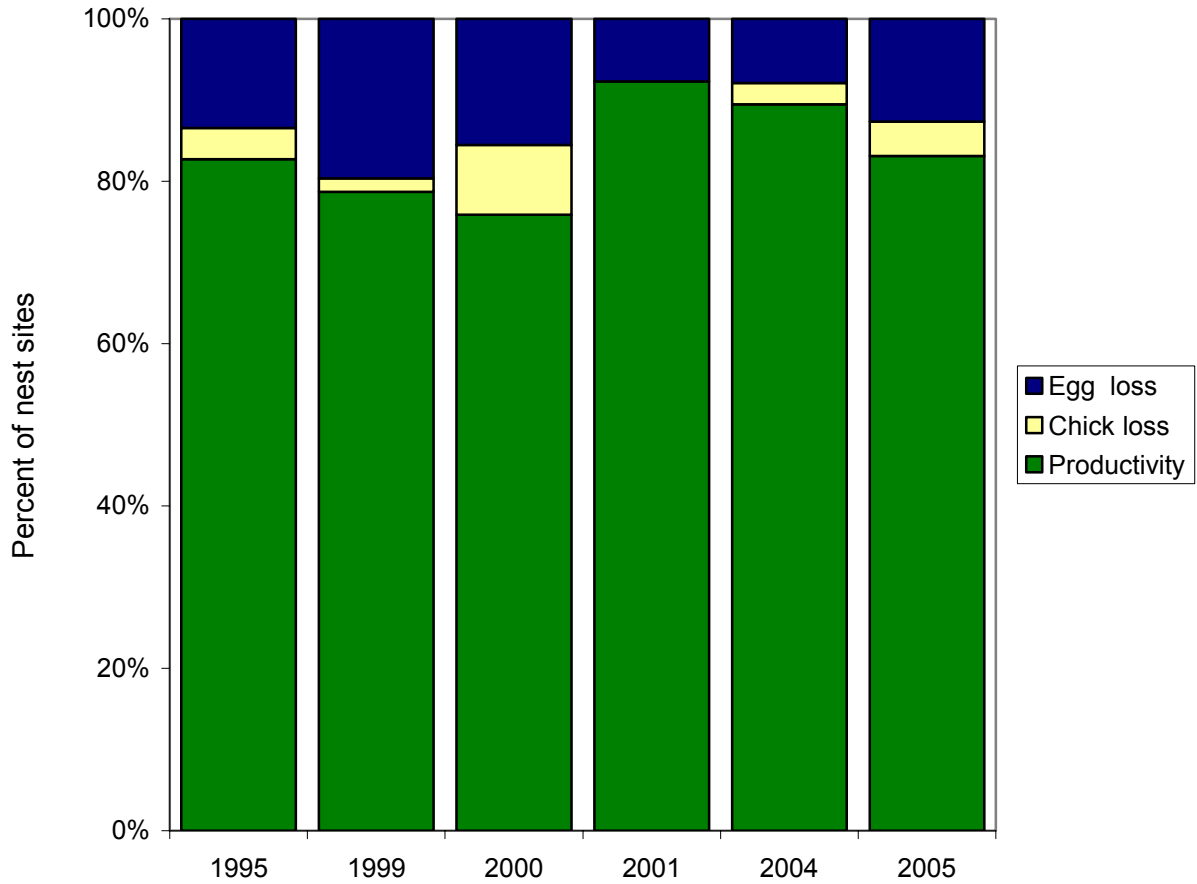


Figure 3. Reproductive performance of Leach's storm-petrels in non-chronology burrows at Aiktak Island, Alaska. Non-chronology burrows were monitored on an interval of ≥ 14 days. The values represent the maximal reproductive potential. Actual values were undoubtedly lower. Egg loss= $(C-D)/C$; Chick loss= $(D-E)/C$, where C=number of eggs, D=number of eggs hatched, E=number of chicks fledged or still alive at last check.

Table 2. Productivity values of Leach's storm-petrels in non-chronology burrows at Aiktak Island, Alaska. Non-chronology burrows were monitored on an interval of ≥ 14 days.

Parameter	1995	1996 ^b	1997	1998	1999	2000	2001	2002	2003 ^c	2004	2005
No. burrows w/known contents (A)	129	--	--	--	205	223	218	--	--	321	272
No. occupied burrows (B)	55	--	--	--	65	60	53	--	--	38	72
No. eggs w/ known fate (C)	52	--	--	--	61	58	52	--	--	38	68
eggs lost to: disappearance	3	--	--	--	1	5	0	--	--	1	0
abandonment	2	--	--	--	9	3	4	--	--	1	2
breakage	2	--	--	--	2	1	0	--	--	1	7
No. eggs remaining at last visit (unknown fate)	0	--	--	--	2	1	0	--	--	0	1
No. chicks (D)	45	--	--	--	49	49	48	--	--	35	62
chicks lost to: disappearance ^a	2	--	--	--	0	1	0	--	--	1	0
death	0	--	--	--	1	4	0	--	--	0	3
No. chicks potentially successful (E)	43	--	--	--	48	44	48	--	--	34	59
chicks disapp. at > 50 days old	0	--	--	--	0	0	0	--	--	0	0
chicks still present at last visit	43	--	--	--	48	44	48	--	--	34	59
Hatching success (D/C)	0.87	--	--	--	0.80	0.84	0.92	--	--	0.92	0.91
Fledging success (E/D)	0.96	--	--	--	0.98	0.90	1.00	--	--	0.97	0.95
Reproductive success (E/C)	0.83	--	--	--	0.79	0.76	0.92	--	--	0.89	0.87

^aChicks known to be < 50 days old when they disappeared.

^bData collected in 1996, 1997, 1998, and 2002 were collected on a ≤ 7 day interval and are not comparable.

^cThere are no productivity data for 2003.

Table 3. Productivity values of Leach's storm-petrels in non-chronology burrows at Aiktak Island, Alaska, in 2005. Non-chronology burrows were monitored on an interval of ≥ 14 days.

Parameter	Plot													All Plots	SD
	9	10	11	13	16	17	18	19	20	21	22	24	26		
No. burrows w/known contents (A)	28	21	27	12	9	14	32	27	25	18	11	14	34	272	
No. occupied burrows (B)	6	5	7	1	4	4	11	7	10	4	1	7	5	72	
No. eggs w/ known fate (C)	6	5	7	1	4	4	11	7	9	4	1	7	5	68	
eggs lost to: disappearance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
abandonment	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0
breakage	1	2	1	0	0	0	2	0	1	0	0	0	0	7	0
No. eggs remaining at last visit (unknown fate)	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
No. chicks (D)	5	3	6	1	4	4	9	7	8	4	1	5	5	62	
chicks lost to: disappearance ^a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
death	0	0	1	0	0	0	0	0	0	1	0	1	0	3	0
No. chicks potentially successful (E)	5	3	5	1	4	4	9	7	8	3	1	4	5	59	
chicks disapp. at > 50 days old	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
chicks still present at last visit	5	3	5	1	4	4	9	7	8	3	1	4	5	59	0
Hatching success (D/C)	0.83	0.60	0.86	1.00	1.00	1.00	0.82	1.00	0.89	1.00	1.00	0.71	1.00	0.91	0.32
Fledging success (E/D)	1.00	1.00	0.83	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.80	1.00	0.95	0.08
Reproductive success (E/C)	0.83	0.60	0.71	1.00	1.00	1.00	0.82	1.00	0.89	0.75	1.00	0.57	1.00	0.70	0.35

^aChicks known to be < 50 days old when they disappeared.

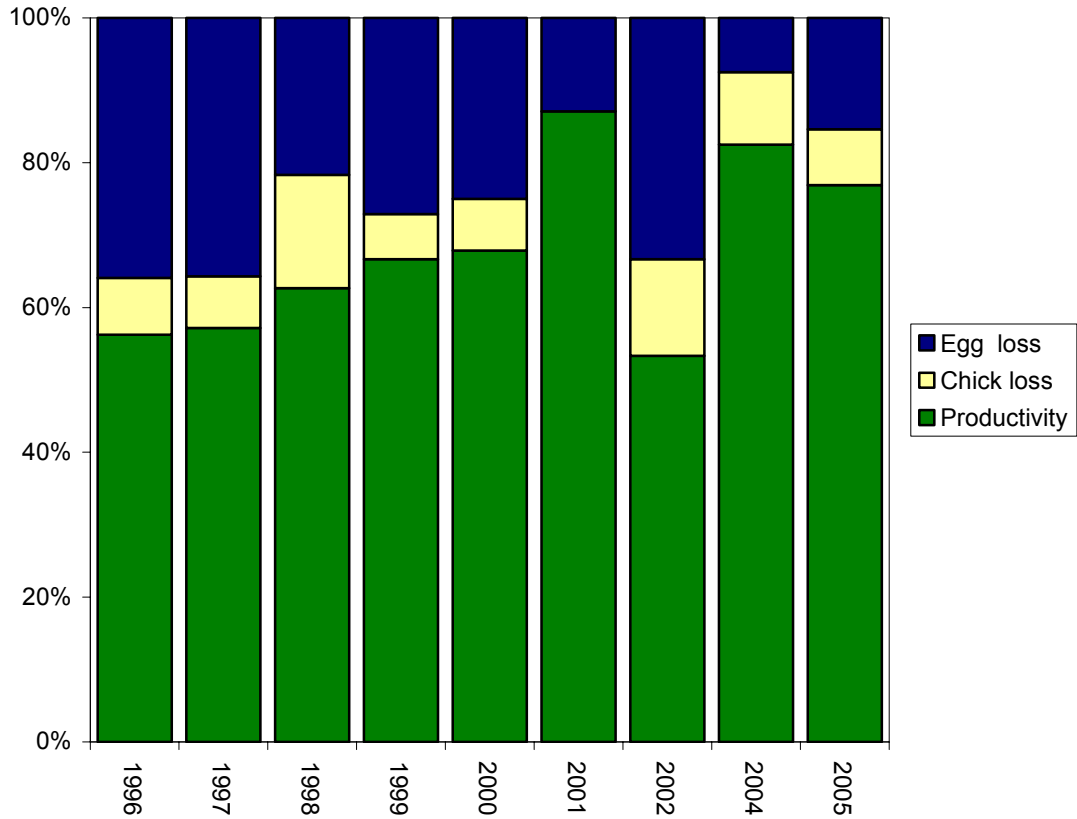


Figure 4. Reproductive performance of Leach's storm-petrels in chronology burrows at Aiktak Island, Alaska. Chronology burrows were monitored on an interval of ≤ 7 days. The values represent the maximal reproductive potential. Actual values were undoubtedly lower. Egg loss= $(C-D)/C$; Chick loss= $(D-E)/C$, where C=number of eggs, D=number of eggs hatched, E=number of chicks fledged or still alive at last check.

Table 4. Productivity values of Leach's storm-petrels in chronology burrows at Aiktak Island, Alaska. Chronology burrows were monitored on an interval of ≤ 7 days.

Parameter	1995 ^b	1996	1997	1998	1999	2000	2001	2002	2003 ^c	2004	2005
No. burrows w/known contents (A)	--	202	323	375	167	195	131	277	--	264	213
No. occupied burrows (B)	--	68	103	87	49	60	33	17	--	44	52
No. eggs w/ known fate (C)	--	64	98	83	48	56	31	15	--	40	52
eggs lost to: disappearance	--	2	5	2	0	2	0	5	--	0	0
abandonment	--	3	27	10	12	9	3	0	--	2	6
breakage	--	18	3	6	1	3	1	0	--	1	2
No. eggs remaining at last visit (unknown fate)	--	0	4	3	1	0	1	0	--	1	0
No. chicks (D)	--	41	63	65	35	42	27	10	--	37	44
chicks lost to: disappearance ^a	--	0	0	1	1	0	0	2	--	3	0
death	--	5	7	12	2	4	0	0	--	1	4
No. chicks potentially successful (E)	--	36	56	52	32	38	27	8	--	33	40
chicks disapp. at > 50 days old	--	0	0	0	0	0	0	0	--	0	0
chicks still present at last visit	--	36	56	52	32	38	27	8	--	33	40
Hatching success (D/C)	--	0.64	0.64	0.78	0.73	0.75	0.87	0.67	--	0.93	0.85
Fledging success (E/D)	--	0.88	0.89	0.80	0.91	0.90	1.00	0.80	--	0.89	0.91
Reproductive success (E/C)	--	0.56	0.57	0.63	0.67	0.68	0.87	0.53	--	0.83	0.77

^aChicks known to be < 50 days old when they disappeared.

^a1995 data were collected on a ≥ 14 day interval and are not comparable.

^bThere are no productivity data for 2003.

Table 5. Productivity values of Leach's storm-petrels in chronology burrows at Aiktak Island, Alaska, in 2005. Chronology burrows were monitored on an interval of ≤ 7 days.

Parameter	Plot					All Plots	SD
	8	12	23	25	27		
No. burrows with known contents (A)	43	25	54	39	52	213	
No. occupied burrows (B)	8	4	19	10	11	52	
No. eggs w/ known fate (C)	8	4	19	10	11	52	
eggs lost to: disappearance	0	0	0	0	0	0	
abandonment	1	0	3	0	2	6	
breakage	0	0	0	2	0	2	
No. eggs remaining at last visit (unknown fate)	0	0	0	0	0	0	
No. chicks (D)	7	4	16	8	9	44	
chicks lost to: disappearance ^a	0	0	0	0	0	0	
death	1	0	3	0	0	4	
No. chicks potentially successful (E)	6	4	13	8	9	40	
chicks disapp. at > 50 days old	0	0	0	0	0	0	
chicks still present at last visit	6	4	13	8	9	40	
Hatching success (D/C)	0.88	1.00	0.84	0.80	0.82	0.85	0.05
Fledging success (E/D)	0.86	1.00	0.81	1.00	1.00	0.91	0.06
Reproductive success (E/C)	0.75	1.00	0.68	0.80	0.82	0.77	0.06

^aChicks known to be < 50 days old when they disappeared.

Table 6. Productivity values of Leach's storm-petrels in all burrows at Aiktak Island, Alaska. This dataset includes burrows monitored on intervals of ≤ 7 days and ≥ 14 days.

Parameter	1995	1996	1997	1998	1999	2000	2001	2002	2003 ^b	2004	2005
No. burrows w/known contents (A)	129	202	323	375	372	418	360	277	--	585	485
No. occupied burrows (B)	55	68	103	87	114	120	87	17	--	82	124
No. eggs w/ known fate (C)	52	64	98	83	109	114	83	15	--	78	123
eggs lost to: disappearance	3	2	5	2	1	7	0	5	--	1	0
abandonment	2	3	27	10	21	12	7	0	--	3	8
breakage	2	18	3	6	3	4	1	0	--	2	9
No. eggs remaining at last visit (unknown fate)	0	0	4	3	3	1	1	0	--	1	1
No. chicks (D)	45	41	63	65	84	91	75	10	--	72	106
chicks lost to: disappearance ^a	2	0	0	1	1	1	0	2	--	4	0
death	0	5	7	12	3	8	0	0	--	1	7
No. chicks potentially successful (E)	43	36	56	52	80	82	75	8	--	67	99
chicks disapp. at > 50 days old	0	0	0	0	0	0	0	0	--	0	0
chicks still present at last visit	43	36	56	52	80	82	75	8	--	67	99
Hatching success (D/C)	0.87	0.64	0.64	0.78	0.77	0.80	0.90	0.67	--	0.92	0.86
Fledging success (E/D)	0.96	0.88	0.89	0.80	0.95	0.90	1.00	0.80	--	0.93	0.93
Reproductive success (E/C)	0.83	0.56	0.57	0.63	0.73	0.72	0.90	0.53	--	0.86	0.80

^aChicks known to be < 50 days old when they disappeared.

^bThere are no productivity data for 2003.

Table 7. Mean growth rates of Leach's storm-petrel chicks at Aiktak Island, Alaska. Chicks were measured during the linear phase of growth. Individual chicks measured at least 2 times were the sample units.

Year	n	Mass (g/day)			Wing chord (mm/day)		
		mean	SD	range	mean	SD	range
1995	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--
2002	8(7for wing)	1.4	0.5	0.7-2.3	3.2	0.6	2.5-4.1
2003	--	--	--	--	--	--	--
2004	24	2.1	0.4	1.0-3.1	--	--	--
2005	37	1.9	0.4	1.3-2.9	1.8	0.4	0.7-2.8

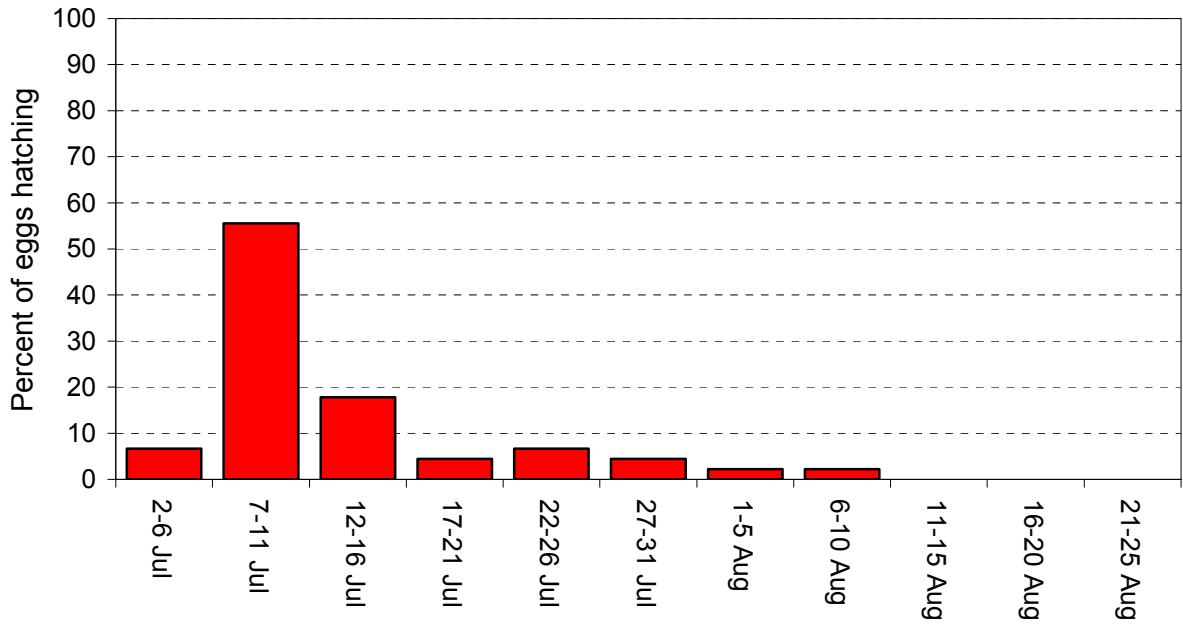


Figure 5. Hatching chronology of fork-tailed storm-petrels at Aiktak Island, Alaska, in 2005.

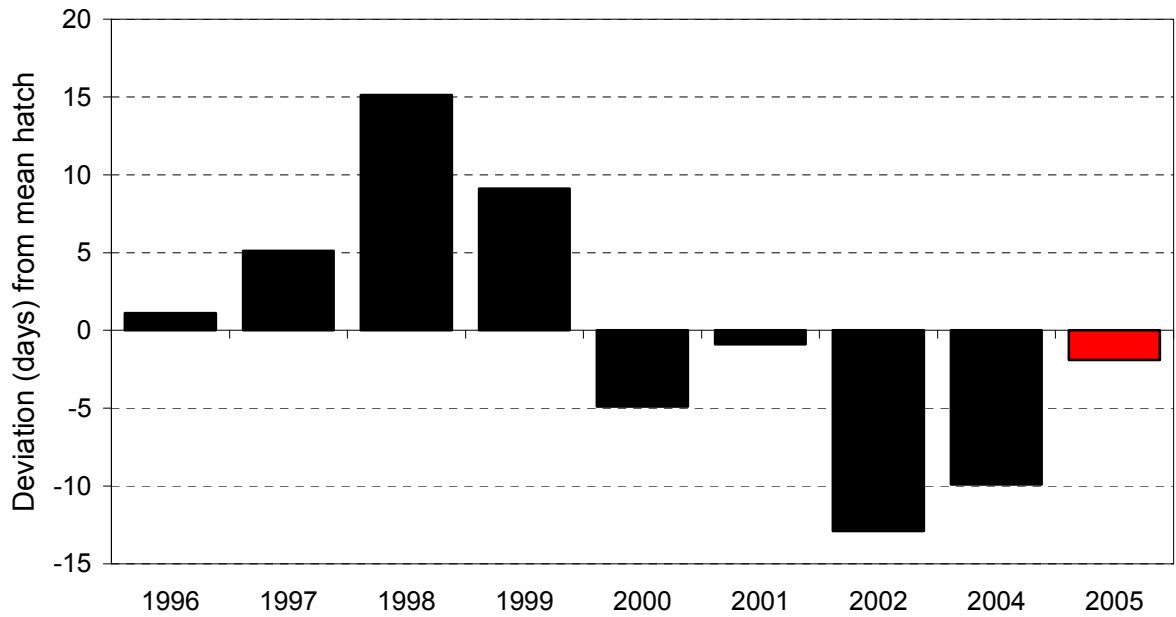


Figure 6. Yearly hatch date deviation (from the 1996-2005 average of 14 July) of fork-tailed storm-petrels at Aiktak Island, Alaska. Numbers below the mean indicate earlier hatch dates, while those above indicate later hatch dates.

Table 8. Breeding chronology dates of fork-tailed storm-petrels at Aiktak Island, Alaska. Chronology burrows were monitored on an interval of ≤ 7 days.

Year	Mean hatch	SD	n	median hatch	mean fledge	SD	n	median fledge	no. nests monitored	first hatch	last hatch	first fledge
1995 ^a	--	--	--	--	--	--	--	--	--	--	--	--
1996	16 Jul	4.80	6	13 Jul	2 Sep	5.74	12	4 Sep	28	3 Jul	25 Jul	21 Aug
1997	21 Jul	10.05	16	19 Jul	--	--	--	--	35	7 Jul	13 Aug	--
1998	31 Jul	11.18	16	27 Jul	--	--	--	--	36	14 Jul	20 Aug	--
1999	25 Jul	8.02	28	24 Jul	--	--	--	--	51	9 Jul	21 Aug	--
2000	10 Jul	9.73	35	8 Jul	4 Sep	3.86	23	5 Sep	61	26 Jun	13 Aug	25 Aug
2001	15 Jul	8.85	38	17 Jul	4 Sep	1.55	6	3 Sep	53	16 Jun	4 Aug	3 Sep
2002	3 Jul	8.56	21	1 Jul	30 Aug	5.00	19	1 Sep	25	20 Jun	2 Aug	22 Aug
2003 ^b	--	--	--	--	--	--	--	--	--	--	--	--
2004	6 Jul	7.61	32	4-Jul	23 Aug	1.51	7	23 Aug	68	22 Jun	19 Jul	17 Aug
2005	14 Jul	8.07	45	11 Jul	30 Aug	0	2	30 Aug	71	23 Jun	10 Aug	30 Aug

^a1995 data were collected on a ≥ 14 day interval and are not comparable.

^bThere are no chronology data for 2003.

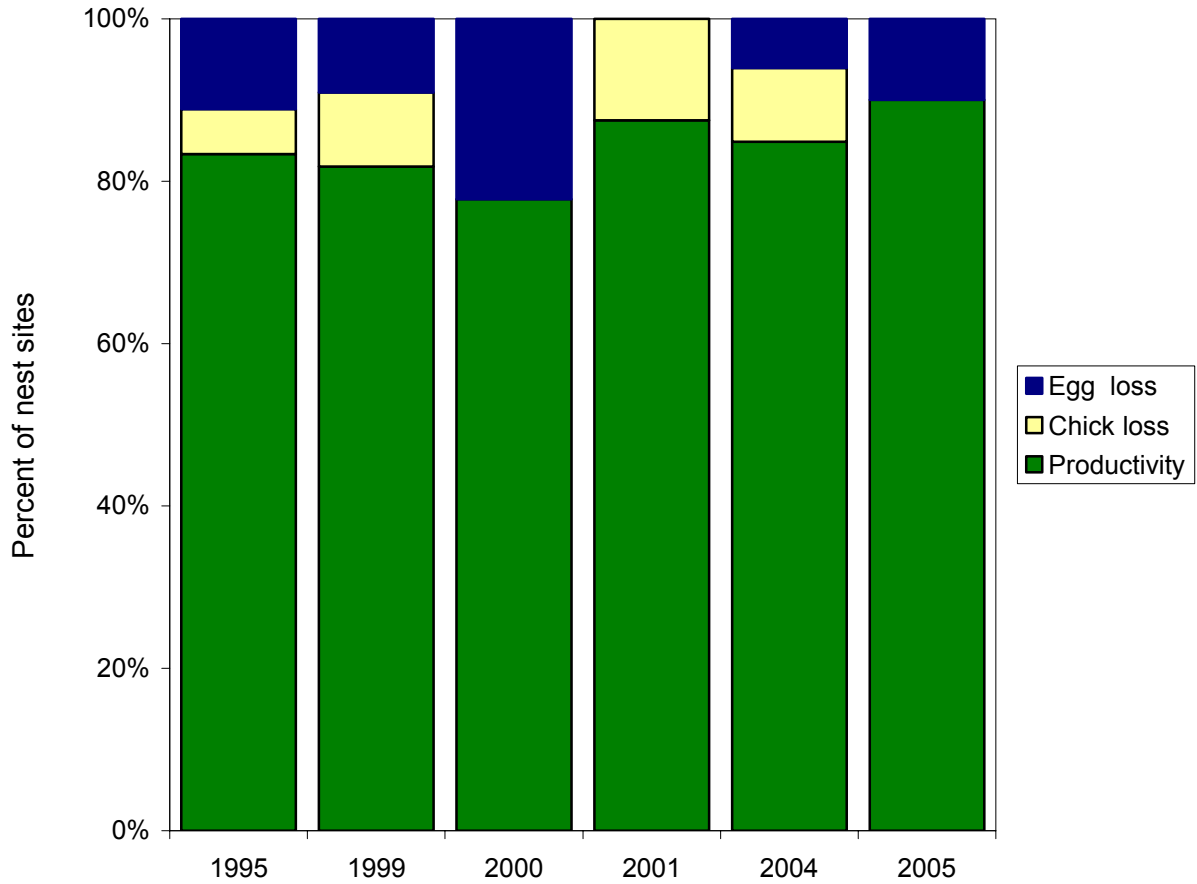


Figure 7. Reproductive performance of fork-tailed storm-petrels in non-chronology burrows at Aiktak Island, Alaska. Non-chronology burrows were monitored on an interval of ≥ 14 days. These values represent the maximal reproductive potential. Actual values were undoubtedly lower. Egg loss= $(C-D)/C$; Chick loss= $(D-E)/C$; Productivity= E/C , where C=number of eggs, D=number of eggs hatched, E=number of chicks fledged or still alive at last check.

Table 9. Productivity values of fork-tailed storm-petrels in non-chronology burrows at Aiktak Island, Alaska. Non-chronology burrows were monitored on an interval of ≥ 14 days.

Parameter	1995	1996 ^b	1997	1998	1999	2000	2001	2002	2003 ^c	2004	2005
No. burrows w/known contents (A)	110	--	--	--	154	199	94	--	--	296	272
No. occupied burrows (B)	21	--	--	--	12	18	8	--	--	33	41
No. eggs w/ known fate (C)	18	--	--	--	11	18	8	--	--	33	20
eggs lost to: disappearance	1	--	--	--	0	1	0	--	--	0	0
abandonment	1	--	--	--	1	3	0	--	--	1	0
breakage	0	--	--	--	0	0	0	--	--	1	2
No. eggs remaining at last visit (unknown fate)	0	--	--	--	0	0	0	--	--	0	0
No. chicks (D)	16	--	--	--	10	14	8	--	--	31	18
chicks lost to: disappearance ^a	0	--	--	--	0	0	0	--	--	3	0
death	1	--	--	--	1	0	1	--	--	0	0
No. chicks potentially successful (E)	15	--	--	--	9	14	7	--	--	28	18
chicks disapp. at > 50 days old	0	--	--	--	0	4	2	--	--	4	2
chicks still present at last visit	15	--	--	--	9	10	5	--	--	24	16
Hatching success (D/C)	0.89	--	--	--	0.91	0.77	1.00	--	--	0.94	0.90
Fledging success (E/D)	0.94	--	--	--	0.90	1.00	0.88	--	--	0.90	1.00
Reproductive success (E/C)	0.83	--	--	--	0.82	0.77	0.88	--	--	0.85	0.90

^aChicks known to be < 50 days old when they disappeared.

^bData collected in 1996, 1997, 1998, and 2002 were collected on a ≤ 7 day interval and are not comparable.

^cThere are no productivity data for 2003.

Table 10. Productivity values of fork-tailed storm-petrels in non-chronology burrows at Aiktak Island, Alaska, in 2005. Non-chronology burrows were monitored on an interval of ≥ 14 days.

Parameter	Plot							All Plots	SD
	9	10	11	16	18	19	24		
No. burrows with known contents (A)	28	21	27	9	32	27	14	158	
No. occupied burrows (B)	2	5	5	1	5	1	1	20	
No. eggs w/ known fate (C)	2	5	5	1	5	1	1	20	
eggs lost to: disappearance	0	0	0	0	0	0	0	0	
abandonment	0	0	0	0	0	0	0	0	
breakage	1	0	0	0	1	0	0	2	
No. eggs remaining at last visit (unknown fate)	0	0	0	0	0	0	0	0	
No. chicks (D)	1	5	5	1	4	1	1	18	
chicks lost to: disappearance ^a	0	0	0	0	0	0	0	0	
death	0	0	0	0	0	0	0	0	
No. chicks potentially successful (E)	1	5	5	1	4	1	1	18	
chicks disapp. at > 50 days old	0	0	0	0	0	0	0	0	
chicks still present at last visit	1	5	5	1	4	1	1	18	
Hatching success (D/C)	0.50	1.00	1.00	1.00	0.80	1.00	1.00	0.90	0.39
Fledging success (E/D)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.41
Reproductive success (E/C)	0.86	1.00	1.00	1.00	0.80	1.00	1.00	0.90	0.39

^aChicks known to be < 50 days old when they disappeared.

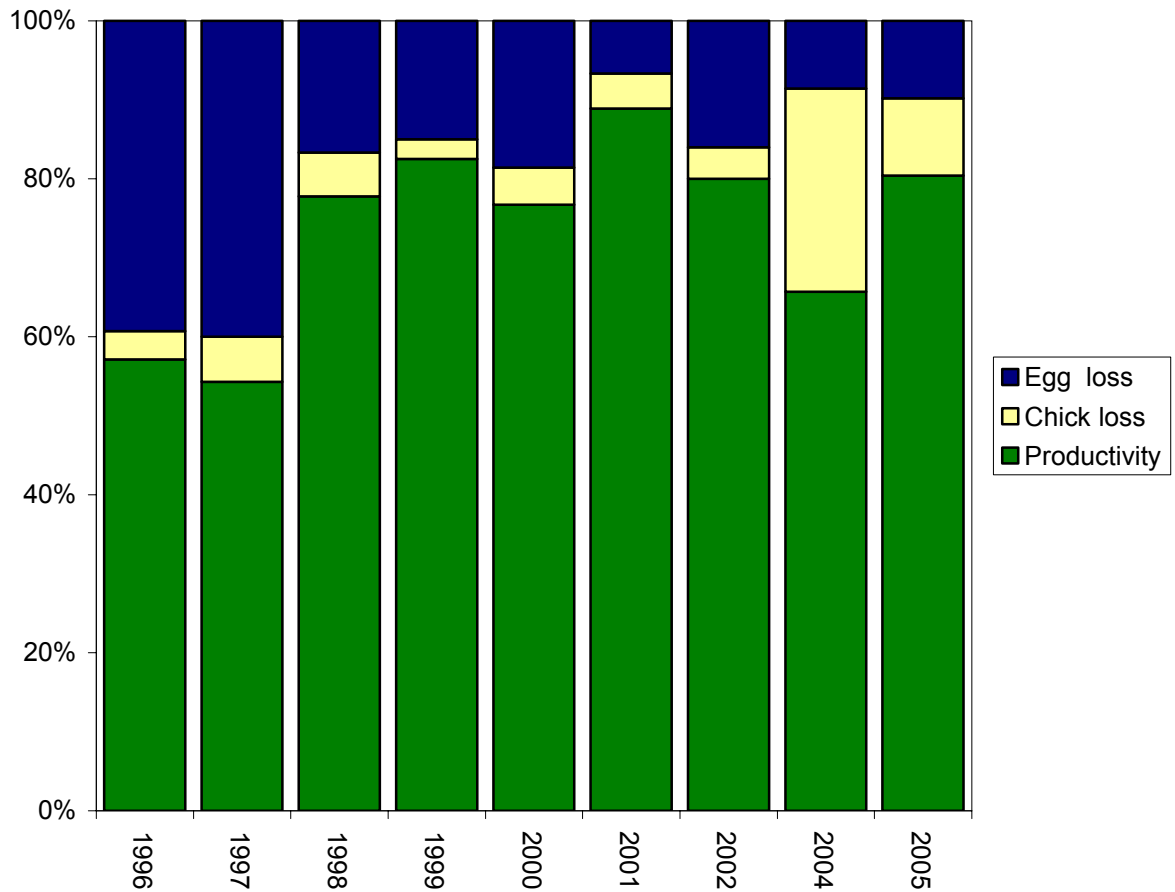


Figure 8. Reproductive performance of fork-tailed storm-petrels in chronology burrows at Aikta Island, Alaska. Chronology burrows were monitored on an interval of ≤ 7 days. The values represent the maximal reproductive potential. Actual values were undoubtedly lower. Egg loss = $(C-D)/C$; Chick loss = $(D-E)/C$, where C = number of eggs, D = number of eggs hatched, E = number of chicks fledged or still alive at last check.

Table 11. Productivity values of fork-tailed storm-petrels in chronology burrows at Aiktak Island, Alaska. Chronology burrows were monitored on an interval of ≤ 7 days.

Parameter	1995 ^b	1996	1997	1998	1999	2000	2001	2002	2003 ^c	2004	2005
No. burrows w/known contents (A)	--	168	292	316	276	348	299	322	--	267	341
No. occupied burrows (B)	--	28	35	36	43	43	46	25	--	35	51
No. eggs w/ known fate (C)	--	28	35	36	40	43	45	25	--	35	51
eggs lost to: disappearance	--	1	1	1	0	4	0	4	--	1	0
abandonment	--	3	13	2	5	3	2	0	--	2	1
breakage	--	7	0	3	1	1	1	0	--	0	4
No. eggs remaining at last visit (unknown fate)	--	0	0	0	2	0	0	0	--	0	0
No. chicks (D)	--	17	21	30	34	35	42	21	--	32	46
chicks lost to: disappearance ^a	--	1	0	0	0	0	0	0	--	9	0
death	--	0	2	2	1	2	2	1	--	0	5
No. chicks potentially successful (E)	--	16	19	28	33	33	40	20	--	23	41
chicks disapp. at > 50 day old	--	12	0	0	0	23	6	19	--	7	2
chicks still present at last visit	--	4	19	28	33	10	34	1	--	16	39
Hatching success (D/C)	--	0.61	0.60	0.83	0.85	0.81	0.93	0.84	--	0.91	0.90
Fledging success (E/D)	--	0.94	0.90	0.93	0.97	0.94	0.95	0.95	--	0.72	0.89
Reproductive success (E/C)	--	0.57	0.54	0.78	0.83	0.76	0.89	0.80	--	0.66	0.80

^aChicks known to be < 50 days old when they disappeared.

^b1995 data were collected on a ≥ 14 day interval and are not comparable.

^cThere are no productivity data for 2003.

Table 12. Productivity values of fork-tailed storm-petrels in chronology burrows at Aiktak Island, Alaska, in 2005. Chronology burrows were monitored on an interval of ≤ 7 days.

Parameter	Plot												All Plots	SD
	8	12	13	17	20	21	22	23	24	25	26	27		
No. burrows with known contents (A)	43	25	12	14	25	18	11	54	14	39	34	52	341	
No. occupied burrows (B)	7	2	2	5	2	3	1	11	1	5	8	4	51	
No. eggs w/ known fate (C)	7	2	2	5	2	3	1	11	1	5	8	4	51	
eggs lost to: disappearance	0	0	0	0	0	0	0	0	0	0	0	0	0	0
abandonment	1	0	0	0	0	0	0	0	0	0	0	0	1	1
breakage	0	0	0	1	0	1	0	0	0	0	1	1	4	1
No. eggs remaining at last visit (unknown fate)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. chicks (D)	6	2	2	4	2	2	1	11	1	5	7	3	46	
chicks lost to: disappearance ^a	0	0	0	0	0	0	0	0	0	0	0	0	0	0
death	0	0	0	1	0	0	0	4	0	0	0	0	5	1
No. chicks potentially successful (E)	6	2	2	3	2	2	1	7	1	5	7	3	41	
chicks disapp. at > 50 days old	0	0	1	0	0	0	0	1	0	0	0	0	2	1
chicks still present at last visit	6	2	1	3	2	2	1	6	1	5	7	3	39	1
Hatching success (D/C)	0.86	1.00	1.00	0.80	1.00	0.67	1.00	1.00	1.00	1.00	0.88	0.75	0.90	0.09
Fledging success (E/D)	1.00	1.00	0.75	1.00	1.00	1.00	0.64	1.00	1.00	1.00	1.00	1.00	0.89	0.14
Reproductive success (E/C)	0.86	1.00	1.00	0.60	1.00	0.67	1.00	0.64	1.00	1.00	0.88	0.75	0.80	0.12

^aChicks known to be < 50 days old when they disappeared.

Table 13. Productivity values of fork-tailed storm-petrels in all burrows at Aiktak Island, Alaska. This dataset includes burrows monitored on an interval of ≤ 7 days and ≥ 14 days.

Parameter	1995	1996	1997	1998	1999	2000	2001	2002	2003 ^b	2004	2005
No. burrows w/known contents (A)	110	168	292	316	336	410	371	322	--	593	45
No. occupied burrows (B)	21	28	35	36	55	61	54	25	--	68	71
No. eggs w/ known fate (C)	18	28	35	36	51	61	53	25	--	68	71
eggs lost to: disappearance	1	1	1	1	0	5	0	4	--	1	0
abandonment	1	3	13	2	6	6	2	0	--	3	1
breakage	0	7	0	3	1	1	1	0	--	1	6
No. eggs remaining at last visit (unknown fate)	0	0	0	0	2	0	0	0	--	0	0
No. chicks (D)	16	17	21	30	42	49	50	21	--	63	64
chicks lost to: disappearance ^a	0	1	0	0	0	0	0	0	--	12	0
death	1	0	2	2	2	2	3	1	--	0	5
No. chicks potentially successful (E)	15	16	19	28	40	47	47	20	--	51	59
chicks disapp. at > 50 days old	0	12	0	0	0	27	8	19	--	11	2
chicks still present at last visit	15	4	19	28	40	20	39	1	--	40	57
Hatching success (D/C)	0.89	0.61	0.60	0.83	0.82	0.80	0.94	0.84	--	0.93	0.90
Fledging success (E/D)	0.94	0.94	0.90	0.93	0.95	0.96	0.94	0.95	--	0.81	0.92
Reproductive success (E/C)	0.83	0.57	0.54	0.78	0.78	0.77	0.89	0.80	--	0.75	0.83

^aChicks known to be < 50 days old when they disappeared.

^bThere are no productivity data for 2003.

Table 14. Mean growth rates of fork-tailed storm-petrel chicks at Aiktak Island, Alaska. Chicks were measured during the linear phase of growth (wing chord between 20 and 140 mm). Individual chicks measured at least 2 times were the sample units.

Year	n	Mass (g/day)			Wing chord (mm/day)		
		mean	SD	range	mean	SD	range
1995	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--
2001	28	2.3	0.8	1.2-4.2	2.7	0.7	0.8-3.5
2002	20	1.2	0.5	0.2-2.2	3.5	0.5	2.4-4.6
2003	--	--	--	--	--	--	--
2004	25	2.8	0.7	1.8-4.9	--	--	--
2005	41	2.4	0.6	1.1-3.8	2.6	0.4	0.6-3.0

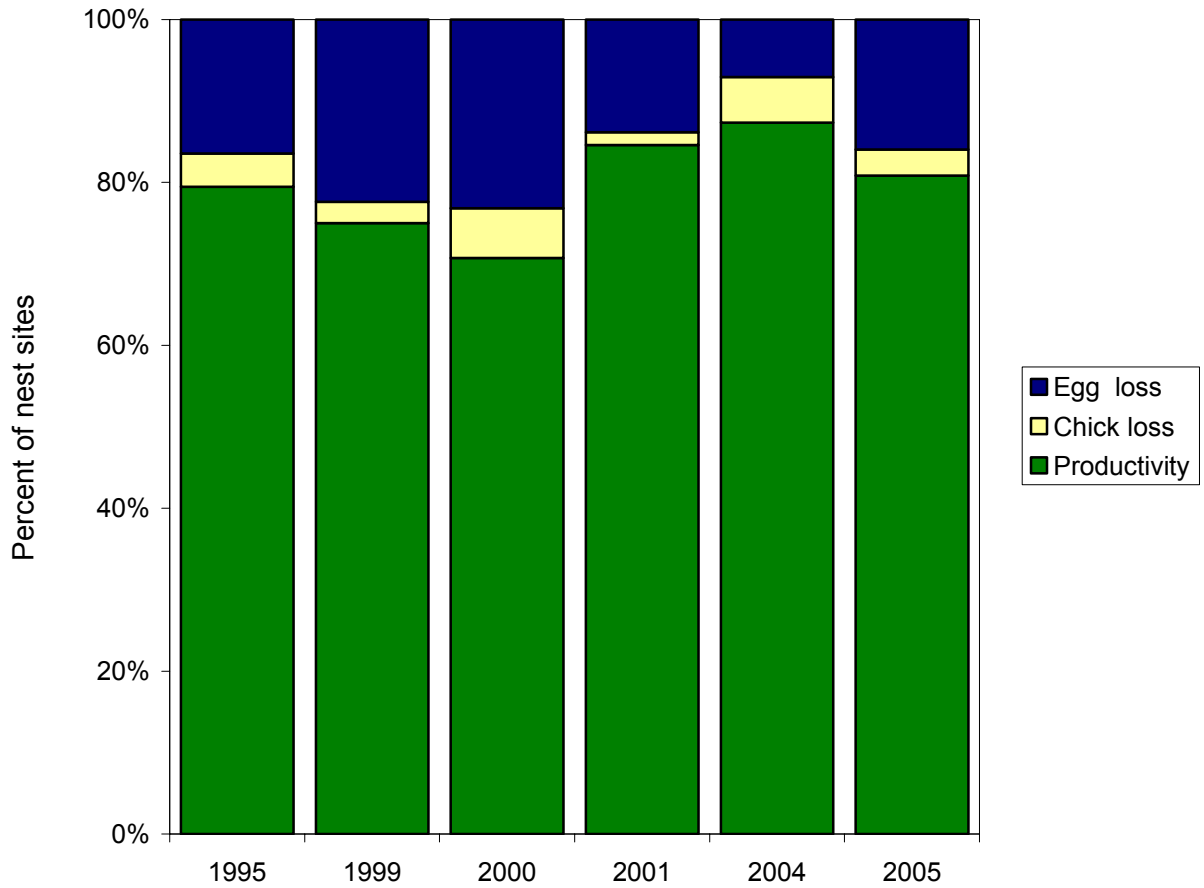


Figure 9. Reproductive performance of storm-petrels (Leach's, fork-tailed, and unknown petrel species) in non-chronology burrows at Aiktak Island, Alaska. These values represent the maximal reproductive potential. Non-chronology burrows were monitored on an interval of ≥ 14 days. Actual values were undoubtedly lower. Egg loss= $(C-D)/C$; Chick loss= $(D-E)/C$; Productivity= E/C , where C=number of eggs, D=number of eggs hatched, E=number of chicks fledged or still alive at last check.

Table 15. Productivity values of storm-petrels (Leach's, fork-tailed, and unknown petrel species) in non-chronology burrows at Aiktak Island, Alaska. Non-chronology burrows were visited on an interval of ≥ 14 days.

Parameter	1995	1996 ^b	1997	1998	1999	2000	2001	2002	2003 ^c	2004	2005
No. burrows w/known contents (A)	129	--	--	--	205	223	219	--	--	334	272
No. occupied burrows (B)	84	--	--	--	94	89	87	--	--	71	123
No. eggs w/ known fate (C)	73	--	--	--	76	82	65	--	--	71	94
eggs lost to: disappearance	4	--	--	--	2	9	1	--	--	1	1
abandonment	4	--	--	--	11	6	7	--	--	1	2
breakage	4	--	--	--	4	4	1	--	--	2	12
No. eggs remaining at last visit (unknown fate)	0	--	--	--	4	1	4	--	--	0	1
No. chicks (D)	61	--	--	--	59	63	56	--	--	66	79
chicks lost to: disappearance ^a	2	--	--	--	0	1	0	--	--	4	0
death	1	--	--	--	2	4	1	--	--	0	3
No. chicks potentially successful (E)	58	--	--	--	57	58	55	--	--	62	76
chicks disapp. at > 50 days old	0	--	--	--	0	5	2	--	--	4	0
chicks still present at last visit	58	--	--	--	57	53	53	--	--	58	76
Hatching success (D/C)	0.84	--	--	--	0.78	0.77	0.86	--	--	0.93	0.84
Fledging success (E/D)	0.95	--	--	--	0.97	0.92	0.98	--	--	0.94	0.96
Reproductive success (E/C)	0.79	--	--	--	0.75	0.71	0.85	--	--	0.87	0.81

^aChicks known to be < 50 days old when they disappeared.

^bData collected in 1996, 1997, 1998, and 2002 were collected on a ≤ 7 day interval and are not comparable.

^cThere are no productivity data for 2003.

Table 16. Productivity values of storm-petrels (Leach's, fork-tailed, and unknown petrel species) in non- chronology burrows at Aiktak Island, Alaska, in 2005. Non-chronology burrows were monitored on an interval of ≥ 14 days.

Parameter	Plot													All Plots	SD
	9	10	11	13	16	17	18	19	20	21	22	24	26		
No. burrows w/known contents (A)	28	21	27	12	9	14	32	27	25	18	11	14	34	272	
No. occupied burrows (B)	16	12	13	1	5	4	19	13	11	7	2	8	12	123	
No. eggs w/ known fate (C)	8	10	13	1	5	4	17	9	9	4	1	7	6	94	
eggs lost to: disappearance	0	0	0	0	0	0	1	0	0	0	0	0	0	1	
abandonment	0	0	0	0	0	0	0	0	0	0	0	2	0	2	
breakage	2	2	2	0	0	0	3	1	1	0	0	0	1	12	
No. eggs remaining at last visit (unknown fate)	0	0	0	0	0	0	0	0	1	0	0	0	0	1	
No. chicks (D)	6	8	11	1	5	4	13	8	8	4	1	5	5	79	
chicks lost to: disappearance ^a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
death	0	0	1	0	0	0	0	0	0	1	0	1	0	3	
No. chicks potentially successful (E)	6	8	10	1	5	4	13	8	8	3	1	4	5	76	
chicks disapp. at > 50 days old	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
chicks still present at last visit	6	8	10	1	5	4	13	8	8	3	1	4	5	76	
Hatching success (D/C)	0.75	0.80	0.85	1.00	1.00	1.00	0.76	0.89	0.89	1.00	1.00	0.71	0.83	0.84	0.09
Fledging success (E/D)	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	0.75	1.00	0.80	1.00	0.96	0.07
Reproductive success (E/C)	0.75	0.80	0.77	1.00	1.00	1.00	0.76	0.89	0.89	0.75	1.00	0.57	0.83	0.81	0.12

^aChicks known to be < 50 days old when they disappeared.

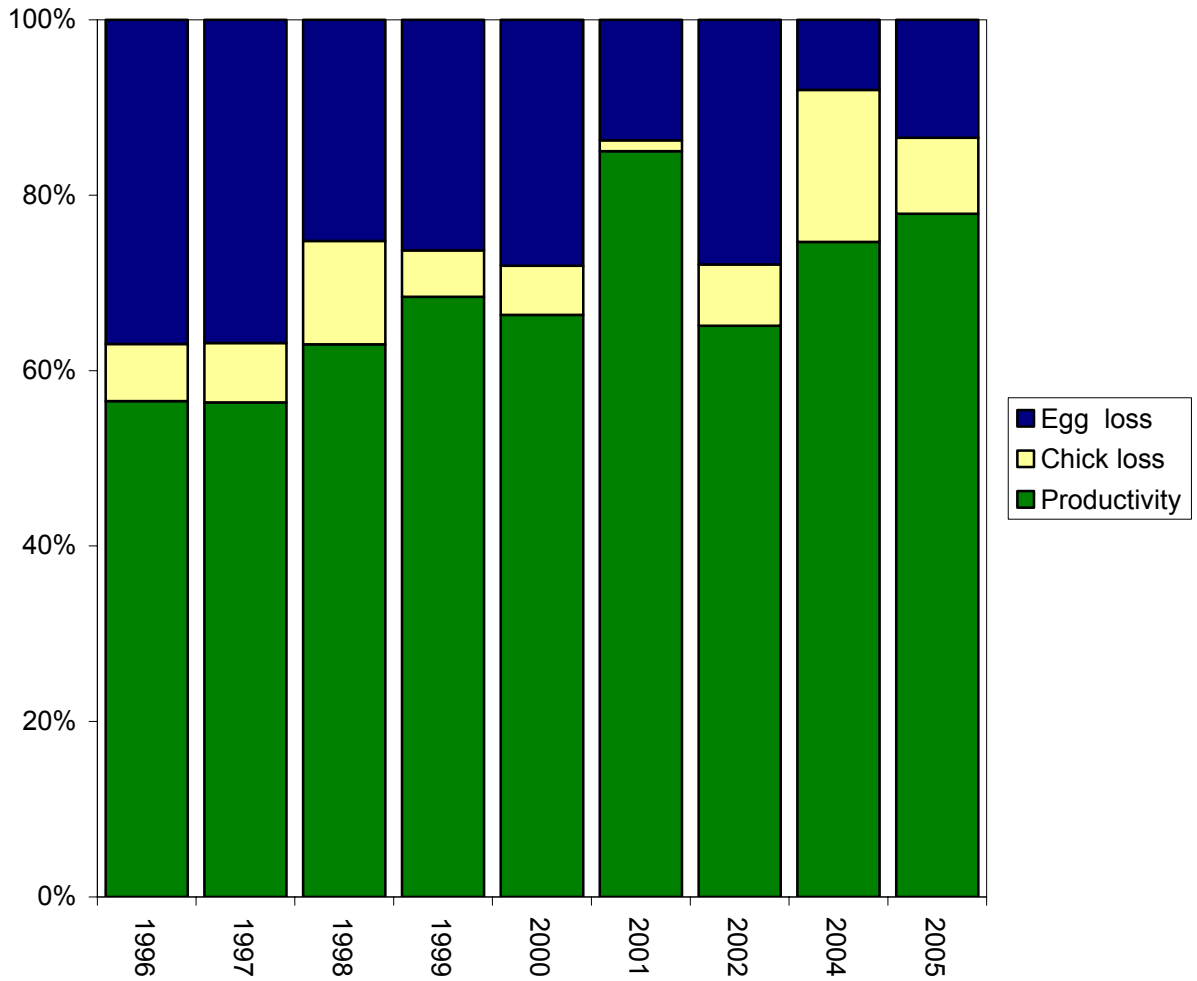


Figure 10. Reproductive performance of storm-petrels (Leach's, fork-tailed, and unknown petrel species) in chronology burrows at Aiktak Island, Alaska. Chronology burrows were monitored on an interval of ≤ 7 days. The values represent the maximal reproductive potential. Actual values were undoubtedly lower. Egg loss= $(C-D)/C$; Chick loss= $(D-E)/C$, where C=number of eggs, D=number of eggs hatched, E=number of checks fledged or still alive at last check.

Table 17. Productivity values of storm-petrels (Leach's, fork-tailed, and unknown petrel species) in chronology burrows at Aiktak Island, Alaska. Chronology burrows were monitored on an interval of ≤ 7 days.

Parameter	1995 ^b	1996	1997	1998	1999	2000	2001	2002	2003 ^c	2004	2005
No. burrows w/known contents (A)	--	202	326	383	276	348	303	412	--	274	341
No. occupied burrows (B)	--	96	138	134	100	122	88	45	--	79	123
No. eggs w/ known fate (C)	--	92	133	127	95	107	80	43	--	75	104
eggs lost to: disappearance	--	3	6	3	1	7	0	12	--	1	0
abandonment	--	6	40	14	20	15	8	0	--	4	8
breakage	--	25	3	15	4	8	3	0	--	1	6
No. eggs remaining at last visit (unknown fate)	--	0	4	4	3	1	1	0	--	1	0
No. chicks (D)	--	58	84	95	70	77	69	31	--	69	90
chicks lost to: disappearance ^a	--	1	0	1	0	0	0	2	--	12	0
death	--	5	9	14	5	6	1	1	--	1	9
No. chicks potentially successful (E)	--	52	75	80	65	71	68	28	--	56	81
chicks disapp. at > 50 days old	--	12	0	0	0	23	4	19	--	7	2
chicks still present at last visit	--	40	75	80	65	48	64	9	--	49	79
Hatching success (D/C)	--	0.63	0.63	0.75	0.74	0.72	0.86	0.72	--	0.92	0.87
Fledging success (E/D)	--	0.90	0.89	0.84	0.93	0.92	0.99	0.90	--	0.81	0.90
Reproductive success (E/C)	--	0.57	0.56	0.63	0.68	0.66	0.85	0.65	--	0.75	0.78

^aChicks known to be < 50 days old when they disappeared.

^b1995 data were collected on a ≥ 14 day interval and are not comparable.

^cThere are no productivity data for 2003.

Table 18. Productivity values of storm-petrels (Leach's, fork-tailed, and unknown petrel species) in chronology burrows at Aiktak Island, Alaska, in 2005. Chronology burrows were monitored on an interval of ≤ 7 days.

Parameter	Plot												All Plots	SD
	8	12	13	17	20	21	22	23	24	25	26	27		
No. burrows with known contents (A)	43	25	12	14	25	18	11	54	14	39	34	52	341	
No. occupied burrows (B)	20	7	2	5	2	3	1	35	1	18	8	21	123	
No. eggs w/ known fate (C)	16	6	2	5	2	3	1	30	1	15	8	15	104	
eggs lost to: disappearance	0	0	0	0	0	0	0	0	0	0	0	0	0	0
abandonment	3	0	0	0	0	0	0	3	0	0	0	2	8	
breakage	0	0	0	1	0	1	0	0	0	2	1	1	6	
No. eggs remaining at last visit (unknown fate)	0	0	0	0	0	0	0	0	0	0	0	0	0	
No. chicks (D)	13	6	2	4	2	2	1	27	1	13	7	12	90	
chicks lost to: disappearance ^a	0	0	0	0	0	0	0	0	0	0	0	0	0	0
death	1	0	0	1	0	0	0	7	0	0	0	0	9	
No. chicks potentially successful (E)	12	6	2	3	2	2	1	20	1	13	7	12	81	
chicks disapp. at > 50 days old	0	0	1	0	0	0	0	1	0	0	0	0	2	
chicks still present at last visit	12	6	1	3	2	2	1	19	1	13	7	12	79	
Hatching success (D/C)	0.81	1.00	1.00	0.80	1.00	0.67	1.00	0.90	1.00	0.87	0.88	0.80	0.87	0.04
Fledging success (E/D)	0.92	1.00	1.00	0.75	1.00	1.00	1.00	0.74	1.00	1.00	1.00	1.00	0.90	0.11
Reproductive success (E/C)	0.75	1.00	1.00	0.60	1.00	0.67	1.00	0.67	1.00	0.87	0.88	0.80	0.78	0.07

^aChicks known to be < 50 days old when they disappeared.

Table 19. Productivity values of storm-petrels (Leach's, fork-tailed, and unknown petrel species) in all burrows at Aiktak Island, Alaska. This dataset includes burrows monitored on intervals of ≤ 7 days and ≥ 14 days.

Parameter	1995	1996	1997	1998	1999	2000	2001	2002	2003 ^b	2004	2005
No. burrows w/known contents (A)	129	202	326	383	383	429	397	412	--	608	485
No. occupied burrows (B)	84	96	138	134	194	211	175	45	--	150	249
No. eggs w/ known fate (C)	73	92	133	127	171	189	145	43	--	146	198
eggs lost to: disappearance	4	3	6	3	3	16	1	12	--	2	1
abandonment	4	6	40	14	31	21	15	0	--	5	10
breakage	4	25	3	15	8	12	4	0	--	3	18
No. eggs remaining at last visit (unknown fate)	0	0	4	4	7	2	5	0	--	1	1
No. chicks (D)	61	58	84	95	129	140	125	31	--	135	169
chicks lost to: disappearance ^a	2	1	0	1	0	1	0	2	--	16	0
death	1	5	9	14	7	10	2	1	--	1	12
No. chicks potentially successful (E)	58	52	75	80	122	129	123	28	--	118	157
chicks disapp. at > 50 days old	0	12	0	0	0	28	6	19	--	11	2
chicks still present at last visit	58	40	75	80	122	101	117	9	--	107	155
Hatching success (D/C)	0.84	0.63	0.63	0.75	0.75	0.74	0.86	0.72	--	0.92	0.85
Fledging success (E/D)	0.95	0.90	0.89	0.84	0.95	0.92	0.98	0.90	--	0.87	0.93
Reproductive success (E/C)	0.79	0.57	0.56	0.63	0.71	0.68	0.85	0.65	--	0.81	0.79

^aChicks known to be < 50 days old when they disappeared.

^bThere are no productivity data for 2003.

Table 20. Density and Occupancy rates of Leach's, fork-tailed and unidentified storm-petrels at Aiktak Island, Alaska.

Parameter	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total number of burrows	--	--	--	--	--	--	--	--	--	--	562
No. of burrows w/ known status	--	--	--	--	--	--	--	--	--	--	451
Density of burrow entrances	--	--	--	--	--	--	--	--	--	--	0.16
% of burrows occupied by:											
All storm petrels	--	--	--	--	--	--	--	--	--	--	50.8
Leach's storm petrels	--	--	--	--	--	--	--	--	--	--	26.4
Fork-tailed storm-petrels	--	--	--	--	--	--	--	--	--	--	10.4

^aDensity and occupancy rates were calculated using plots 8-13, 16-25, and 27 for a combined area of 3917m².

Table 21. Density and occupancy rates of storm-petrels on index plots at Aiktak Island, Alaska, in 2005.

Parameter	Plot																	Total	
	8	9	10	11	12	13	16	17	18	19	20	21	22	23	24	25	27		
Plot Size (m ²)	100	200	150	50	50	50	100	50	494	125	75	119	288	455	52	1219	340	3917	
Total number of burrows	52	46	29	29	25	12	9	19	35	37	31	31	17	62	16	48	64	562	
No. burrows w/ known status	43	28	21	27	25	12	9	14	32	27	25	18	11	54	14	39	52	451	
Density of burrow entrances	0.52	0.26	0.23	0.54	0.52	0.28	0.14	0.50	0.10	0.40	0.48	0.26	0.07	0.15	0.42	0.04	0.19	0.16	
% of burrows occupied by:																			
All storm petrels	46.5	57.1	57.1	55.6	28.0	25.0	55.6	64.3	59.4	48.2	52.0	55.6	27.3	64.8	71.3	46.2	40.4	50.8	
Leach's storm petrels	18.6	21.4	23.8	25.9	16.0	8.3	44.4	28.6	34.4	25.9	40.0	22.2	9.1	35.2	50.0	25.6	21.2	26.4	
Fork-tailed storm-petrels	16.3	7.1	23.8	18.5	8.0	16.7	11.1	35.7	15.6	3.7	8.0	16.7	9.1	9.3	7.1	7.7	11.5	10.4	

Table 22. Mass and wing chord of adult storm-petrels (Leach's and fork-tailed) at Aiktak Island, Alaska, in 2005.

Date ^a	Plot	Burrow	Species ^b	Mass(g)	Diag. Tarsus(mm)	Wing chord (mm)
27-Jun	26	14	FTSP	63.0	28.0	161
27-Jun	26	23	LHSP	48.0	24.0	160
27-Jun	26	30	LHSP	50.5	23.0	152
27-Jun	26	41A	LHSP	45.0	25.0	158
27-Jun	26	43	LHSP	43.0	25.0	155
27-Jun	21	2E	LHSP	47.0	23.0	159
27-Jun	21	24	LHSP	48.5	25.0	154
28-Jun	11	1	LHSP	39.5	23.0	153
28-Jun	11	5	FTSP	59.0	29.0	157
28-Jun	11	8/9	FTSP	70.0	28.0	161
28-Jun	11	28	LHSP	45.0	25.0	155
28-Jun	11	12	FTSP	74.0	29.0	157
28-Jun	11	14	LHSP	46.0	25.0	150
28-Jun	11	16E/18	FTSP	66.0	28.0	156
28-Jun	11	21	FTSP	71.0	28.0	150
28-Jun	11	24	LHSP	43.0	24.0	153
28-Jun	11	25	LHSP	48.0	25.0	155
28-Jun	11	26	LHSP	43.0	24.0	149
28-Jun	18	3/4A	LHSP	47.0	26.0	152
28-Jun	18	39	LHSP	44.0	24.0	152
28-Jun	18	47	LHSP	50.0	25.0	152
28-Jun	18	9	LHSP	45.0	24.0	156
28-Jun	18	48	LHSP	47.0	N/A	N/A
28-Jun	18	18	LHSP	44.0	25.0	150
28-Jun	18	20	LHSP	51.0	24.0	150
28-Jun	18	23	LHSP	53.0	25.0	158
28-Jun	18	24	LHSP	53.0	25.0	152
28-Jun	18	27	LHSP	49.0	25.0	154
28-Jun	18	31	LHSP	51.0	25.5	152
29-Jun	22	9	LHSP	43.0	24.0	152
29-Jun	20	24	LHSP	50.0	24.0	152
29-Jun	20	20	LHSP	43.0	24.0	155
29-Jun	20	15	LHSP	58.0	24.0	160
29-Jun	20	10A	LHSP	41.0	25.0	159
29-Jun	20	10	LHSP	52.0	24.0	158
29-Jun	20	8	LHSP	47.0	24.0	152
29-Jun	20	4	LHSP	41.0	24.0	154
29-Jun	17	8	LHSP	43.0	25.0	153
29-Jun	17	3LG	LHSP	48.0	25.0	152
29-Jun	17	3E1/3E2	LHSP	50.0	24.0	150
29-Jun	17	13	LHSP	46.0	24.0	153
29-Jun	24	13	LHSP	44.0	25.0	151
29-Jun	24	13A	LHSP	53.0	25.0	152
29-Jun	24	11	LHSP	41.0	24.0	148
29-Jun	24	7A	LHSP	48.0	25.0	154

^aDate of capture.

^bSpecies code: LHSP= Leach's storm-petrel; FTSP= Fork-tailed storm-petrel.

Table 22 (continued). Mass and wing chord of adult storm-petrels (Leach's and fork-tailed) at Aiktak Island, Alaska, in 2005.

Date ^a	Plot	Burrow	Species ^b	Mass(g)	Diag. Tarsus(mm)	Wing chord (mm)
29-Jun	24	5	LHSP	46.0	24.0	160
29-Jun	13	4B	LHSP	44.0	24.0	152
29-Jun	16	8	LHSP	43.0	24.5	152
29-Jun	16	7	FTSP	74.0	28.0	161
29-Jun	16	5A	LHSP	45.0	25.0	153
29-Jun	16	3	LHSP	42.0	25.0	148
30-Jun	9	20	LHSP	46.0	25.0	150
30-Jun	9	1	LHSP	48.0	24.5	155
30-Jun	9	24A	FTSP	71.0	26.0	146
30-Jun	9	10	LHSP	49.0	24.0	152
30-Jun	9	12	FTSP	67.0	28.5	152
30-Jun	9	14A	LHSP	49.0	25.5	149
30-Jun	9	192	LHSP	43.0	25.5	150
30-Jun	9	17	FTSP	67.0	27.0	154
30-Jun	9	23	LHSP	56.0	24.0	153
30-Jun	10	24	LHSP	52.0	24.0	151
30-Jun	10	23	FTSP	77.0	27.5	153
30-Jun	10	19	LHSP	47.0	23.5	150
30-Jun	10	20	FTSP	80.0	29.0	161
30-Jun	10	26	LHSP	56.0	23.0	149
30-Jun	10	1	FTSP	72.0	26.0	155
30-Jun	10	5E1/E2	FTSP	69.0	28.0	161
30-Jun	10	22	LHSP	54.0	25.5	155
30-Jun	10	11	FTSP	69.0	28.0	159
30-Jun	19	8	LHSP	51.0	25.0	154
30-Jun	19	15B	LHSP	50.0	25.0	159
30-Jun	19	15A	LHSP	48.0	24.0	154
30-Jun	19	23E	LHSP	39.0	26.0	157
30-Jun	19	25	LHSP	50.0	25.0	159
13-Jul	20	23	LHSP	50.0	25.0	151
13-Jul	21	12	LHSP	54.5	24.0	154
13-Jul	26	36	LHSP	50.5	24.5	152
15-Jul	11	25B	LHSP	51.5	26.0	156
15-Jul	18	11	FTSP	60.5	28.0	156
15-Jul	18	21	FTSP	62.0	27.0	158
15-Jul	18	48	LHSP	44.5	25.5	156
15-Jul	18	37	FTSP	61.0	29.0	163
15-Jul	16	9	LHSP	51.0	23.0	153
15-Jul	19	1	LHSP	46.0	24.0	160
15-Jul	19	16A2	LHSP	43.0	23.0	152
15-Jul	10	8	LHSP	47.0	24.5	154
3-Aug	New Camp Beach	N/A	FTSP	66.0	29.0	158
3-Aug	New Camp Beach	N/A	FTSP	61.0	27.5	155
3-Aug	New Camp Beach	N/A	FTSP	67.0	28.5	150
4-Aug	New Camp Beach	N/A	LHSP	41.5	24.5	150

^aDate of capture.

^bSpecies code: LHSP= Leach's storm-petrel; FTSP= Fork-tailed storm-petrel.

Table 22 (continued). Mass and wing chord of adult storm-petrels (Leach's and fork-tailed) at Aiktak Island, Alaska, in 2005.

Date ^a	Plot	Burrow	Species ^b	Mass(g)	Diag. Tarsus(mm)	Wing chord (mm)
4-Aug	New Camp Beach	N/A	LHSP	43.5	25.5	154
4-Aug	New Camp Beach	N/A	LHSP	40.5	25.0	158
12-Aug	New Camp Beach	N/A	FTSP	58.5	26.5	160
17-Aug	20	2	LHSP	44.5	24.0	153

^aDate of capture.

^bSpecies code: LHSP= Leach's storm-petrel; FTSP= Fork-tailed storm-petrel.

Table 23. Band re-sights of storm-petrels at Aiktak Island, Alaska, in 2005.

Date ^a	Plot	Burrow	Species ^b	Band Number	Mass(g)	Diag. Tarsus (mm)	Wing Chord (mm)
27-Jun	8	4	LHSP	7901-00478	*	*	*
27-Jun	8	19	FTSP	1371-05680	*	*	*
27-Jun	8	31A	FTSP	1371-05601	*	*	*
27-Jun	12	7	FTSP	7901-00403	*	*	*
27-Jun	12	23	LHSP	1371-05798	*	*	*
27-Jun	21	10	FTSP	1371-05690	*	*	*
27-Jun	23	19A	LHSP	1371-05745	*	*	*
27-Jun	23	31A	FTSP	1371-05747	*	*	*
27-Jun	23	38	LHSP	1371-05787	*	*	*
27-Jun	23	16	LHSP	1371-05743	*	*	*
28-Jun	18	11	FTSP	1371-05757	*	*	*
28-Jun	18	20	LHSP	1371-05695	51.0	24.0	150
28-Jun	18	23	LHSP	7901-00436	53.0	25.0	158
28-Jun	18	47	LHSP	1371-05696	50.0	25.0	152
28-Jun	11	8/9	FTSP	7901-00445	70.0	28.0	161
28-Jun	11	12	FTSP	1371-05678	74.0	29.0	157
28-Jun	11	25	LHSP	7901-00452	48.0	25.0	155
29-Jun	16	8	LHSP	7901-00426	43.0	24.5	152
29-Jun	17	3E1/3E2	LHSP	7901-00428	50.0	24.0	150
29-Jun	17	8	LHSP	7901-00431	43.0	25.0	153
29-Jun	20	24	LHSP	1371-05660	50.0	24.0	152
30-Jun	19	25	LHSP	1371-05609	50.0	25.0	159
30-Jun	19	15A	LHSP	1371-05663	48.0	24.0	154
30-Jun	9	14A	LHSP	1371-05643	49.0	25.5	149
30-Jun	10	1	FTSP	1371-05626	72.0	26.0	155
30-Jun	10	11	FTSP	1371-05627	69.0	28.0	159

^aDate of capture

^bSpecies code: LHSP=Leach's storm-petrel; FTSP= Fork-tailed storm-petrel

* Birds utilized for chronology data were spared additional disturbance and not measured

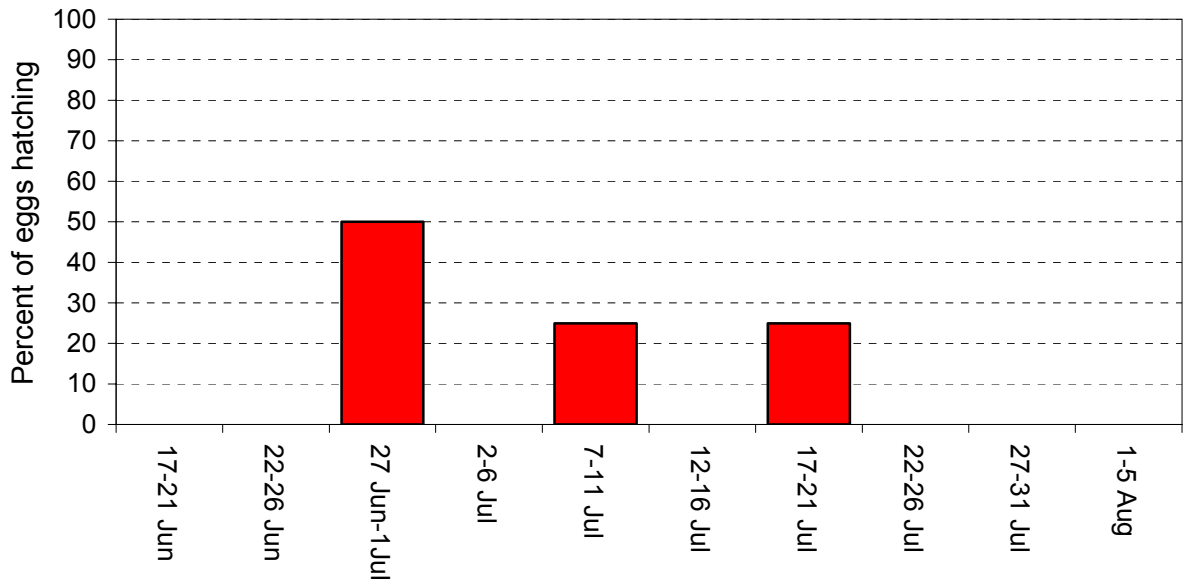


Figure 11. Hatching chronology of black oystercatchers at Aiktak Island, Alaska, in 2005.

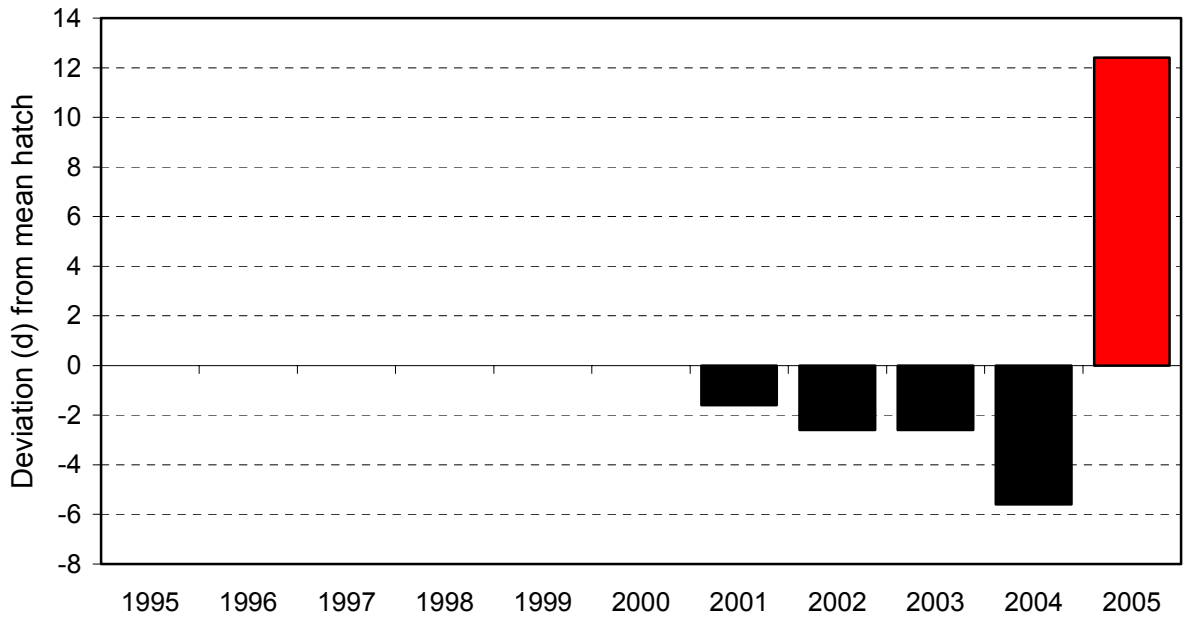


Figure 12. . Yearly hatch date deviation (from the 2001-2005 average of 23 June) of black oystercatchers at Aiktak Island, Alaska. Numbers below the mean indicate earlier hatch dates, while those above indicate later hatch dates.

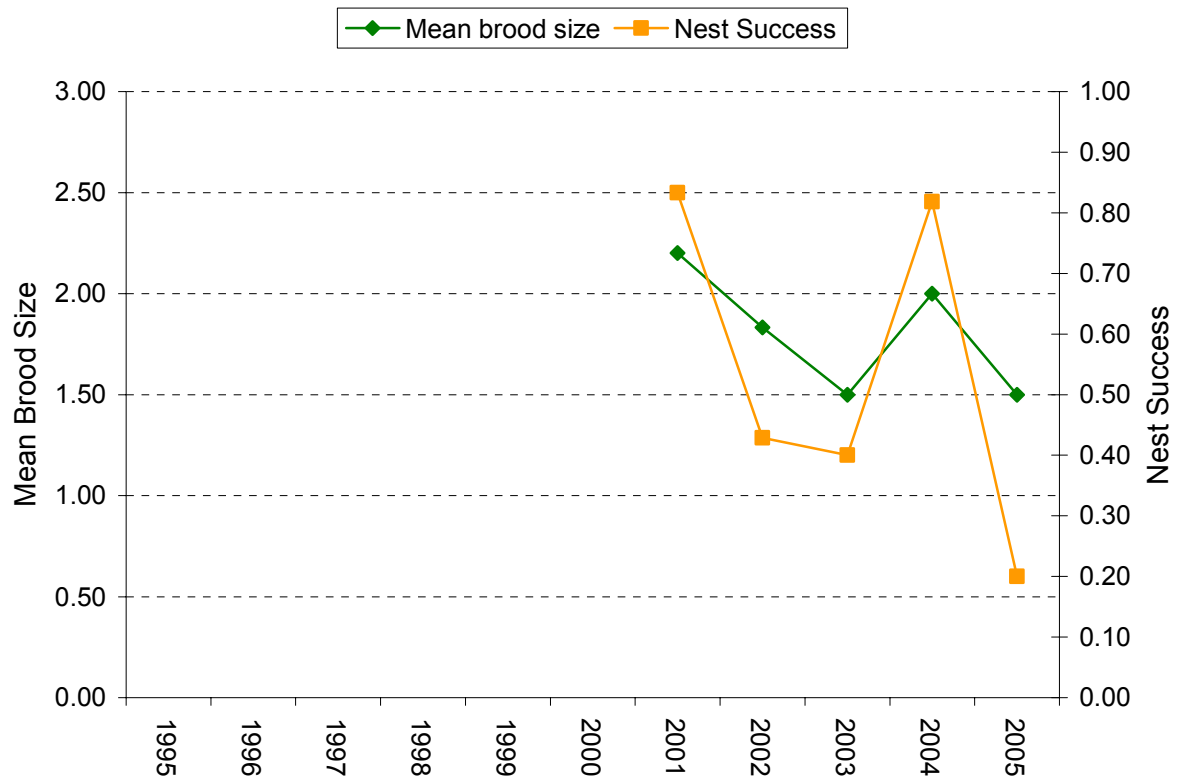


Figure 13. Black oystercatcher reproductive performance at Aiktak Island, Alaska.

Table 24. Reproductive performance of black oystercatchers at Aiktak Island, Alaska. All nesting attempts are included in this data set.

Parameter	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 ^a
Total no. nests w/ eggs (A)	--	--	--	--	--	--	12	14	15	11	20
No. eggs in nest:											
1 egg	--	--	--	--	--	--	2	1	3	1	4
2 eggs	--	--	--	--	--	--	5	2	5	2	9
3 eggs	--	--	--	--	--	--	5	11	7	8	7
Total no. eggs (B)	--	--	--	--	--	--	27	38	34	29	43
Mean Clutch size (B/A)	--	--	--	--	--	--	2.25	2.71	2.27	2.67	2.15
Total no. nests w/ chicks (C)	--	--	--	--	--	--	10	6	6	9	4
Total no. chicks seen (D)	--	--	--	--	--	--	22	11	9	18	6
Mean Brood Size (D/C)	--	--	--	--	--	--	2.2	1.8	1.5	2.0	1.5
Hatch success (D/B)	--	--	--	--	--	--	0.81	0.29	0.26	0.62	0.14
Nest Success (C/A)	--	--	--	--	--	--	0.83	0.43	0.40	0.82	0.20
Mean hatch date	--	--	--	--	--	--	21 Jun	20 Jun	20 Jun	17 Jun	5-Jul
N	--	--	--	--	--	--	10	6	6	9	4
SD	--	--	--	--	--	--	8.18	4.00	8.0	8.03	8.70

^aIn 2005, a storm on 27 May pushed kelp onto several beaches covering nests and forcing many birds to relay.

Table 25. Population estimates^a of black oystercatchers at Aiktak Island, Alaska.

Year	Singles	Pairs	Total Birds
1995	--	--	--
1996	--	--	--
1997	--	--	--
1998	--	--	--
1999	--	--	--
2000	--	--	--
2001	--	--	--
2002	--	--	--
2003	--	--	--
2004	--	--	--
2005	--	14	28

^aPopulation estimates made from distribution maps; created by personnel yearly.

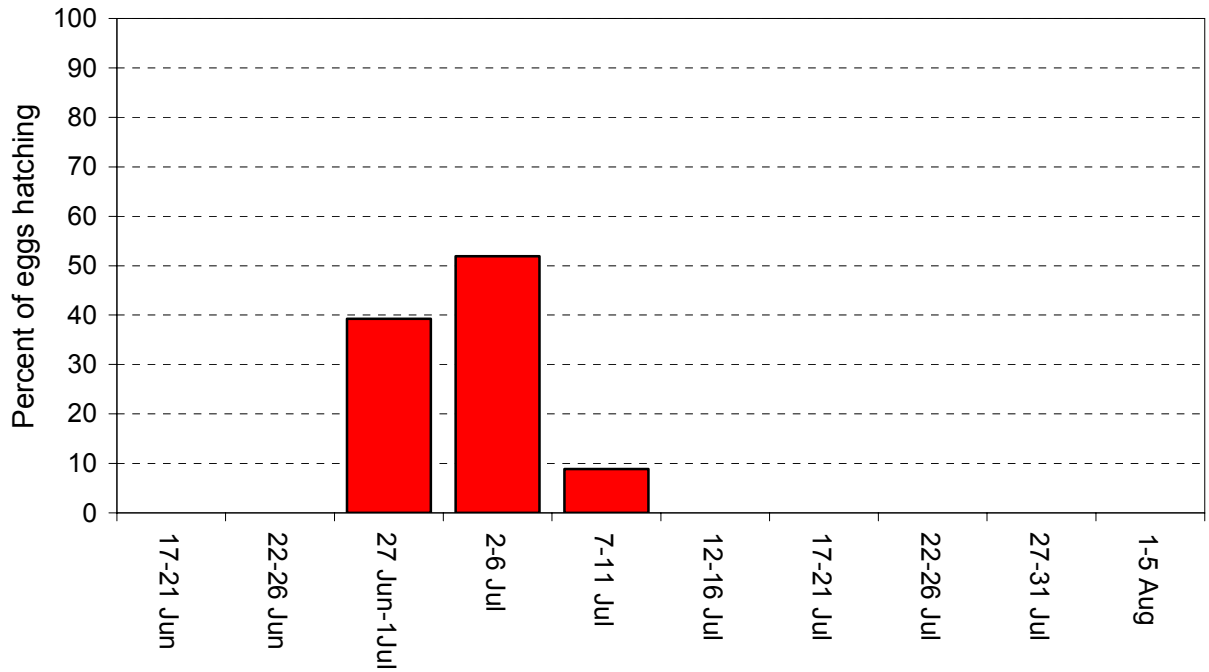


Figure 14. Hatching chronology of glaucous-winged gulls on Aiktak Island, Alaska, in 2005.

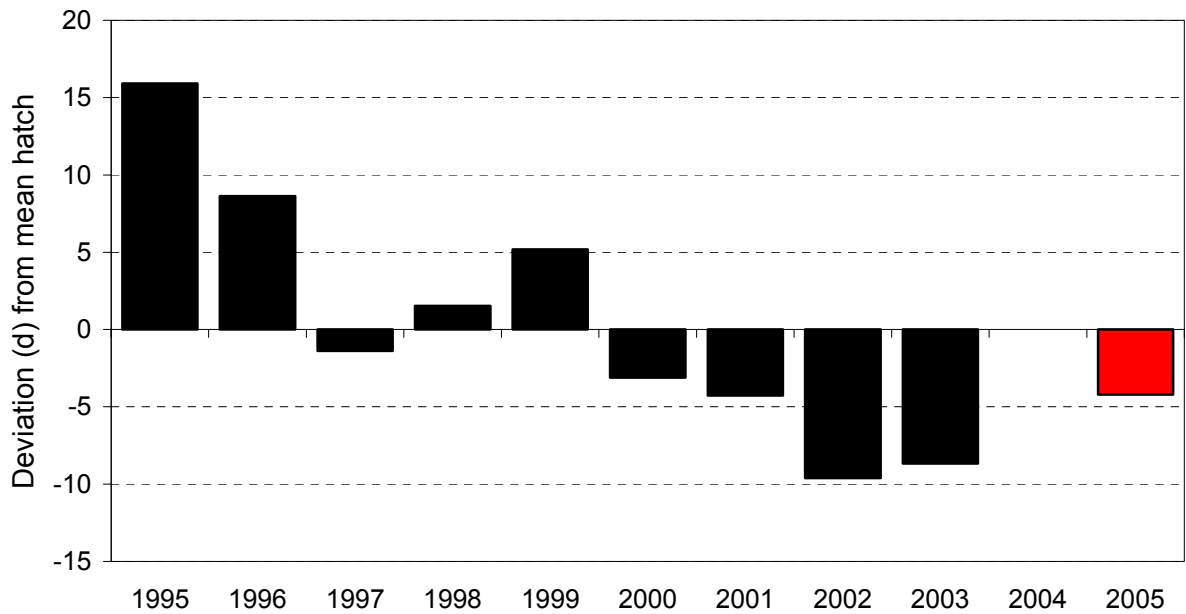


Figure 15. Yearly hatch date deviation (from the 1995-2005 average of 7 July) of glaucous-winged gulls at Aiktak Island, Alaska. Numbers below the mean indicate earlier hatch dates, while those above indicate later hatch dates.

Table 26. Breeding chronology of glaucous-winged gulls at Aiktak Island, Alaska.

Year	mean hatch	SD	n ^a	median hatch	total nests	first lay ^c	last lay	mean lay	first hatch	last hatch
1995	23 Jul	4.13	43	22 Jul	48	--	--	--	17 Jul	1 Aug
1996	15 Jul	4.07	76	14 Jul	93	--	--	--	10 Jul	26 Jul
1997	6 Jul	2.81	95	5 Jul	106	--	--	--	28 Jun	14 Jul
1998	9 Jul	2.91	90	8 Jul	106	--	--	--	3 Jul	17 Jul
1999	12 Jul	3.16	50	11 Jul	78	--	--	--	7 Jul	19 Jul
2000	3 Jul	5.02	70	4 Jul	68	--	--	--	27 Jun	19 Jul
2001	3 Jul	3.67	38	3 Jul	40	--	--	--	28 Jun	14 Jul
2002	28 Jun	2.48	95	27 Jun	100	--	--	--	22 Jun	3 Jul
2003	29 Jun	3.20	93	29 Jun	98	23 May	8 Jun	2 Jun	19 Jun	5 Jul ^d
2004	--	--	--	--	--	--	--	--	--	--
2005	3 Jul	3.07	79	3 Jul	117	31 May	14 Jun	5 Jun	27 Jun	11 Jul

^aSample size is for the calculation of mean and median hatch dates. These dates are a sub-sample for which we have observations ≤ 5 days apart from egg to chick.

^bThe total used for estimating the remaining parameters. These dates might contain observations > 7 days apart.

^cLay date is the hatch date minus 27 days.

^dIn 2003, researchers departed the island early, leaving four nests with unknown fates.

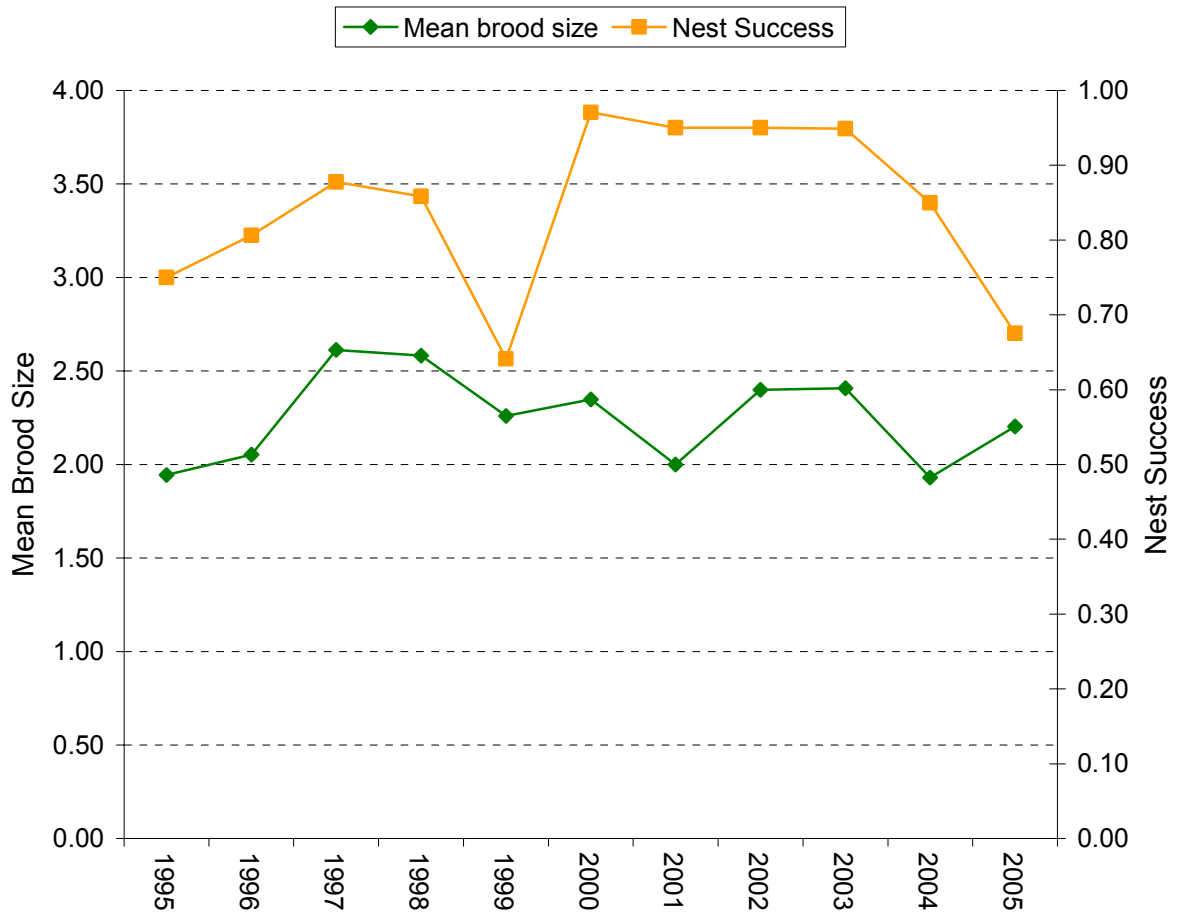


Figure 16. Glaucous-winged gull reproductive performance at Aiktak Island, Alaska.

Table 27. Reproductive performance of glaucous-winged gulls at Aiktak Island, Alaska.

Parameter	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
No. nests with known clutch size (A)	48	93	106	106	78	68	40	100	98	100	117
Total no. eggs laid (B)	97	207	283	275	175	175	95	285	256	243	300
No. nests containing X eggs											
1	11	17	9	11	16	6	2	1	8	13	15
2	25	38	17	21	27	17	21	13	23	33	33
3	12	38	80	74	35	45	17	86	66	52	73
4	0	0	0	0	0	0	0	0	1	2	0
No. nests with ≥ 1 chick (C)	36	75	93	91	50	66	38	95	93	85	79
Total no. chicks seen (F)	70	154	243	235	113	155	76	229	224	164	174
No. nests containing X chicks											
1	9	19	3	4	7	11	8	7	13	27	16
2	20	33	30	30	23	21	22	42	30	37	31
3	7	23	60	57	20	34	8	46	49	21	32
4	0	0	0	0	0	0	0	0	1	0	0
Mean clutch size (B/A)	2.02	2.23	2.67	2.59	2.24	2.57	2.38	2.85	2.61	2.43	2.56
Mean brood size (F/C)	1.94	2.05	2.61	2.58	2.26	2.35	2.00	2.41	2.41	1.93	2.20
Nesting success (C/A)	0.75	0.81	0.88	0.86	0.64	0.97	0.95	0.95	0.95	0.85	0.68
Hatching success (F/B)	0.72	0.74	0.86	0.85	0.65	0.89	0.80	0.80	0.88	0.67	0.58

Table 28. Reproductive performance of glaucous-winged gulls at Aiktak Island, Alaska, in 2005.

Parameter	Plots				Total	Mean	SD
	40 A	40 B	42 C	43 D			
No. nests with known clutch size (A)	30	30	28	29	117		
Total no. eggs in known clutch nests (B)	69	85	75	71	300		
No. nests containing X eggs							
1	7	0	6	2	15		
2	10	5	3	15	33		
3	14	25	21	13	73		
4	0	0	0	0	0		
No. nests with ≥ 1 chick (C)	17	27	21	14	79		
Total no. chicks seen (F)	36	63	52	23	174		
No. nests containing X chicks							
1	3	3	2	8	16		
2	9	12	7	3	31		
3	5	12	12	3	32		
4	0	0	0	0	0		
Mean clutch size (B/A)	2.30	2.83	2.68	2.45	2.56	2.57	0.24
Mean brood size (F/C)	2.12	2.33	2.48	1.64	2.20	2.14	0.36
Nesting success (C/A)	0.57	0.90	0.75	0.48	0.68	0.67	0.19
Hatching success (F/B)	0.52	0.74	0.69	0.32	0.58	0.57	0.19

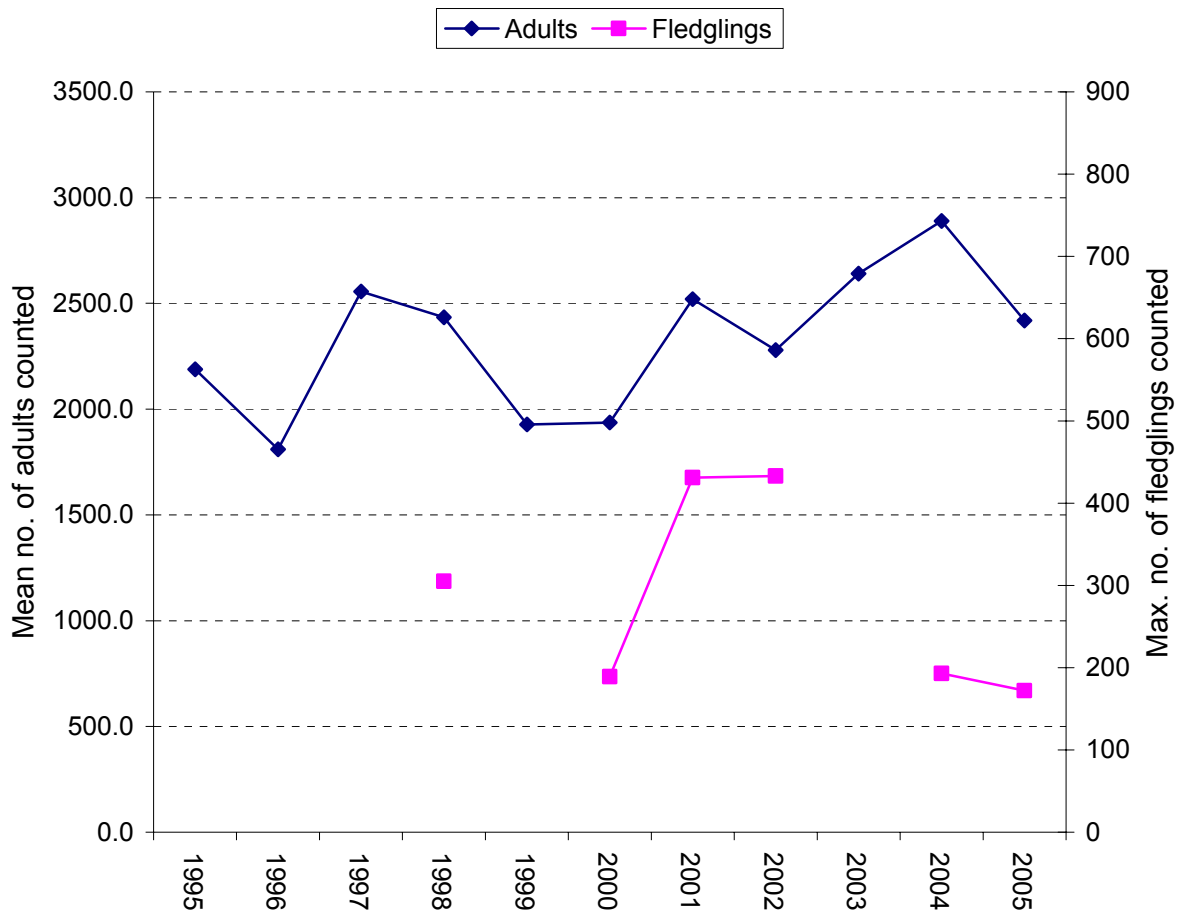


Figure 17. Mean number of glaucous-winged gull adults and maximum number of glaucous-winged fledglings counted at Aiktak Island, Alaska.

Table 29. Populations of glaucous-winged gulls at Aiktak Island, Alaska.

Year	Count					mean	n	SD	first survey	last survey
	1	2	3	4	5					
1995	1994	2240	2527	--	--	2189.0	3	266.8	9 Jun	16 Jul
1996	1701	1875	1671	--	--	1810.8	3	110.1	19 Jun	18 Jul
1997	2689	3211	2329	--	--	2556.5	3	443.5	30 May	16 Jun
1998	2481	3039	2553	2592	1944	2434.5	5	390.2	2 Jun	15 Jun
1999	2004	1275	1631	2734	--	1928.6	4	624.2	30 May	11 Jun
2000	1975	1872	1926	1909	--	1936.4	4	42.8	16 Jun	25 Jun
2001	2564	2996	--	--	--	2520.3	2	305.5	6 Jun	8 Jun
2002	2233	2684	2719	2152	1887	2335.0	5	358.4	29 May	15 Jun
2003	2804	2725	2936	2718	2657	2768.0	5	107.5	22 May	6 Jun
2004	2280	2639	4007	3519	2889	3067.0	5	693.2	24-May	14 Jun
2005	2130	2887	2423	2695	2379	2502.8	5	293.8	3-Jun	19-Jun

Table 30. Populations of glaucous-winged gulls by area at Aiktak Island, Alaska, in 2005.

Plot	Count					mean	max.	SD
	1	2	3	4	5			
A	29	45	14	28	13	25.8	45	13.1
B	436	340	355	436	368	387.0	436	45.8
C-west	439	898	523	515	496	574.2	898	184.0
C-north	587	956	898	1070	941	890.4	1070	181.1
D	12	20	10	21	16	15.8	21	4.8
E	87	79	70	86	78	80.0	87	6.9
F	3	18	17	24	7	13.8	24	8.6
G	9	14	9	6	4	8.4	14	3.8
H	51	38	50	48	32	43.8	51	8.4
I	89	68	153	44	47	80.2	153	44.6
Plot total	1742	2476	2099	2278	2002	2119.4	2476	277.9
Club A	128	133	85	115	109	114.0	133	18.9
Club B	193	185	178	214	201	194.2	214	14.0
Club C	67	93	61	88	67	75.2	93	14.3
Club total	388	411	324	417	377	383.4	417	37.0
Index plot total	2130	2887	2423	2695	2379	2502.8	2887	293.8

Table 31. Glaucous-winged gull fledgling population counts on New Camp and Old Camp Beaches at Aiktak Island, Alaska.

Year	Count						max	mean	n	SD	first survey	last survey
	1	2	3	4	5	6						
1995 ^a	--	--	--	--	--	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--	--	--	--	--	--
1997 ^b	--	--	--	--	--	--	--	--	--	--	--	--
1998	28	31	38	106	305	--	305	--	--	--	14 Aug	1 Sep
1999	--	--	--	--	--	--	--	--	--	--	--	--
2000	37	87	189	120	113	171	189	--	--	--	13 Aug	7 Sep
2001	112	431	62	--	--	--	431	--	--	--	17 Aug	8 Sep
2002	81	376	404	433	361	--	433	331.0	5	142.4	10 Aug	25 Aug
2003 ^c	--	--	--	--	--	--	--	--	--	--	--	--
2004	20	22	50	133	193	--	193	83.6	5	76.5	10 Aug	28 Aug
2005	14	17	18	50	123	172	172	65.7	6	66.6	4 Aug	31 Aug

^aNo data found for 1995, 1996 or 1999.

^bData collected in 1997 are not comparable due to a difference in transect size.

^cThere are no data for 2003.

Table 32. Glaucous-winged gull fledgling population counts on New Camp and Old Camp Beaches at Aiktak Island, Alaska, in 2005.

Plot (segment)	Count						mean	max.	SD
	1	2	3	4	5	6			
Old Camp Beach	7	7	9	26	43	51	28.83	51	19.5
Squid Beak Beach	7	10	9	24	80	121	41.83	121	47.6
Total	14	17	18	50	123	172	65.67	172	66.6

Table 33. Density of glaucous-winged gull nests on index plots at Aiktak Island, Alaska.

Year	no. of nests containing <i>X</i> eggs				total nests w/ eggs (B)	total nests (C)	total eggs (D)	mean clutch size (D/B)	density of nests w/ eggs (B/A ^a)	density of total nests (C/A)
	0	1	2	3						
1995	--	--	--	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--	--	--	--
2002	30	1	12	47	60	90	166	2.77	0.03	0.09
2003	41	1	9	39	49	90	136	2.8	0.03	0.07
2004	24	7	18	32	57	81	140	2.46	0.03	0.04
2005	39	14	8	20	42	81	90	2.14	0.02	0.04

^aSix plots that each measure 314.2 m². The total area represented by all plots combined (A) equals 1885.2 m².

Table 34. Density of glaucous-winged gulls on index plots at Aiktak Island, Alaska, in 2005.

Parameter	Plots						Total	mean	SD
	55	78	40	41	42	43			
Plot size m ² (A)	314.2	314.2	314.2	314.2	314.2	314.2	1885.2	--	--
No. nests containing X eggs									
0	7	9	4	1	5	13	39	6.50	4.2
1	4	3	0	1	3	3	14	2.33	1.5
2	0	0	3	0	3	2	8	1.33	1.5
3	0	0	6	3	9	2	20	3.33	3.6
4	0	0	0	0	0	0	0	0	0
Total nests w/ eggs (B)	4	3	9	4	15	7	42	7.0	4.5
Total nests (C)	11	12	13	5	20	20	81	13.5	5.8
Total eggs (D)	4	3	24	10	36	13	90	15	12.8
Mean clutch size (D/B)	1.00	1.00	2.67	2.50	2.40	1.86	2.14	2.14	0.8
Density of nests w/ eggs (B/A)	0.01	0.01	0.03	0.01	0.05	0.02	0.02	0.02	0.01
Density of total nests (C/A)	0.04	0.04	0.04	0.02	0.06	0.06	0.04	0.04	0.02

Table 35. Reproductive performance of thick-billed murres at Aiktak Island, Alaska.

Year	no. sites w/ egg (A)	no. sites w/ chick (B)	no. sites w/ fledged chick (C)	Hatching success (B/A)	Fledging success (C/B)	Reproductive success (C/A)
1995	--	--	--	--	--	--
1996	--	--	--	--	--	--
1997	--	--	--	--	--	--
1998	--	--	--	--	--	--
1999	--	--	--	--	--	--
2000	--	--	--	--	--	--
2001	--	--	--	--	--	--
2002	--	--	--	--	--	--
2003 ^a	--	--	--	--	--	--
2004	--	--	--	--	--	--
2005	0	0	0	0.00	0.00	0.00

^aNo data were collected in 2003.

Table 36. Reproductive performance of common murrelets at Aiktak Island, Alaska.

Year	no. sites w/ egg (A)	no. sites w/ chick (B)	no. sites w/ fledged chick (C)	Hatching success (B/A)	Fledging success (C/B)	Reproductive success (C/A)
1995	--	--	--	--	--	--
1996	--	--	--	--	--	--
1997	--	--	--	--	--	--
1998	--	--	--	--	--	--
1999	--	--	--	--	--	--
2000	--	--	--	--	--	--
2001	--	--	--	--	--	--
2002	--	--	--	--	--	--
2003 ^a	--	--	--	--	--	--
2004	--	--	--	--	--	--
2005	0	0	0	0.00	0.00	0.00

^aData were not collected in 2003.

Table 37. Murre population counts from land at Aiktak Island, Alaska, in 2005.

Plot	Date				mean	SD
	10 Jul	20 Jul	26 Jul	1 Aug		
1 TBMU	0	1	0	0	0.3	0.50
COMU	0	62	51	47	40.0	27.41
UNMU	0	0	0	0	0.0	0.00
2 TBMU	0	0	0	0	0.0	0.00
COMU	0	0	83	0	20.8	45.1
UNMU	9	43	0	122	43.5	55.51
3 TBMU	0	20	25	0	11.3	13.15
COMU	0	147	90	0	59.3	72.27
UNMU	158	0	0	225	95.8	113.90
4 TBMU	0	0	0	0	0.0	0.00
COMU	0	0	0	0	0.0	0.00
UNMU	0	0	0	0	0.0	0.00
5 TBMU	0	3	30	42	18.8	20.55
COMU	0	0	88	87	43.8	50.52
UNMU	46	0	0	0	11.5	23.00
6 TBMU	0	0	0	0	0.0	0.00
COMU	0	0	0	0	0.0	0.00
UNMU	156	0	749	469	343.5	333.33
7 TBMU	0	0	62	27	22.3	29.40
COMU	0	0	118	58	44.0	56.40
UNMU	0	0	0	0	0.0	0.00
8 TBMU	0	0	69	66	33.8	38.99
COMU	0	0	239	223	115.5	133.53
UNMU	0	0	0	0	0.0	0.00
9 TBMU	0	0	0	2	0.5	1.00
COMU	0	0	0	0	0.0	0.00
UNMU	0	0	0	0	0.0	0.00
10 TBMU	0	0	112	85	49.3	57.93
COMU	0	0	431	296	181.8	216.98
UNMU	1	0	0	0	0.3	0.50
Subtotal	370	276	2147	1749	1135.5	952.93
Rafts						
UNMU	2292	1950	206	440	1222.0	1051.77
Total						
TBMU	0	24	298	222	136.0	146.83
COMU	0	209	1100	711	505.0	496.35
UNMU	370	43	749	816	494.5	359.39
ALL	2662	2226	2353	2189	2357.5	214.81

Table 38. Counts of murre (includes common, thick-billed, and unknown spp.) during circumnavigations at Aiktak Island, Alaska.

Year	Counts					mean	SD	first survey	last survey
	1	2	3	4	5				
1995	--	--	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--	--	--
2002	--	--	--	--	--	--	--	--	--
2003	--	--	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--	--	--
2005	2619	3348	2126	--	--	2697.7	614.8	22 Jul	14 Aug

Table 39. Counts of murre (includes common, thick-billed, and unknown spp.) during circumnavigations at Aiktak Island, Alaska, in 2005.

Segment	Replicate					mean	SD	first survey	last survey
	1	2	3	4	5				
1	518	555	0	--	--	536.5	26.2	22 Jul	14 Aug
2	38	252	235	--	--	175.0	118.9	22 Jul	14 Aug
3	28	185	111	--	--	108.0	78.5	22 Jul	14 Aug
4	28	148	333	--	--	169.7	153.7	22 Jul	14 Aug
5	0	356	29	--	--	128.3	197.7	22 Jul	14 Aug
6	300	26	0	--	--	108.7	166.2	22 Jul	14 Aug
7	0	206	248	--	--	151.3	132.7	22 Jul	14 Aug
8	0	1275	971	--	--	748.7	665.9	22 Jul	14 Aug
9	1057	172	132	--	--	453.7	522.9	22 Jul	14 Aug
10	650	72	60	--	--	260.7	337.2	22 Jul	14 Aug
11	0	0	0	--	--	0.0	0.0	22 Jul	14 Aug
12	0	0	3	--	--	1.0	1.7	22 Jul	14 Aug
13	0	1	0	--	--	0.3	0.6	22 Jul	14 Aug
14	0	0	4	--	--	1.3	2.3	22 Jul	14 Aug
Total	2619	3348	2126	--	--	2664.3	562.4	22 Jul	14 Aug

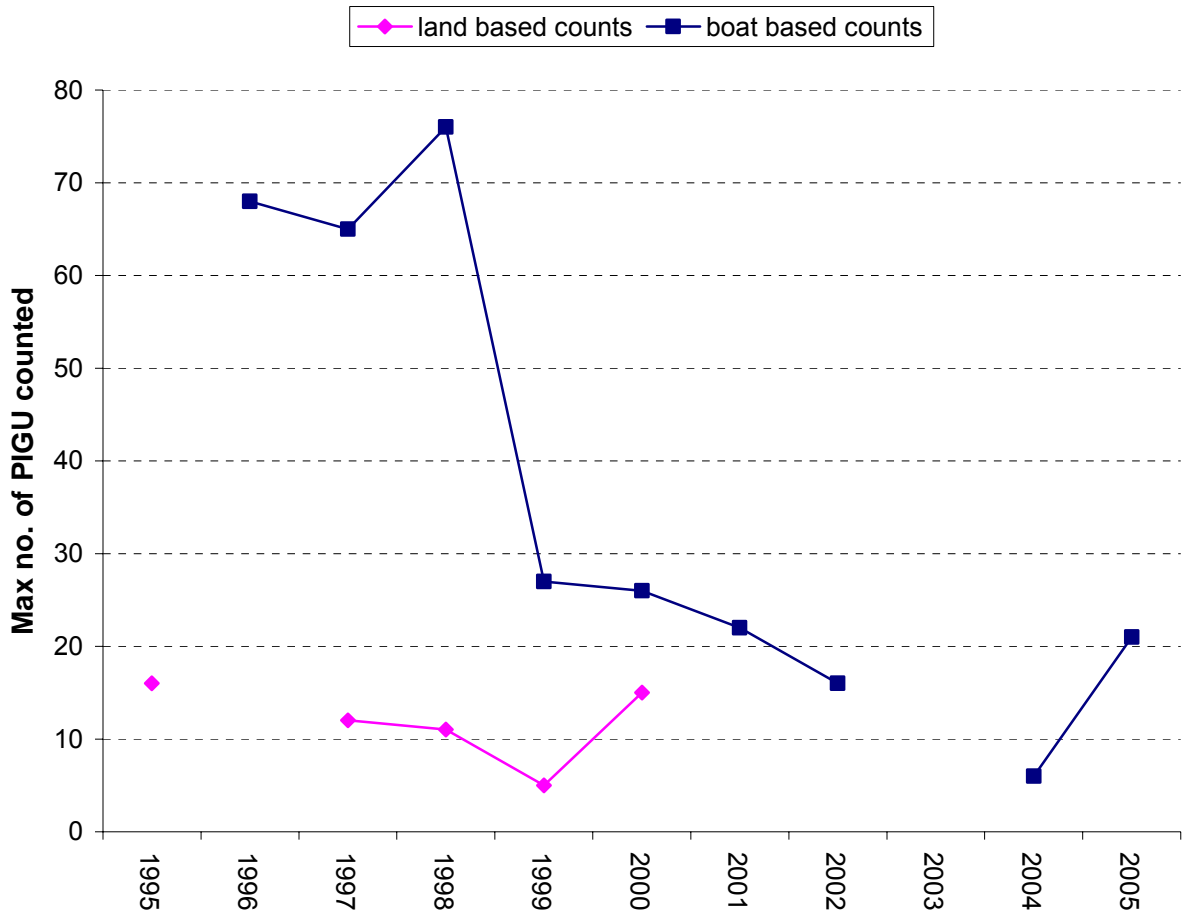


Figure 18. Maximum number of pigeon guillemots counted on land and boat-based surveys at Aiktak Island, Alaska.

Table 40. Maximum land-based counts of pigeon guillemots at Aiktak Island, Alaska.

Observation Points	1995 ^a	1996	1997	1998	1999	2000	2001 ^b	2002	2003	2004	2005	Max	Mean	SD
Island Cove	--	--	--	--	0	--	--	0	0	0	1			
Old Camp Beach	--	--	--	--	12	--	--	0	3	2	1			
Petrel Valley Beach	--	--	--	--	0	--	--	0	1	3	2			
4 Sisters West	--	--	--	--	0	--	--	0	0	0	0			
4 Sisters East	--	--	--	--	2	--	--	1	0	0	0			
Ivory Cove	--	--	--	--	0	--	--	0	1	0	0			
Cove East of Ivory Cove	--	--	--	--	0	--	--	3	0	0	0			
Tower Cove	--	--	--	--	0	--	--	0	0	0	2			
Arch's Cove	--	--	--	--	0	--	--	5	4	0	5			
Petrel Valley Cove	--	--	--	--	2	--	--	3	2	0	4			
Total	--	--	--	--	16	--	--	12	11	5	15	16	11.8	4.32
Start Date	--	--	--	--	25 May	--	--	23 Jun	27 Jun	4 Jul	6 Jul			
End Date	--	--	--	--	25 May	--	--	25 Jun	27 Jun	6 Jul	7 Jul			
Earliest time	--	--	--	--	--	--	--	1100	0945	1200	1300			
Latest time	--	--	--	--	--	--	--	1800	1420	1400	1930			

^aNo data found for 1995-1998.

^bCounts from 2001 not comparable due to methods used.

Table 41. Maximum boat-based counts of pigeon guillemots during circumnavigations of Aiktak Island, Alaska.

Segments	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Max	Mean	SD
A (1 & 2) ^a	--	2	6	14	3	4	12	12	--	2	4			
B (3, 4 & 5)	--	8	0	0	0	2	0	0	--	0	2			
C (6)	--	8	20	19	4	2	0	2	--	0	3			
D (7,8 & 9)	--	3	0	0	2	0	0	0	--	2	0			
E (11 & 12)	--	25	21	22	11	13	0	0	--	0	10			
F (13)	--	13	17	12	4	4	8	2	--	1	1			
G (14)	--	9	1	9	3	0	2	0	--	1	1			
Total	--	68	65	76	27	26	22	16	--	6	21	76	36.3	25.90
Date	--	22 Jul	26 Jul	28 Jun	5 Jul	19 Jul	18 Jun	26 May	--	22 Jul	22 Jul			
Start time	--	0740	0759	0725	0826	0800	0650	1300	--	1100	1100			
End time	--	0930	0900	0855	0944	0910	0750	1830	--	1500	1330			

^aNumbers in parenthesis correspond to segments 1-14 of a general circumnavigation.

Table 42. Land-based counts of pigeon guillemots at Aiktak Island, Alaska, in 2005.

Segments	Date							max	mean	SD
	17 Jun	19 Jun	21 Jun	4 Jul	6 Jul	14 Jul	20 Jul			
Island Cove	0	1	0	0	1	0	0	1	0.3	0.5
Old Camp Beach	0	0	0	0	1	0	0	1	0.2	0.4
Petrel Valley Beach	1	1	1	0	2	2	1	2	1.2	0.7
4 Sisters West	0	0	0	0	0	0	0	0	0	0
4 Sisters East	0	0	0	0	0	0	0	0	0	0
Ivory Cove	0	0	0	0	0	1	0	1	0.1	0.4
Cove East of Ivory Cove	0	0	3	0	0	2	2	3	1.2	1.3
Tower Cove	1	4	1	2	2	1	0	4	1.7	1.3
Arch's Cove	2	0	0	8	5	2	4	8	3.2	2.9
Petrel Valley Cove	2	2	1	4	4	1	1	4	2.2	1.3
Total	6	8	6	14	15	9	8	15	9.4	3.6

Table 43. Boat-based counts of pigeon guillemots at Aiktak Island, Alaska, in 2005.

Plot	Replicate					max	mean	SD	first survey	last survey
	1	2	3	4	5					
A (1 & 2) ^a	4	2	5	--	--	5	3.7	1.5	22 Jul	14 Aug
B (3, 4 & 5)	2	0	0	--	--	2	0.7	1.2	22 Jul	14 Aug
C (6)	3	4	1	--	--	4	2.7	1.5	22 Jul	14 Aug
D (7,8 & 9)	0	5	4	--	--	5	3.0	2.6	22 Jul	14 Aug
E (11 & 12)	10	6	3	--	--	10	6.3	3.5	22 Jul	14 Aug
F (13)	1	0	1	--	--	1	0.7	0.6	22 Jul	14 Aug
G (14)	1	0	2	--	--	2	1.0	1.0	22 Jul	14 Aug
Total	21	17	16	--	--	21	18.0	2.6	22 Jul	14 Aug

^aNumbers in parenthesis correspond to segments 1-14 of a general circumnavigation.

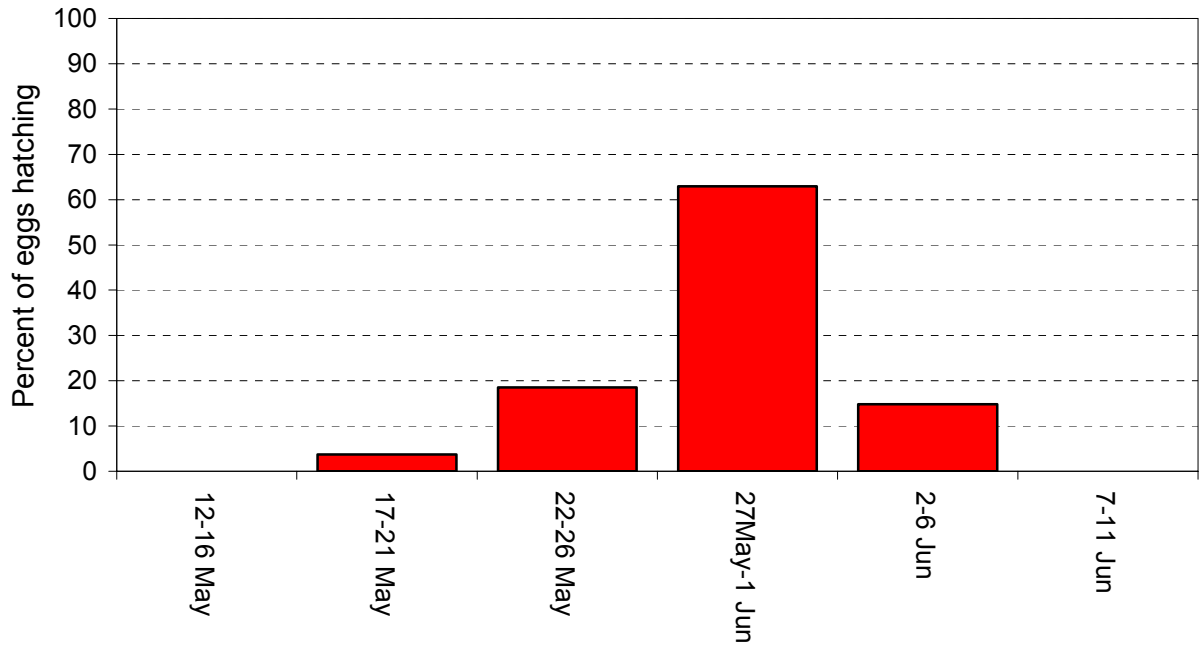


Figure 19. Hatching chronology of ancient murrelets at Aiktak Island, Alaska, in 2005.

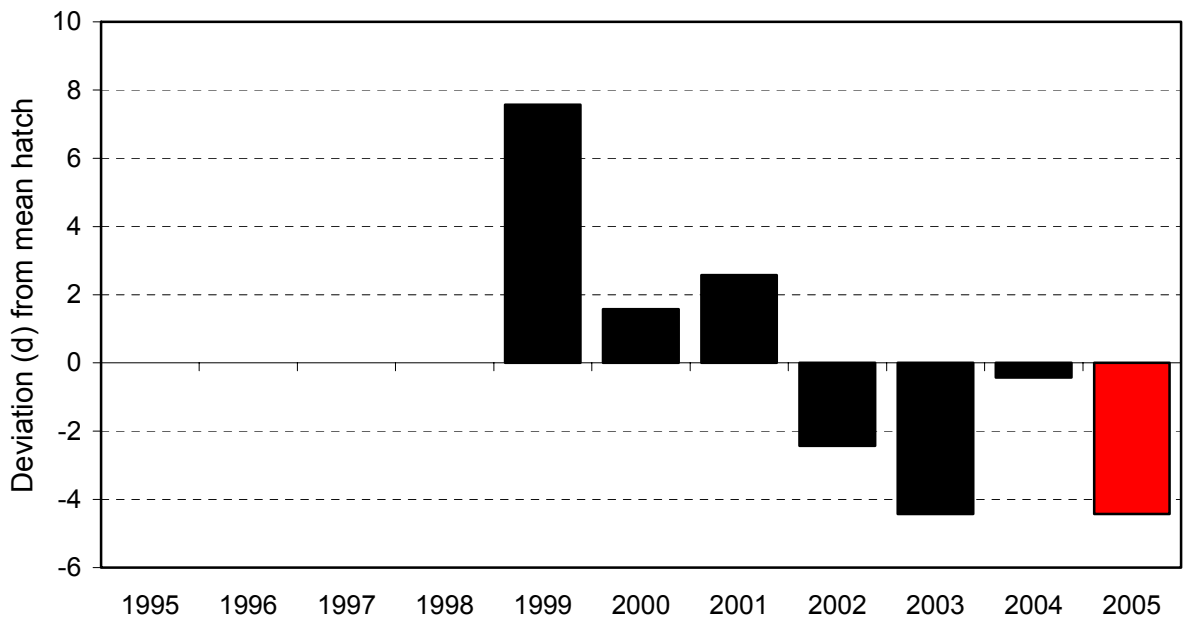


Figure 20. Yearly hatch date deviation (from the 1995-2005 average of 2 July) of ancient murrelets at Aiktak Island, Alaska. Numbers below the mean indicate earlier hatch dates, while those above indicate later hatch dates.

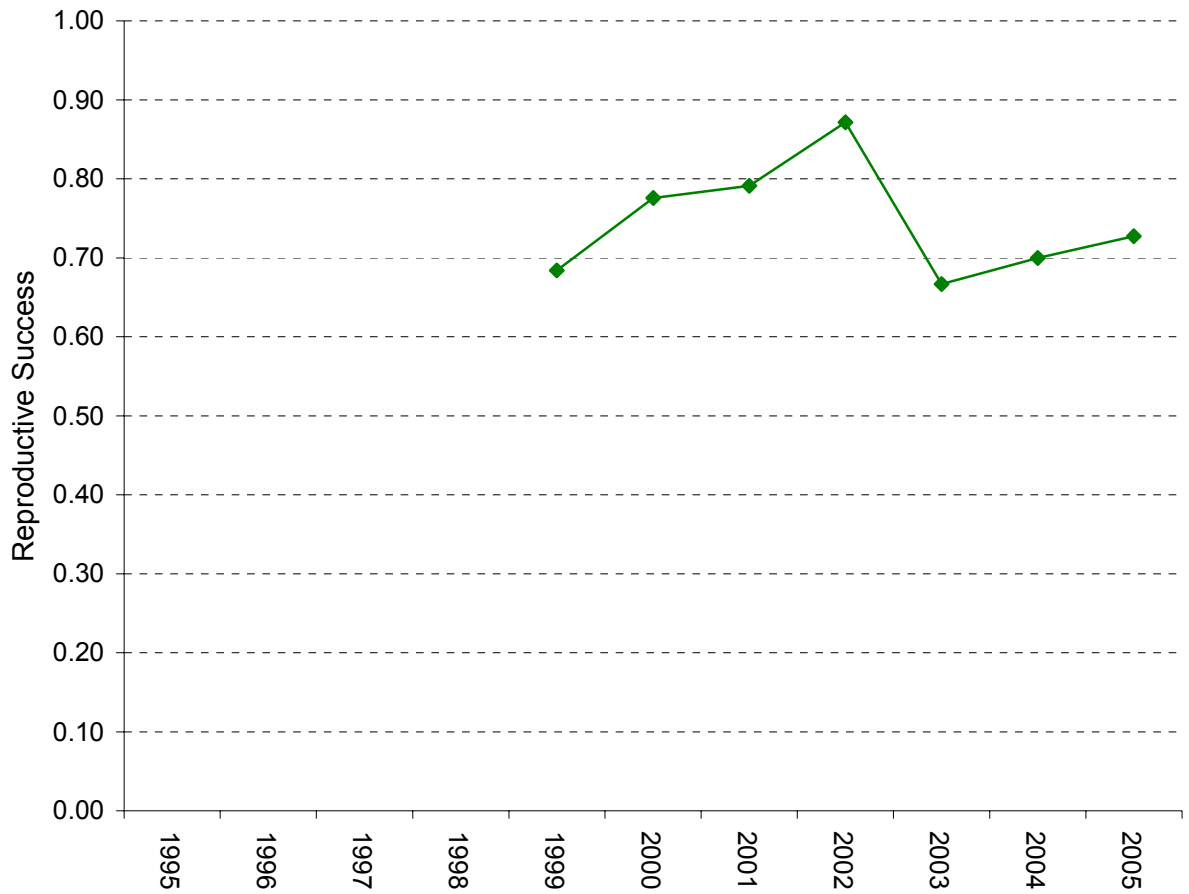


Figure 21. Ancient murrelet reproductive performance at Aiktak Island, Alaska. Reproductive success is defined as the number of chicks that “fledge”/ total number of eggs.

Table 44. Reproductive performance of ancient murrelets at Aiktak Island.

Parameter	1995 ^a	1996	1997	1998	1999	2000	2001	2002	2003 ^b	2004	2005
No. burrows with eggs (A)	--	--	--	--	30	29	35	35	40	31	44
Total eggs (B)	--	--	--	--	57	58	67	70	75	60	88
No. burrows with chicks (C)	--	--	--	--	22	24	29	33	28	23	33
Total chicks (D)	--	--	--	--	39	45	53	61	51	42	65
No. burrows w/chicks "fledged" (E)	--	--	--	--	22	24	29	33	27	23	33
Total chicks "fledged" (F)	--	--	--	--	39	45	53	61	50	42	64
Mean clutch size (B/A)	--	--	--	--	1.90	2.00	1.91	2.00	1.88	1.94	2.0
Hatching success (D/B)	--	--	--	--	0.68	0.78	0.79	0.87	0.68	0.70	0.74
Nest success (E/A)	--	--	--	--	0.73	0.83	0.83	0.94	0.70	0.74	0.75
Mean brood size (D/C)	--	--	--	--	1.77	1.88	1.83	1.85	1.82	1.83	1.97
"Fledging" success (F/D)	--	--	--	--	1.00	1.00	1.00	1.00	0.98	1.00	0.98
Reproductive success (F/B)	--	--	--	--	0.68	0.78	0.79	0.87	0.67	0.70	0.73
Mean hatch date	--	--	--	--	10 Jul	3 Jul	5 Jul	30 Jun	28 Jun	1 Jul	28 Jun
n	--	--	--	--	21	24	29	33	21	23	27
SD	--	--	--	--	5.74	6.37	5.45	5.98	4.40	5.57	4.30

^aNo data exist for 1995 and 1996.

^bIn 2003, there were still burrows with eggs at the time of field crew departure. This is a maximum estimate of productivity.

Table 45. Breeding chronology of horned puffins at Aiktak Island, Alaska.

Year	mean hatch	SD	n ^a	median hatch	no. nests monitored ^b	first hatch	last hatch	first fledge
1995	--	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--	--
2002	--	--	--	--	--	--	--	--
2003	--	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--	--
2005	29 Jul	6.4	4	27 Jul	10	24 Jul	8 Aug	--

^aSample size for calculation of mean and median hatch date estimates only.

^bThe total used for estimating the remaining parameters.

Table 46. Reproductive performance of horned puffins at Aiktak Island, Alaska.

Parameter	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total eggs (A)	--	--	--	--	--	--	--	--	--	--	10
No. eggs lost to:											
disappearance	--	--	--	--	--	--	--	--	--	--	0
abandonment	--	--	--	--	--	--	--	--	--	--	5
breakage	--	--	--	--	--	--	--	--	--	--	0
Total Chicks (B)	--	--	--	--	--	--	--	--	--	--	5
No. chicks lost to:											
disappearance	--	--	--	--	--	--	--	--	--	--	1
death	--	--	--	--	--	--	--	--	--	--	1
No. "successful" chicks (C_1+C_2):	--	--	--	--	--	--	--	--	--	--	3
fledged (C_1) ^a	--	--	--	--	--	--	--	--	--	--	0 ^b
still present (C_2)	--	--	--	--	--	--	--	--	--	--	3
Hatching success (B/A)	--	--	--	--	--	--	--	--	--	--	0.5
Fledging success (C_1+C_2/B)	--	--	--	--	--	--	--	--	--	--	0.6
Reproductive success (C_1+C_2/A)	--	--	--	--	--	--	--	--	--	--	0.3
Productivity (hs x fs)	--	--	--	--	--	--	--	--	--	--	0.3

^aFor chicks to be considered fledged, they had to be at least 38 days old before disappearing. If a chick was still present in its burrow at the last visit, it was not considered a fledgling for purposes of this data analysis.

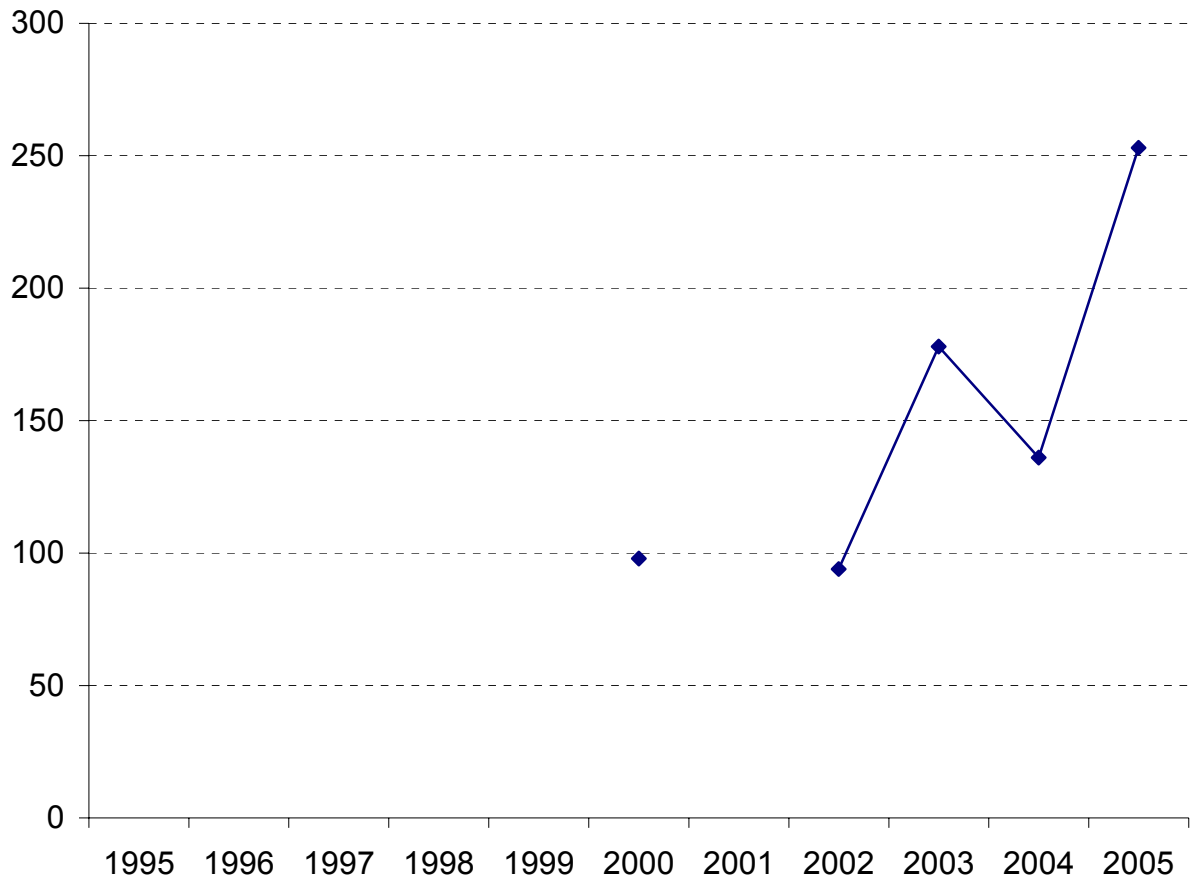


Figure 22. Maximum number of horned puffins counted from land-based observation points at Aiktak Island, Alaska.

Table 47. Maximum land-based counts of horned puffins at Aiktak Island, Alaska.

Observation Points	1995 ^a	1996	1997	1998	1999	2000	2001 ^b	2002	2003	2004	2005	Max	Mean	SD
Island Cove	--	--	--	--	--	11	--	12	3	12	25			
Old Camp Beach	--	--	--	--	--	31	--	6	29	0	3			
Petrel Valley Beach	--	--	--	--	--	15	--	2	0	2	6			
4 Sisters West	--	--	--	--	--	10	--	26	12	8	15			
4 Sisters East	--	--	--	--	--	2	--	7	0	6	16			
Ivory Cove	--	--	--	--	--	2	--	12	0	2	6			
Cove East of Ivory Cove	--	--	--	--	--	2	--	3	6	0	4			
Tower Cove	--	--	--	--	--	0	--	0	9	0	31			
Arch's Cove	--	--	--	--	--	0	--	12	12	0	4			
Petrel Valley Cove	--	--	--	--	--	25	--	14	107	106	143			
Total	--	--	--	--	--	98	--	94	178	136	253	253	151.8	65.98
Start Date	--	--	--	--	--	16 Jun	--	1 Jul	18 Jun	4 Jul	6 Jul			
End Date	--	--	--	--	--	17 Jun	--	3 Jul	18 Jun	6 Jul	7 Jul			
Earliest time	--	--	--	--	--	--	--	1300	1226	1200	1300			
Latest time	--	--	--	--	--	--	--	1630	1552	1400	1930			

^aNo data found for 1995-1999.

^bCounts from 2001 are not comparable due to the methodology used.

Table 48. Land-based counts of horned puffins at Aiktak Island, Alaska, in 2005.

Segments	Date					max	mean	SD
	17 Jun	19 Jun	21 Jun	4 Jul	6 Jul			
Island Cove	5	1	5	15	25	25	11.5	9.8
Old Camp Beach	19	6	4	0	3	19	3.3	7.4
Petrel Valley Beach	1	0	5	2	6	6	3.3	2.6
4 Sisters West	13	7	22	2	15	22	11.5	7.7
4 Sisters East	13	0	1	30	16	30	11.8	12.3
Ivory Cove	0	5	2	3	6	6	3.2	2.4
Cove East of Ivory Cove	3	3	1	1	4	4	2.3	1.3
Tower Cove	11	20	5	15	31	31	17.8	9.8
Arch's Cove	9	20	14	34	4	34	18	11.6
Petrel Valley Cove	71	82	6	66	143	143	74.3	48.8
Total	145	144	65	168	253	253	155	67.3

Table 49. Mean growth rates of horned puffin chicks at Aiktak Island, Alaska. Chicks were measured during the linear phase of growth. Individual chicks measured at least 2 times were the sample units.

Year	n	Mass (g/day)			Wing chord (mm/day)		
		mean	SD	range	mean	SD	range
1995	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--
2002	--	--	--	--	--	--	--
2003	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--
2005	4	8.3	1.9	5.7-10.2	3.3	0.1	3.2-3.5

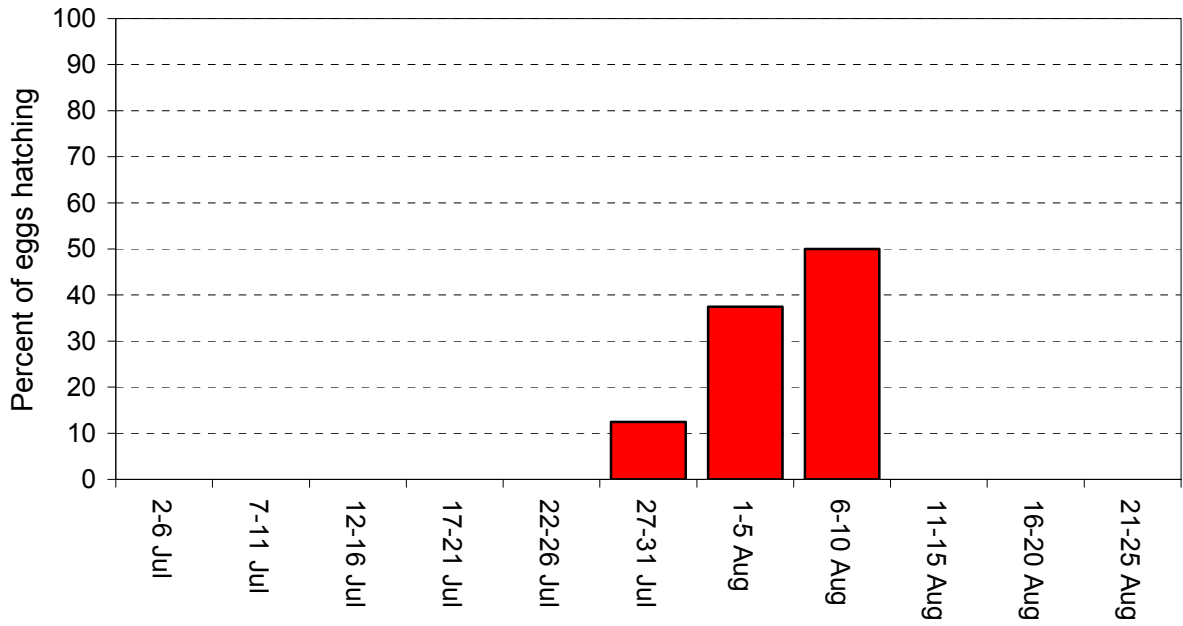


Figure 23. Hatching chronology of tufted puffins at Aiktak Island, Alaska, in 2005.

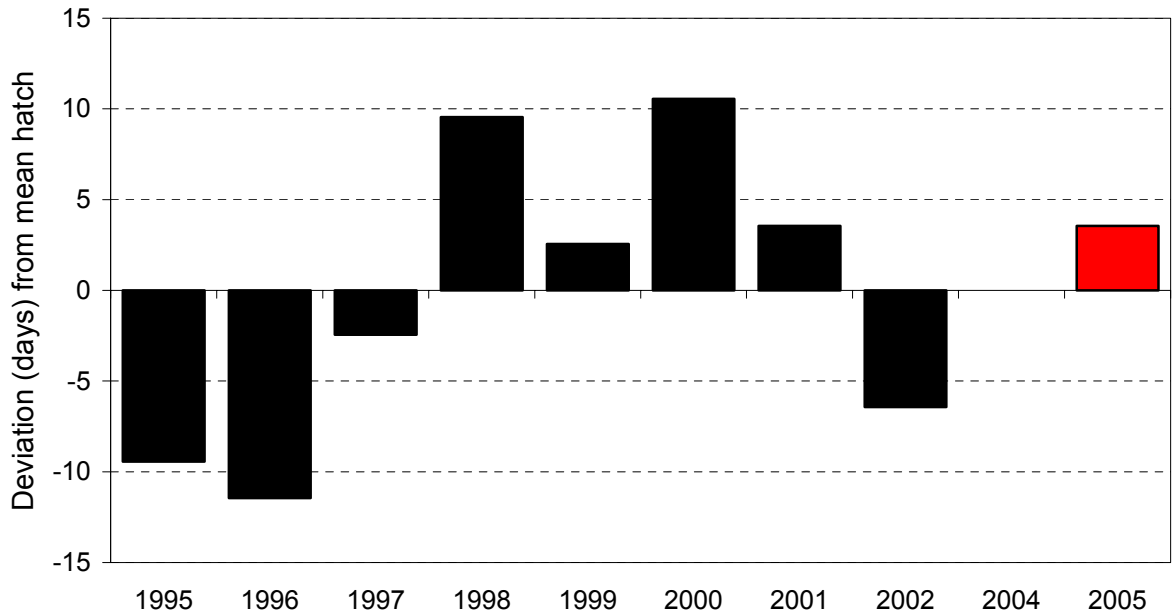


Figure 24. Yearly hatch date deviation (from the 1995-2005 average of 4 August) of tufted puffins at Aiktak Island, Alaska. Numbers below the mean indicate earlier hatch dates, while those above indicate later hatch dates.

Table 50. Breeding chronology of tufted puffins at Aiktak Island, Alaska.

Year	mean hatch	SD	n ^a	median hatch	no. nests monitored ^b	first hatch	last hatch	first fledge
1995	26 Jul	3.46	17	25 Jul	38	21 Jul	31 Jul	--
1996	24 Jul	7.95	27	23 Jul	67	8 Jul	9 Aug	--
1997	2 Aug	4.03	23	4 Aug	81	23 Jul	8 Aug	--
1998	14 Aug	7.15	7	11 Aug	85	4 Aug	23 Aug	--
1999	17 Aug	2.19	5	17 Aug	58	3 Aug	9 Aug	--
2000	14 Aug	0.00	1	14 Aug	62	--	--	--
2001	8 Aug	11.09	6	10 Aug	57	19 Jul	20 Aug	30 Aug
2002	29 Jul	7.35	17	26 Jul	38	19 Jul	18 Aug	1 Sep
2003 ^a	--	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--	--
2005	8 Aug	6.6	8	8 Aug	79	21 Jul	14 Aug	>30 Aug ^c

^aThere are no data for 2003.

^aSample size for calculation of mean and median hatch date estimates only.

^bThe total used for estimating the remaining parameters.

^c> symbol indicates that chicks had not fledged by last visit.

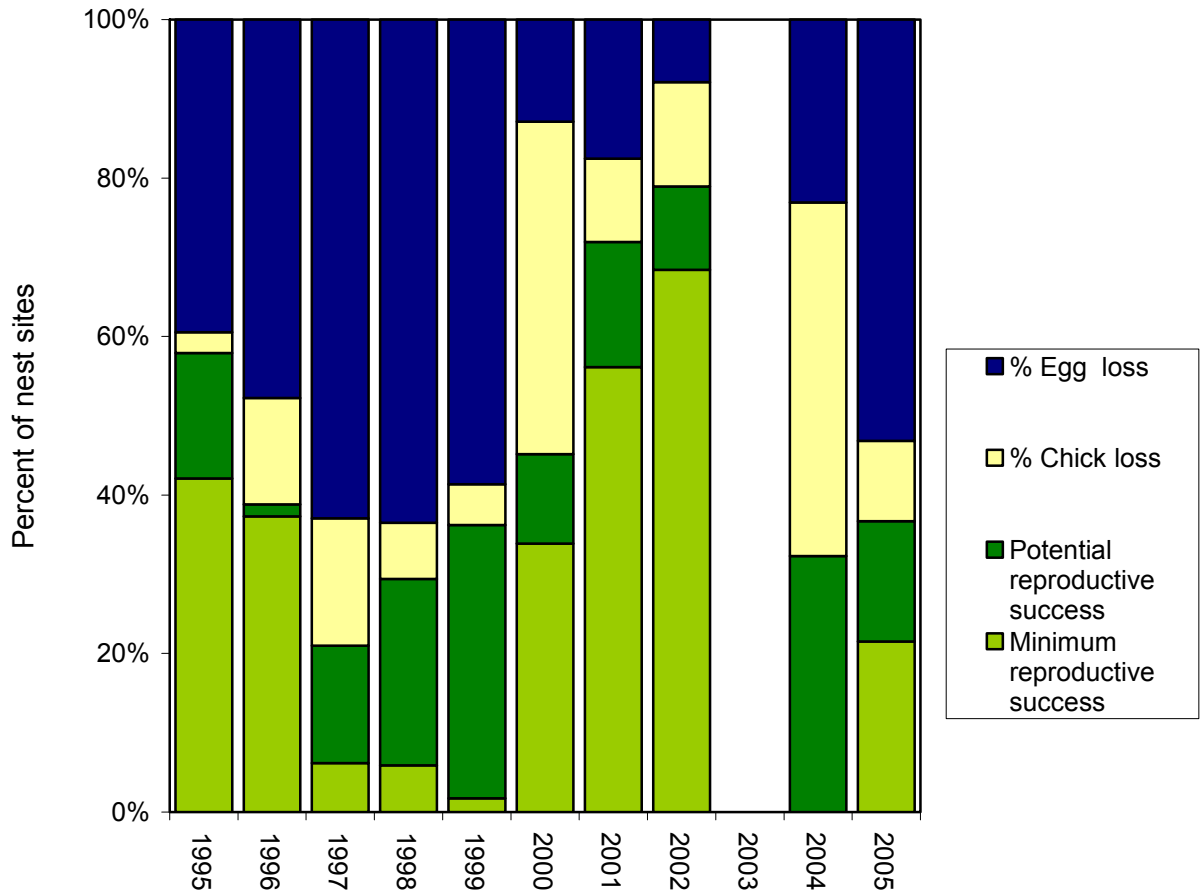


Figure 25. Reproductive performance of tufted puffins in artificial and natural burrows at Aiktak Island, Alaska.

Table 51. Reproductive performance of tufted puffins in artificial and natural burrows at Aiktak Island, Alaska.

Parameter	1995	1996	1997	1998	1999	2000	2001	2002	2003 ^b	2004	2005
Total eggs (A)	38	67	81	85	58	62	57	38	--	65	79
No. eggs lost to:											
disappearance	6	11	29	30	11	7	1	1	--	8	12
abandonment	8	16	17	17	20	0	9	1	--	5	15
breakage	1	5	5	7	3	1	0	1	--	2	15
Total Chicks (B)	23	35	30	31	24	54	47	35	--	50	37
No. chicks lost to:											
disappearance	1	3	6	0	1	24	2	2	--	14	2
death	0	6	7	6	2	2	4	3	--	11	6
No. "successful" chicks (C ₁ +C ₂):	22	26	17	25	21	28	41	30	--	21	29
fledged ^a (C ₁)	16	25	5	5	1	21	32	26	--	0	0
still present (C ₂)	6	1	12	20	20	7	9	4	--	21	29
Hatching success (B/A)	0.61	0.52	0.37	0.36	0.41	0.87	0.82	0.92	--	0.77	0.47
Fledging success (C ₁ +C ₂ /B)	0.96	0.74	0.57	0.81	0.88	0.52	0.87	0.86	--	0.42	0.78
Reproductive success (C ₁ +C ₂ /A)	0.58	0.39	0.21	0.29	0.36	0.45	0.72	0.79	--	0.32	0.37
Productivity (hs x fs)	0.58	0.39	0.21	0.29	0.36	0.45	0.72	0.79	--	0.32	0.37

^aFor chicks to be considered fledged, they had to be at least 38 days old before disappearing or 33 days old at the time of the last visit.

^bThere are no data for 2003.

Table 52. Mean growth rates of tufted puffin chicks at Aiktak Island, Alaska. Chicks were measured during the linear phase of growth. Individual chicks measured at least 2 times were the sample units.

Year	n	Mass (g/day)			Wing chord (mm/day)		
		mean	SD	range	mean	SD	range
1995	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--
2002	--	--	--	--	--	--	--
2003 ^a	--	--	--	--	--	--	--
2004	24	7.4	1.7	3.0 - 9.9	--	--	--
2005	23	7.7	2.4	3.4 -14.5	2.5	0.5	1.4 - 3.3

^aThere are no data for 2003.

Table 53. Maximum burrow density and occupancy rates of tufted puffins on index plots at Aiktak Island, Alaska.

Year	Plot										mean	SD	
	1	2	3	4	5	6	7	8	9	10			
Density													
1995	--	--	--	--	--	--	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--	--	--	--	--	--	--
2002	0.22	0.45	0.66	0.67	0.41	0.35	0.83	0.26	0.83	0.37	0.51	0.22	
2003	0.36	0.55	0.98	0.64	0.39	0.37	0.86	0.21	0.90	0.36	0.56	0.27	
2004	0.33	0.47	0.90	0.80	0.40	0.35	0.85	0.20	0.85	0.41	0.51	0.26	
2005	0.29	0.43	0.90	0.69	0.36	0.36	0.71	0.21	0.77	0.41	0.51	0.23	
Occupancy													
1995	--	--	--	--	--	--	--	--	--	--	--	--	--
1996	--	--	--	--	--	--	--	--	--	--	--	--	--
1997	--	--	--	--	--	--	--	--	--	--	--	--	--
1998	--	--	--	--	--	--	--	--	--	--	--	--	--
1999	--	--	--	--	--	--	--	--	--	--	--	--	--
2000	--	--	--	--	--	--	--	--	--	--	--	--	--
2001	--	--	--	--	--	--	--	--	--	--	--	--	--
2002	0.58	0.62	0.81	0.61	0.78	0.75	0.52	0.65	0.77	0.62	0.67	0.10	
2003 ^a	--	--	--	--	--	--	--	--	--	--	--	--	
2004	0.39	0.57	0.74	0.57	0.83	0.83	0.66	0.60	0.79	0.76	0.67	0.14	
2005	0.60	0.50	0.37	0.69	0.58	0.63	0.51	0.35	0.63	0.39	0.53	0.12	
Plot													
area (m ²):	314.2	314.2	314.2	314.2	314.2	314.2	150	98.5	98.5	98.5			

^aThere are no data for 2003.

Table 54. Mean number of species seen during circumnavigations at Aiktak Island, Alaska.

Species ^a	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Max	Mean	SD
Unk. Shearwater	--	--	--	--	--	--	--	--	--	--	0.3	--	--	--
Cormorant														
Pelagic	--	--	--	--	--	--	--	--	--	--	1.0	--	--	--
Red-faced	--	--	--	--	--	--	--	--	--	--	0.0	--	--	--
Double-crested	--	--	--	--	--	--	--	--	--	--	17.3	--	--	--
Unidentified	--	--	--	--	--	--	--	--	--	--	48.3	--	--	--
Green-winged teal	--	--	--	--	--	--	--	--	--	--	2.3	--	--	--
Harlequin Duck	--	--	--	--	--	--	--	--	--	--	15.3	--	--	--
Bald eagle	--	--	--	--	--	--	--	--	--	--	5.3	--	--	--
Peregrine falcon	--	--	--	--	--	--	--	--	--	--	0.0	--	--	--
Black oystercatcher	--	--	--	--	--	--	--	--	--	--	25.0	--	--	--
Rock sandpiper	--	--	--	--	--	--	--	--	--	--	0.3	--	--	--
Murre														
Common	--	--	--	--	--	--	--	--	--	--	0.0	--	--	--
Thick-billed	--	--	--	--	--	--	--	--	--	--	0.0	--	--	--
Unidentified	--	--	--	--	--	--	--	--	--	--	2697.7	--	--	--
Pigeon guillemot	--	--	--	--	--	--	--	--	--	--	16.3	--	--	--
Horned Puffin	--	--	--	--	--	--	--	--	--	--	140.7	--	--	--
Common raven	--	--	--	--	--	--	--	--	--	--	7.0	--	--	--
Harbor seal	--	--	--	--	--	--	--	--	--	--	21.3	--	--	--
Steller's sea lion	--	--	--	--	--	--	--	--	--	--	61.7	--	--	--
Sea Otter	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--

^aTufted puffins and glaucous-winged gulls are not counted during circumnavigations due to their abundance.

Table 55. Numbers of species seen during circumnavigations, between 22 July and 14 August, at Aiktak Island, Alaska, in 2005.

Species ^a	Replicate					max	mean	SD
	1	2	3	4	5			
Unk. Shearwater	0	1	0	--	--	1	0.3	0.58
Cormorant								
Pelagic	0	3	0	--	--	3	1.0	1.73
Red-faced	0	0	0	--	--	0	0.0	0.00
Double-crested	15	31	6	--	--	31	17.3	12.66
Unidentified	63	44	38	--	--	63	48.3	13.05
Green-winged teal	0	0	7	--	--	7	2.3	4.04
Harlequin Duck	20	16	10	--	--	20	15.3	5.03
Bald eagle	7	6	3	--	--	7	5.3	2.08
Peregrine falcon	0	0	0	--	--	0	0.0	0.00
Black oystercatcher	12	19	44	--	--	44	25.0	16.82
Rock sandpiper	0	1	0	--	--	1	0.3	0.58
Murre								
Common	0	0	0	--	--	0	0.0	0.00
Thick-billed	0	0	0	--	--	0	0.0	0.00
Unidentified	2619	3348	2126	--	--	3348	2697.7	614.79
Pigeon guillemot	21	17	11	--	--	21	16.3	5.03
Horned Puffin	63	203	156	--	--	203	140.7	71.25
Common raven	5	14	2	--	--	14	7.0	6.24
Harbor seal	38	14	12	--	--	38	21.3	14.47
Steller's sea lion	85	100	0	--	--	100	61.7	53.93
Sea Otter	1	1	0	--	--	1	0.7	0.58

^aTufted puffins and glaucous-winged gulls are not counted during circumnavigations due to their abundance.

Table 56. Numbers of birds detected during off-road point count at Ugamak Island, Alaska.

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Max	Mean	SD
Rock sandpiper	--	--	--	--	--	--	--	--	--	--	4	--	--	--
Winter wren	--	--	--	--	--	--	--	--	--	--	2	--	--	--
Song sparrow	--	--	--	--	--	--	--	--	--	--	9	--	--	--
Glaucous-winged gull	--	--	--	--	--	--	--	--	--	--	1	--	--	--
Savannah sparrow	--	--	--	--	--	--	--	--	--	--	25	--	--	--
Rock ptarmigan	--	--	--	--	--	--	--	--	--	--	6	--	--	--
Lapland longspur	--	--	--	--	--	--	--	--	--	--	3	--	--	--
Bank swallow	--	--	--	--	--	--	--	--	--	--	0	--	--	--
Gray-crowned rosy-finch	--	--	--	--	--	--	--	--	--	--	12	--	--	--
Black oystercatcher	--	--	--	--	--	--	--	--	--	--	0	--	--	--
Short-eared owl	--	--	--	--	--	--	--	--	--	--	1	--	--	--
Double-crested corm.	--	--	--	--	--	--	--	--	--	--	1	--	--	--
American pipit	--	--	--	--	--	--	--	--	--	--	2	--	--	--
Snow bunting	--	--	--	--	--	--	--	--	--	--	1	--	--	--
Common raven	--	--	--	--	--	--	--	--	--	--	1	--	--	--
Bald eagle	--	--	--	--	--	--	--	--	--	--	2	--	--	--

Table 57. Numbers of birds detected during off-road point count at Ugamak Island, Alaska, June 2005.

Species	Survey Point												Total on points	% of points spp. observed
	1	2	3	4	5	6	7	8	9	10	11	12		
Rock sandpiper	0	0	0	0	0	0	0	0	0	0	3	1	4	15%
Winter wren	1	0	0	0	0	0	1	0	0	0	0	0	2	15%
Song sparrow	5	1	1	0	1	1	0	0	0	0	0	0	9	38%
Glaucous-winged gull	0	0	0	0	0	0	1	0	0	0	0	0	1	8%
Savannah sparrow	0	1	5	0	0	3	1	2	4	3	2	4	25	69%
Rock ptarmigan	0	1	1	0	0	2	2	0	0	0	0	0	6	31%
Lapland longspur	0	1	0	1	0	0	0	0	0	0	1	0	3	23%
Bank swallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Gray-crowned rosy-finch	0	0	0	3	1	0	2	0	0	0	6	0	12	31%
Black oystercatcher	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
Short-eared owl	0	0	0	0	0	0	0	0	0	1	0	0	1	8%
Double-crested corm.	1	0	0	0	0	0	0	0	0	0	0	0	1	8%
American pipit	0	1	0	0	1	0	0	0	0	0	0	0	2	15%
Snow bunting	0	0	0	0	1	0	0	0	0	0	0	0	1	8%
Common raven	0	0	0	0	0	0	0	1	0	0	0	0	1	8%
Bald eagle	0	0	0	0	0	0	0	1	1	0	0	0	2	15%

Table 58. Mean numbers of birds detected on transect surveys along Old Camp Beach, Aiktak Island, Alaska, 1995-2005.

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Max	Mean	SD
<i>n</i>	--	--	--	--	--	--	--	--	--	--	3	--	--	--
First Survey Date	--	--	--	--	--	--	--	--	--	--	6 Jun	--	--	--
Last Survey Date	--	--	--	--	--	--	--	--	--	--	12 Jun	--	--	--
Black oystercatcher	--	--	--	--	--	--	--	--	--	--	6.0	--	--	--
Rock sandpiper	--	--	--	--	--	--	--	--	--	--	0	--	--	--
Lapland longspur	--	--	--	--	--	--	--	--	--	--	0	--	--	--
Winter wren	--	--	--	--	--	--	--	--	--	--	2.3	--	--	--
Song sparrow	--	--	--	--	--	--	--	--	--	--	11.7	--	--	--
Gray-crowned rosy-finch	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--

Table 59. Mean numbers of birds detected on passerine transect surveys along Old Camp Beach, Aiktak Island, Alaska, in 2005.

Species	Date			mean	SD
	6 Jun	8 Jun	12 Jun		
Black oystercatcher	6	6	6	6.0	0
Rock sandpiper	0	0	0	0	0
Lapland longspur	0	0	0	0	0
Winter wren	4	2	1	2.3	1.5
Song sparrow	10	15	10	11.7	2.9
Gray-crowned rosy-finch	1	0	1	0.7	0.6

Table 60. Annotated list of species observed at Aiktak Island, Alaska, 15 May-2 September 2005, including notes on incidental observations at Ugamak Island, Alaska.

Abundance categories were defined at Aiktak Island 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

For breeding status, please refer to Table 61.

Birds

Emperor goose (*Chen canagica*). Uncommon. On 26 August, 2 adults and 3 juveniles were spotted west of the dike, about 50 m off New Camp Beach. Six individuals were present on New Camp Beach on 27 August. The geese were only present during fall migration.

Brant (*Branta bernicla*). Rare. On 15 and 17 June, one individual was seen on the north side of the island on both New and Old Camp Beach. The large goose was observed foraging on *Ulva* species (a.k.a sea lettuce).

Cackling goose (*Branta hutchinsii*). Rare. One individual was heard and seen over the west face of Gull Mountain while observers descended down Petrel Valley from Petrel Cove's trailhead. Definitive white neck band made it an easily identified goose.

Northern shoveler (*Anas clypeata*). Uncommon. Two observations were recorded during the field season on 16 and 18 May. In each instance only one drake and hen were seen.

Northern pintail (*Anas acuta*). Uncommon. Four adults were seen on New Camp Beach on 23 and 27 May.

Green winged teal (*Anas crecca*). Common. Two ducklings and a hen were seen in Teal Pond on 12 June. On 8 July, 5 ducklings and 2 hens were watched for a short period while the adults preened and the ducklings swam about in Teal Pond. It was very common to see young of the year, hens, and drakes on New Camp Beach near the stream outlet as well as Teal Pond.

Harlequin duck (*Histrionicus histrionicus*). Common. Ducklings and nests were never discovered. A frequently encountered duck during the late summer season. On 20 August, 10 individuals were seen swimming close to shore near 4 Sisters. Again on 25 August, 10 individuals were seen near the dike on the north side of the island.

Common merganser (*Mergus merganser*). Uncommon. On 23 and 24 August, three individuals were seen on the north side of Aiktak and photographed.

Red-breasted merganser (*Mergus serrator*). Uncommon. On 1 June, 2 adults were seen in the near shore environment near New Camp Beach.

Red-necked grebe (*Podiceps grisegena*). Rare. One adult was seen on 18 and 20 July on the north side of the island near the dike.

Short-tailed shearwater (*Puffinus tenuirostris*). Rare. One adult was seen during a circumnavigation on 11 July, in Ugamak Strait, approximately $\frac{1}{4}$ mile offshore. On 4 August, an adult was seen soaring above the water 20m off Old Camp Beach during a gull fledgling index count. The carcass of a beached bird was discovered 11 August on New Camp Beach.

Fork-tailed storm-petrel (*Oceanodroma furcata*). Abundant. Fork-tailed storm-petrels were monitored for chronological and productivity data. Storm-petrel research was completed on historical index plots scattered around the island in slightly variable microhabitats with differing aspect, slope, and elevation. Talus and soil are utilized for nesting chambers on Aiktak Island. Off plot nesting occurred in the Petrel Cove talus, artificial tufted puffin burrows, and ancient murrelet colonies. Two fork-tailed storm-petrels fledged this year with a Julian fledge date of 30 August with a confidence of ± 2.5 days.

Leach's storm-petrel (*Oceanodroma leucorhoa*). Abundant. It was the most abundant species from the family Hydrobatidae on Aiktak Island. Unlike fork-tailed storm-petrels, Leach's storm-petrels prefer soil burrows and were never discovered in talus areas. *O. leucorhoa* did not fledge this year as of the last check on 31 August.

Double-crested cormorant (*Phalacrocorax auritus*). Fairly common. Three circumnavigations of the island failed to yield evidence of nesting or productivity. Birds were regularly sighted in Petrel Cove, east of the dike and along all north beaches of Aiktak.

Red-faced cormorant (*Phalacrocorax urile*). Rare. This species has nested in prior years, but during three circumnavigations, observers did not find nesting pairs, nest bowls or young of the year.

Pelagic cormorant (*Phalacrocorax pelagicus*). Fairly common. The most abundant of the three species occurring on the island. Three circumnavigations of the island failed to yield evidence of nesting (stains or nest bowls) or productivity (eggs or chicks).

Bald eagle (*Haliaeetus leucocephalus*). Fairly common. Two nests were discovered over the course of the field season. The locations for those nests are as follows:

BAEA Nest #1 (east of Petrel Cove)

N 54° 10.939

W 164° 50.128

BAEA Nest #2 (viewed from top of TUPU plot B, looking towards Murre pole 23)

N 54° 10.813

W 164° 50.587

Numerous individuals were present throughout the course of the 2005 field season in various areas and at various life stages (adults and juveniles). Tufted puffins were the dominant prey (nest contents) item seen during chick rearing stages at both sites. Only one eaglet successfully fledged from nest #1. The other eaglet from nest #1 was found in Petrel Cove and monitored until its death one week later. One nestling was discovered in nest #2 and it was not certain whether the eaglet successfully fledged.

Peregrine falcon (*Falco peregrinus*). Uncommon. A pair was seen in the air vocalizing off Aiktak's southeastern cliffs near pole 51 on 17 June. The nest discovered on 6 July contained four older young of the year. The nest was located southeast of murre pole 23 (ledge is halfway down the cliff) and northwest of murre plot 3. Four older chicks were seen walking up and down the ledge vocalizing and spreading their wings. No flying was observed during the observation period. The adult in the area displayed protective behavior in the form of calls, fly bys, and perching away from the nest site.

Black oystercatcher (*Haematopus bachmani*). Common. A strong storm surge on 27 May covered a large percentage of the island's nests in kelp forcing pairs to re-nest. Only one fledgling was seen this year. There were 13 initial nest attempts, with 7 pairs relaying after the storm.

Wandering tattler (*Tringa incana*). Rare. On 11 August, an individual flushed from the large cobblestone stretch of East Camp Beach less than 20m west of the upland access trailhead.

Lesser yellowlegs (*Tringa flavipes*). Rare. One individual was seen on 11 August on Old Camp Beach less than 1 meter from the waterline in small cobbles. On 18 August one individual was seen alongside a ruddy turnstone in the same location.

Ruddy turnstone (*Arenaria interpres*). Rare. One individual was seen foraging alongside a lesser yellowlegs on Old Camp Beach in the fog and mist on 18 August with 2 rock sandpipers in the vicinity. Another juvenile was identified on New Camp Beach foraging amongst the kelp on 28 August.

Least sandpiper (*Calidris minutilla*). Common. Birds were commonly seen on the north side of the island in the wrack and near Teal Pond throughout the year. On 5 July, one individual was flushed out of the trail near Teal Pond. While conducting murre population counts on 6 July, three sandpipers were identified on the southwestern side of Big West Island. On 5 August, two foraging individuals were spotted, while a lone individual stood under a rock overhang near the upland access trail.

Rock sandpiper (*Calidris ptilocnemis*). Uncommon. The first sighting of the year took place in Petrel Cove on 17 July, where two adults in breeding plumage were seen atop an inter-tidal rock. On 24 July, one adult was seen on the rocky shoreline in Petrel Cove. On 30 July, in Petrel Cove, two adults were spotted. In August, all sightings were restricted to the north side of the island, with one individual spotted on 4 August and 2 on 25 August. This species is commonly seen in the higher elevations of Ugamak Island (>200ft) in early June.

Glaucous-winged gull (*Larus glaucescens*). Abundant. The maximum number of individuals present this year on historical index plots was 2887 adults. 117 nests were flagged and monitored this year. Nests were higher in relative abundance on Gull Mountain in comparison to the Southwest Slope. Other nesting areas include Old Camp Beach berms, Tuxedo Rock, East Island, and Big West Island. 172 fledglings (maximum for the year) were recorded on the morning of 31 August, while walking the index transect located on the Old and New Camp Beaches. Fledglings were still present on the beach at the time of our departure on 2 September. Five dead chicks were discovered throughout the nesting phase, without external injuries and were measured for the following information:

Specimen	Date found	Wt. (g)	Diag.Tarsus (mm)	Total Head (mm)	Culmen (mm)
1	6-Jul	54	28	52	13
2	6-Jul	61	30	55	20
3	6-Jul	39.5	27	48	12
4	12-Jul	325	48	76	28
5	12-Jul	74	27	49	18

Black-legged kittiwake (*Rissa tridactyla*). Rare. On 26 July, an adult was seen diving into the water approximately 30 yards from shore, while a glaucous-winged gull harassed the individual repeatedly. At a later date (27 July), 50-60 individuals were seen in the channel between Aiktak and Ugamak. Birds erratically dove into the water 40-50 yards offshore and two birds perched on a rock 10 yards from tide line amidst several adult gulls.

Common and thick-billed murre (*Uria aalge* and *U. lomvia*). Abundant. Common murre were more abundant in comparison to thick-billed murre populations, but several index plots contained both species. Murres experienced reproductive failure, which led to sporadic cliff attendance during population counts. Ravens, bald eagles, and peregrine falcons were often seen harassing birds while observers attempted to collect index population information. Common ravens were seen with murre eggs on several occasions and a total of 14 depredated

eggs were discovered between 6-19 July. The majority of the depredated eggs were found near a large boulder on New Camp Beach. Rafts of murres were common on both the eastern and western side of Sail Rock, as well as the area between Barred Island and Tuxedo Rock. Estimated raft size ranged from 56 to 1650 murres.

Pigeon guillemot (*Cephus columba*). Fairly common. Nest #1 was discovered on the north side of the island, west of Tower Cove, amongst large grass covered boulders on 24 July. The longitude and latitude of that nest was N 54° 11.212' / W 164° 49.250', with an accuracy of 44ft. A membrane and large chick were discovered at that point in time. Guano stains marked the nest along with an adult swimming nervously 20 yards from the nest site carrying an unidentified round fish approximately 3-4 inches in length. Additional instances of adults carrying fish were recorded during circumnavigations on 22 July, 4 Aug, and 14 August. The entire contents of nest #1 could not be ascertained due to its depth and obscure location. Subsequent nest visits revealed the presence of a second chick. Both chicks were monitored for chick growth and fledging status. The older and more developed chick fledged on 21 August. The second chick was present as of the last visit on 27 August. Chicks were separated or identified based on weight and plumage. The measurement synthesis is as follows:

Chick	Date	Wt. (g)	Diag.Tarsus (mm)	Post.Tarsus (mm)	Total Head (mm)	Wing Chord (mm)	Culmen (mm)
1	27-Jul	118.5	28.5	29.5	55	33	16.5
1	3-Aug	278	33.5	34	64	71	18
1	10-Aug	365	36.5	36.5	69	103	24
1	18-Aug	395	36.5	37	75.5	128	27
2	3-Aug	179.5	30.5	31	60.5	48	12
2	10-Aug	210	32	32.5	64	75	18
2	18-Aug	203	32.5	32.5	65.5	81	22
2	24-Aug	277.5	32	32	66.5	89.5	21.2
2	27-Aug	303.5	33	33.5	69	98.5	22.5

Ancient murrelet (*Synthliboramphus antiquus*). Abundant. Four productivity plots were flagged, mapped, and checked every five days until hatch dates and chick departure data were obtained. The locations of those plots were as follows:

ANMU Upland Access N 54° 11.217' / W 164° 50.475'
 ANMU Tower Cove N 54° 11.169' / W 164° 49.171'
 ANMU Cabin N 54° 11.134' / W 164° 50.591'
 ANMU New Camp/Squid Beak Beach N 54° 11.145' / W 164° 50.569'

The plots include: Upland Access, Tower Cove, Cabin, and New Camp/Squid Beak Beach. Off plot nests were found on STPE plot #17. One membrane and undeveloped egg were found on TUPU plot A in an artificial puffin burrow. Nests were primarily located along drainages and beach berms under 30m in height with relatively close access to beach habitat. Burrow depth varied (<.1m to <1.5m) and chambers were lined with grass, feathers, old membranes and pieces of old orange flagging. One dead adult was discovered on 16 July on the Petrel Valley trail, with no apparent wounds. Fork-tailed storm-petrels often occupy abandoned murrelet nests. The first "fledging" (murrelet chicks depart the chamber 1-2 days after hatch) date was 21 June.

Rhinoceros auklet (*Cerorhinca monocerata*). Rare. On 17 June, while conducting a pigeon guillemot and horned puffin index count from the Tower Cove vantage point, an unusual bird lacking the breeding plumage of a tufted puffin, was confirmed by two observers. The bird had a black back, orange bill, and appeared somewhat drab in color compared to a tufted puffin.

One observer made out the appearance of an obtrusive feature atop the bill. A scope was used during the sighting at 45X magnification. The bird was amongst a large raft of tufted puffins. The raft was approximately 1/8 to 1/4 mile offshore. On 27 July, the entire head of a rhinoceros auklet was found 10 feet above tide line directly below petrel plot #18. Feathers were still anchored to the head. The erect horn was both grey and white in color and the orange bill was topped with black. White facial streaks were present as well as black feathers surrounding the remaining skull portions.

Horned puffin (*Fratercula corniculata*). Abundant. The majority of breeding birds on the island nested in the Petrel Cove talus. Other nesting areas include Pleasure Cove, New Camp Beach boulders, and the immediate beach area east of Four Sisters. Ten nests were monitored throughout the year on a 7 day interval. 5 nests were abandoned at various stages of development, while 5 eggs hatched. Fledging of this species was not observed at Aiktak this year with the oldest chick being 37 days old.

Tufted puffin (*Fratercula cirrhata*). Abundant. The most abundant breeding seabird of Aiktak Island. Tufted puffin chronology and productivity data was collected in 2005 from a sample of plots scattered about Aiktak Island. Historical artificial burrow plots (A, B, C, D, E, G), along with natural burrow plots (Tower Cove and Four Sisters) created the overall sample size of occupied burrows. The Tower Cove natural burrows were located at N 54° 11.203' / W 164° 49.226' and the Four Sisters natural burrows were in the immediate vicinity of N 54° 11.344' / W 164° 49.746'. Tufted puffin fledglings did not fledge this year as of the last check on 30 August. During rain and wind storms it was common to find downed birds in Petrel Valley with no sign of predation. Some birds were able to make their way back to the colony or beaches while some perished. From 17 Jul to 19 Aug, a total of 11 dead adults were discovered in Petrel Valley or Petrel Stream. The first sighting of an adult with a food load took place on 21 July. Screening for food loads during the chick rearing periods took place from 6 to 28 August. All screening took place off-plot and the coordinates of those locations are as follows: N 54° 10.936' / W 164° 50.335', N 54° 10.934' / W 164° 50.842', N 54° 11.320' / W 164° 49.862', and N 54° 11.017' / W 164° 49.362'. Field observers submitted food samples for analysis and identifications have yet to be returned. 26 of 82 artificial burrows were occupied by breeding birds this year, while in 2004, 33 of 82 artificial burrows were occupied.

Short-eared owl (*Asio flammeus*). Rare. The only sighting took place in the early morning hours of 21 August. One individual was seen from the cabin flying east near the short cliffs above New Camp Beach. It seized a tufted puffin in mid air, but dropped it while continuing east. The tufted puffin continued on its original path out to sea after the incident. Birds were seen during the off road point count on Ugamak Island where, unlike Aiktak, vole populations are present.

Common raven (*Corvus corax*). Fairly common. Nests were not discovered in 2005, but birds were commonly seen on murre index plots. On 1, 3, and 14 July, ravens were seen holding murre eggs in their bills at various locations of the island. Common ravens are efficient predators of murre eggs on Aiktak Island. On 5 August, a dead adult was discovered at the base of Petrel Cove with no apparent injuries. Tissue samples were submitted to UAF for genetic analysis.

Purple martin (*Progne subis*). Rare. On 3 and 5 June, amongst several tree swallows, an adult male (no gray below) was seen storming up and down Petrel Valley. The male paused for a moment on a large beach boulder on New Camp Beach and then resumed storming up and down the valley foraging on insects. The episode was filmed and photographed, due to its rare nature. The deep purple plumage provided a stark contrast against the tree swallows flying in the area. The martin's plumage produced iridescence when sunlight reflected off the bird. The martin had a larger wingspan and body compared to the accompanying tree swallows and it was evident that the male was not nearly as acrobatic or quick as his counter-swallows.

Tree swallow (*Tachycineta bicolor*). Uncommon. On 3 June, 5 individuals, in addition to a male purple martin, were storming up and down Petrel Valley near the cabin, with 2 individuals taking time out to perch on the solar panel frame. 3 individuals were seen along with a male purple martin on 5 June.

Winter Wren (*Troglodytes troglodytes*). Common. The smallest passerine on Aiktak Island. Adults and fledglings were commonly seen alongside song and savannah sparrows on Old and New Camp Beaches.

American "Buff-bellied" pipit (*Anthus [rubescens] japonicus*). Uncommon. Two individuals were seen on New Camp Beach on 5 August. The agile, song sparrow-sized birds were seen chasing each other from rock to rock near the access point for the upland access trail above New Camp Beach. A stark white outer rectrice was seen during flight when the birds flew off the rock cliffs. A white eye ring was easily seen as well as rust colored breast and undersides with brown streaks on upper portions of the breast. Large numbers of least sandpipers were also walking the beaches during the observation. Photographs and field notes indicate the presence of pink legs which are evidence for the *japonicus* subspecies. Three individuals were seen near the outlet of Petrel Stream on 7 August. Two individuals chased each other, while the other rinsed in the cobblestone embedded stream.

Savannah sparrow (*Passerculus sandwichensis*). Common. The most predominant passerine present this year. Fledglings and adults were very common on New Camp Beach and along trails in the upland areas. Songbird transects were completed on historical index transects located on Old Camp Beach.

Song sparrow (*Melospiza melodia*). Common. Birds were frequently encountered along beaches and trails in the uplands. Fledglings and adults were common sites perching on various camp buildings and lines.

Golden-crowned sparrow (*Zonotrichia atricapilla*). Uncommon. An adult was frequently heard in the morning hours around camp. The solar panel frame was the favored perch site for most of the field season. An individual in immature plumage was seen 12 Aug. Single adults were seen on 3 June and 29 May.

Lapland longspur (*Calcarius lapponicus*). Rare. One adult female (buffy fall plumage) was seen on 24 May near pole 51, which marked the only sighting on Aiktak in 2005. Ugamak holds a breeding population of longspurs indexed by point count totals during the spring.

Gray-crowned rosy-finch (*Leucosticte tephrocotis*). Fairly common. The stout passerine favors the perimeter and beaches of the island, especially the Petrel Cove talus area. The first fledgling was sighted on 18 August in Petrel Cove, where an adult and fledgling were photographed together.

Fish

Pacific cod (*Gadus macrocephalus*). Fairly Common. Several fish were caught, along with kelp greenling and dusky rockfish in the channel north of Aiktak at 9 fathoms.

Dusky rockfish (*Sebastes ciliatus*). Fairly Common. Caught with plastic jig baits in the channel between Aiktak and Ugamak Island. Specimens had white peritoneum and dorsal fin counts of 13 stiff spines. Head spines were absent except for the nasal spine.

Atka mackerel (*Pleurogrammus monopterygius*). Rare. On 12 August, a large deceased female was found under a large tidal boulder in Petrel Cove. The female was gravid. Specimens were never caught on line in the channel.

Rock greenling (*Hexagrammos lagocephalus*). Fairly Common. On 21 June, one adult was caught near pleasure cove. Large numbers of adult fish, along with kelp greenling, were caught in the channel between Aiktak and Ugamak from an inflatable Avon skiff. Greenling were never caught away from kelp beds and preferred depths <9 fathoms. Flesh and mouth color were blue, but when cooked the meat loses its coloration and becomes white.

Sea Mammals

Sea Otter (*Enhydra lutris*). Rare. Only one adult was seen over the course of the year. There were no sightings of pups or pairs (adults). The single otter was seen in Petrel Cove, Arch's Cove and in front of New Camp Beach.

Harbor Seal (*Phoca vitulina*). Two harbor seal rookeries exist on Aiktak Island. The two rookeries are located near Four Sisters and the south side of East Island. Both areas experience tidal fluctuations and counts were taken during low and high tide periods. Distinctions between pup and juvenile ages were not determined after the end of June; only total counts were continued. Counts were taken at various tide stages, thus there is the possibility that low counts on certain days do not accurately depict exact numbers present, since individuals present in the water may have been missed. The maximum number counted in one day was 26 (20 July). The highest number of pups seen in one day was 7. On 9 June, one adult (sex unknown) seal with extensive wounds was found beached in Pleasure cove on the western side of the island. One large laceration or puncture on the right side of the animal appeared infected, discolored, and pustulating during animal movement. Labored breathing, inability to move, and hoarse vocalizations were encountered when approaching the injured animal. The injured seal finally disappeared from the beach on 17 June, its fate undetermined.

Steller Sea Lion (*Eumetopias jubatus*). Fairly Common. On 19 June, marked animal A119 was seen swimming towards Big West Island with another male. At the base of Murre Pole 51, on 24 July, two marked animals were seen using a tripod mounted scope. A11 and F1099 were amidst 72 other individuals hauled out near Sail Rock. Of those 74, 4 dominant sub-adult bulls exhibited territorial behavior (biting, posturing, and moving other males off). Once pups disperse from the rookery located on Ugamak Island, they congregated in several areas on the south side of Aiktak in late July and into August.

Orca (*Orcinus orca*). Uncommon. On the morning of 23 June at least three individuals were seen momentarily swimming east on the North side of Aiktak Island. The sighting was recorded during the cruise to Ugamak Island NMFS camp site on the southeast side of Ugamak Island. The three individuals (one male adult, two unknown) were swimming very close (<50m) to the shore in the kelp forest. The sighting was located between Ivory Cove and the dike. This location was in close proximity to a Harbor Seal (*Phoca vitulina*) haul out. Sighting viewed by Kevin Bell, Tyra Zeman, Joel Helm, and Tom Gelatt from the wheelhouse of USFWS Tiglax. On 14 July, one adult male and another individual passed between East Island and its most easterly satellite rock. The large adult male came into view first, with the second individual appearing much later. The second whale was a young, much smaller male, due to its non-falcate dorsal fin and relative size. Spyhopping behavior was recorded. Large flocks of glaucous-winged gulls hovered over and landed amongst the whales, possibly feeding off of discarded or residual fish captured by the two individuals. Their approach began very close to shore in the kelp (<50m), but as they traveled west they moved approximately ¼ mile offshore due north of Four Sisters where they remained for approximately 30 minutes. The whales never ventured within 200m of the Four Sisters harbor seal haul out, but fog obscured vision 30 minutes after the sighting began.

* GPS Datum & Model: WGS 84 / Model Garmin GPS map 76S

Table 61. Breeding status and abundance of birds and marine mammals observed on Aiktak Island, Alaska in 2004. Breeding status codes: C=confirmed (observations of current nests, eggs, or chicks, adults carrying nesting materials or food to nests or chicks, recently fledged young, distraction displays), P=probable (observations of pairs or territorial behavior), X=possible but not likely (species seen or heard, but no other evidence for breeding). Abundance codes: 5=abundant(>50/day or 6/hr), 4=common (10-50/day or 2-5/hr), 3=fairly common (5-9/day or 1/hr), 2=uncommon (2-4/day or <1/hr), 1=rare (1/day).

Species	2004	2005
Emperor goose	X-1	X-2
Brant goose	X-1	X-1
Cackling goose	X-1	X-1
Mallard	X-1	--
Northern shoveler	--	X-2
Northern pintail	--	X-2
Aleutian green-winged teal	C-4	C-4
Harlequin duck	P-4	P-4
White-winged scoter	X-1	--
Long-tailed duck	X-1	--
Common merganser	--	X-2
Red-breasted merganser	X-1	X-2
Rock ptarmigan	X-1	--
Common loon	X-1	--
Red-necked grebe	--	X-1
Short-tailed shearwater	--	X-1
Fork-tailed storm-petrel	C-5	C-5
Leach's storm-petrel	C-5	C-5
Double-crested cormorant	C-5	X-3
Red-faced cormorant	C-5	X-1
Pelagic cormorant	C-4	X-3
Bald eagle	C-3	C-3
Golden eagle	X-1	--
Peregrine falcon	C-2	C-2
Semipalmated plover	X-1	X-1
Black oystercatcher	C-4	C-4
Wandering tattler	X-1	X-1
Lesser yellowlegs	--	X-1
Ruddy turnstone	--	X-1
Least sandpiper	X-2	P-4
Rock sandpiper	X-1	P-2
Red-necked phalarope	X-1	--
Slaty-backed gull	X-1	--
Glaucous-winged gull	C-5	C-5
Black-legged kittiwake	--	X-1
Common murre	C-5	C-5
Thick-billed murre	C-5	C-5
Pigeon guillemot	P-2	C-3
Ancient murrelet	C-5	C-5
Horned puffin	C-5	C-5
Tufted puffin	C-5	C-5
Short-eared owl	X-1	X-1
Common raven	C-3	P-3
Purple martin	--	X-1
Tree swallow	X-1	X-2

Table 61. continued. Breeding status and abundance of birds and marine mammals observed on Aiktak Island, Alaska in 2004. Breeding status codes: C=confirmed (observations of current nests, eggs, or chicks, adults carrying nesting materials or food to nests or chicks, recently fledged young, distraction displays), P=probable (observations of pairs or territorial behavior), X=possible but not likely (species seen or heard, but no other evidence for breeding). Abundance codes: 5=abundant(>50/day or 6/hr), 4=common (10-50/day or 2-5/hr), 3=fairly common (5-9/day or 1/hr), 2=uncommon (2-4/day or <1/hr), 1=rare (1/day).

Species	2004	2005
Bank swallow	X-2	--
Barn swallow	X-1	--
Winter wren	C-4	C-4
American "buff-bellied" pipit	--	X-2
Savannah sparrow	C-4	C-4
Fox sparrow	X-1	--
Song sparrow	C-4	C-4
Golden-crowned sparrow	--	C-2
Lapland longspur	X-1	X-1
Snow bunting	X-1	--
Gray-crowned rosy-finch	X-2	C-2
====		
Sea otter	X-1	X-1
Harbor seal	C-4	C-4
Steller sea lion	C-4	C-4
Orca	X-1	X-1
Gray whale	X-1	--
Humpback whale	X-1	--

Table 62. Appearance of first fledglings at Aiktak Island, Alaska, in 2005. Question marks indicate fledgling data were not recorded.

Species	Date
Leach's storm-petrel	>31 Aug
Fork-tailed storm-petrel	30 Aug
Double-crested cormorant	N/A
Pelagic cormorant	N/A
Red-faced cormorant	N/A
Aleutian green-winged teal	
Black Oystercatcher	?
Walked from nest	2 Jul
Flew from nest area	?
Glaucous-winged gull	20 Jul
Common murre	N/A
Thick-billed murre	N/A
Pigeon guillemot	21 Aug
Ancient murrelet	21 Jun
Horned puffin	>30 Aug
Tufted puffin	>30 Aug
Bald eagle	12 Aug
Peregrine falcon	<6 Jul
Common raven	?
Winter wren	?
Savannah sparrow	?
Song sparrow	?
Rosy finch	18 Aug

Table 63. Flowering chronology of commonly observed plants at Aiktak Island, Alaska, in 2005.

Family	Scientific Name	First seen in flower
Lycopodiaceae	<i>Lycopodium selago selago</i>	16 May
	<i>L. annotinum annotinum</i>	16 May
Equisetaceae	<i>Equisetum</i> spp.	18 Jun
Athyriaceae	<i>Cystopteris fragilis fragilis</i>	early Jun
	<i>Athyrium filix-femina cyclosorum</i>	early Jun
Graminae	<i>Poa</i> spp.	--
	<i>Elymus arenarius mollis</i>	--
	<i>Calamagrostis</i> spp.	--
	<i>Festuca rubra aucta</i>	--
	<i>Phleum commutatum americanum</i>	--
	<i>Hordeum brachyantherum</i>	--
Cyperaceae	<i>Eriophorum russeolum</i> spp.	5 Jul
	<i>Eriophorum angustifolium subarcticum</i>	--
	<i>Carex macrochaeta</i>	--
Juncaceae	<i>Carex saxatilis laxa</i>	--
	<i>Luzula multiflora multiflora</i>	--
	<i>L. multiflora Kobayashii</i>	--
Liliaceae	<i>Juncus arcticus sitchensis</i>	--
	<i>Fritillaria camschatcensis</i>	4 Jun
Orchidaceae	<i>Platanthera convallariaefolia</i>	early Jul
	<i>P. dilatata</i>	--
	<i>Listera chordata</i>	--
Salicaceae	<i>Dactylorhiza aristata</i>	4 Jun
	<i>Salix arctica</i>	--
Polygonaceae	<i>Rumex fenestratus</i>	early Jul
Portulacaceae	<i>Claytonia sibirica</i>	16 May
Caryophyllaceae	<i>Honkenya peploides major</i>	30 May
	<i>Cerastium Beeringianum grandiflorum</i>	--
Ranunculaceae	<i>Caltha palustris asarifolia</i>	24 May
	<i>Aconitum maximum</i>	--
	<i>Aconitum delphinifolium delphinifolium</i>	mid Jul
	<i>Ranunculus occidentalis Nelsoni</i>	mid Jun
	<i>Ranunculus bongardi</i>	--
Cruciferae	<i>Anemone narcissiflora villosissiflora</i>	19 May
	<i>Draba hyperborea</i>	--
	<i>D. borealis</i>	late May
	<i>Cardemine umbellata</i>	5 Jul
Saxifragaceae	<i>Arabis lyrata</i>	--
	<i>Saxifraga punctata insularis</i>	--
Rosaceae	<i>S. bracteata</i>	--
	<i>Rubus arcticus stellatus</i>	19 Jun
	<i>Potentilla villosa</i>	16 Jun
	<i>Geum calthifolium</i>	--
Leguminosae	<i>Sanguisorba stipulata</i>	29 Jul
	<i>Lupinus nootkatensis</i>	25 May
Geraniaceae	<i>Geranium erianthum</i>	4 Jun
Violaceae	<i>Viola Langsdorffii</i>	31 May
Onagraceae	<i>Epilobium glandulosum</i>	--
	<i>E. behringianum</i>	27 Jul
	<i>E. hornemannii</i>	27 Jul
	<i>E. leptocarum</i>	29 Jul
	<i>E. angustifolium</i>	6 Aug

Table 63 (continued). Flowering chronology of commonly observed plants at Aiktak Island, Alaska, in 2005.

Family	Scientific Name	First seen in flower
Umbelliferae	<i>Heracleum lanatum</i>	5 Jul
	<i>Angelica lucida</i>	5 Jul
	<i>Ligusticum scoticum-Hultenii</i>	end of Jun
	<i>Conioselinum chinense</i>	4 Aug
Ericaceae	<i>Rhododendron camtschaticum</i>	8 Jul
Primulaceae	<i>Trientalis europaea</i>	5 Jul
Gentianaceae	<i>Gentiana amarelle acuta var. Plebeya</i>	28 Jul
Polemoniaceae	<i>Polemonium acutiforum</i>	10 Jul
Scrophulariaceae	<i>Mimulus guttatus</i>	6 Jul
	<i>Pedicularis Langsdorffii Langsdorffii</i>	15 Jun
	<i>Veronica Selleri</i>	--
	<i>Castilleja unalaschcenis</i>	5 Jul
	<i>Rhinanthus minor boreales</i>	29 Jul
	<i>Galium aparine</i>	5 Jul
Rubiaceae	<i>Campanula lasiocarpa lasiocarpa</i>	1 Aug
Campanulaceae	<i>Petasites frigidus</i>	--
Compositae	<i>Achillea borealis</i>	--
	<i>Senecio pseudo-Arnica</i>	7 Jul
	<i>Taraxacum trigonolobum</i>	30 Jun
	<i>Erigeron peregrinus</i>	6 Jul
	<i>Anaphalis margaritacea</i>	29 Jul

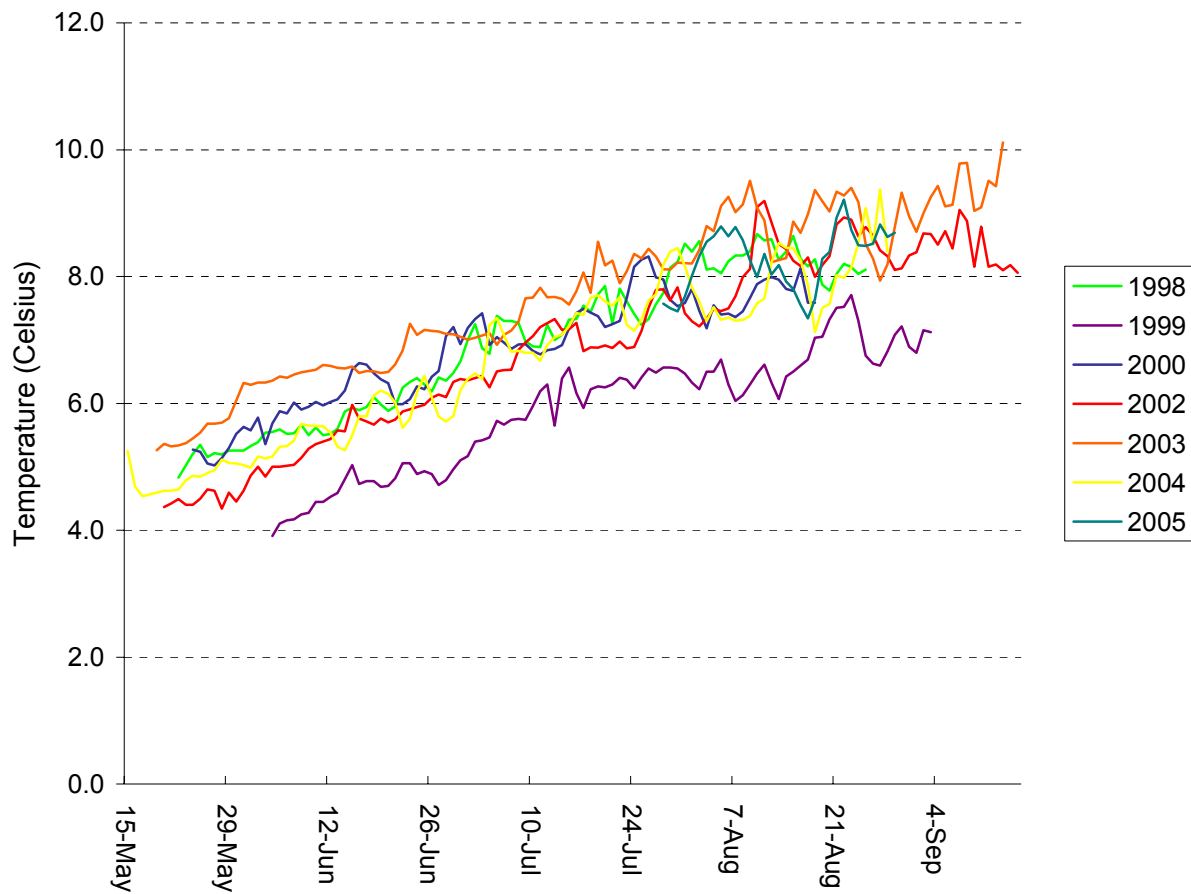


Figure 26. Sea surface temperature (° C) at Aiktak Island, Alaska. Values are the daily mean temperature.

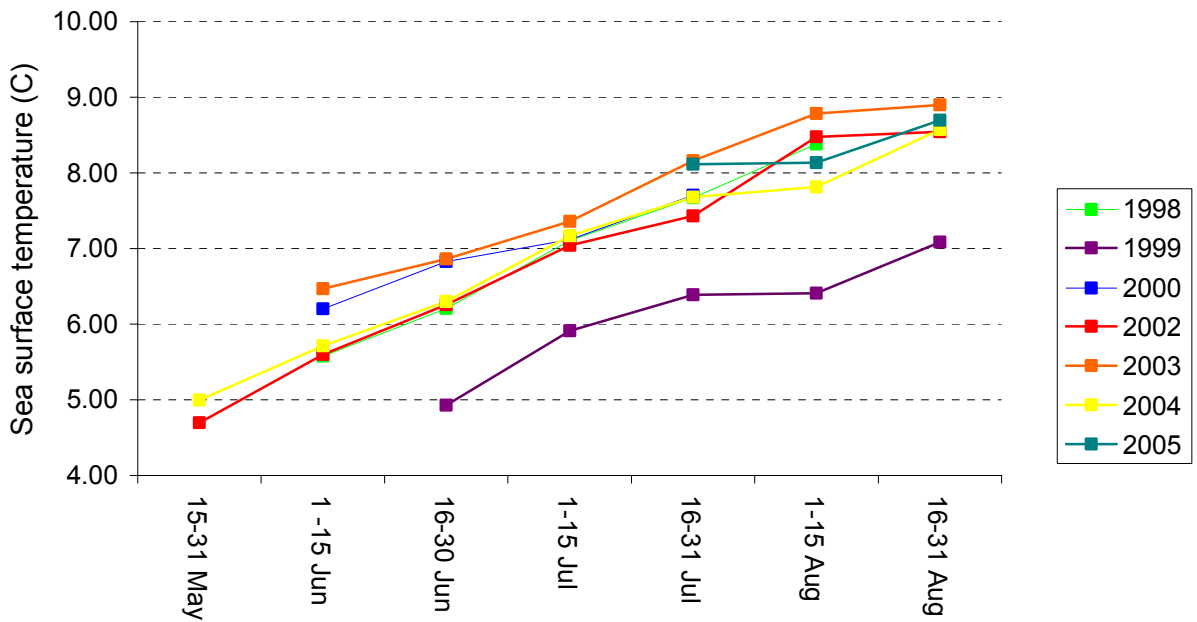


Figure 27. Mean bi-monthly sea surface temperature at Aiktak Island, Alaska.

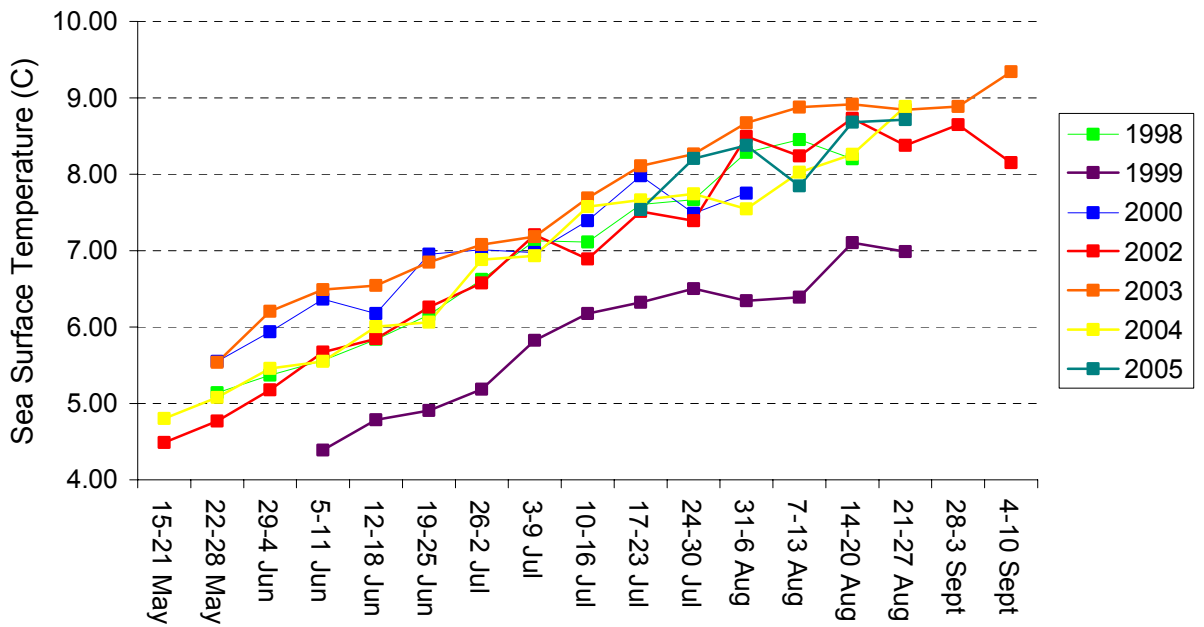


Figure 28. Mean daily sea surface temperature at Aiktak Island, Alaska.

Table 64. Biweekly mean sea surface temperature (°C) at Aiktak Island, Alaska. Composite of mean daily temperatures.

Date	1997	1998	1999	2000	2001	2002	2003	2004	2005
15-31 May	--	--	--	--	--	4.70	--	5.00	--
1-5 Jun	--	--	--	--	--	--	--	--	--
16-30 Jun	--	6.21	4.93	6.83	--	6.26	6.86	6.30	--
1-15 Jul	--	7.10	5.91	7.12	--	7.04	7.36	7.17	--
16-31 Jul	--	7.67	6.39	7.70	--	7.43	8.16	7.68	8.12
1-15 Aug	--	8.38	6.41	--	--	8.48	8.79	7.82	8.14
16-31 Aug	--	--	7.09	--	--	8.54	8.90	8.57	8.70
1-5 Sep	--	--	--	--	--	--	--	--	--

Table 65. Weekly mean sea surface temperature (°C) at Aiktak Island, Alaska. Composite of mean daily temperatures.

Date	1997	1998	1999	2000	2001	2002	2003	2004	2005
15-21 May	--	--	--	--	--	4.49	--	4.80	--
22-28 May	--	5.14	--	5.55	--	4.77	5.54	5.08	--
29-4 Jun	--	5.37	--	5.94	--	5.18	6.21	5.46	--
5-11 Jun	--	5.56	4.39	6.36	--	5.67	6.49	5.55	--
12-18 Jun	--	5.84	4.78	6.18	--	5.84	6.54	6.01	--
19-25 Jun	--	6.16	4.91	6.95	--	6.26	6.85	6.06	--
26-2 Jul	--	6.62	5.19	7.01	--	6.58	7.08	6.88	--
3-9 Jul	--	7.13	5.83	6.97	--	7.21	7.18	6.93	--
10-16 Jul	--	7.11	6.18	7.39	--	6.89	7.69	7.57	--
17-23 Jul	--	7.60	6.32	7.98	--	7.51	8.11	7.66	7.54
24-30 Jul	--	7.66	6.50	7.48	--	7.39	8.26	7.74	8.21
31-6 Aug	--	8.29	6.34	7.75	--	8.49	8.67	7.54	8.37
7-13 Aug	--	8.45	6.39	--	--	8.24	8.87	8.03	7.84
14-20 Aug	--	8.20	7.10	--	--	8.73	8.91	8.26	8.68
21-27 Aug	--	--	6.98	--	--	8.37	8.84	8.89	8.71
28-3 Sep	--	--	--	--	--	8.65	8.88	--	--
4-10 Sep	--	--	--	--	--	8.15	9.34	--	--