AMNWR 2011/14

BIOLOGICAL MONITORING AT ST. PAUL ISLAND, ALASKA IN 2011

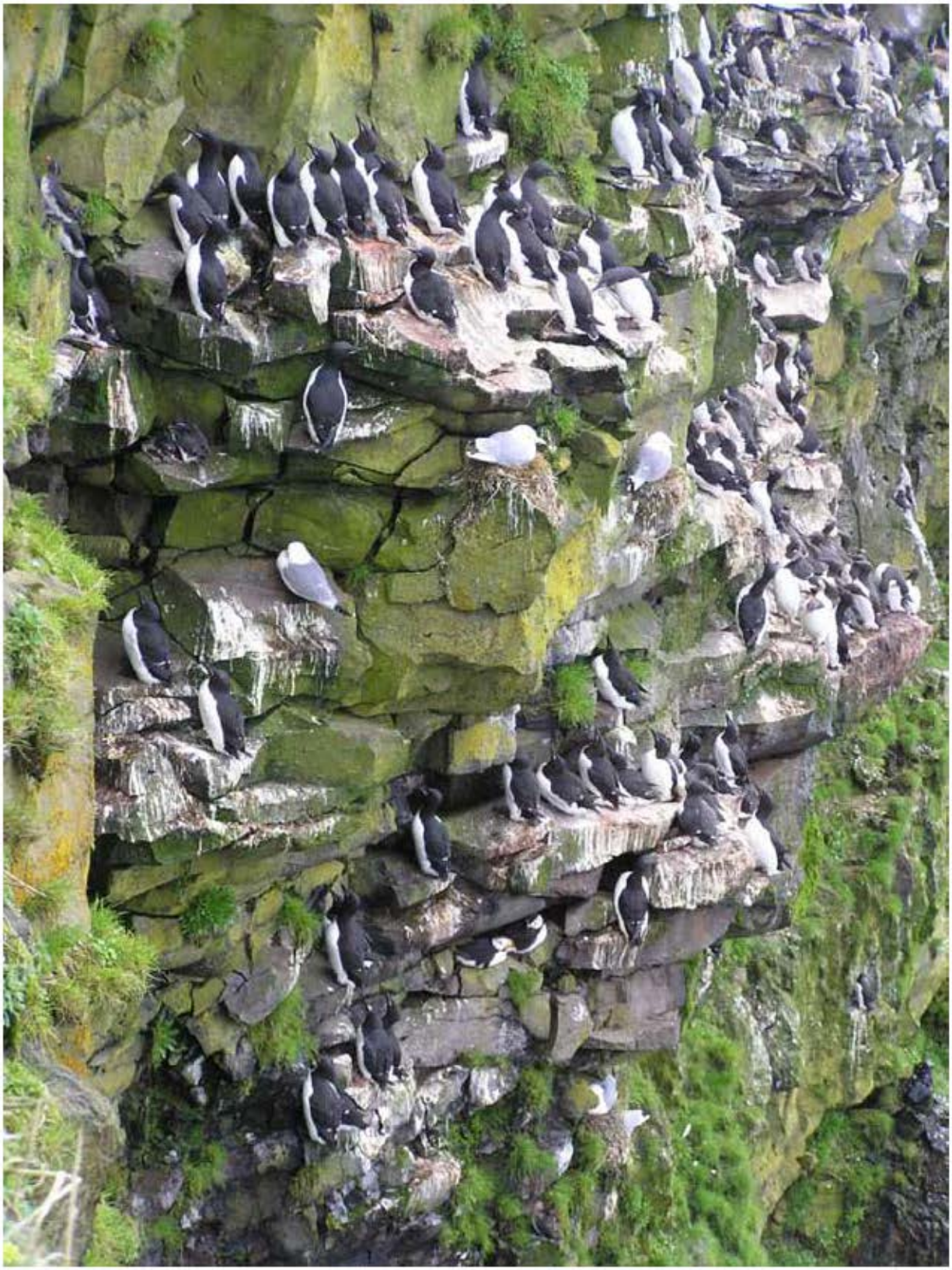
Gregory Thomson and Brie Drummond

Key words: *Aethia pusilla*, Bering Sea, black-legged kittiwake, breeding biology, common murre, least auklet, Otter Island, *Phalacrocorax urile*, populations, Pribilof Islands, productivity, red-faced cormorant, red-legged kittiwake, *Rissa brevirostris*, *Rissa tridactyla*, St. Paul Island, thick-billed murre, *Uria aalge*, *Uria lomvia*, Walrus Island.

U.S. Fish and Wildlife Service
Alaska Maritime National Wildlife Refuge
95 Sterling Highway, Suite 1
Homer, AK 99603

October 2011

Cite as: Thomson, G. and B. Drummond. 2011. Biological monitoring at St. Paul Island, Alaska in 2011. U.S. Fish and Wildl. Serv. Rep., AMNWR 2011/14. Homer, Alaska.



Plot 48 at High Bluffs, St. Paul Island

TABLE OF CONTENTS **Page**

TABLE OF CONTENTS (continued) **Page**

INTRODUCTION

The Alaska Maritime National Wildlife Refuge (AMNWR) conducts annual ecological monitoring at nine sites throughout Alaska. The objective of this long-term monitoring program is to collect baseline status and trend information for a suite of seabird species representing piscivorous and planktivorous trophic guilds, including key species that serve as indicators of ecosystem health. Members of these guilds include surface feeders and divers feeding in both nearshore and offshore waters. By relating data to environmental conditions and information from other sites, ecosystem processes may be better understood. Data also provide a basis for directing management and research actions, and in assessing effects of management.

St. Paul Island, in the Pribilof Islands in the southeastern Bering Sea, has been an annual monitoring site since 1985. Between 1975 and 1984, the Minerals Management Service (MMS) funded studies to monitor trends in populations and productivity of ledge-nesting seabirds in the Pribilof Islands due to concerns over potential offshore oil development along the continental shelf (Hickey and Craighead 1977, Hunt et al. 1981, Craighead and Oppenheim 1985, Lloyd 1985, Johnson and Baker 1985, Troy and Baker 1985). The U.S. Fish and Wildlife Service purchased most of the seabird nesting areas in the Pribilof Islands between 1982 and 1985. Annual monitoring by AMNWR has occurred in most years since 1985 (Byrd et al. 1985; Byrd 1986, 1987, 1989; Dragoo et al. 1989; Wagner 1989; Fairchild 1991; Climo 1993, 1997; Carten and Calvin 1997; Carten and Sommer 1998; Bittner and Farence 1999; Bittner 2001; Snorek 2001; Howard 2002; Polito and Drew 2003; Wright and Will 2004; Thomson 2006; Thomson and Sapora 2007; Wright et al. 2007; Thomson and Spitler 2008; McClintock et al. 2010; Drummond et al. 2011).

The specific monitoring goals in 2011 were to estimate productivity and/or population parameters for six indicator species representing three major feeding guilds: 1) diving fish-feeders (red-faced cormorants [*Phalacrocorax urile*] and common and thick-billed murres [*Uria aalge* and *U. lomvia*], 2) surface fish-feeders (black-legged and red-legged kittiwakes [*Rissa tridactyla and R. brevirostris*], and 3) surface plankton-feeders (northern fulmars [*Fulmarus glacialis*]). Additional monitoring goals include the description of breeding chronology, food habits, chick growth, and adult survival for one or more of the above species, as well as food habits data for least auklets (diving plankton feeders; *Aethia pusilla*).

Detailed results of the 2011 monitoring program are contained in these appendices and archived at the AMNWR headquarters in Homer, Alaska. Summary data will also be included in the annual Alaska seabird monitoring summary report. Due to occasional reanalysis of some data, correction of typographical errors, and efforts to standardize presentation across sites, some values used in this report have changed from previous versions. The values presented here are considered the cleanest data set available at the time this report was issued and should supersede previous reports.

STUDY AREA

St. Paul Island (57º10'N, 170º15'W) is located in the Pribilof Islands in the southeastern Bering Sea, Alaska (see Figures 1 and 2). Volcanic in origin, the island lies near the outer edge of the continental shelf that runs between Alaska and Russia. Water exchange between the Bering Sea and North Pacific Ocean forms a zone of upwellings and ocean fronts around the continental shelf that is rich in nutrients. These conditions create some of the highest primary productivity rates in the world's oceans (Lewbel 1983), which in turn support one of the highest densities of seabirds on earth (Hood 1981). About 90 km

from the other major Pribilof island of St. George, St. Paul is farther north, a greater distance from the highly-productive shelf break region and closer to the maximum extent of winter pack ice.

Cliffs span approximately 11 km of St. Paul's coastline and reach up to 115 m high, providing breeding habitat to an estimated 250,000 seabirds (Sowls et al. 1978). In addition, St. Paul Island is one of just a few sites where red-legged kittiwakes nest (Byrd and Williams 1993).

METHODS

Personnel: The USFWS field crew at St. Paul Island in 2011 consisted of Greg Thomson (23 May to 4 September) and Derek Evon (23 May to 27 August). Heather Renner (3 July to 15 July) and Merry Maxwell (15 July to 31 July) also assisted with ledge nesting seabird population counts in July.

Data Collection and Analysis: Methods outlined in the refuge monitoring protocols and in previous St. Paul Island reports were followed for all of the data collection (USFWS 2000). Monitoring plots for kittiwakes, murres, and red-faced cormorants were visited for productivity and chronology every three to five days from pre-laying until fledging, beginning on 28 May and continuing until 2 September. Diet samples were collected from least auklets with noose carpets and mist nets, and red-faced cormorant chicks during chick banding procedures (when thirty-seven chicks were banded). In addition to the seabird work described above, the monitoring crew compiled a species account of all birds and marine mammals seen in 2011. Two "HOBO" water temperature sensors were deployed in English Bay from 7 June to 27 August.

The crew also provided support to other researchers: for Leah Kinney, a Graduate Research Assistant at the University of Alaska, Anchorage, fish from several lakes was collected as part of a monitoring, biogeography and toxicology study; for Dr. David F. Murray of the University of Alaska, Fairbanks and Heidi Solstad of the University of Oslo, Norway, we collected plants (*Eritrichium chamissonis* and *Papaver macounii*) for DNA sequencing; and for the third year running common and thick-billed murre eggs were collected for the Seabird Tissue Archival and Monitoring Project (STAMP), a long term program designed to track trends in pollutants in northern marine environments using seabird eggs that the National Institute of Standards and Technology has the lead on.

Over the past three years, AMNWR has been developing a database to analyze reproductive success and chronology data automatically, which will both reduce human calculation errors and ensure consistency across sites and years. As of fall 2011, this database is currently up and running for kittiwakes, murres, auklets, and puffins.

The refuge's ultimate intent is to reanalyze all available historic data with this database. This database uses slightly different conventions to calculate nest fate than previous hand-calculated summaries in that it includes the interval between nest checks as part of the uncertainty around hatch and fledge events rather using Julian midpoints (see Williams et al. 2002). This new approach will likely change historic summary numbers to a small degree, mostly due to differences in which nests are included or excluded from analysis due to excess uncertainty and correction of prior errors or inconsistent analyses. Based on testing the database over the past several years, these changes are not expected to be large, however, and the end result will represent a stronger and repeatable dataset.

At the time of this report, we were still working to import all historic data files into the database. In the meantime, we present in this report:

- Reproductive success and chronology data for kittiwakes and murres from 2010 and 2011 summarized using the database.

- Reproductive success and chronology data for kittiwakes and murres from 1975-2009, and for all other species from 1975-2011, summarized by hand following methods outlined in the St. Paul Island protocols.

- Data for all other parameters summarized by hand following methods outlined in the St. Paul Island protocols.

INTERESTING OBSERVATIONS

- At least 43 red-faced cormorants banded as chicks at the Tsamana colonies were resighted on St. Paul in 2011. No bird banded prior to 2009 was observed. All resighted birds had immature plumage except two. Interestingly, both these birds were less than two years old (Details are in the Annotated list; see photos on page 6)

- Black-legged and red-legged kittiwakes experienced essentially complete breeding failure in 2011. Black-legged kittiwakes have failed (<.05 productivity) in 2005, 2007, 2009 and 2011. Populations of red-legged kittiwakes continue to decline on St. Paul.

- One black-legged kittiwake nest had a three-egg clutch.

- Observations detailed in the annotated list of this report suggest the possibility of cross-mating between a thick-billed murre and a common murre.

ACKNOWLEDGMENTS

John Warzybok assembled a comprehensive banding and resighting protocol for St. Paul. Gary and Catherine Stanley National Oceanographic and Atmospheric Administration (NOAA) gave helpful assistance at our accommodations at the Staff Quarters compound on St. Paul. NOAA researchers Ryan Burner, Greg Logan, Jennifer Mannas, Dustin Carl and Kristen Dullen helped with collecting least auklet chick food and banding red-faced cormorants. Sean Haggerty and Forrest Roland of the Tanadgusix Corporation Island Tours directed us to some of the rare birds they observed on the island this year. Thanks again to Aquilina Lestenkof and Phil Zavadil of the Tribal Government of St. Paul Ecological Conservation Office for their support. We also thank the residents of St. Paul for their hospitality. And finally, thanks to Derek Evon for taking time out from his usual haunts on the Yukon Delta National Wildlife Refuge and helping us this season on St. Paul.

REFERENCES

Bittner, T. 2001. Results of seabird monitoring at St. Paul Island, Alaska in 2000: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 01/05. Homer, Alaska.

Bittner, T. and C. Farence. 1999. Results of seabird monitoring at St. Paul Island, Alaska in 1999: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 99/08. Homer, Alaska.

Byrd, G. V. 1986. Results of seabird monitoring in the Pribilof Islands in 1986. U.S. Fish and Wildl. Serv. Rep., AMNWR 86/03. Homer, Alaska.

Byrd, G. V. 1987. The status of ledge-nesting seabirds in the Pribilof Islands, Alaska, 1976-1987: an executive summary. U.S. Fish and Wildl. Serv. Rep., AMNWR 87/04. Homer, Alaska.

Byrd. G. V. 1989. Seabirds in the Pribilof Islands, Alaska: trends and monitoring methods. M. S. thesis, University of Idaho, Moscow, Idaho.

Byrd, G. V., P. R. Sievert, and L. Slater. 1985. Population trends and productivity of fulmars, cormorants, kittiwakes, and murres in the Pribilof Islands, Alaska in 1985. U.S. Fish and Wildl. Serv. Rep., AMNWR 85/02. Homer, Alaska.

Byrd, G. V. and J. C. Williams. 1993. Red-legged kittiwake (*Rissa brevirostris*). *In* A. Poole and F. Gill (eds.). The Birds of North America, No. 60. The Academy of Natural Sciences, Philadelphia; The American Ornithologists' Union, Washington D.C.

Carten, T. M. and M. E. Calvin, Jr. 1997. Results of seabird monitoring at St. Paul Island, Alaska in 1997: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 97/17. Homer, Alaska.

Carten, T. M. and E. S. Sommer. 1998. Results of seabird monitoring at St. Paul Island, Alaska in 1998: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 98/07. Homer, Alaska.

Climo, L. A. 1993. The status of cliff-nesting seabirds at St. Paul Island, Alaska in 1992. U.S. Fish and Wildl. Serv. Rep., AMNWR 93/15. Homer, Alaska.

Climo, L. A. 1997. Results of seabird monitoring at St. Paul Island, Alaska in 1996: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 97/07. Homer, Alaska.

Craighead, F. L. and J. Oppenheim. 1985. Population estimates and temporal trends of Pribilof Island seabirds. U.S. Dept. Commerce, NOAA, OCSEAP. Final Rep. 30:307-356.

Dragoo, D. E., B. K. Bain, A. L. Sowls, and R. F. Chaundy. 1989. The status of cliff nesting seabirds in the Pribilof Islands, Alaska, 1976-1988: a summary. U.S. Fish and Wildl. Serv. Rep., AMNWR 89/01. Homer, Alaska.

Drummond, B. A., A. L. Larned, and G. Thomson. 2011. Biological monitoring at St. Paul Island, Alaska in 2010 with additional observations at Otter and Walrus Islands. U.S. Fish and Wildl. Serv. Rep., AMNWR 2011/03. Homer, Alaska.

Fairchild, L. 1991. The status of red-faced cormorants, kittiwakes and murres at St. Paul Island, Alaska, summer 1990. U.S. Fish and Wildl. Serv. Rep., AMNWR 91/01. Homer, Alaska.

Hickey, J. J. and F. L. Craighead. 1977. A census of seabirds on the Pribilof Islands. Environ. Assess. Alaskan Contin. Shelf. Ann. Rep. 2:96-195. NOAA Environ. Res. Lab., Boulder, Colorado.

Hood, D. W. 1981. Introduction. Pp. iii-xviii *in* D. W. Hood and J. A. Calder (eds.). The Eastern Bering Sea Shelf: Oceanography and Resources. University of Washington Press, Seattle, Washington.

Howard, R. 2002. Results of seabird monitoring at St. Paul Island, Alaska in 2002: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 02/11. Homer, Alaska.

Hunt, G. L., Z. Eppley, B. Burgeson, and R. Squibb. 1981. Reproductive ecology, foods, and foraging areas of seabirds nesting on the Pribilof Islands, 1975-1979. Environ. Assess. Alaskan Contin. Shelf. Ann. Rep. 12:1-258. NOAA Environ. Res. Lab., Boulder, Colorado.

Johnson, S. R. and J. S. Baker. 1985. Productivity studies. Pages 191-256 *in* S. R. Johnson (ed.). Population Estimation, Productivity, and Food Habits of Nesting Seabirds at Cape Pierce and the Pribilof Islands, Bering Sea, Alaska. LGL Ecol. Res. Assoc., Inc., Bryant, Texas.

Lewbel, G. S. 1983. Bering sea biology: an evaluation of the environmental data base related to Bering Sea oil and gas exploration and development. LGL Alas. Res. Assoc., Inc., Anchorage, Alaska;

SOHIO Alas. Petroleum Co., Anchorage, Alaska.
Lloyd, D. S. 1985. Breeding performance of kittiwakes and murres in relation to oceanographic and meteorological conditions across the shelf of the southeastern Bering Sea. M. S. thesis, University of Alaska, Fairbanks, Alaska.
McClintock, M. E., G. Thomson, and B. A. Drummond. 2010. Biological monitoring at St. Paul Island, Alaska in 2009 with additional observations at Otter and Walrus Islands. U.S. Fish and Wildl. Serv. Rep., AMNWR 2010/06. Homer, Alaska.
Polito, M. J. and E. K. Drew. 2003. Results of seabird monitoring at St. Paul Island, Alaska in 2003: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 03/11. Homer, Alaska.
Snorek, J. 2001. Results of seabird monitoring at St. Paul Island, Alaska in 2001: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 01/13. Homer, Alaska.
Sowls, A. L., S. A. Hatch, and C. J. Lensink. 1978. Catalog of Alaskan seabird colonies. U.S. Fish and Wildl. Serv., FWS/OBS-78/78, Anchorage, Alaska.
Thomson, G. 2006. Results of seabird monitoring at St. Paul Island, Alaska in 2006: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 06/09. Homer, Alaska.
Thomson, G. and S. F. Sapora. 2007. Results of seabird monitoring at St. Paul Island, Alaska in 2007: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 07/16. Homer, Alaska.
Thomson, G. L. and L. Spitler 2008. Results of seabird monitoring at St. Paul Island, Alaska in 2008: summary appendices with additional observations at Otter Island and Walrus Island. U.S. Fish and Wildl. Serv. Rep., AMNWR 08/19. Homer, Alaska.
Troy, D. M. and J. S. Baker. 1985. Population studies. Pp. 34-190 *in* S. R. Johnson (ed.). Population Estimation, Productivity, and Food Habits of Nesting Seabirds at Cape Pierce and the Pribilof Islands, Bering Sea, Alaska. LGL Ecol. Res. Assoc., Inc., Bryant, Texas.
USFWS. 2000. Standard operating procedures for population inventories: ledge-nesting seabirds. U.S. Fish and Wildl. Serv. Rep. Homer, Alaska.
Wagner, P. J. 1989. Seabird monitoring: a study of population, productivity, and disturbance factors of cliff-nesting seabirds and observations of Salt Lagoon, St. Paul Island, Alaska, 1989. U.S. Fish and Wildl. Serv. Rep., AMNWR 89/33. Homer, Alaska.
Wright, S. K. and A. Will. 2004. Results of seabird monitoring at St. Paul Island, Alaska in 2004: summary appendices. U.S. Fish and Wildl. Serv. Unpubl. Rep. Homer, Alaska.
Wright, S. K., D. Dykstra, D. Wynn, and G. Thomson. 2007. Results of seabird monitoring at St. Paul Island, Alaska in 2005: summary appendices. U.S. Fish and Wildl. Serv. Rep., AMNWR 07/04. Homer, Alaska.

Red-faced cormorant no. 145 banded as a nestling on 3 August 2009. This photo was taken on 27 May 2011.



These two photos are red-faced cormorant no. 147, who was banded as a nestling on 3 August 2009 and is a sibling of no.145. The photo on left was made on 4 June 2011 and on the right on 22 August 2011.

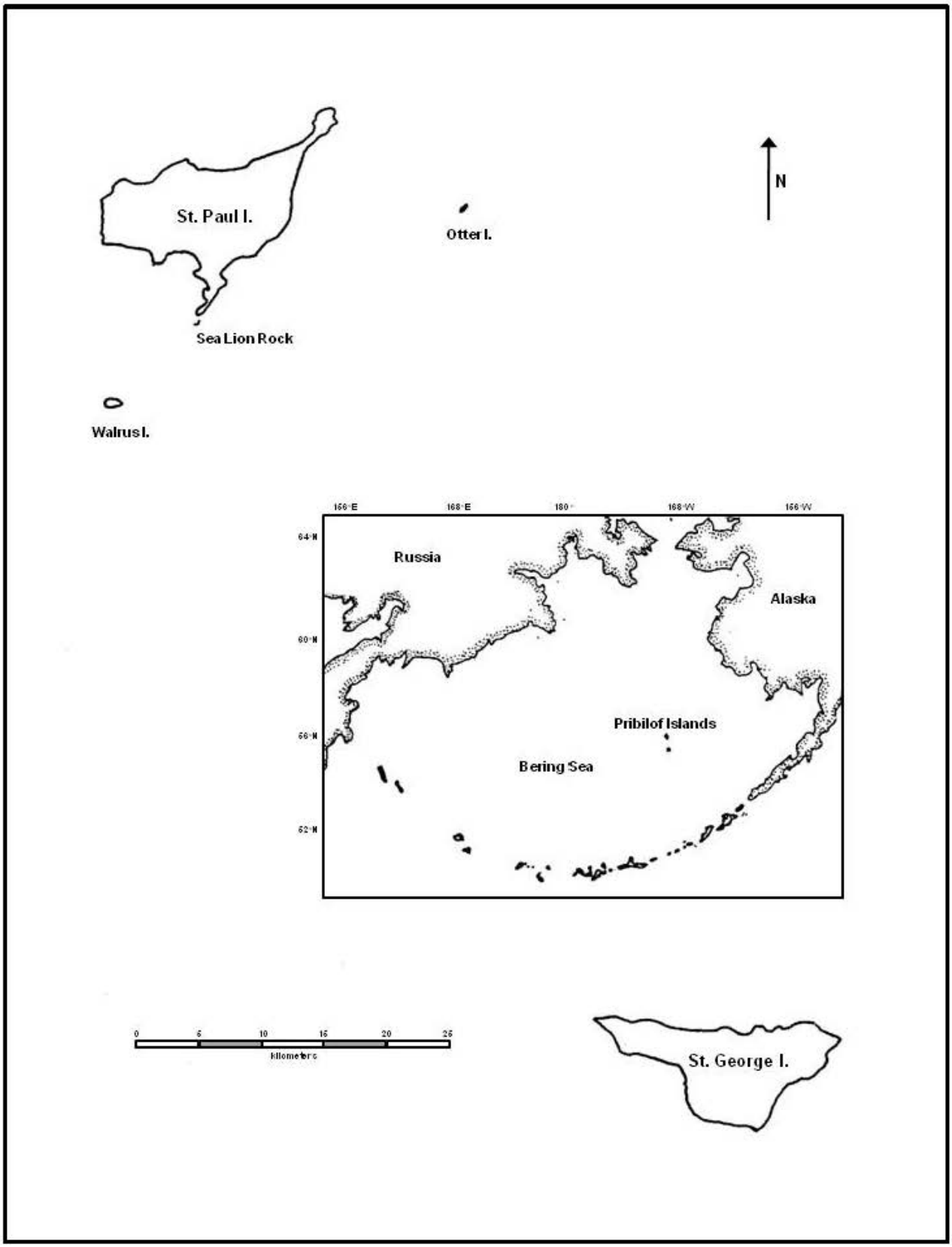


Figure 1. Map of the Pribilof Islands, Alaska.

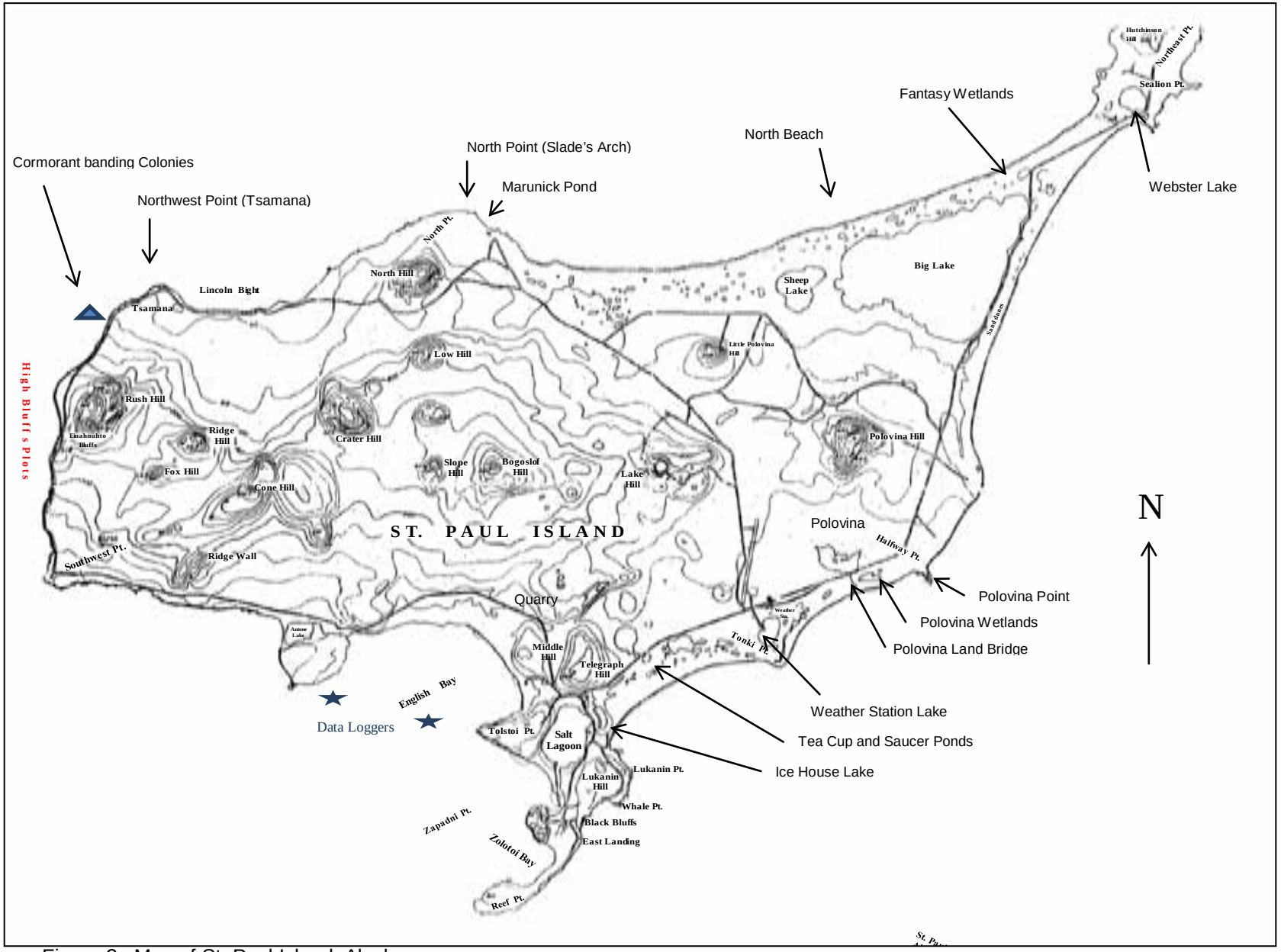


Figure 2. Map of St. Paul Island, Alaska.

FIGURES AND TABLES

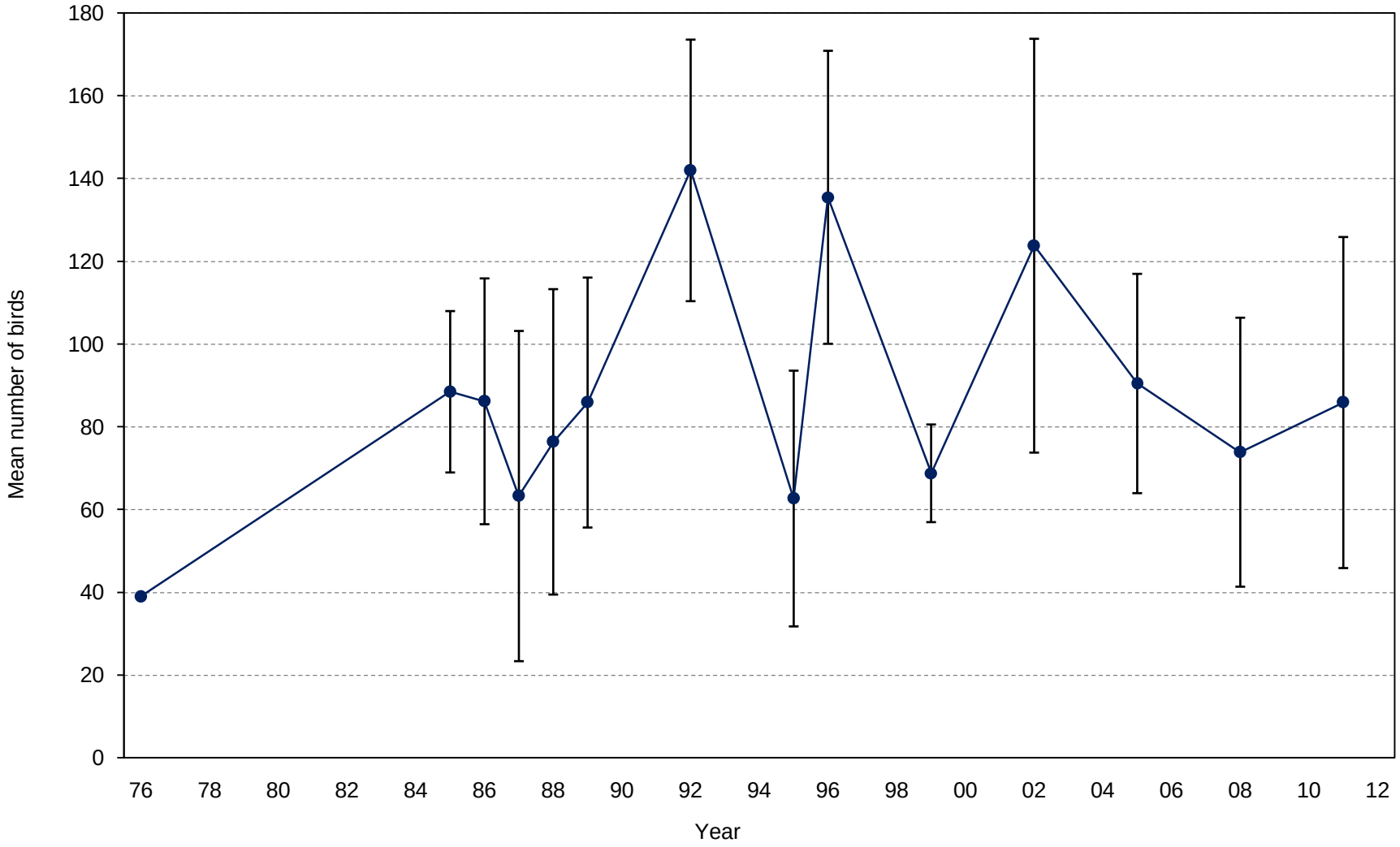


Figure 3. Mean numbers of northern fulmars counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 1. Numbers of northern fulmars counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 and 1984 are excluded because not all plots were counted.

Replicate	1976	1985	1986	1987	1988	1989	1992	1995	1996	1999	2002	2005	2008	2011
1	39	95	63	133	116	74	120	37	99	84	68	83	119	47
2	-	95	105	72	123	52	159	97	176	69	129	60	64	117
3	-	104	129	75	27	124	100	54	94	63	84	68	37	90
4	-	60	61	34	73	89	136	-	175	58	117	81	59	165
5	-	-	73	43	42	69	191	-	138	57	211	88	50	88
6	-	-	-	23	57	62	146	-	131	82	134	114	47	52
7	-	-	-	-	97	79	-	-	-	-	-	143	115	51
8	-	-	-	-	-	138	-	-	-	-	-	87	100	77
Mean	39	89	86	63	76	86	142	63	136	69	124	91	74	86
n	1	4	5	6	7	8	6	3	6	6	6	8	8	8
SD	-	20	30	40	37	30	32	31	35	12	50	27	33	40
First count	17 Jul	xx[a]	6 Jul	9 Jul	12 Jul	17 Jul	12 Jul	9 Jul	10 Jul	7 Jul	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	29 Jul	23 Jul	7 Aug	9 Aug	7 Aug	3 Aug	2 Aug	7 Aug	1 Aug	31 Jul	31 Jul	1 Aug

[a]xx indicates data potentially exist but have not yet been summarized.

Table 2. Numbers of northern fulmars counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate								Mean	SD
	1	2	3	4	5	6	7	8		
	6-8 Jul	9-10 Jul	12-14 Jul	14-17 Jul	19-21 Jul	25-26 Jul	28-29 Jul	30 Jul-1 Aug		
1	0	0	0	0	0	0	0	0	-	-
2sw	0	0	0	0	0	0	0	0	-	-
2ne	0	0	0	0	0	0	0	0	-	-
3	0	1	0	0	0	0	0	0	-	-
4	0	0	0	4	3	0	0	0	-	-
5sw	7	6	8	10	10	9	5	8	-	-
5ne	1	1	0	2	0	2	1	0	-	-
6[a]	-	-	-	-	-	-	-	-	-	-
7	0	0	0	0	0	0	0	0	-	-
8	1	3	2	6	6	2	0	2	-	-
9	-	-	-	-	-	-	-	-	-	-
10	0	0	0	0	0	1	0	1	-	-
11	0	0	0	0	0	0	0	0	-	-
12	0	0	0	0	0	0	0	0	-	-
13	0	0	0	2	2	1	0	1	-	-
14	0	4	2	7	5	7	1	3	-	-
15	0	0	1	1	0	1	0	0	-	-
16[a]	-	-	-	-	-	-	-	-	-	-
17[a]	-	-	-	-	-	-	-	-	-	-
18	1	0	0	0	0	0	0	0	-	-
19top	1	2	2	5	2	1	2	2	-	-
19btm	0	0	0	0	0	0	0	0	-	-
20top	0	0	0	0	0	0	0	0	-	-
20btm	0	0	0	0	0	0	0	0	-	-
21[a]	-	-	-	-	-	-	-	-	-	-
22	7	6	6	10	10	3	2	6	-	-
23	3	9	4	11	8	9	7	9	-	-
24	0	0	0	0	0	0	0	0	-	-
25	0	0	0	0	0	0	0	0	-	-
26	0	0	0	0	0	0	0	0	-	-
27	0	0	0	0	0	0	0	0	-	-
28	0	0	0	0	0	0	0	0	-	-
29[a]	-	-	-	-	-	-	-	-	-	-
29new	0	1	0	1	1	0	0	0	-	-
30	8	16	12	16	6	8	5	2	-	-
31	15	68	41	80	35	13	24	36	-	-
32	11	17	24	27	6	3	9	9	-	-
33	0	0	0	0	1	0	0	0	-	-
Total[b]	47	117	90	165	88	52	51	77	86	40

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.

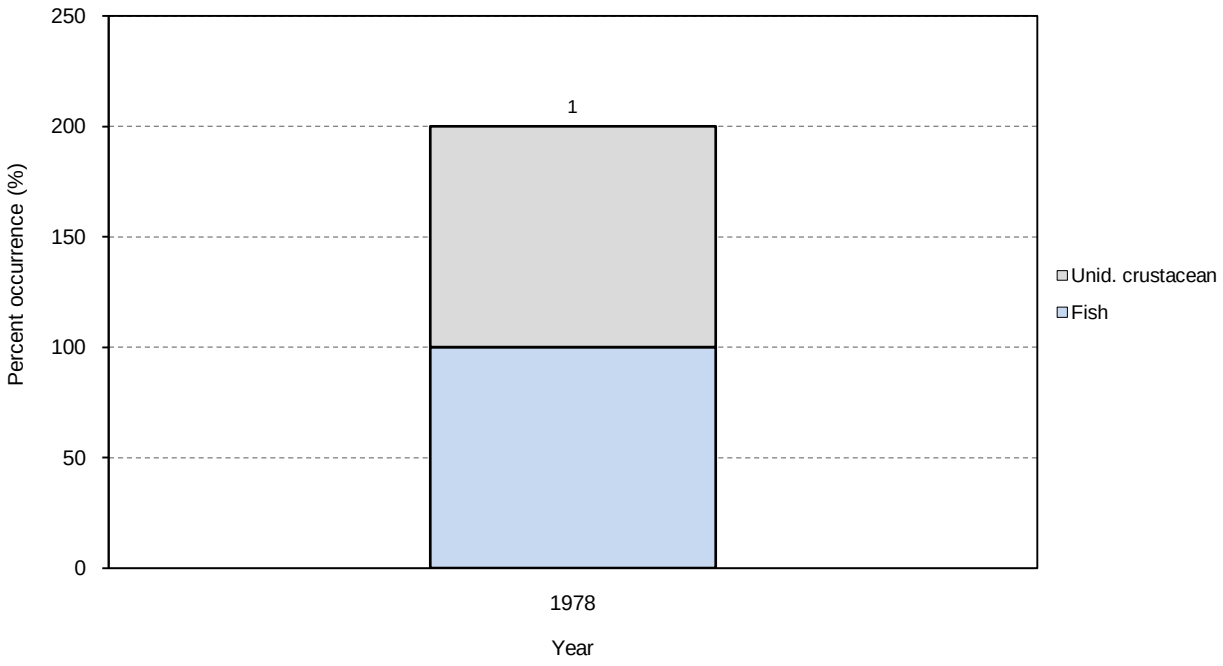


Figure 4. Frequency of occurrence of selected prey items in diets of northern fulmars at St. Paul Island, Alaska. Number above column indicates sample size. No samples were collected in years other than 1978.

Table 3. Frequency of occurrence of prey in diets of northern fulmars at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents. No samples were collected in years other than 1978.

	1978
No. samples	1
Unid. crustacean	100.0
Fish	**100.0**
Unid. fish	100.0

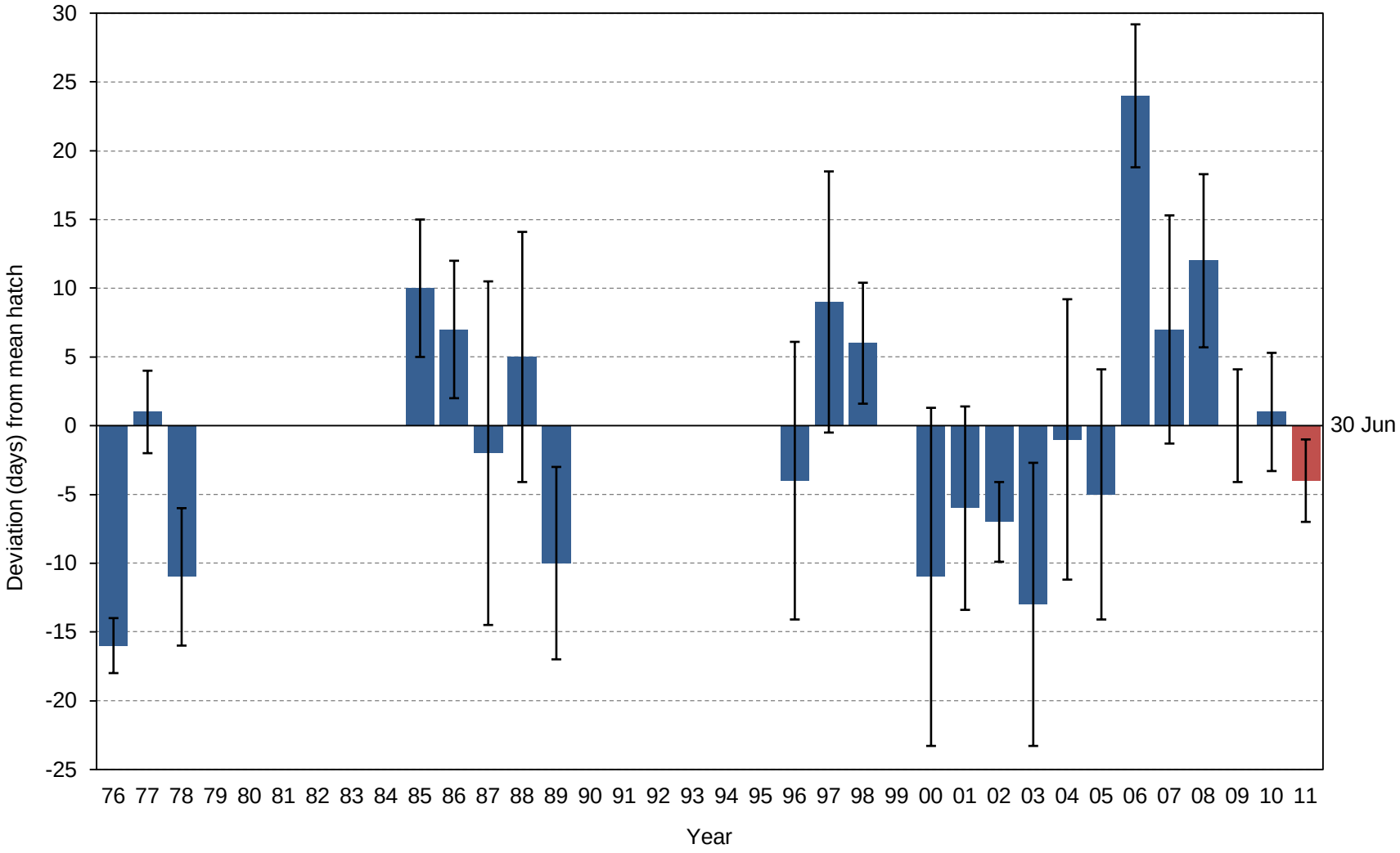


Figure 5. Yearly hatch date deviation (from the 1976-2010 average of 30 June) for red-faced cormorants at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 4. Breeding chronology of red-faced cormorants at St. Paul Island, Alaska.

Year	Mean hatch	SD	*n*[a]	First hatch	Last hatch
1976	13 Jun	2.0	7	-	-
1977	1 Jul	3.0	11	18-21 Jun[b]	12-15 Jul[b]
1978	19 Jun	5.0	7	-	-
1979	*no data*	-	-	-	-
1980	*no data*	-	-	-	-
1981	*no data*	-	-	-	-
1982	*no data*	-	-	-	-
1983	*no data*	-	-	-	-
1984	*no data*	-	-	-	-
1985	10 Jul	5.0	16	3 Jul	17 Jul
1986	7 Jul	5.0	17	-	-
1987	28 Jun	12.5	31	9 Jun	27 Jul
1988	4 Jul	9.1	11	26 Jun	26 Jul
1989	20 Jun	7.0	22	9 Jun	5 Jul
1990	*no data*	-	-	-	-
1991	*no data*	-	-	-	-
1992	*no data*	-	-	-	-
1993	*no data*	-	-	-	-
1994	*no data*	-	-	-	-
1995	*no data*	-	-	-	-
1996	25 Jun	10.1	10	12 Jun	14 Jul
1997	9 Jul	9.5	31	29 Jun	12 Aug
1998	6 Jul	4.4	23	27 Jun	15 Jul
1999	*no data*	-	-	-	-
2000	18 Jun	12.3	22	6 Jun	10 Jul
2001	24 Jun	7.4	9	17 Jun	10 Jul
2002	23 Jun	2.9	12	18 Jun	25 Jun
2003	17 Jun	10.3	24	5 Jun	21 Jul
2004	28 Jun	10.2	84	10 Jun	28 Jul
2005	25 Jun	9.1	111	8 Jun	28 Jul
2006	24 Jul	5.2	11	19 Jul	2 Aug
2007	7 Jul	8.3	43	24 Jun	4 Aug
2008	11 Jul	6.3	16	2 Jul	22 Jul
2009	30 Jun	4.1	28	25 Jun	13 Jul
2010	1 Jul	4.3	31	24 Jun	12 Jul
2011	26 Jun	3.0	33	21 Jun	5 Jul

[a]Sample sizes for mean hatch dates are a sub-sample of total nests for which egg to chick interval is ≤ 7 days.
[b]Data available only as range (Hunt et al. 1981).

Table 5. Frequency distribution of hatch dates for red-faced cormorants at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days. Raw hatch date data are not available prior to 1987.

Julian date[a]	No. nests hatching on Julian date												
	87	88	89	90	91	92	93	94	95	96	97	98	99
156	-	-	-	*no*	*no*	*no*	*no*	*no*	*no*	-	-	-	*no*
157	-	-	-	*data*	*data*	*data*	*data*	*data*	*data*	-	-	-	*data*
158	-	-	-	-	-	-	-	-	-	-	-	-	-
159	-	-	-	-	-	-	-	-	-	-	-	-	-
160	1	-	2	-	-	-	-	-	-	-	-	-	-
161	-	-	-	-	-	-	-	-	-	-	-	-	-
162	-	-	1	-	-	-	-	-	-	-	-	-	-
163	1	-	1	-	-	-	-	-	-	2	-	-	-
164	-	-	-	-	-	-	-	-	-	-	-	-	-
165	-	-	-	-	-	-	-	-	-	-	-	-	-
166	3	-	4	-	-	-	-	-	-	-	-	-	-
167	-	-	-	-	-	-	-	-	-	1	-	-	-
168	-	-	1	-	-	-	-	-	-	-	-	-	-
169	4	-	-	-	-	-	-	-	-	-	-	-	-
170	-	-	3	-	-	-	-	-	-	-	-	-	-
171	-	-		-	-	-	-	-	-	-	-	-	-
172	3	-	3	-	-	-	-	-	-	-	-	-	-
173	-	-		-	-	-	-	-	-	2	-	-	-
174	-	-	2	-	-	-	-	-	-	-	-	-	-
175	2	-	-	-	-	-	-	-	-	-	-	-	-
176	-	-	-	-	-	-	-	-	-	-	-	-	-
177	-	2	-	-	-	-	-	-	-	-	-	-	-
178	5	2	1	-	-	-	-	-	-	2	-	1	-
179	-	-	-	-	-	-	-	-	-	1	-	-	-
180	-	-	3	-	-	-	-	-	-	-	1	-	-
181	2	3	-	-	-	-	-	-	-	-	1	-	-
182	-	-	-	-	-	-	-	-	-	-	2	3	-
183	-	-	-	-	-	-	-	-	-	-	1	-	-
184	2	-	-	-	-	-	-	-	-	-	5	4	-
185	-	-	-	-	-	-	-	-	-	-	-	-	-
186	-	-	1	-	-	-	-	-	-	1	6	2	-
187	-	-	-	-	-	-	-	-	-	-	-	-	-
188	-	-	-	-	-	-	-	-	-	-	2	4	-
189	-	-	-	-	-	-	-	-	-	-	-	-	-
190	2	3	-	-	-	-	-	-	-	-	1	-	-
191	-	-	-	-	-	-	-	-	-	-	1	6	-
192	-	-	-	-	-	-	-	-	-	-	2	2	-
193	1	-	-	-	-	-	-	-	-	-	-	-	-
194	-	-	-	-	-	-	-	-	-	-	1	-	-
195	-	-	-	-	-	-	-	-	-	1	-	-	-
196	2	-	-	-	-	-	-	-	-	-	2	1	-
197	-	-	-	-	-	-	-	-	-	-	-	-	-
198	-	-	-	-	-	-	-	-	-	-	2	-	-
199	1	-	-	-	-	-	-	-	-	-	-	-	-
200	-	-	-	-	-	-	-	-	-	-	-	-	-
201	-	-	-	-	-	-	-	-	-	-	-	-	-
202	-	-	-	-	-	-	-	-	-	-	1	-	-
203	-	-	-	-	-	-	-	-	-	-	-	-	-
204	-	-	-	-	-	-	-	-	-	-	1	-	-
205	1	-	-	-	-	-	-	-	-	-	-	-	-
206	-	-	-	-	-	-	-	-	-	-	-	-	-
207	-	1	-	-	-	-	-	-	-	-	-	-	-
208	1	-	-	-	-	-	-	-	-	-	1	-	-
209	-	-	-	-	-	-	-	-	-	-	-	-	-
210	-	-	-	-	-	-	-	-	-	-	-	-	-
211	-	-	-	-	-	-	-	-	-	-	-	-	-
212	-	-	-	-	-	-	-	-	-	-	-	-	-
213	-	-	-	-	-	-	-	-	-	-	-	-	-
214	-	-	-	-	-	-	-	-	-	-	-	-	-
215	-	-	-	-	-	-	-	-	-	-	-	-	-
216	-	-	-	-	-	-	-	-	-	-	-	-	-
217	-	-	-	-	-	-	-	-	-	-	-	-	-
218	-	-	-	-	-	-	-	-	-	-	-	-	-
219	-	-	-	-	-	-	-	-	-	-	-	-	-
220	-	-	-	-	-	-	-	-	-	-	-	-	-
221	-	-	-	-	-	-	-	-	-	-	-	-	-
222	-	-	-	-	-	-	-	-	-	-	-	-	-
223	-	-	-	-	-	-	-	-	-	-	-	-	-
224	-	-	-	-	-	-	-	-	-	-	1	-	-
n	31	11	22	-	-	-	-	-	-	10	31	23	-

[a]Julian dates are adjusted by one day in leap years.

Table 5 (continued). Frequency distribution of hatch dates for red-faced cormorants at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days. Raw hatch date data are not available prior to 1987.

Julian date[a]	No. nests hatching on Julian date											
	00	01	02	03	04	05	06	07	08	09	10	11
156	-	-	-	1	-	-	-	-	-	-	-	-
157	7	-	-	-	-	-	-	-	-	-	-	-
158	-	-	-	2	-	-	-	-	-	-	-	-
159	-	-	-	1	-	1	-	-	-	-	-	-
160	1	-	-	3	-	-	-	-	-	-	-	-
161	3	-	-	-	1	1	-	-	-	-	-	-
162	-	-	-	2	-	1	-	-	-	-	-	-
163	-	-	-	-	-	1	-	-	-	-	-	-
164	1	-	-	1	-	-	-	-	-	-	-	-
165	-	-	-	-	-	1	-	-	-	-	-	-
166	-	-	-	5	3	8	-	-	-	-	-	-
167	-	-	-	-	3	6	-	-	-	-	-	-
168	1	1	-	-	1	2	-	-	-	-	-	-
169	1	-	1	2	4	7	-	-	-	-	-	-
170	-	3	2	-	6	6	-	-	-	-	-	-
171	-	-	-	-	1	4	-	-	-	-	-	-
172	-	1	-	2	4	7	-	-	-	-	-	3
173	-	-	1	-	4	2	-	-	-	-	-	-
174	-	-	-	2	3	5	-	-	-	-	-	-
175	1	-	-	-	7	9	-	2	-	-	3	11
176	-	2	8	-	4	5	-	-	-	1	-	1
177	-	-	-	-	1	2	-	1	-	-	-	3
178	-	-	-	-	6	6	-	-	-	11	-	7
179	-	-	-	-	5	7	-	1	-	-	5	-
180	-	-	-	-	1	3	-	4	-	-	2	6
181	3	-	-	-	9	2	-	-	-	-	1	-
182	-	1	-	1	-	2	-	3	-	10	9	1
183	-	-	-	-	-	1	-	4	2	-	-	-
184	-	-	-	1	1	4	-	2	-	1	2	-
185	1	-	-	-	3	-	-	2	1	-	-	-
186	-	-	-	-	-	4	-	1	1	-	6	1
187	2	-	-	-	2	1	-	8	1	4	-	-
188	-	-	-	-	-	1	-	1	-	-	-	-
189	-	-	-	-	1	-	-	1	-	-	-	-
190	-	-	-	-	1	4	-	-	3	-	2	-
191	1	1	-	-	1	2	-	3	1	-	-	-
192	-	-	-	-	1	1	-	1	-	-	-	-
193	-	-	-	-	1	-	-	1	-	-	1	-
194	-	-	-	-	3	1	-	-	-	1	-	-
195	-	-	-	-	-	1	-	3	2	-	-	-
196	-	-	-	-	1	-	-	-	-	-	-	-
197	-	-	-	-	1	-	-	-	2	-	-	-
198	-	-	-	-	-	-	-	-	-	-	-	-
199	-	-	-	-	-	1	-	2	1	-	-	-
200	-	-	-	-	-	-	5	-	-	-	-	-
201	-	-	-	-	-	-	-	-	1	-	-	-
202	-	-	-	1	1	-	-	-	-	-	-	-
203	-	-	-	-	2	-	-	1	1	-	-	-
204	-	-	-	-	-	1	2	-	-	-	-	-
205	-	-	-	-	-	-	-	-	-	-	-	-
206	-	-	-	-	-	-	-	-	-	-	-	-
207	-	-	-	-	-	-	-	1	-	-	-	-
208	-	-	-	-	-	-	2	-	-	-	-	-
209	-	-	-	-	2	1	-	-	-	-	-	-
210	-	-	-	-	-	-	-	-	-	-	-	-
211	-	-	-	-	-	-	-	-	-	-	-	-
212	-	-	-	-	-	-	1	-	-	-	-	-
213	-	-	-	-	-	-	-	-	-	-	-	-
214	-	-	-	-	-	-	1	-	-	-	-	-
215	-	-	-	-	-	-	-	-	-	-	-	-
216	-	-	-	-	-	-	-	1	-	-	-	-
217	-	-	-	-	-	-	-	-	-	-	-	-
218	-	-	-	-	-	-	-	-	-	-	-	-
219	-	-	-	-	-	-	-	-	-	-	-	-
220	-	-	-	-	-	-	-	-	-	-	-	-
221	-	-	-	-	-	-	-	-	-	-	-	-
222	-	-	-	-	-	-	-	-	-	-	-	-
223	-	-	-	-	-	-	-	-	-	-	-	-
224	-	-	-	-	-	-	-	-	-	-	-	-
n	22	9	12	24	84	111	11	43	16	28	31	33

[a]Julian dates are adjusted by one day in leap years.

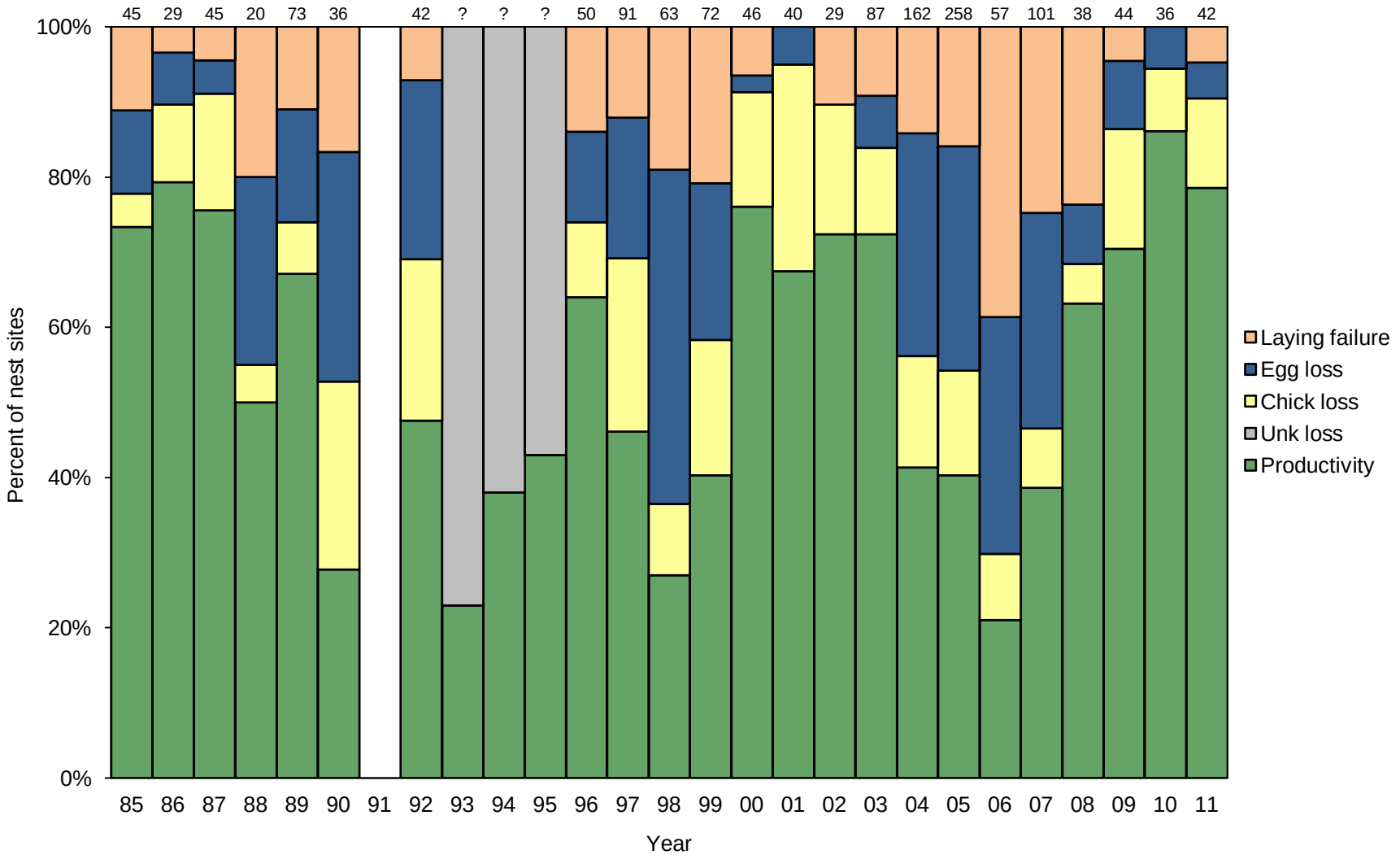


Figure 6. Reproductive performance of red-faced cormorants at St. Paul Island, Alaska. Laying failure=(A-B)/A; Egg loss=(B-D)/A; Chick loss=(D-F)/A; Productivity=F/A, where A=total nest sites; B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns indicate sample sizes (A).

Table 6. Reproductive performance of red-faced cormorants at St. Paul Island, Alaska. Measures of success are based on frequent monitoring of individual nests (as opposed to Boom or Bust methodology presented in Table 8).

Year	Total nest starts	Nest sites w/ eggs	Total eggs	Nest sites w/ chicks	Total chicks	Nest sites w/ chicks fledged	Total chicks fledged	Laying success	Mean clutch size	Nesting success	Hatching success	Chick success	Egg success	Fledging success	Reprod. success	Fledglings /nest start	Prod.
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(B/A)	(C/B)	(D/B)	(E/C)	(G/E)	(G/C)	(F/D)	(F/B)	(G/A)	(F/A)
1975	88	80	-	-	-	-	107	0.90	3.0[a]	-	0.41	-	-	-	-	1.22	-
1976	82	79	-	-	-	-	120	0.96	2.9[a]	-	0.33	-	-	-	-	1.46	-
1977	54	51	-	-	-	-	65	0.94	2.8[a]	-	0.45	-	-	-	-	1.20	-
1978	90	83	-	-	-	-	90	0.92	2.6[a]	-	0.51	-	-	-	-	1.00	-
1979	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1980	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1981	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1982	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1983	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1984	14	-	-	-	-	0	0	-	-	-	-	0.00	0.00	-	-	0.00	-
1985	45	40	116	35	-	33	76	0.89	2.9	0.88	-	-	0.66	0.94	0.83	1.69	0.73
1986	29	28	77	26	67	23	50	0.97	2.8	0.93	0.87	0.75	0.65	0.88	0.82	1.72	0.79
1987	45	43	-	41	-	34	80	0.96	3.4[a]	0.95	-	-	-	0.83	0.79	1.78	0.76
1988	20	16	44	11	29	10	23	0.80	2.8	0.69	0.66	0.79	0.52	0.91	0.63	1.15	0.50
1989	73	65	186	54	142	49	121	0.89	2.9	0.83	0.76	0.85	0.65	0.91	0.75	1.66	0.67
1990	36	30	80	19	45	10	23	0.83	2.7	0.63	0.56	0.51	0.29	0.53	0.33	0.64	0.28
1991	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1992	42	39	121	29	68	20	43	0.93	3.1	0.74	0.56	0.63	0.36	0.69	0.51	1.02	0.48
1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.23[b]
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.38[b]
1995	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.43[b]
1996	50	43	128	37	100	32	78	0.86	3.0	0.86	0.78	0.78	0.61	0.86	0.74	1.52	0.64
1997	91	80	228	63	131	42	89	0.88	2.9	0.79	0.57	0.68	0.39	0.67	0.53	0.63	0.46
1998	63	51	150	23	63	17	31	0.81	2.9	0.45	0.42	0.49	0.21	0.74	0.33	0.49	0.27
1999	72	57	138	42	88	29	55	0.79	2.4	0.74	0.64	0.63	0.40	0.69	0.51	0.76	0.40
2000	46	43	129	42	120	35	97	0.93	3.0	0.98	0.93	0.81	0.75	0.83	0.81	2.11	0.76
2001	40	40	99	38	87	27	67	1.00	2.5	0.95	0.88	0.77	0.68	0.71	0.68	1.68	0.68
2002	29	26	84	26	75	21	45	0.90	3.2	1.00	0.89	0.60	0.54	0.81	0.81	1.55	0.72
2003	87	79	249	73	215	63	175	0.91	3.2	0.92	0.86	0.81	0.70	0.86	0.80	2.01	0.72
2004	162	139	438	91	257	67	174	0.86	3.2	0.65	0.59	0.68	0.40	0.74	0.48	1.07	0.41
2005	258	217	679	140	381	104	239	0.84	3.1	0.65	0.56	0.63	0.35	0.74	0.48	0.93	0.40
2006	57	35	74	17	34	12	27	0.61	2.1	0.49	0.46	0.79	0.36	0.71	0.34	0.47	0.21
2007	101	76	205	47	114	39	94	0.75	2.7	0.62	0.56	0.82	0.46	0.83	0.51	0.93	0.39
2008	38	29	87	26	65	24	59	0.76	3.0	0.90	0.75	0.91	0.68	0.92	0.83	1.55	0.63
2009	44	42	128	38	91	31	62	0.95	3.1	0.90	0.71	0.68	0.48	0.82	0.74	1.41	0.70
2010	36	36	122	34	100	31	81	1.00	3.4	0.94	0.82	0.81	0.66	0.91	0.86	2.25	0.86
2011	42	40	133	38	95	33	81	0.95	3.3	0.95	0.71	0.85	0.61	0.87	0.83	1.93	0.79

[a]Value calculated from smaller sample size.
[b]Data based on short-duration visits.

Table 7. Reproductive performance of red-faced cormorants at St. Paul Island, Alaska in 2011. Measures of success are based on frequent monitoring of individual nests (as opposed to Boom or Bust methodology presented in Table 8).

Parameter	Plots		Total
	Tolstoi East	Tolstoi West	
Total nest starts (A)	23	19	42
Nest sites w/ eggs (B)	22	18	40
Total eggs (C)	75	58	133
Nest sites w/ chicks (D)	21	17	38
Total chicks (E)	57	38	95
Nest sites w/ chicks fledged (F)	21	12	33
Total chicks fledged (G)	53	28	81
Laying success (B/A)	0.96	0.95	0.95
Mean clutch size (C/B)	3.41	3.22	3.33
Nesting success (D/B)	0.95	0.94	0.95
Hatching success (E/C)	0.76	0.66	0.71
Chick success (G/E)	0.93	0.74	0.85
Egg success (G/C)	0.71	0.48	0.61
Fledging success (F/D)	1.00	0.71	0.87
Reproductive success (F/B)	0.95	0.67	0.83
Fledglings/nest start (G/A)	2.30	1.47	1.93
Productivity (F/A)	0.91	0.63	0.79

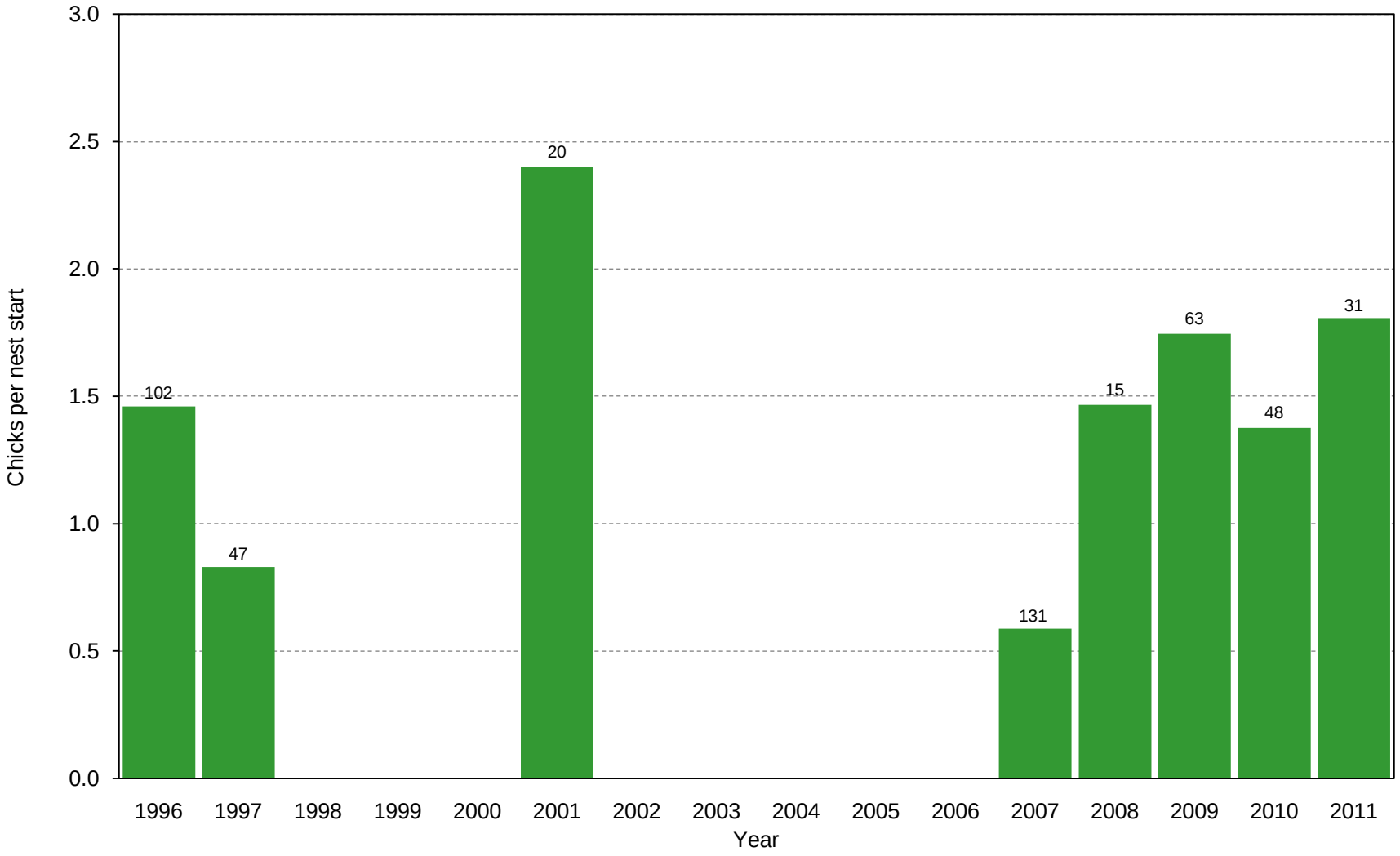


Figure 7. Reproductive performance of red-faced cormorants at St. Paul Island, Alaska, as determined by a Boom or Bust methodology. Success is measured by the number of chicks per nest start (E/A), where E=total chicks and A=total nest starts (including those without chicks). Numbers above columns indicate sample sizes (A).

Table 8. Reproductive performance of red-faced cormorants at St. Paul Island, Alaska, as determined by a Boom or Bust methodology. Measures of success are based on a count of nests (or maximum of several counts) conducted early in the nesting period and a count of large chicks (or maximum of several counts) conducted late in the nesting period.

Year	Total nest starts	Nest sites w/ unk. contents	Nest sites w/ x chicks[a]:						Nest sites w/ chicks	Total chicks	Mean brood size	Prop. nest sites w/ chicks	Chicks/ nest start	Date(s) of nest count	Date(s) of chick count
	(A)		0	1	2	3	4	5	(D)	(E)	(E/D)	(D/A)[b]	(E/A)[b]		
1996	102	-	-	-	-	-	-	-	71	149	2.1	0.70	1.46	xx[c]	xx
1997	47	-	-	-	-	-	-	-	26	39	1.5	0.55	0.83	6+13 Jul	8+11 Aug
1998	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1999	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2000	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2001	20	-	-	-	-	-	-	-	19	48	2.5	0.95	2.40	xx	xx
2002	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2005	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2007	131	11	74	21	19	6	0	0	46	77	1.7	0.35	0.59	xx	xx
2008	15	7	0	1	2	3	2	0	8	22	2.8	0.53	1.47	xx	xx
2009	63	10	4	10	20	16	3	0	49	110	2.2	0.78	1.75	xx	xx
2010	48	8	7	9	16	7	1	0	33	66	2.0	0.69	1.38	16+18 Jun	31 Jul+3 Aug
2011	31	3	0	7	11	9	0	0	27	56	2.1	0.87	1.80	8 Jun	20 Jul

[a]Numbers of chicks may represent a minimum count as not all may have been visible.

[b]Proportion of nest sites with chicks (D/A) and chicks/nest start (E/A) may be considered maximum potential values of productivity (F/A) and fledglings/nest start (G/A), respectively, based on the assumption that all chicks counted eventually fledge.

[c]xx indicates data potentially exist but have not yet been summarized.

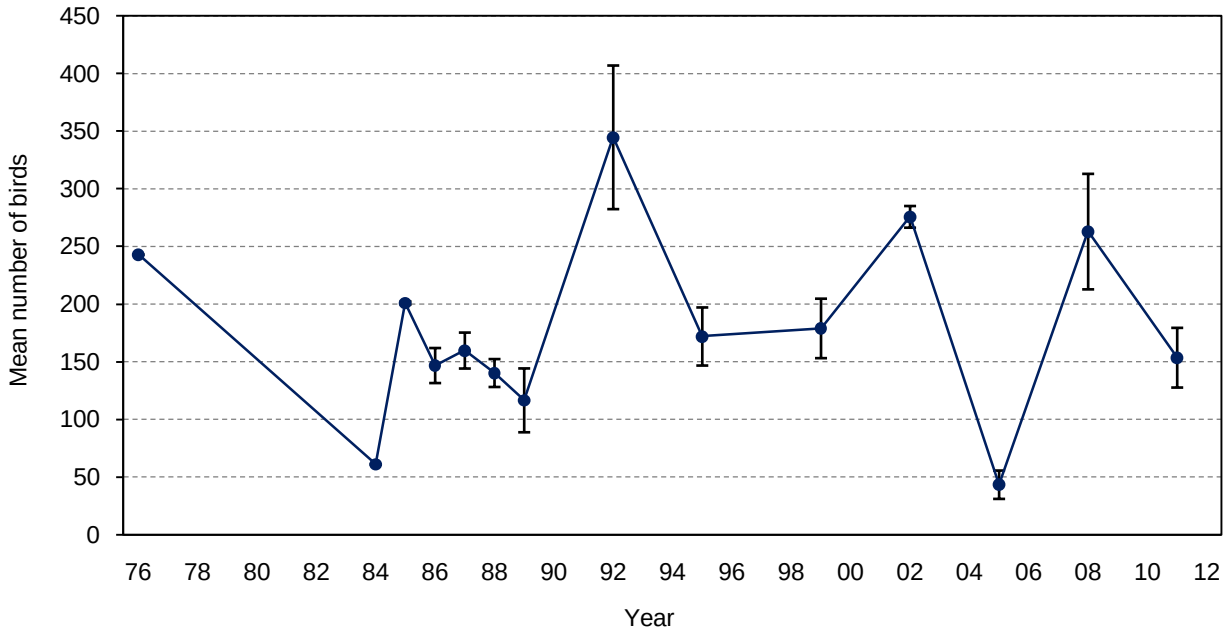


Figure 8. Mean numbers of red-faced cormorants counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 are excluded because not all plots were counted. Error bars represent standard deviation.

Figure 9. Mean numbers of red-faced cormorant nests counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 9. Numbers of red-faced cormorants counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 are excluded because not all plots were counted.

Replicate	1976	1984	1985	1986	1987	1988	1989	1992	1995	1999	2002	2005	2008	2011
1	243	61	200	148	164	149	123	372	160	216	272	63	340	178
2	-	-	200	142	187	137	150	361	201	198	276	49	238	190
3	-	-	201	140	163	140	151	425	155	186	291	33	211	176
4	-	-	203	132	143	142	135	268	-	146	276	34	249	146
5	-	-	-	172	153	141	97	298	-	165	278	32	224	150
6	-	-	-	-	149	156	74	-	-	163	262	55	230	113
7	-	-	-	-	-	117	98	-	-	-	-	38	276	133
8	-	-	-	-	-	-	105	-	-	-	-	-	336	143
Mean	243	61	201	147	160	140	117	345	172	179	276	43	263	154
n	1	1	4	5	6	7	8	6	3	6	6	7	8	8
SD	-	-	1	15	16	12	28	62	25	26	9	12	50	26
First count	17 Jul	xx[a]	xx	6 Jul	9 Jul	12 Jul	17 Jul	12 Jul	9 Jul	7 Jul	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	xx	29 Jul	23 Jul	7 Aug	9 Aug	7 Aug	3 Aug	7 Aug	1 Aug	31 Jul	31 Jul	1 Aug

[a]xx indicates data potentially exist but have not yet been summarized.

Table 10. Numbers of red-faced cormorant nests counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 are excluded because not all plots were counted.

Replicate	1976	1984	1985	1986	1987	1988	1989	1992	1995	1999	2002	2005	2008	2011
1	120	22	xx[a]	xx	xx	xx	xx	xx	xx	xx	166	xx	148	153
2	-	-	xx	xx	xx	xx	xx	xx	xx	xx	167	xx	123	155
3	-	-	xx	xx	xx	xx	xx	xx	xx	xx	186	xx	117	146
4	-	-	xx	xx	xx	xx	xx	xx	-	xx	-	xx	133	-
5	-	-	-	xx	xx	xx	xx	xx	-	xx	-	xx	131	-
6	-	-	-	-	xx	xx	xx	xx	-	xx	-	xx	142	-
7	-	-	-	-	-	xx	xx	-	-	-	-	xx	159	-
8	-	-	-	-	-	-	xx	-	-	-	-	xx	173	-
Mean	120	22	xx	xx	xx	xx	xx	xx	xx	xx	173	xx	141	151
Overall max.[b]	120	22	142	132	138	107	87	314	122	156	194	29	179	155
n	1	1	xx	xx	xx	xx	xx	xx	xx	xx	3	xx	8	3
SD	-	-	xx	xx	xx	xx	xx	xx	xx	xx	11	xx	19	5
First count	17 Jul	xx	xx	xx	xx	xx	xx	xx	xx	xx	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	xx	xx	xx	xx	xx	xx	xx	xx	23 Jul	xx	31 Jul	14 Jul

[a]xx indicates data potentially exist but have not yet been summarized.
[b]Overall maximum nest number is the highest nest count on each plot in a year, summed across all plots.

Table 11. Numbers of red-faced cormorants counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate								Mean	SD
	1	2	3	4	5	6	7	8		
	6-8 Jul	9-10 Jul	12-14 Jul	14-17 Jul	19-21 Jul	25-26 Jul	28-29 Jul	30 Jul-1 Aug		
1	7	8	8	8	10	6	5	8	-	-
2sw	0	0	0	1	0	0	0	0	-	-
2ne	7	4	9	4	4	7	6	2	-	-
3	3	3	3	2	4	3	3	1	-	-
4	1	3	2	0	0	1	0	0	-	-
5sw	2	4	2	2	0	0	0	1	-	-
5ne	2	3	2	3	1	2	0	1	-	-
6[a]	-	-	-	-	-	-	-	-	-	-
7	3	0	1	1	0	0	0	0	-	-
8	0	0	0	0	0	0	0	0	-	-
9	-	-	-	-	-	-	-	-	-	-
10	0	0	0	0	0	0	0	0	-	-
11	0	0	0	0	0	0	0	0	-	-
12	0	0	0	0	0	0	0	0	-	-
13	0	0	0	0	0	0	0	0	-	-
14	0	0	0	0	0	0	0	0	-	-
15	0	0	0	0	0	0	0	3	-	-
16[a]	-	-	-	-	-	-	-	-	-	-
17[a]	-	-	-	-	-	-	-	-	-	-
18	0	0	0	0	0	0	0	0	-	-
19top	0	0	0	1	0	0	0	0	-	-
19btm	0	0	0	0	0	0	0	0	-	-
20top	0	0	0	0	0	0	0	0	-	-
20btm	1	1	1	0	0	0	0	0	-	-
21[a]	-	-	-	-	-	-	-	-	-	-
22	0	0	0	0	0	0	0	1	-	-
23	0	0	0	0	0	0	0	0	-	-
24	0	0	0	0	0	0	0	0	-	-
25	0	0	0	0	0	0	0	0	-	-
26	0	0	0	0	0	0	0	0	-	-
27	0	0	0	0	0	0	0	0	-	-
28	0	0	0	1	0	0	0	0	-	-
29[a]	-	-	-	-	-	-	-	-	-	-
29new	0	0	0	0	0	0	0	0	-	-
30	0	0	0	0	0	0	0	0	-	-
31	6	5	3	5	9	3	5	5	-	-
32	1	0	0	0	0	0	1	0	-	-
33	153	164	155	122	126	98	119	123	-	-
Total[b]	178	190	176	146	150	113	133	143	154	26

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.

Table 12. Numbers of red-faced cormorant nests counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate			Mean	SD	Max.
	1	2	3			
	6-8 Jul	9-10 Jul	12-14 Jul			
1	7	7	7	-	-	7
2sw	0	0	0	-	-	0
2ne	7	4	6	-	-	7
3	3	3	3	-	-	3
4	0	0	0	-	-	0
5sw	2	2	2	-	-	2
5ne	1	1	1	-	-	1
6[a]	-	-	-	-	-	-
7	0	0	0	-	-	0
8	0	0	0	-	-	0
9	-	-	-	-	-	0
10	0	0	0	-	-	0
11	0	0	0	-	-	0
12	0	0	0	-	-	0
13	0	0	0	-	-	0
14	0	0	0	-	-	0
15	0	0	0	-	-	0
16[a]	-	-	-	-	-	-
17[a]	-	-	-	-	-	-
18	0	0	0	-	-	0
19top	0	0	0	-	-	0
19btm	0	0	0	-	-	0
20top	0	0	0	-	-	0
20btm	1	0	1	-	-	1
21[a]	-	-	-	-	-	-
22	0	0	0	-	-	0
23	0	0	0	-	-	0
24	0	0	0	-	-	0
25	0	0	0	-	-	0
26	0	0	0	-	-	0
27	0	0	0	-	-	0
28	0	0	0	-	-	0
29[a]	-	-	-	-	-	-
29new	0	0	0	-	-	0
30	0	0	0	-	-	0
31	0	0	0	-	-	0
32	0	0	0	-	-	0
33	140	142	133	-	-	142
Total[b]	153	155	146	151	5	155[c]

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.
[c]Overall maximum nest number is the highest nest count on each plot, summed across all plots.

Table 13. Total number of red-faced cormorant chicks banded on banding plot at Tsamana, St. Paul Island, Alaska.

Parameter	Year							
	2004	2005	2006	2007	2008	2009	2010	2011
Total new chicks banded	47	55	0	0	22	31	62	37
Cumulative chicks banded	47	102	102	102	124	155	217	254

Table 14. Fates of cohorts of red-faced cormorants banded as chicks on banding plot at Tsamana, St. Paul Island, Alaska. Data represent fidelity of chicks to the plot from where they fledged and not survival because red-faced cormorants typically move among plots and islands each year. Resights are based on incidental observations only and not a standardized resighting effort. Values in parentheses indicate observations of immature birds and not those of breeding age.

Year	No. chicks banded in year	No. birds resighted in:							Prop. birds resighted in 2011
		2005	2006	2007	2008	2009	2010	2011	
2004	47	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.00
2005	55	-	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.00
2006	0	-	-	-	-	-	-	-	-
2007	0	-	-	-	-	-	-	-	-
2008	22	-	-	-	-	0 (1)	0 (0)	0 (0)	0.00
2009	31	-	-	-	-	-	0 (1)	0 (7)	0.00 (0.22)
2010	62	-	-	-	-	-	-	2 (34)	0.02 (0.56)
2011	37	-	-	-	-	-	-	-	-
No. birds seen in current year (A)		0	0	0	0	0 (1)	0 (1)	2 (41)	-

Table 15. Resight history of red-faced cormorants banded as chicks on banding plot at Tsamana, St. Paul Island, Alaska. Data represent number of times birds were resighted each year and include only birds resighted at least once after banding (in subsequent years). Resights are based on incidental observations only and not a standardized resighting effort. Values in parentheses indicate observations of immature birds and not those of breeding age.

Color band		Metal band #	Year banded	Notes	Year resighted						
Color	band #				2005	2006	2007	2008	2009	2010	2011
Yellow	115	1018-01294	2008		-	-	-	-	(1)	0	0
Yellow	129	1018-01306	2009		-	-	-	-	-	0	(2)
Yellow	141	1018-01317	2009		-	-	-	-	-	(1)	0
Yellow	144	1018-01320	2009		-	-	-	-	-	0	(2)
Yellow	145	1018-01321	2009		-	-	-	-	-	0	1
Yellow	147	1018-01322	2009		-	-	-	-	-	0	1
Yellow	149	1018-01324	2009		-	-	-	-	-	0	(2)
Yellow	151	1018-01326	2009		-	-	-	-	-	0	(1)
Yellow	171	1018-01335	2009		-	-	-	-	-	0	(1)
Yellow	172	1018-01336	2010		-	-	-	-	-	-	(1)
Yellow	173	1018-01337	2010		-	-	-	-	-	-	(3)
Yellow	177	1018-01340	2010		-	-	-	-	-	-	(2)
Yellow	178	1018-01341	2010		-	-	-	-	-	-	(4)
Yellow	179	1018-01342	2010		-	-	-	-	-	-	(2)
Yellow	180	1018-01343	2010		-	-	-	-	-	-	(1)
Yellow	181	1018-01344	2010		-	-	-	-	-	-	(2)
Yellow	182	1018-01345	2010		-	-	-	-	-	-	(3)
Yellow	183	1018-01346	2010		-	-	-	-	-	-	(2)
Yellow	184	1018-01347	2010		-	-	-	-	-	-	(2)
Yellow	187	1018-01349	2010		-	-	-	-	-	-	(1)
Yellow	188	1018-01350	2010		-	-	-	-	-	-	(2)
Yellow	192	1018-01354	2010		-	-	-	-	-	-	(1)
Yellow	194	1018-01355	2010		-	-	-	-	-	-	(3)
Yellow	195	1018-01357	2010		-	-	-	-	-	-	(2)
Yellow	197	1018-01358	2010		-	-	-	-	-	-	(3)
Yellow	199	1018-01360	2010		-	-	-	-	-	-	(1)
Yellow	209	1018-01369	2010		-	-	-	-	-	-	(1)
Yellow	211	1018-01371	2010		-	-	-	-	-	-	(1)
Yellow	214	1018-01375	2010		-	-	-	-	-	-	(1)
Yellow	215	1018-01276	2010		-	-	-	-	-	-	(4)

Table 15 (continued). Resight history of red-faced cormorants banded as chicks on banding plot at Tsamana, St. Paul Island, Alaska. Data represent number of times birds were resighted each year and include only birds resighted at least once after banding (in subsequent years). Resights are based on incidental observations only and not a standardized resighting effort. Values in parentheses indicate observations of immature birds and not those of breeding age.

Color band		Metal band #	Year banded	Notes	Year resighted						
Color	band #				2005	2006	2007	2008	2009	2010	2011
Yellow	217	1018-01377	2010		-	-	-	-	-	-	(1)
Yellow	218	1018-01379	2010		-	-	-	-	-	-	(5)
Yellow	220	1018-01380	2010		-	-	-	-	-	-	(5)
Yellow	221	1018-01281	2010		-	-	-	-	-	-	(4)
Yellow	222	1018-01382	2010		-	-	-	-	-	-	(4)
Yellow	223	1018-01383	2010		-	-	-	-	-	-	(1)
Yellow	224	1018-01385	2010		-	-	-	-	-	-	(1)
Yellow	225	1018-01384	2010		-	-	-	-	-	-	(4)
Yellow	227	1018-01386	2010		-	-	-	-	-	-	(2)
Yellow	228	1018-01386	2010		-	-	-	-	-	-	(1)
Yellow	231	1018-01390	2010		-	-	-	-	-	-	(1)
Yellow	232	1018-01391	2010		-	-	-	-	-	-	(2)
Yellow	233	1018-01392	2010		-	-	-	-	-	-	(2)
Yellow	234	1018-01393	2010		-	-	-	-	-	-	(2)
Yellow	237	1018-01397	2010		-	-	-	-	-	-	(1)
		Total birds resighted[a]			0	0	0	0	0 (1)	0 (1)	2 (41)

[a]Does not include resights of birds banded in resight year.

Table 16. Red-faced cormorant chicks banded on banding plot at Tsamana, St. Paul Island, Alaska. Color bands that have been resighted are underlined (e.g., 141). Birds are not included in resight summaries (Table 15) until they are seen at least once.

Color band		Metal band #	Year banded	Color band		Metal band #	Year banded	Color band		Metal band #	Year banded
Color	Band #			Color	Band #			Color	Band #		
-	-	778-26751	2004	-	-	778-26793	2004	Yellow	42	1018-01238	2005
-	-	778-26752	2004	-	-	778-26794	2004	Yellow	43	1018-01239	2005
-	-	778-26753	2004	-	-	778-26795	2004	Yellow	44	1018-01240	2005
-	-	778-26754	2004	-	-	778-26796	2004	Yellow	45	1018-01241	2005
-	-	778-26755	2004	-	-	778-26797	2004	Yellow	47	1018-01242	2005
-	-	778-26756	2004	Yellow	1	1018-01201	2005	Yellow	48	1018-01243	2005
-	-	778-26757	2004	Yellow	2	1018-01202	2005	Yellow	49	1018-01244	2005
-	-	778-26758	2004	Yellow	3	1018-01203	2005	Yellow	50	1018-01245	2005
-	-	778-26759	2004	Yellow	4	1018-01204	2005	Yellow	51	1018-01246	2005
-	-	778-26760	2004	Yellow	5	1018-01205	2005	Yellow	52	1018-01247	2005
-	-	778-26761	2004	Yellow	7	1018-01206	2005	Yellow	53	1018-01248	2005
-	-	778-26762	2004	Yellow	8	1018-01207	2005	Yellow	54	1018-01249	2005
-	-	778-26763	2004	Yellow	9	1018-01208	2005	Yellow	55	1018-01250	2005
-	-	778-26764	2004	Yellow	10	1018-01209	2005	Yellow	57	1018-01251	2005
-	-	778-26765	2004	Yellow	11	1018-01210	2005	Yellow	58	1018-01252	2005
-	-	778-26766	2004	Yellow	12	1018-01211	2005	Yellow	59	1018-01253	2005
-	-	778-26767	2004	Yellow	13	1018-01212	2005	Yellow	70	1018-01254	2005
-	-	778-26768	2004	Yellow	14	1018-01213	2005	Yellow	71	1018-01255	2005
-	-	778-26769	2004	Yellow	15	1018-01214	2005	Yellow	103	1018-01283	2008
-	-	778-26770	2004	Yellow	17	1018-01215	2005	Yellow	104	1018-01284	2008
-	-	778-26771	2004	Yellow	18	1018-01216	2005	Yellow	105	1018-01285	2008
-	-	778-26772	2004	Yellow	19	1018-01217	2005	Yellow	107	1018-01286	2008
-	-	778-26773	2004	Yellow	20	1018-01218	2005	Yellow	108	1018-01287	2008
-	-	778-26774	2004	Yellow	21	1018-01219	2005	Yellow	109	1018-01288	2008
-	-	778-26775	2004	Yellow	22	1018-01220	2005	Yellow	110	1018-01289	2008
-	-	778-26776	2004	Yellow	23	1018-01221	2005	Yellow	111	1018-01290	2008
-	-	778-26777	2004	Yellow	24	1018-01222	2005	Yellow	112	1018-01291	2008
-	-	778-26778	2004	Yellow	25	1018-01223	2005	Yellow	113	1018-01292	2008
-	-	778-26779	2004	Yellow	27	1018-01224	2005	Yellow	114	1018-01293	2008
-	-	778-26780	2004	Yellow	28	1018-01225	2005	Yellow	115	1018-01294	2008
-	-	778-26781	2004	Yellow	29	1018-01226	2005	Yellow	117	1018-01295	2008
-	-	778-26782	2004	Yellow	30	1018-01227	2005	Yellow	118	1018-01296	2008
-	-	778-26783	2004	Yellow	31	1018-01228	2005	Yellow	119	1018-01297	2008
-	-	778-26784	2004	Yellow	32	1018-01229	2005	Yellow	120	1018-01298	2008
-	-	778-26785	2004	Yellow	33	1018-01230	2005	Yellow	121	1018-01299	2008
-	-	778-26786	2004	Yellow	34	1018-01231	2005	Yellow	117	1018-01295	2008
-	-	778-26787	2004	Yellow	35	1018-01232	2005	Yellow	118	1018-01296	2008
-	-	778-26788	2004	Yellow	37	1018-01233	2005	Yellow	119	1018-01297	2008
-	-	778-26789	2004	Yellow	38	1018-01234	2005	Yellow	120	1018-01298	2008
-	-	778-26790	2004	Yellow	39	1018-01235	2005	Yellow	122	1018-01300	2008
-	-	778-26791	2004	Yellow	40	1018-01236	2005	Yellow	123	1018-01301	2008
-	-	778-26792	2004	Yellow	41	1018-01237	2005	Yellow	124	1018-01302	2008

Table 16 (continued). Red-faced cormorant chicks banded on banding plot at Tsamana, St. Paul Island, Alaska. Color bands that have been resighted are underlined (e.g., 141). Birds are not included in resight summaries (Table 15) until they are seen at least once.

Color band		Metal band #	Year banded	Color band		Metal band #	Year banded	Color band		Metal band #	Year banded
Color	Band #			Color	Band #			Color	Band #		
Yellow	125	1018-01303	2008	Yellow	181	1018-01344	2010	Yellow	225	1018-01384	2010
Yellow	127	1018-01304	2008	Yellow	182	1018-01345	2010	Yellow	227	1018-01386	2010
Yellow	128	1018-01305	2009	Yellow	183	1018-01346	2010	Yellow	228	1018-01387	2010
Yellow	129	1018-01306	2009	Yellow	184	1018-01347	2010	Yellow	229	1018-01388	2010
Yellow	130	1018-01307	2009	Yellow	185	1018-01348	2010	Yellow	230	1018-01389	2010
Yellow	131	1018-01308	2009	Yellow	187	1018-01349	2010	Yellow	231	1018-01390	2010
Yellow	132	1018-01309	2009	Yellow	188	1018-01350	2010	Yellow	232	1018-01391	2010
Yellow	133	1018-01310	2009	Yellow	189	1018-01352	2010	Yellow	233	1018-01392	2010
Yellow	134	1018-01311	2009	Yellow	190	1018-01353	2010	Yellow	234	1018-01393	2010
Yellow	135	1018-01312	2009	Yellow	191	1018-01351	2010	Yellow	235	1018-01394	2010
Yellow	137	1018-01313	2009	Yellow	192	1018-01354	2010	Yellow	237	1018-01395	2010
Yellow	138	1018-01314	2009	Yellow	193	1018-01356	2010	Yellow	238	1018-01396	2010
Yellow	139	1018-01315	2009	Yellow	194	1018-01355	2010	Yellow	239	1018-01397	2010
Yellow	140	1018-01316	2009	Yellow	195	1018-01357	2010	Yellow	240	1018-01398	2011
Yellow	141	1018-01317	2009	Yellow	197	1018-01358	2010	Yellow	241	1018-01399	2011
Yellow	142	1018-01318	2009	Yellow	198	1018-01359	2010	Yellow	242	1018-01400	2011
Yellow	143	1018-01319	2009	Yellow	199	1018-01360	2010	Yellow	243	1018-01401	2011
Yellow	144	1018-01320	2009	Yellow	200	1018-01361	2010	Yellow	244	1018-01402	2011
Yellow	145	1018-01321	2009	Yellow	201	1018-01362	2010	Yellow	245	1018-01403	2011
Yellow	147	1018-01322	2009	Yellow	202	1018-01363	2010	Yellow	247	1018-01404	2011
Yellow	148	1018-01323	2009	Yellow	203	1018-01364	2010	Yellow	248	1018-01405	2011
Yellow	149	1018-01324	2009	Yellow	204	1018-01365	2010	Yellow	249	1018-01406	2011
Yellow	150	1018-01325	2009	Yellow	205	1018-01366	2010	Yellow	250	1018-01407	2011
Yellow	151	1018-01326	2009	Yellow	207	1018-01367	2010	Yellow	151	1018-01408	2011
Yellow	152	1018-01332	2009	Yellow	208	1018-01368	2010	Yellow	252	1018-01409	2011
Yellow	153	1018-01327	2009	Yellow	209	1018-01369	2010	Yellow	253	1018-01410	2011
Yellow	154	1018-01328	2009	Yellow	210	1018-01370	2010	Yellow	254	1018-01411	2011
Yellow	155	1018-01329	2009	Yellow	211	1018-01371	2010	Yellow	255	1018-01412	2011
Yellow	157	1018-01330	2009	-	-	1018-01372	2010	Yellow	257	1018-01413	2011
Yellow	158	1018-01331	2009	Yellow	212	1018-01373	2010	Yellow	258	1018-01414	2011
Yellow	159	1018-01333	2009	Yellow	213	1018-01374	2010	Yellow	259	1018-01415	2011
Yellow	170	1018-01334	2009	Yellow	214	1018-01375	2010	Yellow	270	1018-01416	2011
Yellow	171	1018-01335	2009	Yellow	215	1018-01376	2010	Yellow	271	1018-01417	2011
Yellow	172	1018-01336	2010	Yellow	217	1018-01377	2010	Yellow	272	1018-01418	2011
Yellow	173	1018-01337	2010	Yellow	218	1018-01379	2010	Yellow	273	1018-01419	2011
Yellow	174	1018-01338	2010	Yellow	219	1018-01378	2010	Yellow	274	1018-01420	2011
Yellow	175	1018-01339	2010	Yellow	220	1018-01380	2010	Yellow	275	1018-01421	2011
Yellow	177	1018-01340	2010	Yellow	221	1018-01381	2010	Yellow	277	1018-01422	2011
Yellow	178	1018-01341	2010	Yellow	222	1018-01382	2010	Yellow	278	1018-01423	2011
Yellow	179	1018-01342	2010	Yellow	223	1018-01383	2010	Yellow	279	1018-01424	2011
Yellow	180	1018-01343	2010	Yellow	224	1018-01385	2010	Yellow	280	1018-01425	2011

Table 16 (continued). Red-faced cormorant chicks banded on banding plot at Tsamana, St. Paul Island, Alaska. Color bands that have been resighted are underlined (e.g., 141). Birds are not included in resight summaries (Table 15) until they are seen at least once.

Color band		Metal band #	Year banded		Color band		Metal band #	Year banded	Color band		Metal band #	Year banded
Color	Band #				Color	Band #			Color	Band #		
Yellow	281	1018-0	2011	1018-01426	Yellow	284	1018-01429	2011	Yellow	288	1018-01433	2011
Yellow	282	1018-0	2011	1018-01427	Yellow	285	1018-01430	2011	Yellow	289	1018-01434	2011
Yellow	283	1018-0	2011	1018-01428	Yellow	287	1018-01431	2011	Yellow	290	1018-01435	2011

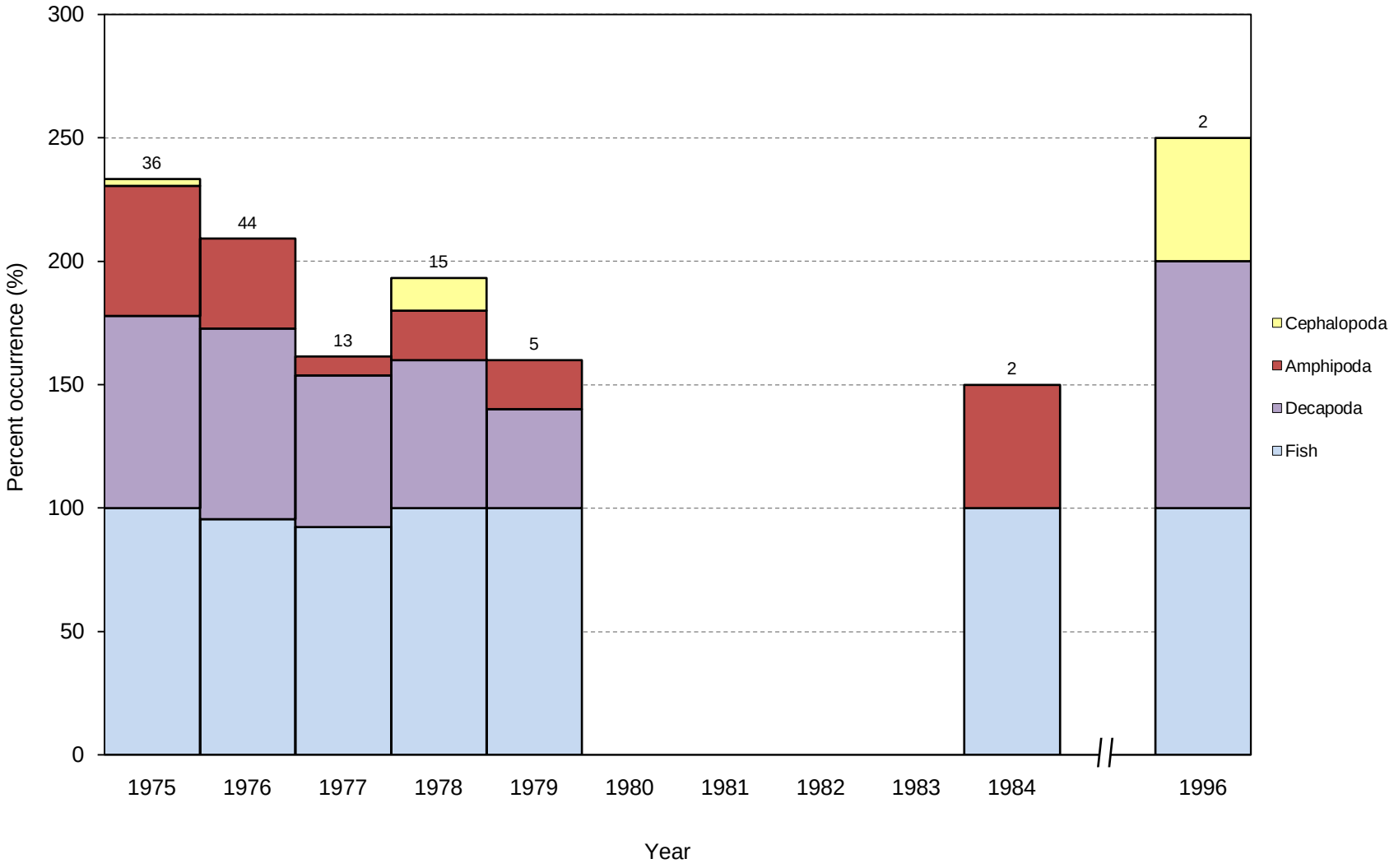


Figure 10. Frequency of occurrence of selected prey items in diets of red-faced cormorants at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1985-1995 or 1996-2008; samples were collected 2009-2011 but have not yet been summarized.

Table 17. Frequency of occurrence of prey in diets of red-faced cormorants at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents. No samples were collected 1980-1983, 1985-1995, or 1996-2008; samples were collected 2009-2011 but have not yet been summarized.

	1975	1976	1977	1978	1979	1984	1996
No. samples	36	44	13	15	5	2	2
Cephalopoda	**2.8**	**-**	**-**	**13.3**	**-**	**-**	**50.0**
Unid. squid	2.8	-	-	13.3	-	-	50.0
Gastropoda	**-**	**2.3**	**-**	**6.7**	**-**	**-**	**-**
Unid. gastropod	-	-	-	-	-	-	-
Unid. mollusca	8.3	11.4	-	6.7	-	-	50.0
Copepoda	**-**	**-**	**-**	**-**	**20.0**	**-**	**-**
Unid. copepod	-	-	-	-	20.0	-	-
Amphipoda	**52.8**	**36.4**	**7.7**	**20.0**	**20.0**	**50.0**	**-**
Hyperiidea							
Themisto libellula	5.6	-	-	-	-	-	-
Ampithoe rubricatoides	2.8	-	-	-	-	-	-
Jassa pulchella	2.8	-	-	-	-	-	-
Unid. Hyperiidea	-	2.3	-	-	-	-	-
Gammaridea							
Ischyrocerus spp.	19.4	2.3	-	6.7	-	-	-
Melita dentata	2.8	-	-	-	-	-	-
Eusiridae	5.6	-	-	-	-	-	-
Pleustidae	2.8	-	-	-	-	-	-
Parapleustes spp.	2.8	2.3	-	-	-	-	-
Pleusymptes spp.	2.8	-	-	-	-	-	-
Unid. Gammaridea	27.8	27.3	7.7	13.3	20.0	-	-
Unid. amphipod	-	-	-	-	-	50.0	-
Euphausiacae	**8.3**	**-**	**-**	**-**	**-**	**-**	**-**
Euphausia spp.	8.3	-	-	-	-	-	-
Decapoda	**77.8**	**77.3**	**61.5**	**60.0**	**40.0**	**-**	**100.0**
Lebbeus grandimanus	16.7	-	-	-	-	-	-
Lebbeus polaris	5.6	29.5	46.2	6.7	-	-	-
Lebbeus groenlandicus	-	15.9	23.1	20.0	-	-	-
Caridea spp.	2.8	-	-	-	-	-	-
Unid. shrimp	36.1	45.5	23.1	13.3	-	-	-
Dermaturus mandtii	27.8	20.5	23.1	-	-	-	-
Haplogaster grebnitzkii		4.5	7.7	-	-	-	-
Unid. crab	30.6	20.5	7.7	20.0	-	-	100.0
Unid. decapod	-	-	-	13.3	40.0	-	-
Isopoda	**-**	**2.3**	**-**	**-**	**-**	**-**	**-**
Unid. isopod	-	2.3	-	-	-	-	-
Unid. crustacean	-	-	-	13.3	40.0	-	-
Nereidae	5.6	2.3	-	46.7	40.0	-	100.0
Fish	**100.0**	**95.5**	**92.3**	**100.0**	**100.0**	**100.0**	**100.0**
Osmeridae							
Mallotus villosus	-	-	-	6.7	-	-	-
Myctophidae	8.3	-	-	6.7	-	-	-
Gadidae							
Theragra chalcogramma	-	2.3	-	20.0	-	-	-
Unid. gadid	-	4.5	-	6.7	-	-	-
Cottidae	2.8	13.7	7.7	66.7	-	-	100.0
Agonidae	-	4.5	-	-	-	-	-
Liparidae	-	18.2	-	-	-	-	-
Stichaeidae							
Lumpenus spp.	-	2.3	-	-	-	-	-
Trichodontidae							
Trichodon trichodon	2.8	-	-	-	-	100.0	-
Ammodyitidae							
Ammodytes hexapterus	2.8	-	-	13.3	-	-	-
Unid. fish	88.9	68.2	84.6	60.0	100.0	-	50.0

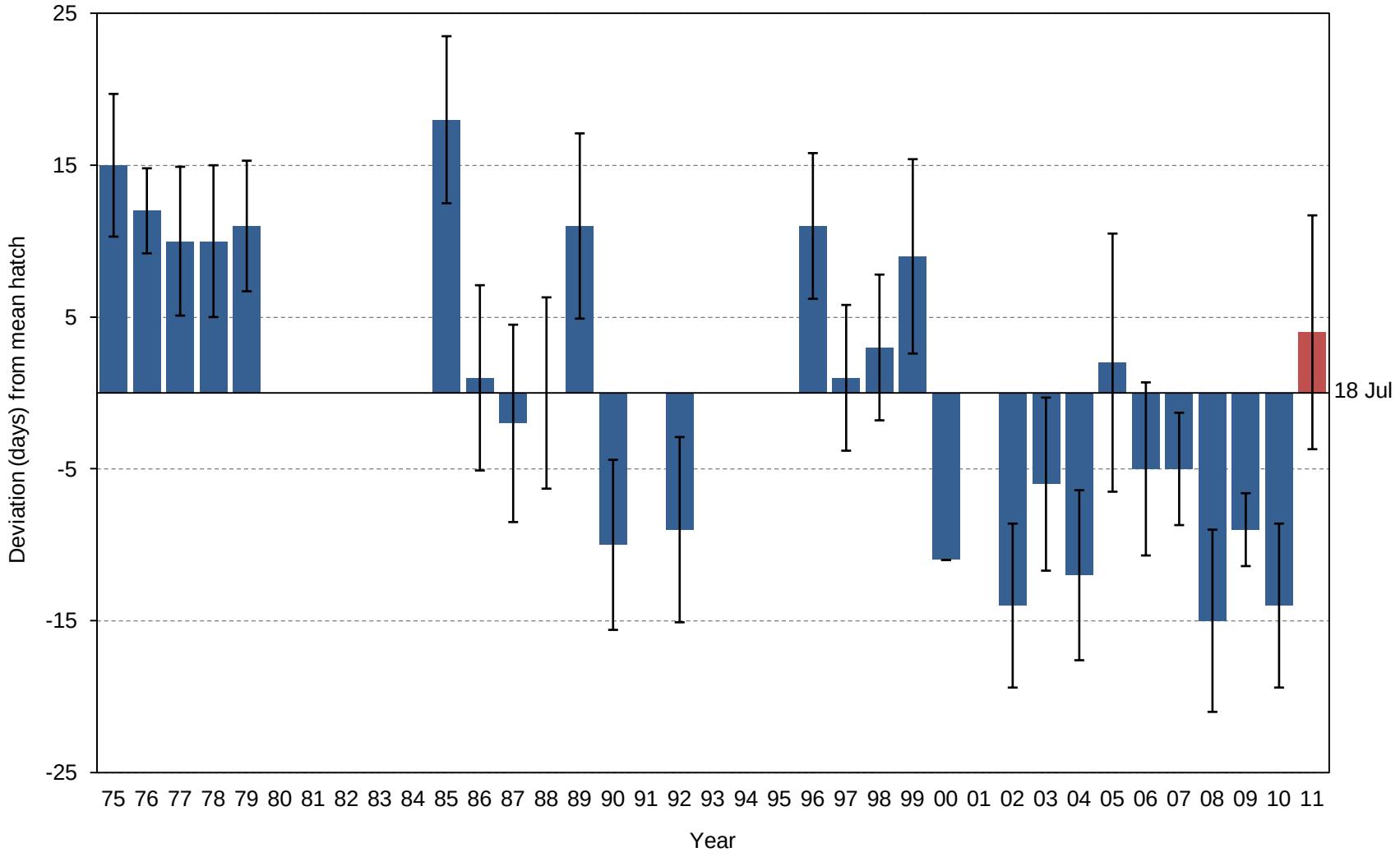


Figure 11. Yearly hatch date deviation (from the 1975-2010 average of 18 July) for black-legged kittiwakes at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 18. Breeding chronology of black-legged kittiwakes at St. Paul Island, Alaska.

Year	Mean lay	SD	n[a]	Mean hatch	SD	n[b]	First lay	First hatch	Last hatch	First fledge
1975	xx[c]	xx	xx	2 Aug	4.7	33	xx	xx	xx	xx
1976	xx	xx	xx	29 Jul	2.8	23	xx	xx	xx	xx
1977	xx	xx	xx	28 Jul	4.9	60	xx	xx	xx	xx
1978	xx	xx	xx	28 Jul	5.0	39	xx	xx	xx	xx
1979	xx	xx	xx	29 Jul	4.3	19	xx	xx	xx	xx
1980	*no data*	-	-	-	-	-	-	-	-	-
1981	*no data*	-	-	-	-	-	-	-	-	-
1982	*no data*	-	-	-	-	-	-	-	-	-
1983	*no data*	-	-	-	-	-	-	-	-	-
1984	*no data*	-	-	-	-	-	-	-	-	-
1985	xx	xx	xx	5 Aug	5.5	62	xx	xx	xx	xx
1986	xx	xx	xx	19 Jul	6.1	229	xx	xx	xx	xx
1987	xx	xx	xx	16 Jul	6.5	148	xx	xx	xx	xx
1988	xx	xx	xx	17 Jul	6.3	113	xx	xx	xx	xx
1989	xx	xx	xx	29 Jul	6.1	30	xx	xx	xx	xx
1990	xx	xx	xx	8 Jul	5.6	189	xx	xx	xx	xx
1991	*no data*	-	-	-	-	-	-	-	-	-
1992	xx	xx	xx	8 Jul	6.1	333	xx	xx	xx	xx
1993	*no data*	-	-	-	-	-	-	-	-	-
1994	*no data*	-	-	-	-	-	-	-	-	-
1995	*no data*	-	-	-	-	-	-	-	-	-
1996	xx	xx	xx	28 Jul	4.8	37	xx	xx	xx	xx
1997	xx	xx	xx	19 Jul	4.8	133	xx	xx	xx	xx
1998	xx	xx	xx	21 Jul	4.8	199	xx	10 Jul	6 Aug	xx
1999	xx	xx	xx	27 Jul	6.4	31	xx	13 Jul	12 Aug	xx
2000	xx	xx	xx	6 Jul	-	236	xx	xx	xx	xx
2001	xx	xx	xx	11 Jul	5.5	86	xx	xx	27 Jul	xx
2002	xx	xx	xx	4 Jul	5.4	210	xx	xx	xx	xx
2003	xx	xx	xx	12 Jul	5.7	201	xx	xx	xx	xx
2004	xx	xx	xx	5 Jul	5.6	273	xx	xx	xx	xx
2005	xx	xx	xx	20 Jul	8.5	52	xx	xx	xx	xx
2006	xx	xx	xx	13 Jul	5.7	127	xx	xx	xx	xx
2007	xx	xx	xx	13 Jul[d]	3.7	204	xx	xx	xx	xx
2008	xx	xx	xx	2 Jul	6.0	173	xx	xx	xx	xx
2009	xx	xx	xx	9 Jul	2.4	24	xx	5 Jul	13 Jul	xx
2010	9 Jun	5.4	260	4 Jul	5.4	207	3 Jun	19 Jun	23 Jul	6 Aug
2011	20 Jun	6.6	153	22 Jul	7.7	5	3 Jun	9 Jul	29 Jul	>30 Aug

[a]Sample sizes for mean lay dates are a sub-sample of total nests for which no egg to egg interval is ≤ 7 days.
[b]Sample sizes for mean hatch dates are a sub-sample of total nests for which egg to chick interval is ≤ 7 days.
[c]xx indicates data potentially exist but have not yet been summarized.
[d]Only two eggs hatched (mean 14 Jul, SD=0.07), so dates estimated from laying dates and average incubation period (27 days for black-legged kittiwake).

Table 19. Frequency distribution of hatch dates for black-legged kittiwakes at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days.

Julian date[a]	No. nests hatching on Julian date																		
	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
169	xx[b]	xx	xx	xx	xx	*no data*	*no data*	*no data*	*no data*	*no data*	xx	xx	xx	xx	xx	xx	*no data*	xx	*no data*
170	xx	xx	xx	xx	xx						xx	xx	xx	xx	xx	xx		xx	
171	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
172	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
173	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
174	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
175	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
176	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
177	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
178	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
179	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
180	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
181	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
182	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
183	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
184	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
185	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
186	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
187	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
188	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
189	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
190	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
191	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
192	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
193	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
194	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
195	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
196	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
197	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
198	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
199	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
200	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
201	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
202	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
203	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
204	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
205	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
206	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
207	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
208	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
209	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
210	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
211	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
212	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
213	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
214	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
n	33	23	60	39	19	-	-	-	-	-	62	229	148	113	30	189	-	333	-

[a]Julian dates are adjusted by one day in leap years.
[b]xx indicates data potentially exist but have not yet been summarized.

Table 19 (continued). Frequency distribution of hatch dates for black-legged kittiwakes at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days.

Julian date[a]	No. nests hatching on Julian date																	
	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11
169	*no data*	*no data*	xx[b]	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
170			xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	-
171	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
172	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	-
173	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
174	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
175	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	4	-
176	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	9	-
177	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
178	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	5	-
179	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	17	-
180	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	12	-
181	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
182	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	29	-
183	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	-
184	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	15	-
185	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	30	-
186	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3	18	-
187	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
188	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	21	-
189	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
190	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	13	10	1
191	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	8	-
192	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	8	-
193	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	4	12	-
194	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3	-	-
195	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
196	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	2	-
197	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
198	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	3	1
199	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
200	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
201	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
202	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
203	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
204	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	-
205	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
206	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
207	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
208	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	2
209	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
210	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	1
211	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
212	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
213	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
214	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
n	-	-	37	133	199	31	236	86	210	201	273	52	127	204	173	24	207	5

[a] Julian dates are adjusted by one day in leap years.
[b] xx indicates data potentially exist but have not yet been summarized.

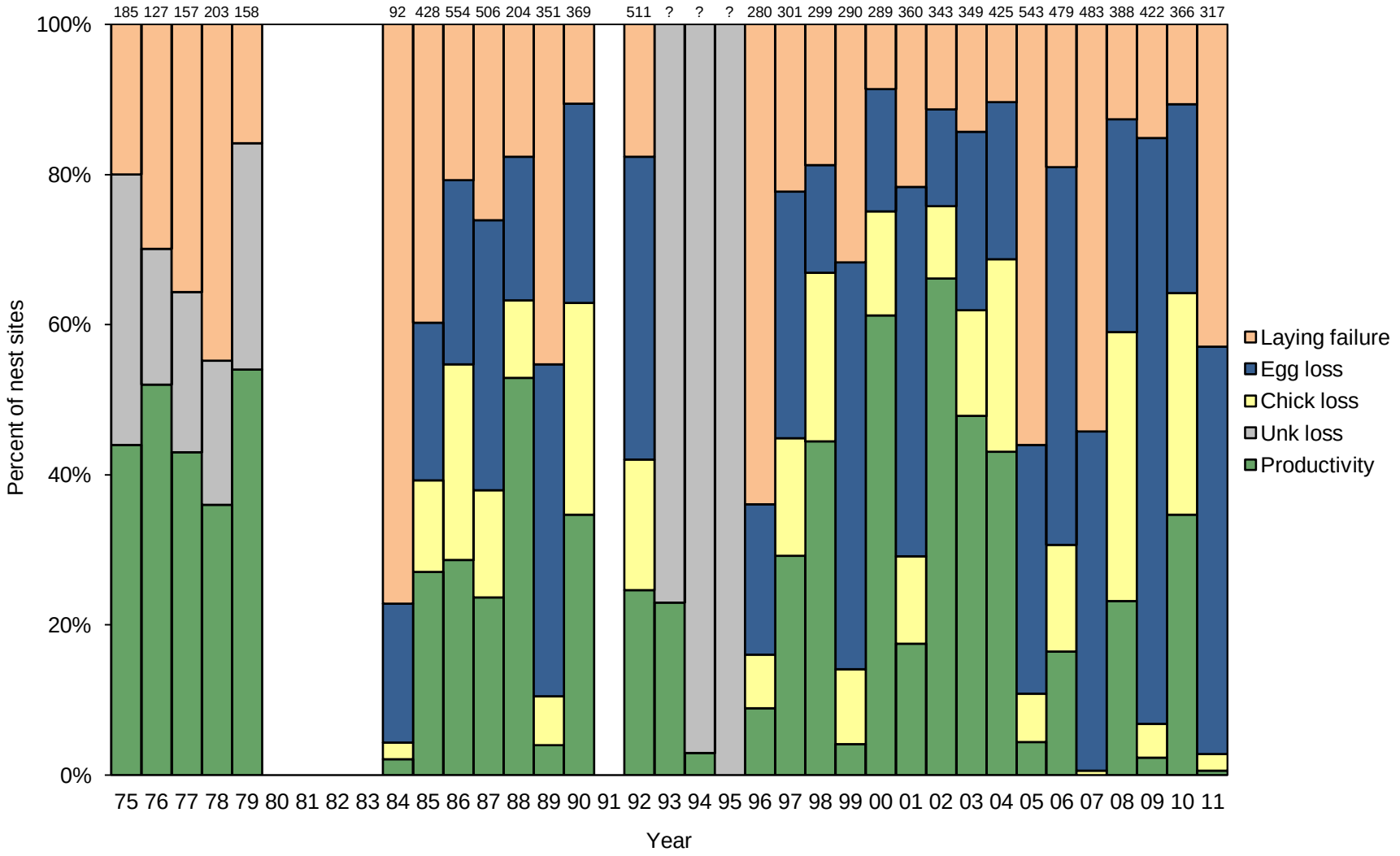


Figure 12. Reproductive performance of black-legged kittiwakes at St. Paul Island, Alaska. Laying failure=(A-B)/A; Egg loss=(B-D)/A; Chick loss=(D-F)/A; Productivity=F/A, where A=total nest sites; B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns indicate sample sizes (A).

Table 20. Reproductive performance of black-legged kittiwakes at St. Paul Island, Alaska.

Year	Total nest starts (A)	Nest sites w/ eggs (B)	Total eggs (C)	Nest sites w/ chicks (D)	Total chicks (E)	Nest sites w/ chicks fledged (F)	Total chicks fledged (G)	Laying success (B/A)	Mean clutch size (C/B)	Nesting success (D/B)	Hatching success (E/C)	Chick success (G/E)	Egg success (G/C)	Fledging success (F/D)	Reprod. success (F/B)	Fledglings /nest start (G/A)	Prod. (F/A)
1975	185	(148)[a]	(204)	-	(145)	-	(81)	(0.80)	1.4[b]	-	0.71[c]	0.56[c]	0.40	-	0.55[b]	0.44	(0.44)
1976	127	(89)	(131)	-	(105)	-	(66)	(0.70)	1.5[b]	-	0.80[c]	0.63[c]	(0.50)	-	0.74[b]	0.52	-
1977	157	(101)	(150)	-	(108)	-	(68)	(0.64)	1.5[b]	-	0.72[c]	0.63[c]	0.45	-	0.67[b]	0.43	-
1978	203	(112)	(149)	-	(118)	-	(73)	(0.55)	1.3[b]	-	0.79[c]	0.62[c]	0.49	-	0.64[b]	0.36	-
1979	(158)	(133)	(191)	-	(155)	-	(85)	(0.84)	1.5[b]	-	0.81[c]	0.55[c]	0.45	-	0.64[b]	0.54	-
1980	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1981	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1982	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1983	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1984	92	21	23	4	4	2	2	0.23	1.1	0.19	0.17	0.50	0.09	0.50	0.10	0.02	0.02
1985	428	258	-	168	-	116	118	0.60	1.3	0.65	-	-	-	0.69	0.45	0.28	0.27
1986	554	439	576	303	333	159	159	0.79	1.3	0.69	0.58	0.48	0.28	0.52	0.36	0.29	0.29
1987	506	374	575	192	240	120	129	0.74	1.5	0.51	0.42	0.54	0.22	0.63	0.32	0.25	0.24
1988	204	168	293	129	177	108	108	0.82	1.7	0.77	0.60	0.61	0.37	0.84	0.64	0.53	0.53
1989	351	192	256	37	46	14	14	0.55	1.3	0.19	0.18	0.30	0.05	0.38	0.07	0.04	0.04
1990	369	330	566	232	315	128	131	0.89	1.7	0.70	0.56	0.42	0.23	0.55	0.39	0.36	0.35
1991	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1992	511	421	714	215	275	126	129	0.82	1.7	0.51	0.39	0.47	0.18	0.59	0.30	0.25	0.25
1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.23[d]
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03[d]
1995	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00[d]
1996	280	101	119	45	49	25	25	0.36	1.2	0.45	0.41	0.51	0.21	0.56	0.25	0.09	0.09
1997	301	234	367	135	181	88	89	0.78	1.6	0.58	0.49	0.49	0.24	0.65	0.38	0.30	0.29
1998	299	243	359	200	245	133	133	0.81	1.5	0.82	0.68	0.54	0.37	0.67	0.55	0.44	0.44
1999	290	198	232	41	44	12	12	0.68	1.2	0.21	0.19	0.27	0.05	0.29	0.06	0.04	0.04
2000	289	264	407	217	248	177	178	0.91	1.5	0.82	0.61	0.72	0.44	0.82	0.67	0.62	0.61
2001	360	282	437	105	117	63	63	0.78	1.5	0.37	0.27	0.54	0.14	0.60	0.22	0.18	0.18
2002	343	304	546	260	345	227	274	0.89	1.8	0.86	0.63	0.79	0.50	0.87	0.75	0.80	0.66
2003	349	299	528	216	305	167	204	0.86	1.8	0.72	0.58	0.67	0.39	0.77	0.56	0.58	0.48
2004	425	381	681	292	441	183	210	0.90	1.8	0.77	0.65	0.48	0.31	0.63	0.48	0.49	0.43
2005	543	239	310	59	66	24	27	0.44	1.3	0.25	0.21	0.41	0.09	0.41	0.10	0.05	0.04
2006	479	388	579	147	173	79	79	0.81	1.5	0.38	0.30	0.46	0.14	0.54	0.20	0.16	0.16
2007	483	221	268	3	3	0	0	0.46	1.2	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2008	388	339	589	229	264	90	90	0.87	1.7	0.68	0.45	0.34	0.15	0.39	0.27	0.23	0.23
2009	422	354	552	29	36	10	10	0.84	1.6	0.08	0.07	0.28	0.02	0.34	0.03	0.02	0.02
2010	366	327	581	235	291	127	127	0.89	1.8	0.72	0.50	0.44	0.22	0.54	0.39	0.35	0.35
2011	317	181	223	9	9	2	2	0.57	1.2	0.05	0.04	0.22	0.01	0.22	0.01	0.01	0.01

[a]Values in parentheses were not reported by original investigators and are estimated from other known parameters.
[b]Value calculated from smaller sample size.
[c]Reported values are the midpoint of a range (see Appendix B).
[d]Data based on short-duration visits (see Appendix B).

Table 21. Standard deviation in reproductive performance parameters of black-legged kittiwakes at St. Paul Island, Alaska. For sampling clustered by plot, values are calculated using ratio estimator spreadsheets.

Year	No. plots[a]	Sampling design	Laying success	Mean clutch size	Nesting success	Hatching success	Chick success	Egg success	Fledging success	Reprod. success	Fledglings /nest start	Prod.
1975	xx[b]	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1976	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1977	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1978	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1979	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1980	*no data*	-	-	-	-	-	-	-	-	-	-	-
1981	*no data*	-	-	-	-	-	-	-	-	-	-	-
1982	*no data*	-	-	-	-	-	-	-	-	-	-	-
1983	*no data*	-	-	-	-	-	-	-	-	-	-	-
1984	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1985	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1986	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1987	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1988	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1989	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1990	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1991	*no data*	-	-	-	-	-	-	-	-	-	-	-
1992	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1993	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1994	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1995	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1996	10	Cluster by plot	0.06	0.33	0.08	0.06	0.18	0.09	0.19	0.10	0.10	0.10
1997	12	Cluster by plot	0.04	0.26	0.08	0.10	0.01	0.03	0.01	0.13	0.15	0.15
1998	11	Cluster by plot	0.03	0.03	0.02	0.03	0.04	0.04	0.04	0.05	0.04	0.04
1999	11	Cluster by plot	0.04	0.04	0.04	0.04	0.07	0.02	0.08	0.02	0.01	0.01
2000	11	Cluster by plot	0.02	0.03	0.03	0.02	0.03	0.02	0.03	0.03	0.02	0.02
2001	14	Cluster by plot	0.02	0.06	0.05	0.04	xx	0.04	0.10	0.05	0.04	0.04
2002	15	Cluster by plot	0.02	0.03	0.04	0.03	0.03	0.03	0.02	0.04	0.06	0.04
2003	15	Cluster by plot	0.03	0.04	0.04	0.03	0.05	0.04	0.05	0.06	0.08	0.06
2004	16	Cluster by plot	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.05	0.04
2005	18	Cluster by plot	0.05	0.06	0.06	0.06	0.14	0.05	0.12	0.04	0.03	0.02
2006	20	Cluster by plot	0.19	0.38	0.22	0.17	0.30	0.13	0.39	0.20	0.15	0.15
2007	21	Cluster by plot	0.04	0.03	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00
2008	17	Cluster by plot	0.04	0.26	0.27	0.05	0.04	0.26	0.13	0.15	0.16	0.04
2009	16	Cluster by plot	0.07	0.14	0.09	0.08	0.21	0.03	0.25	0.05	0.01	0.04
2010	13	Cluster by plot	0.03	0.03	0.05	0.04	0.06	0.03	0.06	0.06	0.05	0.05
2011	15	Cluster by plot	0.05	0.04	0.02	0.01	0.14	0.01	0.14	0.01	<0.01	<0.01

[a]Plots that are combined for analysis are counted as a single "plot".
[b]xx indicates data potentially exist but have not yet been summarized.

Table 22. Reproductive performance of black-legged kittiwakes at St. Paul Island, Alaska in 2011.

Parameter	Plot															Total	SD[b]
	49	50/ 51[a]	53	54/ 55[a]	56	61	64/ 65[a]	66/ 67[a]	68	87	89	91	104	110	114		
Total nest starts (A)	19	25	13	41	22	11	20	15	26	14	17	32	29	16	17	317	-
Nest sites w/ eggs (B)	8	18	12	23	12	3	10	8	9	6	15	27	15	9	6	181	-
Total eggs (C)	11	22	18	29	18	3	11	9	9	8	21	31	17	10	6	223	-
Nest sites w/ chicks (D)	1	0	0	1	0	0	0	1	0	1	3	2	0	0	0	9	-
Total chicks (E)	1	0	0	1	0	0	0	1	0	1	3	2	0	0	0	9	-
Nest sites w/ chicks fledged (F)	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	-
Total chicks fledged (G)	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	-
Laying success (B/A)	0.42	0.72	0.92	0.56	0.55	0.27	0.50	0.53	0.35	0.43	0.88	0.84	0.52	0.56	0.35	0.57	0.05
Mean clutch size (C/B)	1.4	1.2	1.5	1.3	1.5	1.0	1.1	1.1	1.0	1.3	1.4	1.1	1.1	1.1	1.0	1.2	0.04
Nesting success (D/B)	0.13	0.00	0.00	0.04	0.00	0.00	0.00	0.13	0.00	0.17	0.20	0.07	0.00	0.00	0.00	0.05	0.02
Hatching success (E/C)	0.09	0.00	0.00	0.03	0.00	0.00	0.00	0.11	0.00	0.13	0.14	0.06	0.00	0.00	0.00	0.04	0.01
Chick success (G/E)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.22	0.14
Egg success (G/C)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.01
Fledging success (F/D)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.22	0.14
Reproductive success (F/B)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.01
Fledglings/nest start (G/A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	<0.01
Productivity (F/A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	<0.01

[a]Plots were combined for statistical purposes.
[b]Standard deviations are calculated from ratio estimator spreadsheets, based on plot as a sample unit.

Table 23. Mean growth rates of black-legged kittiwake chicks at St. Paul Island, Alaska. Data include chicks measured at least two times during the linear phase of growth. No chicks were measured 1980-1985 and 1988-2002.

Year	Mass (g/day)				Wing chord (mm/day)				Linear phase definition[a]
	Mean	SD	Range	*n*	Mean	SD	Range	*n*	
1975	14.6	2.3	-	34	-	-	-	-	A
1976	12.8	4.9	-	33	-	-	-	-	A
1977	14.5	1.6	-	22	-	-	-	-	A
1978	15.1	2.5	-	16	-	-	-	-	A
1979	16.6	2.9	-	14	-	-	-	-	A
1986	13.9	2.8	xx-xx[b]	10	6.7	1.1	xx-xx	10	unk.
1987	15.5	1.6	xx-xx	11	6.8	0.5	xx-xx	8	unk.
2003	14.8	2.7	9.6-18.4	19	7.3	0.8	4.6-8.5	19	B
2004	15.5	2.8	9.7-20.2	17	7.4	0.9	5.6-8.7	17	B
2005	*no data*	-	-	-	-	-	-	-	-
2006	11.8	3.1	7.2-16.6	13	5.3	1.3	3.1-7.9	13	C
2007	*no data*	-	-	-	-	-	-	-	-
2008	11.5	-	-	1	4.2	-	-	1	C
2009	*no data*	-	-	-	-	-	-	-	-
2010	15.7	5.1	6.0-24.4	15	4.4	1.7	0.7-6.9	15	C
2011	*no data*	-	-	-	-	-	-	-	-

[a]A=linear growth phase defined as period between initial and peak weight measurements of each chick; B=linear growth phase defined as period when chick age 5-25 days; C=chicks of unknown age, linear growth phase determined by visual inspection of individual growth curves.
[b]xx indicates data potentially exist but have not yet been summarized.

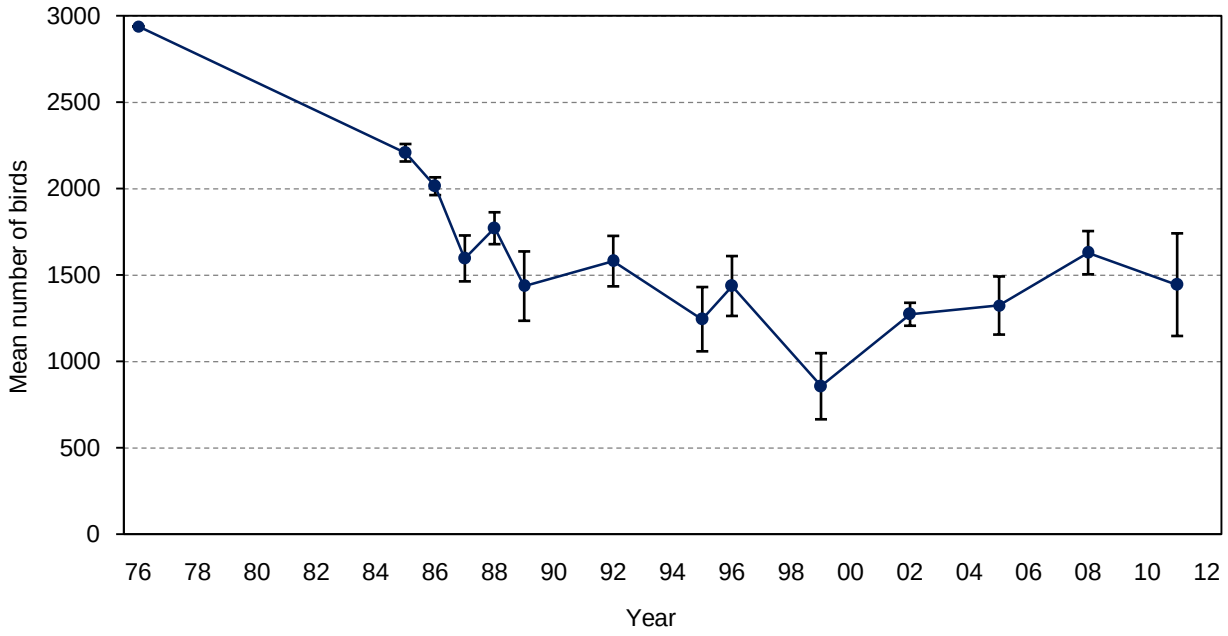


Figure 13. Mean numbers of black-legged kittiwakes counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

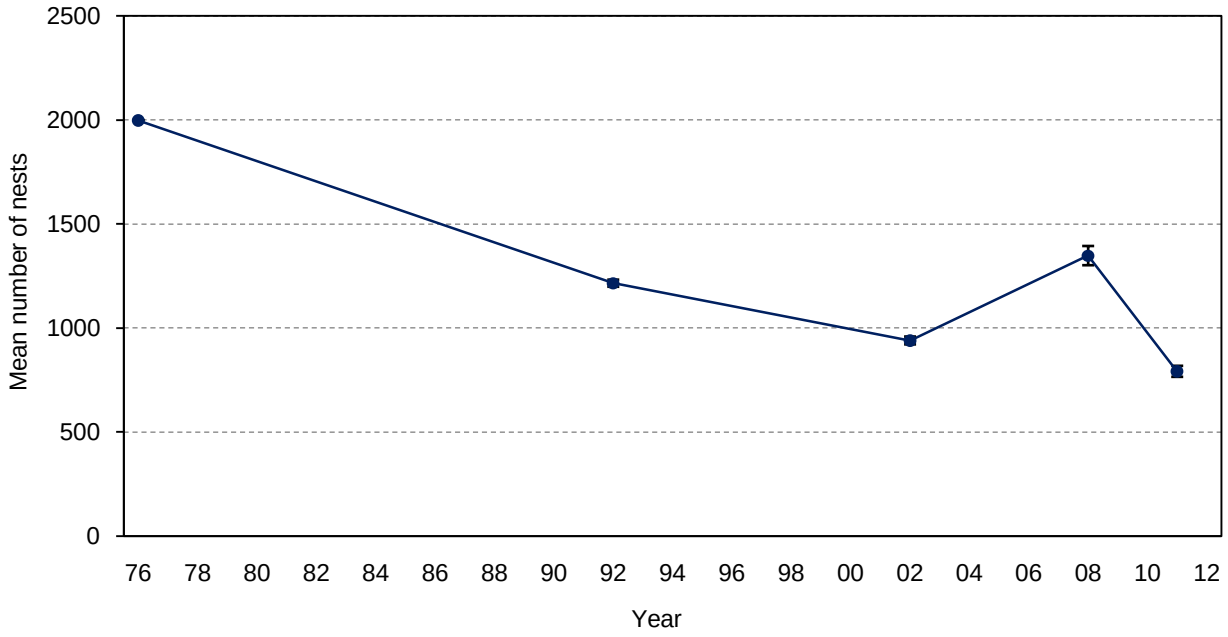


Figure 14. Mean numbers of black-legged kittiwake nests counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 24. Numbers of black-legged kittiwakes counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 and 1984 are excluded because not all plots were counted.

Replicate	1976	1985	1986	1987	1988	1989	1992	1995	1996	1999	2002	2005	2008	2011
1	2939	2240	2003	1382	1714	1596	1630	1132	1195	635	1175	1266	1569	1004
2	-	2238	2100	1636	1739	1708	1687	1142	1476	698	1226	1165	1606	1050
3	-	2133	1971	1644	1758	1602	1521	1459	1592	831	1290	1140	1559	1399
4	-	2219	2016	1559	1721	1244	1709	-	1382	803	1299	1353	1507	1508
5	-	-	1979	1568	1666	1220	1314	-	1316	1069	1369	1164	1585	1744
6	-	-	-	1787	1880	1226	1621	-	1657	1102	1278	1568	1572	1380
7	-	-	-	-	1917	1329	-	-	-	-	-	1534	1749	1728
8	-	-	-	-	-	1561	-	-	-	-	-	1398	1886	1740
Mean	2939	2208	2014	1596	1771	1436	1580	1244	1436	856	1273	1323	1629	1444
n	1	4	5	6	7	8	6	3	6	6	6	8	8	8
SD	-	51	52	133	92	201	146	186	173	191	66	168	125	297
First count	17 Jul	xx[a]	6 Jul	9 Jul	12 Jul	17 Jul	12 Jul	9 Jul	10 Jul	7 Jul	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	29 Jul	23 Jul	7 Aug	9 Aug	7 Aug	3 Aug	2 Aug	7 Aug	1 Aug	31 Jul	31 Jul	1 Aug

[a]xx indicates data potentially exist but have not yet been summarized.

Table 25. Numbers of black-legged kittiwake nests counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 and 1984 are excluded because not all plots were counted.

Replicate	1976	1985	1986	1987	1988	1989	1992	1995	1996	1999	2002	2005	2008	2011
1	1998	xx[a]	xx	xx	xx	xx	1200	*no nest count*	xx	xx	917	xx	1399	816
2	-	xx	xx	xx	xx	xx	1237		xx	xx	951	xx	1384	792
3	-	xx	xx	xx	xx	xx	1216	-	xx	xx	948	xx	1396	763
4	-	xx	xx	xx	xx	xx	1201	-	xx	xx	-	xx	1357	-
5	-	-	xx	xx	xx	xx	-	-	xx	xx	-	xx	1339	-
6	-	-	-	xx	xx	xx	-	-	xx	xx	-	xx	1316	-
7	-	-	-	-	xx	xx	-	-	-	-	-	xx	1314	-
8	-	-	-	-	-	xx	-	-	-	-	-	xx	1268	-
Mean	1998	xx	xx	xx	xx	xx	1214	-	xx	xx	939	xx	1347	790
Overall max.[b]	1998	1569	1959	1521	1399	924	1277	-	940	851	987	441	1496	881
n	1	xx	xx	xx	xx	xx	4	-	xx	xx	3	xx	8	3
SD	-	xx	xx	xx	xx	xx	17	-	xx	xx	19	xx	46	27
First count	17 Jul	xx	xx	xx	xx	xx	12 Jul	-	xx	xx	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	xx	xx	xx	xx	30 Jul	-	xx	xx	23 Jul	xx	31 Jul	14 Jul

[a]xx indicates data potentially exist but have not yet been summarized.
[b]Overall maximum nest number is the highest nest count on each plot in a year, summed across all plots.

Table 26. Numbers of black-legged kittiwakes counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate								Mean	SD
	1	2	3	4	5	6	7	8		
	6-8 Jul	9-10 Jul	12-14 Jul	14-17 Jul	19-21 Jul	25-26 Jul	28-29 Jul	30 Jul-1 Aug		
1	2	0	2	2	1	5	0	1	-	-
2sw	4	4	4	11	7	11	6	7	-	-
2ne	9	7	14	14	15	17	16	9	-	-
3	21	13	28	31	37	36	36	9	-	-
4	15	6	15	34	39	35	41	33	-	-
5sw	33	8	38	42	57	62	64	47	-	-
5ne	3	0	0	12	8	4	4	5	-	-
6[a]	-	-	-	-	-	-	-	-	-	-
7	2	6	6	8	8	7	7	4	-	-
8	0	0	0	0	2	2	0	0	-	-
9	-	-	-	-	-	-	-	-	-	-
10	5	4	6	12	8	14	12	9	-	-
11	5	6	8	19	22	16	13	15	-	-
12	19	21	11	51	50	54	54	49	-	-
13	8	12	9	26	28	29	38	30	-	-
14	2	1	2	8	7	5	4	2	-	-
15	0	0	0	0	21	11	20	12	-	-
16[a]	-	-	-	-	-	-	-	-	-	-
17[a]	-	-	-	-	-	-	-	-	-	-
18	13	12	9	32	27	13	30	18	-	-
19top	1	2	2	1	1	2	4	0	-	-
19btm	15	5	9	47	41	28	34	24	-	-
20top	0	0	0	0	0	0	0	0	-	-
20btm	1	3	0	6	10	3	11	3	-	-
21[a]	-	-	-	-	-	-	-	-	-	-
22	17	10	9	27	30	21	34	15	-	-
23	9	12	8	24	31	37	35	22	-	-
24	28	20	43	59	56	51	63	39	-	-
25	16	6	24	28	17	25	29	17	-	-
26	12	6	15	20	16	19	24	13	-	-
27	12	1	11	19	21	23	34	16	-	-
28	1	1	3	0	2	1	3	1	-	-
29[a]	-	-	-	-	-	-	-	-	-	-
29new	0	0	0	0	0	0	0	1	-	-
30	3	2	2	12	15	11	16	6	-	-
31	197	264	253	188	496	269	419	405	-	-
32	201	154	256	258	153	132	148	290	-	-
33	378	481	637	596	599	496	606	681	-	-
Total[b]	1004	1050	1399	1508	1744	1380	1728	1740	1444	297

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.

Table 27. Numbers of black-legged kittiwake nests counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate			Mean	SD	Max.
	1	2	3			
	6-8 Jul	9-10 Jul	12-14 Jul			
1	0	0	0	-	-	0
2sw	1	3	3	-	-	3
2ne	7	8	8	-	-	8
3	12	11	7	-	-	12
4	15	13	10	-	-	15
5sw	23	22	20	-	-	23
5ne	0	0	0	-	-	0
6[a]	-	-	-	-	-	-
7	2	4	4	-	-	4
8	0	0	0	-	-	0
9	-	-	-	-	-	-
10	4	5	4	-	-	5
11	6	6	6	-	-	6
12	20	16	15	-	-	20
13	3	4	4	-	-	4
14	1	1	1	-	-	1
15	0	0	0	-	-	0
16[a]	-	-	-	-	-	-
17[a]	-	-	-	-	-	-
18	7	6	6	-	-	7
19top	0	0	0	-	-	0
19btm	7	7	7	-	-	7
20top	0	0	0	-	-	0
20btm	0	1	0	-	-	1
21[a]	-	-	-	-	-	-
22	12	11	8	-	-	12
23	6	5	5	-	-	6
24	24	23	23	-	-	24
25	11	10	12	-	-	12
26	8	5	6	-	-	8
27	13	13	11	-	-	13
28	1	1	1	-	-	1
29[a]	-	-	-	-	-	-
29new	0	0	0	-	-	0
30	2	2	2	-	-	2
31	157	198	209	-	-	209
32	174	113	113	-	-	174
33	316	322	295	-	-	322
Total[b]	816	792	763	790	27	881[c]

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.
[c]Overall maximum nest number is the highest nest count on each plot, summed across all plots.

Table 28. Total number of adult black-legged kittiwakes banded on survival plots at St. Paul Island, Alaska. Data include birds banded with alphanumeric color bands and three color band combinations (2008 only) but not birds historically banded with color bands 1970-1990's.

Parameter	Year			
	2008	2009	2010	2011
New color bands	7	7	78	0
New metal and colors	7	0	54	0
New colors on previous metal-banded bird[a]	0	7	24	0
New color bands replace old color bands[b]	0	0	0	0
Cum. color-banded birds	7	14	92	92

[a]Bird previously banded with metal band only, caught subsequent year and given color band; adds one bird to number of new color bands.
[b]Bird previously banded with color band recaptured and given new color band; does not add to number of birds color-banded.

Table 29. Fates of cohorts of adult black-legged kittiwakes banded on survival plots at St. Paul Island, Alaska. Data include birds banded with alphanumeric color bands and three color band combinations (2008 only) but not birds historically banded with color bands 1970-1990's.

Year	No. birds banded in year	No. birds resighted in:			Prop. birds resighted in 2011
		2009	2010	2011	
2008	7	5	3	2	0.29
2009	7	-	4	6	0.86
2010	78	-	-	52	0.67
2011	0[a]	-	-	-	-[a]
Birds seen in current year (A)		5	7	60	-
Birds potentially alive from prior year (B)[b]		7	14	87	-
Apparent annual survival (A/B)[c]		0.71	0.50	0.69	-
Resighting effort[d]					
Total no. resight days		16	14	15	-
Total no. resight hours		N/A[e]	46.0	16.1	-

[a]Birds banded in current year are not resighted until following year and not included in current year totals.

[b]Value equals the sum of birds resighted in prior year + birds not resighted in prior year but resighted in future years and thus known to have been alive in prior year + new birds banded in prior year.

[c]Survival should be considered a minimum estimate because it is likely not all birds present were observed each year.

[d]Resighting effort represents sum of time spent at survival plots and includes only dedicated resighting time, not incidental observations made during other work. Hours are calculated by people-hours: 2 people resighting for 1 hour each = 2 resight hours.

[e]N/A indicates total resight hours not recorded.

Table 30. Resight history of adult black-legged kittiwakes banded on survival plots at St. Paul Island, Alaska. Data include birds banded with alphanumeric color bands and three color band combinations (2008 only) but not birds historically banded with color combinations 1970-1990's. Values represent number of times birds were resighted each year. Color codes are recorded as color and # of band for birds banded with alphanumeric color bands, and as colors (in code) of bands on left (L) and right (R) legs for birds banded with three band combinations.

Codes: Color combos
DB = dark blue R = red Y = yellow
DG = dark green W = white GY = gray
O = orange

Location
SW = Southwest Pt.
TS = Tsamana
TN = Tsamana North

Resight history
0 = not resighted
x = band no longer resightable (dead, removed, etc.)

Color band		Metal band #	Year banded	Location banded	Notes	Year resighted		
Color or L leg	Band # or R leg					2009	2010	2011
DG/O	GY	974-09358	2008	SW		3	0	0
DG/R	GY	974-09357	2008	SW		0	1	0
O/DB	R	974-09361	2008	SW		2	5	1
O/Y	R	974-09356	2008	SW		0	1	0
R/Y	O	974-09359	2008	SW		2	0	3
R/O	Y	974-09360	2008	SW		3	0	0
Y/GY	DG	974-09362	2008	SW		1	0	0
Yellow	A1	974-09368	2009	SW		-	6	1
Yellow	A4	974-09377	2009	SW		-	0	0
Yellow	A5	974-09366	2009	SW		-	0	1
Yellow	A9	974-09372	2009	SW		-	0	2
Yellow	A0	974-09378	2009	SW		-	5	1
Yellow	C1	794-86629	2009	TS		-	3	3
Yellow	C4	974-09385	2010	TS		-	-	2
Yellow	C5	794-86632	2009	TS		-	2	5
Yellow	C6	794-86641	2010	TS		-	-	5
Yellow	C7	794-86631	2010	TS		-	-	3
Yellow	C8	714-10325	2010	TS		-	-	3
Yellow	C9	714-10330	2010	TS		-	-	0
Yellow	C0	714-10306	2010	TS		-	-	6
Yellow	E1	794-86621	2010	TS		-	-	3
Yellow	E2	974-09386	2010	TS		-	-	0
Yellow	E3	714-10312	2010	TS		-	-	0
Yellow	E6	974-09332	2010	SW		-	-	2
Yellow	E8	974-09380	2010	TS		-	-	2
Yellow	E9	974-09363	2010	SW		-	-	2
Yellow	E0	714-10324	2010	TS		-	-	3
Yellow	F1	714-10369	2010	SW		-	-	1
Yellow	F2	714-10371	2010	SW		-	-	0
Yellow	F3	714-10373	2010	SW		-	-	3
Yellow	F4	714-10375	2010	SW		-	-	0
Yellow	F5	714-10380	2010	SW		-	-	0
Yellow	F6	974-09381	2010	TS		-	-	5
Yellow	F7	714-10381	2010	SW		-	-	1

Table 30 (continued). Resight history of adult black-legged kittiwakes banded on survival plots at St. Paul Island, Alaska. Data include birds banded with alphanumeric color bands and three color band combinations (2008 only) but not birds historically banded with color combinations 1970-1990's. Values represent number of times birds were resighted each year. Color codes are recorded as color and # of band for birds banded with alphanumeric color bands, and as colors (in code) of bands on left (L) and right (R) legs for birds banded with three band combinations.

Codes: Color combos
DB = dark blue R = red Y = yellow
DG = dark green W = white GY = gray
O = orange

Location
SW = Southwest Pt.
TS = Tsamana
TN = Tsamana North

Resight history
0 = not resighted
x = band no longer resightable (dead, removed, etc.)

Color band		Metal band #	Year banded	Location banded	Notes	Year resighted		
Color or L leg	Band # or R leg					2009	2010	2011
Yellow	F8	974-09387	2010	TS		-	-	6
Yellow	F9	974-09384	2010	TS		-	-	3
Yellow	F0	974-09392	2010	TS		-	-	1
Yellow	H1	974-09399	2010	TS		-	-	4
Yellow	H2	974-09400	2010	TN		-	-	0
Yellow	H3	714-10301	2010	TS		-	-	2
Yellow	H4	714-10307	2010	TS		-	-	3
Yellow	H5	714-10303	2010	TS		-	-	5
Yellow	H7	974-09383	2010	TS		-	-	2
Yellow	H8	714-10305	2010	TS		-	-	2
Yellow	H9	714-10392	2010	TN		-	-	0
Yellow	J1	714-10346	2010	SW		-	-	1
Yellow	J2	714-10347	2010	SW		-	-	2
Yellow	J3	714-10348	2010	SW		-	-	2
Yellow	J4	714-10349	2010	SW		-	-	2
Yellow	J5	714-10350	2010	SW		-	-	0
Yellow	J6	714-10351	2010	SW		-	-	0
Yellow	J7	714-10352	2010	SW		-	-	1
Yellow	J8	714-10353	2010	TN		-	-	1
Yellow	J9	714-10354	2010	SW		-	-	0
Yellow	J0	714-10356	2010	SW		-	-	3
Yellow	K1	714-10355	2010	SW		-	-	0
Yellow	K2	714-10357	2010	SW		-	-	2
Yellow	K3	714-10358	2010	SW		-	-	0
Yellow	K4	714-10359	2010	SW		-	-	0
Yellow	K5	974-09367	2010	SW		-	-	0
Yellow	K6	714-10360	2010	SW		-	-	0
Yellow	K7	714-10363	2010	SW		-	-	0
Yellow	K8	714-10365	2010	SW		-	-	2
Yellow	K9	714-10368	2010	SW		-	-	1
Yellow	K0	714-10376	2010	SW		-	-	2
Yellow	L1	714-10367	2010	SW		-	-	1
Yellow	L2	714-10370	2010	SW		-	-	0
Yellow	L3	714-10372	2010	SW		-	-	0

Table 30 (continued). Resight history of adult black-legged kittiwakes banded on survival plots at St. Paul Island, Alaska. Data include birds banded with alphanumeric color bands and three color band combinations (2008 only) but not birds historically banded with color combinations 1970-1990's. Values represent number of times birds were resighted each year. Color codes are recorded as color and # of band for birds banded with alphanumeric color bands, and as colors (in code) of bands on left (L) and right (R) legs for birds banded with three band combinations.

Codes:

Color combos
DB = dark blue
DG = dark green
O = orange
R = red
W = white
Y = yellow
GY = gray

Location
SW = Southwest Pt.
TS = Tsamana
TN = Tsamana North

Resight history
0 = not resighted
x = band no longer resightable (dead, removed, etc.)

Color band		Metal band #	Year banded	Location banded	Notes	Year resighted		
Color or L leg	Band # or R leg					2009	2010	2011
Yellow	L4	714-10378	2010	SW		-	-	0
Yellow	L5	714-10379	2010	SW		-	-	3
Yellow	L6	714-10382	2010	SW		-	-	1
Yellow	L7	0974-09382	2010	TS		-	-	4
Yellow	L8	0974-09388	2010	TS		-	-	5
Yellow	L9	0974-09393	2010	TS		-	-	6
Yellow	L0	0974-09397	2010	TS		-	-	5
Yellow	M1	0974-09390	2010	TS		-	-	2
Yellow	M2	794-86720	2010	TS		-	-	2
Yellow	M3	0974-09396	2010	TS		-	-	3
Yellow	M4	0974-09398	2010	TS		-	-	5
Yellow	M5	0974-09365	2010	SW		-	-	0
Yellow	M6	714-10391	2010	TN		-	-	1
Yellow	M7	714-10393	2010	TN		-	-	2
Yellow	N1	714-10361	2010	SW		-	-	0
Yellow	N2	714-10362	2010	SW		-	-	0
Yellow	N3	714-10364	2010	SW		-	-	0
Yellow	N4	714-10366	2010	SW		-	-	3
Yellow	N5	714-10374	2010	SW		-	-	0
Yellow	N6	714-10377	2010	SW		-	-	0
Yellow	N7	0974-09389	2010	TS		-	-	3
Yellow	N8	0974-09391	2010	TS		-	-	3
Yellow	N9	0974-09394	2010	TS		-	-	2
Yellow	N0	0974-09395	2010	TS		-	-	5
				Total birds resighted		5	7	60

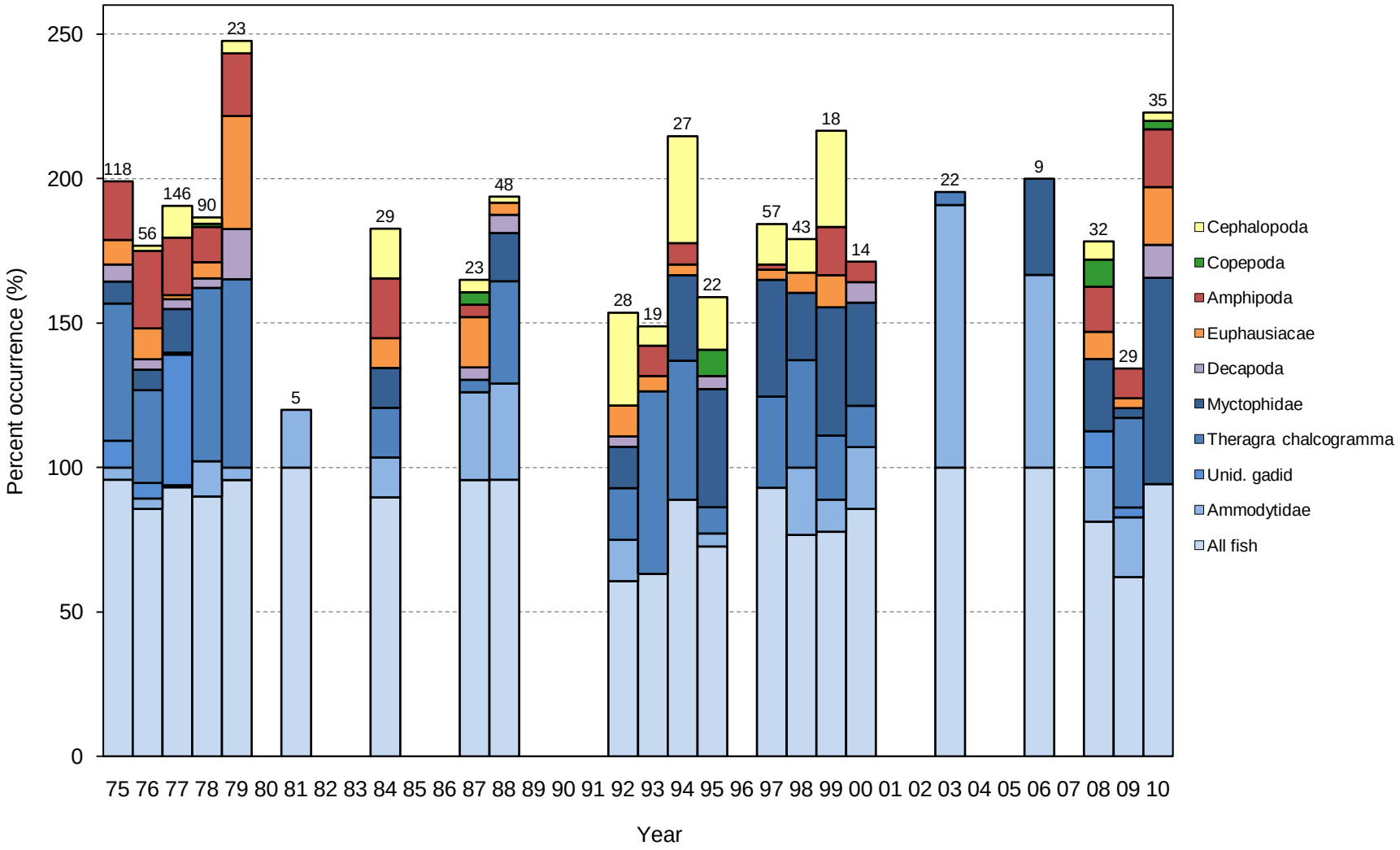


Figure 15. Frequency of occurrence of selected prey items in diets of black-legged kittiwakes at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected in 2011.

Table 31. Frequency of occurrence of prey in diets of black-legged kittiwakes at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult and chick regurgitations. No samples were collected in 2011.

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
No. samples	118	56	146	90	23	*no samples*	5	*no samples*	*no samples*	29	*no samples*	*no samples*
Cephalopoda	**-**	**1.8**	**11.0**	**2.2**	**4.3**	**-**	**-**	**-**	**-**	**17.2**	**-**	**-**
Unid. squid	-	1.8	11.0	2.2	4.3	-	-	-	-	17.2	-	-
Gastropoda	**-**	**-**	**0.7**	**1.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. pteropod	-	-	-	-	-	-	-	-	-	-	-	-
Unid. snail	-	-	0.7	1.1	-	**-**	**-**	**-**	**-**	-	**-**	**-**
Unid. mollusca	0.8	-	1.4	-	-	-	-	-	-	-	-	-
Copepoda	**-**	**-**	**-**	**1.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Neocalanus plumchrus/flemengeri	-	-	-	-	-	-	-	-	-	-	-	-
Neocalanus/Calanus spp.	-	-	-	1.1	-	-	-	-	-	-	-	-
Unid. copepod	-	-	-	-	-	-	-	-	-	-	-	-
Amphipoda	**20.3**	**26.8**	**19.9**	**12.2**	**21.7**	**-**	**-**	**-**	**-**	**20.7**	**-**	**-**
Hyperiidea												
Themisto libellula	20.3	17.9	11.0	12.2	-	**-**	**-**	**-**	**-**	-	**-**	**-**
Parathemisto pacifica	4.2	-	-	-	21.7	-	-	-	-	-	-	-
Parathemisto/Themisto spp.	0.8	-	1.4	-	-	-	-	-	-	-	-	-
Unid. Hyperiidea	1.7	1.8	6.8	-	-	**-**	**-**	**-**	**-**	-	**-**	**-**
Gammaridea												
Ischyrocerus spp.	-	-	-	-	-	-	-	-	-	-	-	-
Lysianassidae	-	-	-	-	-	-	-	-	-	-	-	-
Unid. Gammaridea	3.4	3.6	2.7	-	-	**-**	**-**	**-**	**-**	-	**-**	**-**
Unid. amphipod	-	5.4	-	-	-	-	-	-	-	20.7	-	-
Euphausiacae	**8.5**	**10.7**	**1.4**	**5.6**	**39.1**	**-**	**-**	**-**	**-**	**10.3**	**-**	**-**
Thysanoessa raschii	3.4	3.6	0.7	2.2	4.3	**-**	**-**	**-**	**-**	-	**-**	**-**
T. inermis	-	1.8	-	2.2	13.0	-	-	-	-	-	-	-
T. spinifera	-	1.8	-	-	-	**-**	**-**	**-**	**-**	-	**-**	**-**
T. longipes	-	1.8	-	2.2	-	-	-	-	-	-	-	-
Thysanoessa spp.	-	1.8	-	-	-	-	-	-	-	-	-	-
Unid. euphausiid	4.2	3.6	0.7	4.4	30.4	**-**	**-**	**-**	**-**	10.3	**-**	**-**
Decapoda	**5.9**	**3.6**	**3.4**	**3.3**	**17.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. crab	-	-	-	-	-	**-**	**-**	**-**	**-**	-	**-**	**-**
Gnathophausia oigas	-	-	-	-	-	-	-	-	-	-	-	-
Paralithodes camtschatica	-	-	-	-	-	-	-	-	-	-	-	-
Pandalid shrimp	-	-	-	-	-	-	-	-	-	-	-	-
Unid. shrimp	-	-	-	-	-	-	-	-	-	-	-	-
Unid. decapod	5.9	3.6	3.4	3.3	17.4	-	-	-	-	-	-	-
Cumacae	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. cumacean	2.5	-	-	-	-	-	-	-	-	-	-	-
Unid. crustacean	-	1.8	-	-	-	**-**	**-**	**-**	**-**	-	**-**	**-**
Nereidae	7.6	-	7.5	14.4	13.0	-	-	-	-	-	-	-
Fish	**95.8**	**85.7**	**93.2**	**90.0**	**95.7**	**-**	**100.0**	**-**	**-**	**89.7**	**-**	**-**
Osmeridae												
Mallotus villosus	9.3	32.1	22.6	3.3	-	**-**	**-**	**-**	**-**	-	**-**	**-**
Unid. osmeridae	-	1.8	-	-	-	-	-	-	-	-	-	-
Myctophidae	7.6	7.1	15.1	-	-	-	-	-	-	13.8	-	-
Stenobrachius leucopsarus	-	-	-	-	-	-	-	-	-	-	-	-
S. nannochir	-	-	-	-	-	-	-	-	-	-	-	-
Nannobrachium regale	-	-	-	-	-	-	-	-	-	-	-	-
Unid. myctophid	7.6	7.1	15.1	-	-	-	-	-	-	13.8	-	-
Gadidae												
Theragra chalcogramma	47.5	32.1	0.7	60.0	65.2	**-**	**-**	**-**	**-**	17.2	**-**	**-**
Unid. gadid	9.3	5.4	45.2	-	-	-	-	**-**	**-**	**-**	**-**	**-**
Scorpaenidae												
Sebastes spp.	-	-	-	-	-	-	-	-	-	-	-	-
Hexagrammidae	-	-	-	-	-	-	-	-	-	-	-	-
Cottidae	0.8	-	-	-	8.7	**-**	**-**	-	-	-	-	-
Liparidae	0.8	-	-	-	-	-	-	**-**	**-**	**-**	**-**	**-**
Zoarcidae												
Lycodes spp.	-	-	-	-	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Stichaeidae	-	1.8	-	-	-	-	-	-	-	-	-	-
Trichodontidae												
Trichodon trichodon	-	-	1.4	-	-	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Ammodytidae												
Ammodytes hexapterus	4.2	3.6	0.7	12.2	4.3	**-**	20.0	**-**	**-**	13.8	**-**	**-**
Pleuronectidae	-	-	-	-	-	-	**-**	-	-	-	-	-
Unid. fish	44.9	28.6	29.5	33.3	30.4	-	80.0	-	-	62.1	-	-

Table 31 (continued). Frequency of occurrence of prey in diets of black-legged kittiwakes at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult and chick regurgitations. No samples were collected in 2011.

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
No. samples	23	48	*no samples*	*no samples*	*no samples*	28	19	27	22	*no samples*	57	43
Cephalopoda	**4.3**	**2.1**	**-**	**-**	**-**	**32.1**	**6.7**	**37.0**	**18.2**	**-**	**14.0**	**11.6**
Unid. squid	4.3	2.1	-	-	-	32.1	6.7	37.0	18.2	-	14.0	11.6
Gastropoda	**-**	**-**	**-**	**-**	**-**	**-**	**10.5**	**-**	**-**	**-**	**-**	**-**
Unid. pteropod	-	-	-	-	-	-	10.5	-	-	-	-	-
Unid. snail	-	-	-	-	-	-	-	-	-	-	-	-
Unid. mollusca	-	-	-	-	-	-	-	-	-	-	-	11.6
Copepoda	**4.3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**9.1**	**-**	**-**	**-**
Neocalanus plumchrus/flemengeri	-	-	-	-	-	-	-	-	-	-	-	-
Neocalanus/Calanus spp.	-	-	-	-	-	-	-	-	9.1	-	-	-
Unid. copepod	4.3	-	-	-	-	-	-	-	-	-	-	-
Amphipoda	**4.3**	**-**	**-**	**-**	**-**	**-**	**10.5**	**7.4**	**-**	**-**	**1.8**	**-**
Hyperiidea												
Themisto libellula	-	-	-	-	-	-	-	-	-	-	-	-
Parathemisto pacifica	-	-	-	-	-	-	-	-	-	-	-	-
Parathemisto/Themisto spp.	-	-	-	-	-	-	-	-	-	-	-	-
Unid. Hyperiidea	4.3	-	-	-	-	-	-	7.4	-	-	-	-
Gammaridea												
Ischyrocerus spp.	-	-	-	-	-	-	-	-	-	-	-	-
Lysianassidae	-	-	-	-	-	-	-	-	-	-	-	-
Unid. Gammaridea	-	-	-	-	-	-	10.5	-	-	-	1.8	-
Unid. amphipod	-	-	-	-	-	-	-	-	-	-	1.8	-
Euphausiacae	**17.4**	**4.2**	**-**	**-**	**-**	**10.7**	**5.3**	**3.7**	**-**	**-**	**3.5**	**7.0**
Thysanoessa raschii	-	-	-	-	-	-	-	-	-	-	-	-
T. inermis	-	-	-	-	-	-	-	-	-	-	-	-
T. spinifera	-	-	-	-	-	-	-	-	-	-	-	-
T. longipes	-	-	-	-	-	-	-	-	-	-	-	-
Thysanoessa spp.	8.7	-	-	-	-	10.7	5.3	-	-	-	-	-
Unid. euphausiid	8.7	4.2	-	-	-	-	-	3.7	-	-	3.5	7.0
Decapoda	**4.3**	**6.3**	**-**	**-**	**-**	**3.6**	**-**	**-**	**4.5**	**-**	**-**	**-**
Unid. crab	-	-	-	-	-	-	-	-	-	-	-	-
Gnathophausia oigas	-	-	-	-	-	-	-	-	-	-	-	-
Paralithodes camtschatica	-	-	-	-	-	-	-	-	-	-	-	-
Pandalid shrimp	-	-	-	-	-	-	-	-	-	-	-	-
Unid. shrimp	4.3	-	-	-	-	-	-	-	-	-	-	-
Unid. decapod	-	6.3	-	-	-	3.6	-	-	4.5	-	-	-
Cumacae	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. cumacean	-	-	-	-	-	-	-	-	-	-	-	-
Unid. crustacean	4.3	10.4	-	-	-	-	-	-	4.5	-	-	-
Nereidae	4.3	12.5	-	-	-	1.7	-	-	13.6	-	8.8	7.0
Fish	**95.7**	**95.8**	**-**	**-**	**-**	**60.7**	**63.2**	**88.9**	**72.7**	**-**	**93.0**	**76.7**
Osmeridae												
Mallotus villosus	-	-	-	-	-	-	-	14.8	9.1	-	15.8	2.3
Unid. osmeridae	-	-	-	-	-	-	-	-	-	-	-	-
Myctophidae	-	16.7	-	-	-	14.3	-	29.6	40.9	-	40.4	23.3
Stenobrachius leucopsarus	-	-	-	-	-	-	-	-	-	-	-	-
S. nannochir	-	-	-	-	-	-	-	-	-	-	-	-
Nannobrachium regale	-	-	-	-	-	-	-	-	-	-	-	-
Unid. myctophid	-	16.7	-	-	-	14.3	-	29.6	40.9	-	40.4	23.3
Gadidae												
Theragra chalcogramma	4.3	35.4	-	-	-	17.9	63.2	48.1	9.1	-	31.6	37.2
Unid. gadid	-	-	-	-	-	-	-	-	-	-	-	-
Scorpaenidae												
Sebastes spp.	-	-	-	-	-	-	-	-	-	-	-	-
Hexagrammidae	-	-	-	-	-	-	-	-	-	-	1.8	-
Cottidae	-	4.2	-	-	-	-	-	-	-	-	-	-
Liparidae	-	-	-	-	-	-	-	-	-	-	-	-
Zoarcidae												
Lycodes spp.	-	-	-	-	-	-	-	-	-	-	-	-
Stichaeidae	-	-	-	-	-	-	-	-	-	-	-	-
Trichodontidae												
Trichodon trichodon	-	4.2	-	-	-	-	-	-	-	-	3.5	-
Ammodytidae												
Ammodytes hexapterus	30.4	33.3	-	-	-	14.3	-	-	4.5	-	-	23.3
Pleuronectidae	-	2.1	-	-	-	-	-	-	-	-	-	2.3
Unid. fish	60.9	18.8	-	-	-	14.3	-	3.7	18.2	-	8.8	11.6

Table 31 (continued). Frequency of occurrence of prey in diets of black-legged kittiwakes at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult and chick regurgitations. No samples were collected in 2011.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
No. samples	18	14	*no samples*	*no samples*	22	*no samples*	*no samples*	9	*no samples*	32	29	35
Cephalopoda	**33.3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**6.3**	**-**	**2.9**
Unid. squid	33.3	-	-	-	-	-	-	-	-	6.3	-	2.9
Gastropoda	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**18.8**	**-**	**2.9**
Unid. pteropod	-	-	-	-	-	-	-	-	-	-	-	2.9
Unid. snail	-	-	-	-	-	-	-	-	-	18.8	-	-
Unid. mollusca	-	-	-	-	-	-	-	-	-	6.3	-	-
Copepoda	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**9.4**	**-**	**2.9**
Neocalanus plumchrus/flemengeri	-	-	-	-	-	-	-	-	-	-	-	2.9
Neocalanus/Calanus spp.	-	-	-	-	-	-	-	-	-	9.4	-	-
Unid. copepod	-	-	-	-	-	-	-	-	-	-	-	-
Amphipoda	**16.7**	**7.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**15.6**	**10.3**	**20.0**
Hyperiidea												
Themisto libellula	-	-	-	-	-	-	-	-	-	-	6.9	2.9
Parathemisto pacifica	-	-	-	-	-	-	-	-	-	3.1	-	5.7
Parathemisto/Themisto spp.	-	-	-	-	-	-	-	-	-	-	-	-
Unid. Hyperiidea	-	-	-	-	-	-	-	-	-	3.1	-	-
Gammaridea												
Ischyrocerus spp.	-	-	-	-	-	-	-	-	-	-	-	2.9
Lysianassidae	-	-	-	-	-	-	-	-	-	-	-	8.6
Unid. Gammaridea	-	7.1	-	-	-	-	-	-	-	15.6	-	-
Unid. amphipod	16.7	-	-	-	-	-	-	-	-	9.4	6.9	-
Euphausiacae	**11.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**9.4**	**3.4**	**20.0**
Thysanoessa raschii	-	-	-	-	-	-	-	-	-	-	3.4	2.9
T. inermis	-	-	-	-	-	-	-	-	-	-	-	-
T. spinifera	-	-	-	-	-	-	-	-	-	-	-	-
T. longipes	-	-	-	-	-	-	-	-	-	-	-	-
Thysanoessa spp.	-	-	-	-	-	-	-	-	-	6.3	-	5.7
Unid. euphausiid	11.1	-	-	-	-	-	-	-	-	3.1	-	17.1
Decapoda	**-**	**7.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**11.4**
Unid. crab	-	-	-	-	-	-	-	-	-	-	-	-
Gnathophausia oigas	-	-	-	-	-	-	-	-	-	-	-	2.9
Paralithodes camtschatica	-	-	-	-	-	-	-	-	-	-	-	2.9
Pandalid shrimp	-	-	-	-	-	-	-	-	-	-	-	2.9
Unid. shrimp	-	-	-	-	-	-	-	-	-	-	-	2.9
Unid. decapod	-	7.1	-	-	-	-	-	-	-	-	-	-
Cumacae	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. cumacean	-	-	-	-	-	-	-	-	-	-	-	-
Unid. crustacean	-	-	-	-	-	-	-	-	-	-	-	-
Nereidae	-	28.6	-	-	-	-	-	-	-	-	3.4	-
Fish	**77.8**	**85.7**	**-**	**-**	**100.0**	**-**	**-**	**100.0**	**-**	**81.3**	**62.1**	**94.3**
Osmeridae												
Mallotus villosus	11.1	-	-	-	-	-	-	-	-	-	-	-
Unid. osmeridae	-	-	-	-	-	-	-	-	-	-	-	-
Myctophidae	44.4	35.7	-	-	-	-	-	33.3	-	25.0	3.4	71.4
Stenobrachius leucopsarus	-	-	-	-	-	-	-	-	-	-	-	11.4
S. nannochir	-	-	-	-	-	-	-	-	-	-	-	17.1
Nannobrachium regale	-	-	-	-	-	-	-	-	-	-	-	2.9
Unid. myctophid	44.4	35.7	-	-	-	-	-	33.3	-	25.0	3.4	48.6
Gadidae												
Theragra chalcogramma	22.2	14.3	-	-	4.5	-	-	-	-	-	31.0	-
Unid. gadid	-	-	-	-	-	-	-	-	-	12.5	3.4	-
Scorpaenidae												
Sebastes spp.	-	-	-	-	-	-	-	-	-	-	-	17.1
Hexagrammidae	-	14.3	-	-	-	-	-	-	-	6.3	-	2.9
Cottidae	-	-	-	-	-	-	-	-	-	-	-	-
Liparidae	-	-	-	-	-	-	-	-	-	-	-	-
Zoarcidae												
Lycodes spp.	-	-	-	-	-	-	-	-	-	-	10.3	2.9
Stichaeidae	-	-	-	-	-	-	-	-	-	-	-	-
Trichodontidae												
Trichodon trichodon	-	-	-	-	-	-	-	-	-	3.1	-	-
Ammodytidae												
Ammodytes hexapterus	11.1	21.4	-	-	90.9	-	-	66.7	-	18.8	20.7	-
Pleuronectidae	-	-	-	-	-	-	-	-	-	-	-	-
Unid. fish	-	21.4	-	-	4.5	-	-	-	-	9.4	13.8	8.6

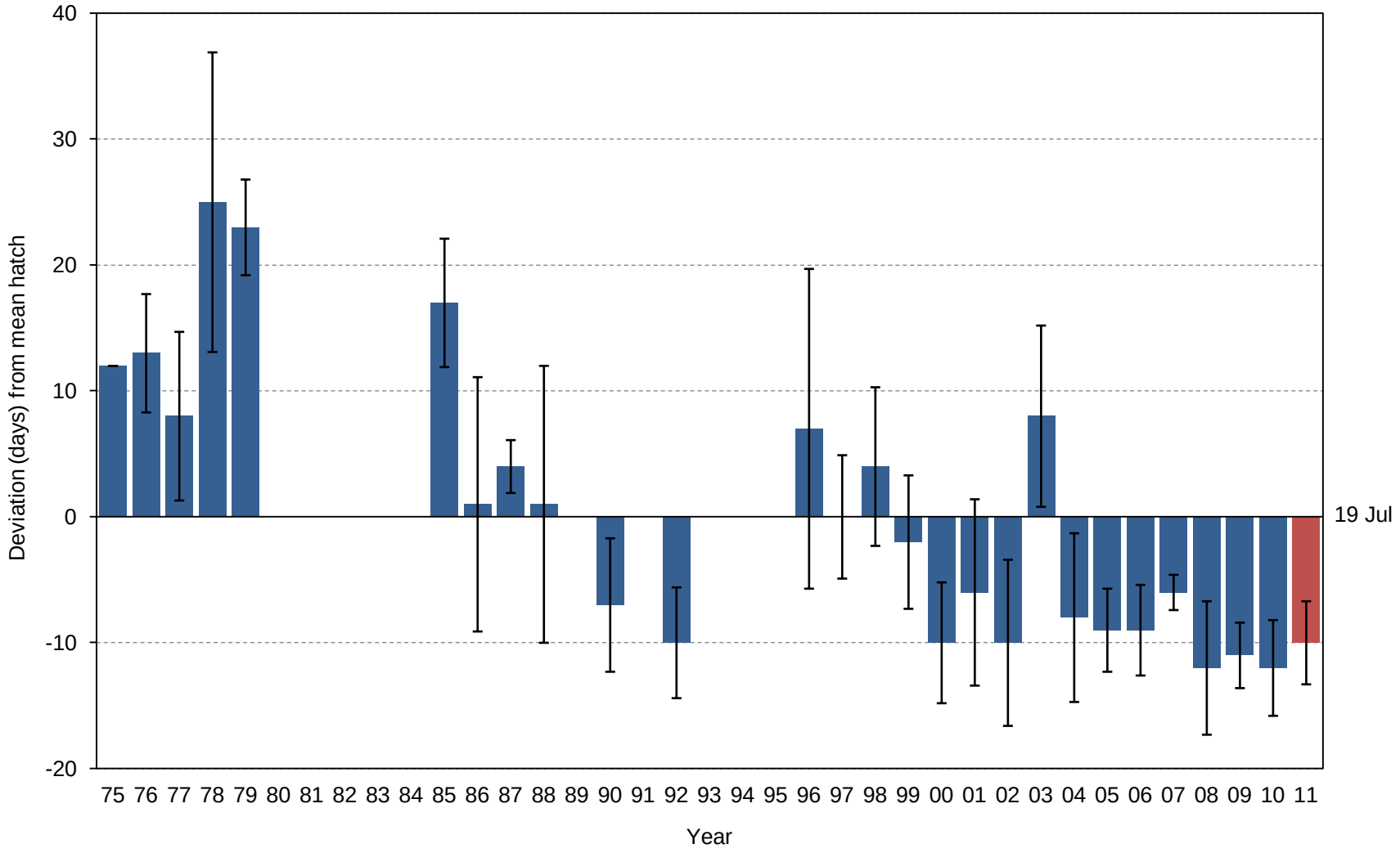


Figure 16. Yearly hatch date deviation (from the 1975-2010 average of 19 July) for red-legged kittiwakes at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 32. Breeding chronology of red-legged kittiwakes at St. Paul Island, Alaska.

Year	Mean lay	SD	n[a]	Mean hatch	SD	n[b]	First lay	First hatch	Last hatch	First fledge
1975	xx[c]	xx	xx	31 Jul	0.0	3	xx	xx	xx	xx
1976	xx	xx	xx	31 Jul	4.7	41	xx	xx	xx	xx
1977	xx	xx	xx	27 Jul	6.7	10	xx	xx	xx	xx
1978	xx	xx	xx	13 Aug	11.9	7	xx	xx	xx	xx
1979	xx	xx	xx	11 Aug	3.8	12	xx	xx	xx	xx
1980	*no data*	-	-	-	-	-	-	-	-	-
1981	*no data*	-	-	-	-	-	-	-	-	-
1982	*no data*	-	-	-	-	-	-	-	-	-
1983	*no data*	-	-	-	-	-	-	-	-	-
1984	*no data*	-	-	-	-	-	-	-	-	-
1985	xx	xx	xx	5 Aug	5.1	6	xx	xx	xx	xx
1986	xx	xx	xx	20 Jul	10.1	19	xx	xx	xx	xx
1987	xx	xx	xx	23 Jul	2.1	2	xx	xx	xx	xx
1988	xx	xx	xx	19 Jul	11.0	17	xx	xx	xx	xx
1990	xx	xx	xx	12 Jul	5.3	11	xx	xx	xx	xx
1991	*no data*	-	-	-	-	-	-	-	-	-
1992	xx	xx	xx	8 Jul	4.4	21	xx	xx	xx	xx
1993	*no data*	-	-	-	-	-	-	-	-	-
1994	*no data*	-	-	-	-	-	-	-	-	-
1995	*no data*	-	-	-	-	-	-	-	-	-
1996	xx	xx	xx	25 Jul	12.7	2	xx	xx	xx	xx
1997	xx	xx	xx	19 Jul	4.9	11	xx	15 Jul	xx	xx
1998	xx	xx	xx	23 Jul	6.3	22	xx	11 Jul	xx	xx
1999	xx	xx	xx	17 Jul	5.3	18	xx	7 Jul	27 Jul	xx
2000	xx	xx	xx	8 Jul	4.8	23	xx	30 Jun	18 Jul	xx
2001	xx	xx	xx	13 Jul	7.4	13	xx	2 Jul	24 Jul	xx
2002	xx	xx	xx	9 Jul	6.6	16	xx	xx	xx	xx
2003	xx	xx	xx	27 Jul	7.2	5	xx	xx	xx	xx
2004	xx	xx	xx	10 Jul	6.7	20	xx	xx	xx	xx
2005	xx	xx	xx	10 Jul	3.3	5	xx	xx	xx	xx
2006	xx	xx	xx	10 Jul	3.6	11	xx	xx	xx	xx
2007	xx	xx	xx	13 Jul	1.4	4	xx	xx	xx	xx
2008	xx	xx	xx	6 Jul	5.3	17	xx	xx	xx	xx
2009	xx	xx	xx	8 Jul	2.6	5	xx	5 Jul	12 Jul	xx
2010	9 Jun	3.3	9	7 Jul	3.8	8	5 Jun	3 Jul	15 Jul	26 Aug
2011	13 Jun	3.7	9	9 Jul	3.3	3	7 Jun	5 Jul	13 Jul	24 Aug

[a]Sample sizes for mean lay dates are a sub-sample of total nests for which no egg to egg interval is ≤ 7 days.
[b]Sample sizes for mean hatch dates are a sub-sample of total nests for which egg to chick interval is ≤ 7 days.
[c]xx indicates data potentially exist but have not yet been summarized.

Table 33. Frequency distribution of hatch dates for red-legged kittiwakes at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days.

Julian date[a]	No. nests hatching on Julian date																		
	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
169	xx[b]	xx	xx	xx	xx	*no data*	*no data*	*no data*	*no data*	*no data*	xx	xx	xx	xx	xx	*no data*	xx	xx	*no data*
170	xx	xx	xx	xx	xx						xx	xx	xx	xx	xx		xx	xx	
171	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
172	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
173	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
174	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
175	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
176	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
177	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
178	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
179	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
180	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
181	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
182	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
183	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
184	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
185	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
186	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
187	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
188	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
189	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
190	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
191	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
192	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
193	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
194	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
195	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
196	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
197	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
198	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
199	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
200	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
201	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
202	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
203	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
204	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
205	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
206	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
207	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
208	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
209	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
210	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
211	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
212	xx	xx	xx	xx	xx	-	-	-	-	-	xx	xx	xx	xx	xx	-	xx	xx	-
n	3	41	10	7	12	-	-	-	-	-	6	19	2	17	11	-	21	3	-

[a]Julian dates are adjusted by one day in leap years.
[b]xx indicates data potentially exist but have not yet been summarized.

Table 33 (continued). Frequency distribution of hatch dates for red-legged kittiwakes at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days.

Julian date[a]	No. nests hatching on Julian date																	
	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11
169	*no data*	*no data*	xx[b]	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
170			xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
171	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
172	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
173	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
174	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
175	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
176	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
177	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
178	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
179	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
180	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
181	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
182	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
183	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
184	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	-
185	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	3	-
186	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	1
187	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
188	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	2	-
189	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
190	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	2	-	1
191	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	-
192	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
193	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
194	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	1
195	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
196	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	-
197	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
198	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
199	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
200	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
201	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
202	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
203	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
204	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
205	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
206	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
207	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
208	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
209	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
210	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
211	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
212	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
213	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
214	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
n	-	-	2	11	22	18	23	13	16	5	20	5	11	4	17	5	8	3

[a]Julian dates are adjusted by one day in leap years.
[b]xx indicates data potentially exist but have not yet been summarized.

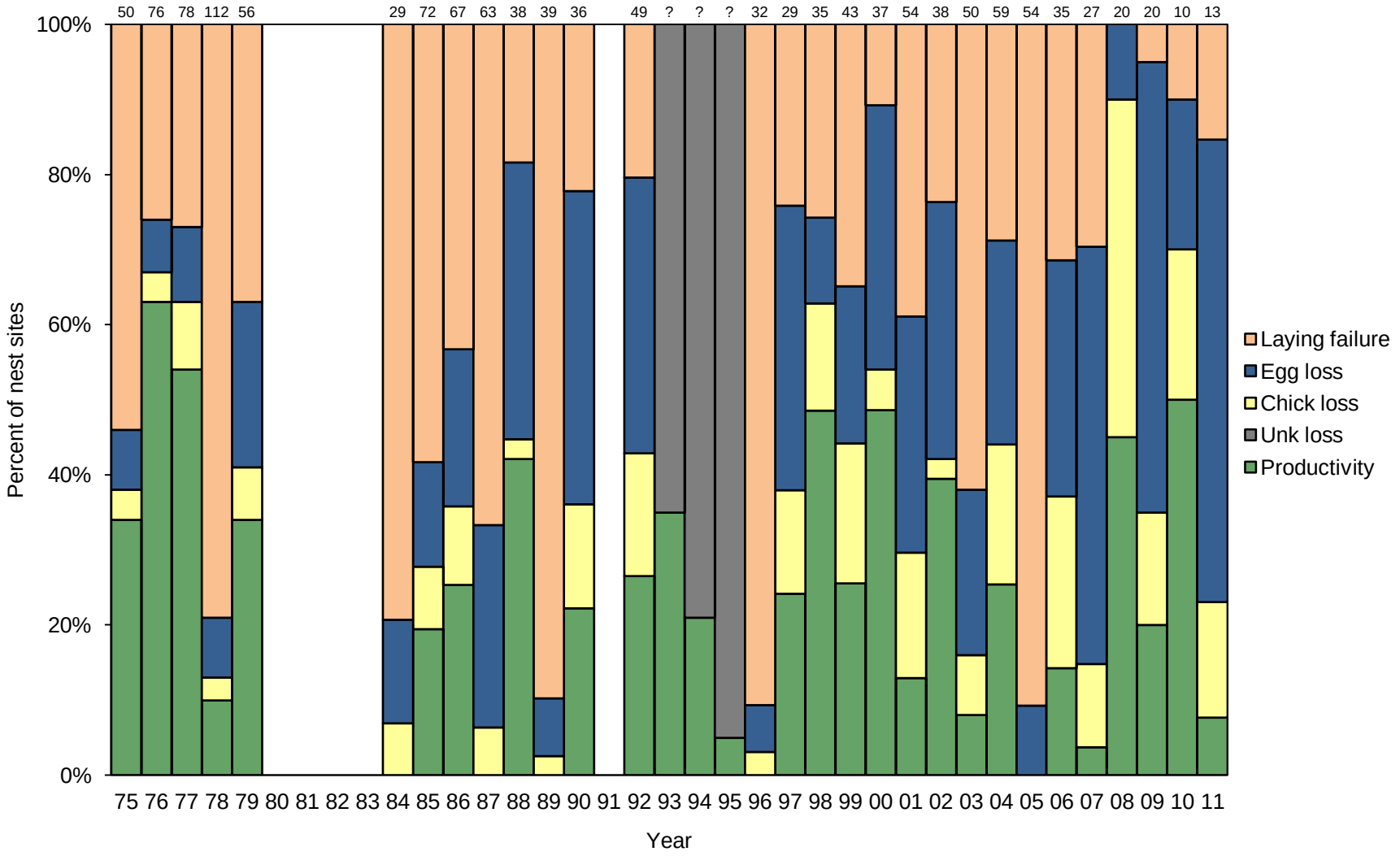


Figure 17. Reproductive performance of red-legged kittiwakes at St. Paul Island, Alaska. Laying failure=(A-B)/A; Egg loss=(B-D)/A; Chick loss=(D-F)/A; Productivity=F/A, where A=total nest sites; B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns indicate sample sizes (A).

Table 34. Reproductive performance of red-legged kittiwakes at St. Paul Island, Alaska.

Year	Total nest starts (A)	Nest sites w/ eggs (B)	Total eggs (C)	Nest sites w/ chicks (D)	Total chicks (E)	Nest sites w/ chicks fledged (F)	Total chicks fledged (G)	Laying success (B/A)	Mean clutch size (C/B)	Nesting success (D/B)	Hatching success (E/C)	Chick success (G/E)	Egg success (G/C)	Fledging success (F/D)	Reprod. success (F/B)	Fledglings /nest start (G/A)	Prod. (F/A)
1975	50	23	xx[a]	(19)[b]	xx	(17)	xx	0.46	xx	0.85[c]	xx	xx	xx	0.88[c]	0.74	xx	0.34
1976	76	56	xx	(51)	xx	(48)	xx	0.74	xx	0.91[c]	xx	xx	xx	0.95[c]	0.86	xx	0.63
1977	78	57	xx	(49)	xx	(42)	xx	0.73	xx	0.86[c]	xx	xx	xx	0.86[c]	0.74	xx	0.54
1978	112	24	xx	(15)	xx	(11)	xx	0.21	xx	0.63[c]	xx	xx	xx	0.73[c]	0.46	xx	0.10
1979	56	(35)	xx	(23)	xx	(19)	xx	0.63	xx	0.67[c]	xx	xx	xx	0.82[c]	0.54	xx	0.34
1980	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1981	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1982	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1983	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1984	29	6	xx	2	xx	0	0	0.21	xx	0.33	xx	xx	xx	0.00	0.00	0.00	0.00
1985	72	30	xx	20	xx	14	xx	0.42	xx	0.67	xx	xx	xx	0.70	0.47	xx	0.19
1986	67	38	xx	24	xx	17	xx	0.57	xx	0.63	xx	xx	xx	0.71	0.45	xx	0.25
1987	63	21	xx	4	xx	0	0	0.33	xx	0.19	xx	xx	xx	0.00	0.00	0.00	0.00
1988	38	31	xx	17	xx	16	xx	0.82	xx	0.55	xx	xx	xx	0.94	0.52	xx	0.42
1989	39	4	xx	1	xx	0	0	0.10	xx	0.25	xx	xx	xx	0.00	0.00	0.00	0.00
1990	36	28	xx	13	xx	8	xx	0.78	xx	0.46	xx	xx	xx	0.62	0.29	xx	0.22
1991	*no data*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1992	49	39	xx	21	xx	13	xx	0.80	xx	0.54	xx	xx	xx	0.62	0.33	xx	0.27
1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.35[d]
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.21[d]
1995	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05[d]
1996	32	3	xx	1	1	0	0	0.09	xx	0.33	xx	0.00	0.00	0.00	0.00	0.00	0.00
1997	29	22	xx	11	xx	7	xx	0.76	xx	0.50	xx	xx	xx	0.64	0.32	xx	0.24
1998	35	26	xx	22	xx	17	xx	0.74	xx	0.85	xx	xx	xx	0.77	0.65	xx	0.49
1999	43	28	xx	19	xx	11	xx	0.65	xx	0.68	xx	xx	xx	0.58	0.39	xx	0.26
2000	37	33	xx	20	xx	18	xx	0.89	xx	0.61	xx	xx	xx	0.90	0.55	xx	0.49
2001	54	33	xx	16	xx	7	xx	0.61	xx	0.48	xx	xx	xx	0.44	0.21	xx	0.13
2002	38	29	xx	16	xx	15	xx	0.76	xx	0.55	xx	xx	xx	0.94	0.52	xx	0.39
2003	50	19	xx	8	xx	4	xx	0.38	xx	0.42	xx	xx	xx	0.50	0.21	xx	0.08
2004	59	42	43	26	26	15	15	0.71	1.0	0.62	0.60	0.58	0.35	0.58	0.36	0.25	0.25
2005	54	5	5	0	0	0	0	0.09	1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	35	24	xx	13	xx	5	xx	0.69	xx	0.54	xx	xx	xx	0.38	0.21	xx	0.14
2007	27	19	xx	4	xx	1	1	0.70	xx	0.21	xx	xx	xx	0.25	0.05	0.04	0.04
2008	20	20	xx	18	xx	9	xx	1.00	xx	0.90	xx	xx	xx	0.50	0.45	xx	0.45
2009	20	19	19	7	7	4	4	0.95	1.0	0.37	0.37	0.57	0.21	0.57	0.21	0.20	0.20
2010	10	9	9	7	7	5	5	0.90	1.0	0.78	0.78	0.71	0.56	0.71	0.56	0.50	0.50
2011	13	11	11	3	3	1	1	0.85	1.0	0.27	0.27	0.33	0.09	0.33	0.09	0.08	0.08

[a] xx indicates data potentially exist but have not yet been summarized.
[b] Values in parentheses were not reported by original investigators and are estimated from other known parameters.
[c] Reported values are the midpoint of a range (see Appendix C).
[d] Data based on short-duration visits (see Appendix C).

Table 35. Standard deviation in reproductive performance parameters of red-legged kittiwakes at St. Paul Island, Alaska. For sampling clustered by plot, values are calculated using ratio estimator spreadsheets.

Year	No. plots[a]	Sampling design	Laying success	Mean clutch size	Nesting success	Hatching success	Chick success	Egg success	Fledging success	Reprod. success	Fledglings /nest start	Prod.
1975	xx[b]	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1976	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1977	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1978	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1979	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1980	*no data*	-	-	-	-	-	-	-	-	-	-	-
1981	*no data*	-	-	-	-	-	-	-	-	-	-	-
1982	*no data*	-	-	-	-	-	-	-	-	-	-	-
1983	*no data*	-	-	-	-	-	-	-	-	-	-	-
1984	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1985	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1986	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1987	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1988	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1989	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1990	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1991	*no data*	-	-	-	-	-	-	-	-	-	-	-
1992	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1993	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1994	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1995	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
1996	2	Cluster by plot	0.09	xx	0.39	xx	xx	xx	0.13	0.10	xx	0.11
1997	2	Cluster by plot	0.00	xx	0.35	Xx	Xx	Xx	0.24	0.61	xx	0.68
1998	2	Cluster by plot	0.03	xx	0.06	xx	xx	xx	0.08	0.02	xx	<0.01
1999	2	Cluster by plot	0.04	xx	0.15	xx	xx	xx	0.07	0.03	xx	0.04
2000	3	Cluster by plot	0.05	xx	0.05	xx	xx	xx	0.09	0.02	xx	0.04
2001	3	Cluster by plot	0.13	xx	0.09	xx	xx	xx	0.23	0.14	xx	0.09
2002	3	Cluster by plot	0.13	xx	0.10	xx	xx	xx	0.08	0.14	xx	0.17
2003	4	Cluster by plot	0.04	xx	0.17	xx	xx	xx	0.14	0.09	xx	0.03
2004	4	Cluster by plot	0.03	0.02	0.11	0.09	0.19	0.15	0.19	0.16	0.12	0.12
2005	4	Cluster by plot	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	2	Cluster by plot	0.13	xx	0.23	xx	xx	xx	0.35	0.23	xx	0.15
2007	2	Cluster by plot	0.08	xx	0.18	xx	xx	xx	0.13	0.07	xx	0.05
2008	2	Cluster by plot	0.00	0.00	0.09	xx	xx	xx	0.70	0.11	xx	0.11
2009	xx	Cluster by plot	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]
2010	4	Cluster by plot	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]
2011	4	Cluster by plot	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]	-[c]

[a]Plots that are combined for analysis are counted as a single "plot".
[b]xx indicates data potentially exist but have not yet been summarized.
[c]Standard deviations not calculated by ratio estimator because sample size was too small.

Table 36. Reproductive performance of red-legged kittiwakes at St. Paul Island, Alaska in 2011.

Parameter	Plot				Total	SD[a]
	53	56	61	87		
Total nest starts (A)	4	4	2	3	13	-
Nest sites w/ eggs (B)	3	4	1	3	11	-
Total eggs (C)	3	4	1	3	11	-
Nest sites w/ chicks (D)	3	0	0	0	3	-
Total chicks (E)	3	0	0	0	3	-
Nest sites w/ fledged chicks (F)	1	0	0	0	1	-
Total fledged chicks (G)	1	0	0	0	1	-
Laying success (B/A)	0.75	1.00	0.50	1.00	0.85	-
Mean clutch size (C/B)	1.0	1.0	1.0	1.0	1.0	-
Nesting success (D/B)	1.00	0.00	0.00	0.00	0.27	-
Hatching success (E/C)	1.00	0.00	0.00	0.00	0.27	-
Chick success (G/E)	0.33	0.00	0.00	0.00	0.33	-
Egg success (G/C)	0.33	0.00	0.00	0.00	0.09	-
Fledging success (F/D)	0.33	0.00	0.00	0.00	0.33	-
Reproductive success (F/B)	0.33	0.00	0.00	0.00	0.33	-
Fledglings/nest start (G/A)	0.25	0.00	0.00	0.00	0.08	-
Productivity (F/A)	0.25	0.00	0.00	0.00	0.08	-

[a]Standard deviation values not calculated by ratio estimator because sample size was too small.

Table 37. Mean growth rates of red-legged kittiwake chicks at St. Paul Island, Alaska. Data include chicks measured at least two times during the linear phase of growth. No chicks were measured 1980-2005.

Year	Mass (g/day)				Wing chord (mm/day)				Linear phase definition[a]
	Mean	SD	Range	*n*	Mean	SD	Range	*n*	
1976	11.7	1.2	-	4	-	-	-	-	A
1977	13.6	2.5	-	3	-	-	-	-	A
1978	*no data*	-	-	-	-	-	-	-	-
1979	12.3	-	-	1	-	-	-	-	A
2006	11.0	1.7	9.7-12.9	3	5.2	1.3	3.8-6.0	3	C
2007	9.9	2.9	5.3-13.2	4	3.5	1.3	1.3-4.5	4	C
2008	*no data*	-	-	-	-	-		-	-
2009	*no data*	-	-	-	-	-		-	-
2010	*no data*	-	-	-	-	-		-	-
2011	*no data*	-	-	-	-	-		-	-

[a]A=linear growth phase defined as period between initial and peak weight measurements of each chick; C=chicks of unknown age, linear growth phase determined by visual inspection of individual growth curves.

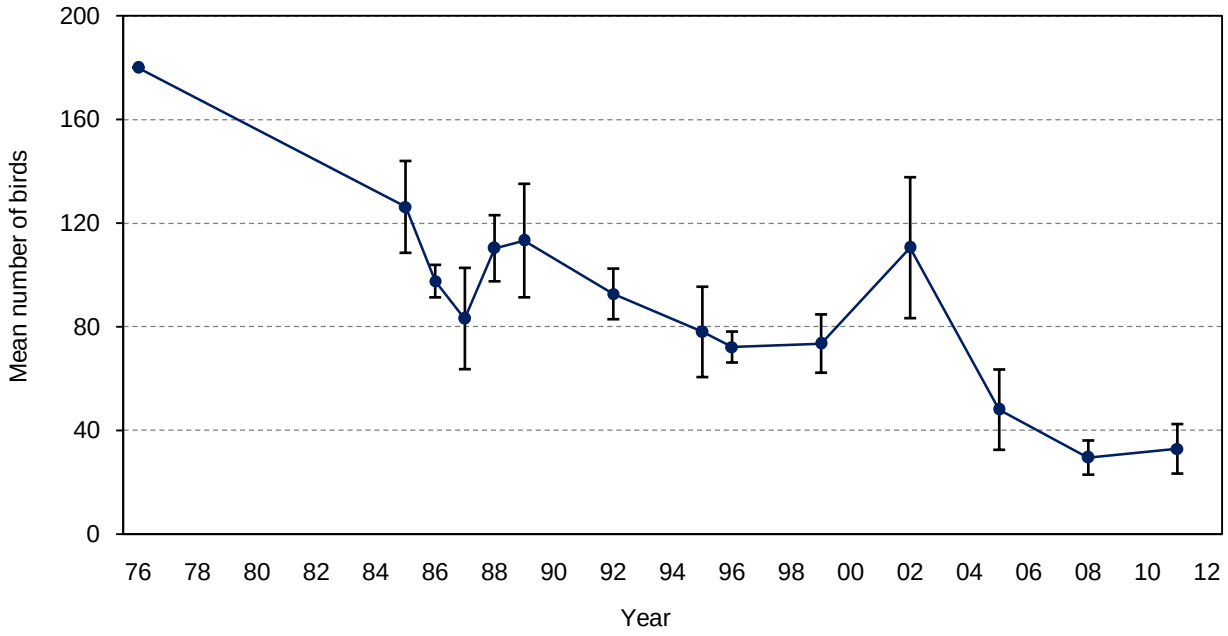


Figure 18. Mean numbers of red-legged kittiwakes counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

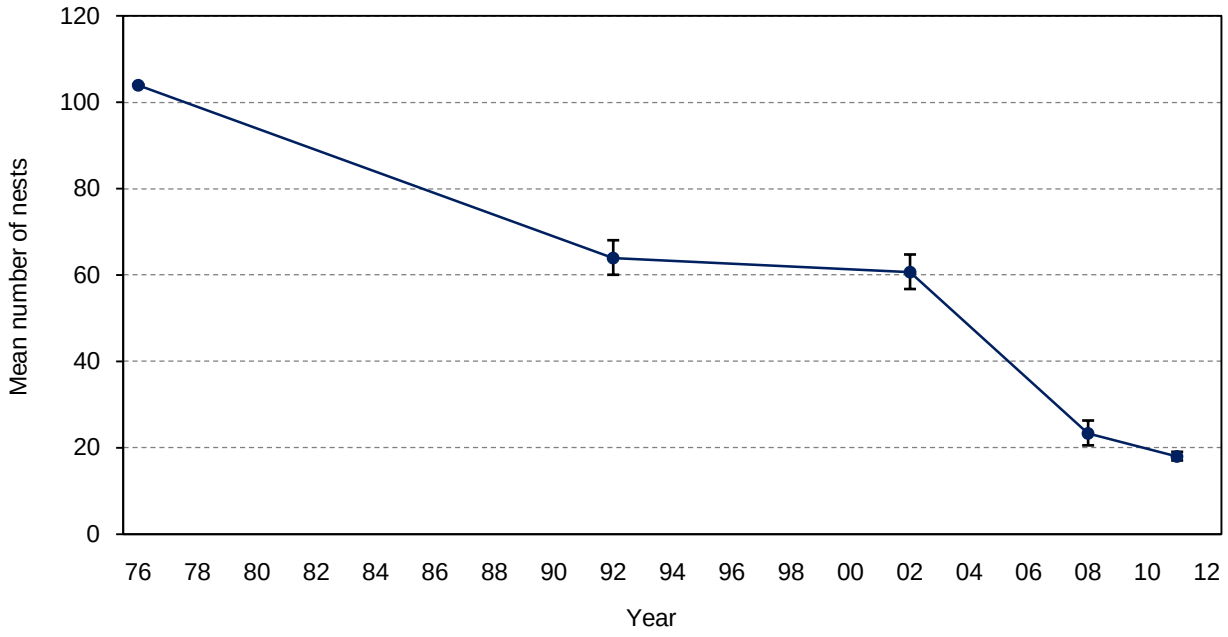


Figure 19. Mean numbers of red-legged kittiwake nests counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 38. Numbers of red-legged kittiwakes counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 and 1984 are excluded because not all plots were counted.

Replicate	1976	1985	1986	1987	1988	1989	1992	1995	1996	1999	2002	2005	2008	2011
1	180	101	106	59	106	80	87	66	62	65	99	40	26	21
2	-	142	96	87	108	115	101	70	70	74	87	35	27	23
3	-	131	93	78	87	119	104	98	75	66	90	28	24	21
4	-	119	91	70	108	123	93	-	71	77	109	40	25	42
5	-	135	102	116	122	112	77	-	76	65	161	49	25	38
6	-	-	-	89	126	124	94	-	79	94	117	66	31	36
7	-	-	-	-	115	85	-	-	-	-	-	73	35	39
8	-	-	-	-	-	148	-	-	-	-	-	53	43	43
Mean	180	126	98	83	110	113	93	78	72	74	111	48	30	33
n	1	5	5	6	7	8	6	3	6	6	6	8	8	8
SD	-	16	6	20	13	22	10	17	6	11	27	15	7	10
First count	17 Jul	xx[a]	6 Jul	9 Jul	12 Jul	17 Jul	12 Jul	9 Jul	10 Jul	7 Jul	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	29 Jul	23 Jul	7 Aug	9 Aug	7 Aug	3 Aug	2 Aug	7 Aug	1 Aug	31 Jul	31 Jul	1 Aug

[a]xx indicates data potentially exist but have not yet been summarized.

Table 39. Numbers of red-legged kittiwake nests counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 and 1984 are excluded because not all plots were counted.

Replicate	1976	1985	1986	1987	1988	1989	1992	1995	1996	1999	2002	2005	2008	2011
1	104	xx[a]	xx	xx	xx	xx	60	*no nest count*	xx	xx	65	xx	24	18
2	-	xx	xx	xx	xx	xx	65		xx	xx	57	xx	22	19
3	-	xx	xx	xx	xx	xx	69	-	xx	xx	60	xx	22	17
4	-	xx	xx	xx	xx	xx	61	-	xx	xx	-	xx	22	0[b]
5	-	xx	xx	xx	xx	xx	-	-	xx	xx	-	xx	22	-
6	-	-	-	xx	xx	xx	-	-	xx	xx	-	xx	21	-
7	-	-	-	-	xx	xx	-	-	-	-	-	xx	24	-
8	-	-	-	-	-	xx	-	-	-	-	-	xx	30	-
Mean	104	xx	xx	xx	xx	xx	64	-	xx	xx	61	xx	23	18
Overall max.[c]	104	104	101	83	79	61	75	-	51	103	74	3	32	21
n	1	xx	xx	xx	xx	xx	4	-	xx	xx	3	xx	8	3
SD	-	xx	xx	xx	xx	xx	4	-	xx	xx	4	xx	3	1
First count	17 Jul	xx	xx	xx	xx	xx	12 Jul	-	xx	xx	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	xx	xx	xx	xx	30 Jul	-	xx	xx	23 Jul	xx	31 Jul	17 Jul

[a]xx indicates data potentially exist but have not yet been summarized.
[b]Incomplete count used for maximum nest number but not included in calculation of mean.
[c]Overall maximum nest number is the highest nest count on each plot in a year, summed across all plots.

Table 40. Numbers of red-legged kittiwakes counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate								Mean	SD
	1	2	3	4	5	6	7	8		
	6-8 Jul	9-10 Jul	12-14 Jul	14-17 Jul	19-21 Jul	25-26 Jul	28-29 Jul	30 Jul-1 Aug		
1	0	0	0	0	0	0	0	0	-	-
2sw	0	0	0	0	0	1	0	0	-	-
2ne	0	0	0	0	0	0	0	0	-	-
3	0	0	0	0	0	0	0	0	-	-
4	0	0	0	0	0	0	0	0	-	-
5sw	2	3	1	0	0	0	0	0	-	-
5ne	0	0	0	0	0	0	0	0	-	-
6[a]	-	-	-	-	-	-	-	-	-	-
7	0	0	0	0	0	0	0	0	-	-
8	0	0	0	0	0	0	0	0	-	-
9	-	-	-	-	-	-	-	-	-	-
10	0	0	0	0	0	0	0	0	-	-
11	0	0	0	0	0	0	0	0	-	-
12	0	0	0	0	0	0	0	0	-	-
13	0	0	0	0	0	0	0	0	-	-
14	5	4	3	11	7	8	11	8	-	-
15	0	0	0	0	0	0	0	0	-	-
16[a]	-	-	-	-	-	-	-	-	-	-
17[a]	-	-	-	-	-	-	-	-	-	-
18	0	0	0	0	0	0	0	0	-	-
19top	0	0	0	0	0	0	0	0	-	-
19btm	1	0	1	0	2	1	2	1	-	-
20top	0	0	0	0	0	0	0	0	-	-
20btm	0	0	0	0	0	0	0	0	-	-
21[a]	-	-	-	-	-	-	-	-	-	-
22	6	6	5	14	15	15	14	19	-	-
23	0	0	0	0	0	0	0	0	-	-
24	0	0	0	0	0	0	0	0	-	-
25	0	0	0	0	0	0	0	0	-	-
26	0	0	0	0	0	0	0	0	-	-
27	3	0	1	3	2	2	2	2	-	-
28	0	0	0	0	0	0	0	0	-	-
29[a]	-	-	-	-	-	-	-	-	-	-
29new	0	0	0	0	0	0	0	0	-	-
30	1	0	1	0	0	0	0	0	-	-
31	0	3	4	7	8	6	9	6	-	-
32	5	7	7	7	6	4	3	4	-	-
33	0	0	0	0	0	0	0	4	-	-
Total[b]	0	0	0	0	0	1	0	0	33	10

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.

Table 41. Numbers of red-legged kittiwake nests counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate				Mean	SD	Max.
	1	2	3	4			
	6-8 Jul	9-10 Jul	12-14 Jul	14-17 Jul			
1	0	0	0	-	-	-	0
2sw	0	0	0	-	-	-	0
2ne	0	0	0	-	-	-	0
3	0	0	0	-	-	-	0
4	0	0	0	-	-	-	0
5sw	1	1	1	-	-	-	1
5ne	0	0	0	-	-	-	0
6[a]	-	-	-	-	-	-	-
7	0	0	0	-	-	-	0
8	0	0	0	-	-	-	0
9	-	-	-	-	-	-	-
10	0	0	0	-	-	-	0
11	0	0	0	-	-	-	0
12	0	0	0	-	-	-	0
13	0	0	0	-	-	-	0
14	4	4	4	-	-	-	4
15	0	0	0	-	-	-	0
16[a]	-	-	-	-	-	-	-
17[a]	-	-	-	-	-	-	-
18	0	0	0	-	-	-	0
19top	0	0	0	-	-	-	0
19btm	0	0	1	-	-	-	1
20top	0	0	0	-	-	-	0
20btm	0	0	0	-	-	-	0
21[a]	-	-	-	-	-	-	-
22	6	6	6	-	-	-	6
23	0	0	0	-	-	-	0
24	0	0	0	-	-	-	0
25	0	0	0	-	-	-	0
26	0	0	0	-	-	-	0
27	3	3	1	-	-	-	3
28	0	0	0	-	-	-	0
29[a]	-	-	-	-	-	-	-
29new	0	0	0	-	-	-	0
30	1	0	1	-	-	-	1
31	0	3	3	-	-	-	3
32	4	2	2	0	-	-	4
33	0	0	0	-	-	-	0
Total[b]	18	19	17	0	18	1	21[c]

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.
[c]Overall maximum nest number is the highest nest count on each plot, summed across all plots.

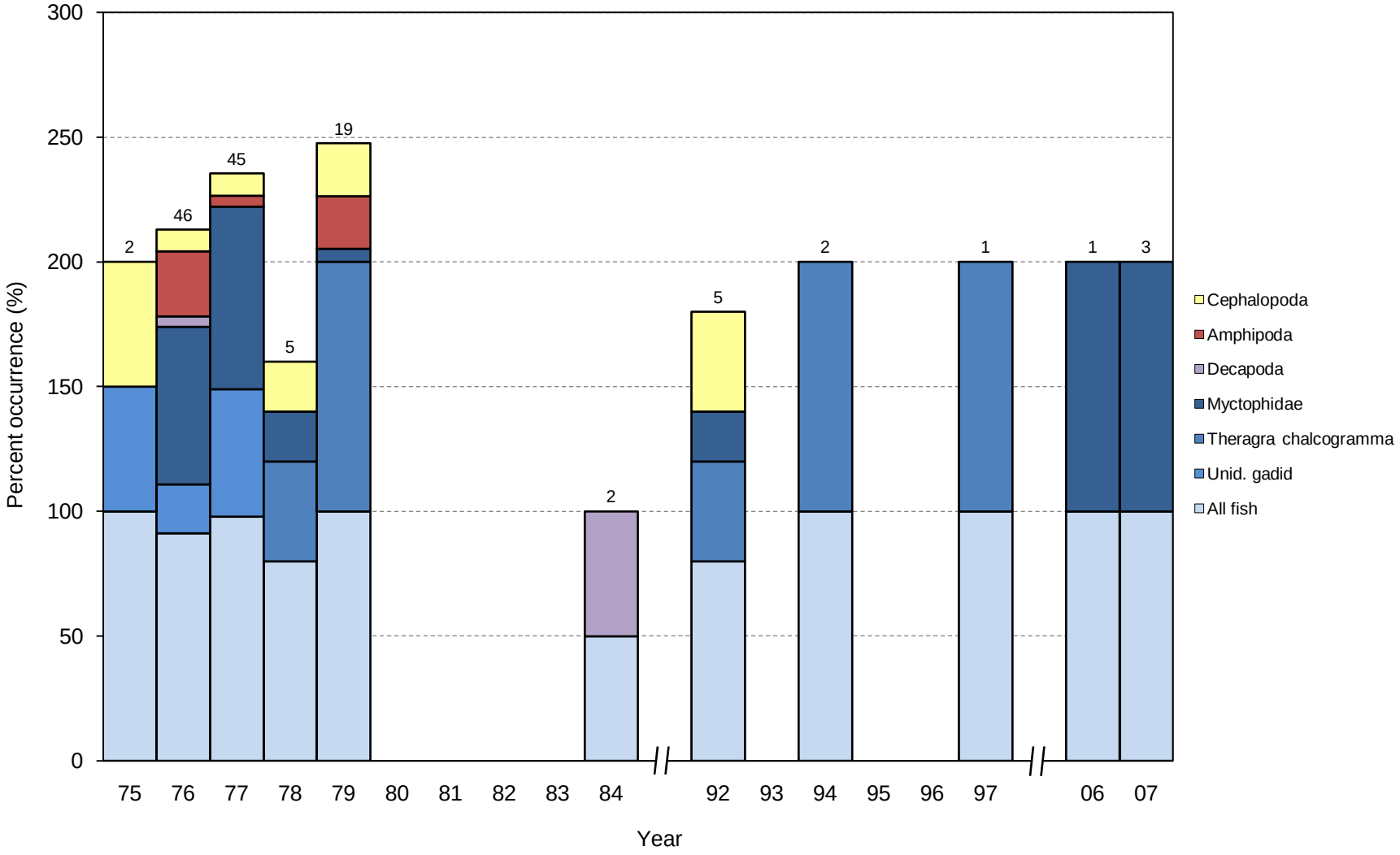


Figure 20. Frequency of occurrence of selected prey items in diets of red-legged kittiwakes at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1985-1991, 1998-2005, or after 2007.

Table 42. Frequency of occurrence of prey in diets of red-legged kittiwakes at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult and chick regurgitations. No samples were collected 1980-1983, 1985-1991, 1998-2005, or after 2007.

	1975	1976	1977	1978	1979	1984	1992	1993	1994	1995	1996	1997	2006	2007
No. samples	2	46	45	5	19	2	5	*no samples*	2	*no samples*	*no samples*	1	1	3
Cephalopoda	**50.0**	**8.7**	**8.9**	**20.0**	**21.1**	**-**	**40.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. squid	50.0	8.7	8.9	20.0	21.1	-	40.0	-	-	-	-	-	-	-
Amphipoda	**-**	**26.1**	**4.4**	**-**	**21.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Hyperiidea														
Themisto libellula	-	21.7	2.2	-	-	-	-	-	-	-	-	-	-	-
Parathemisto pacifica	-	-	-	-	21.1	-	-	-	-	-	-	-	-	-
Unid. Hyperiidea	-	4.3	-	-	-	-	-	-	-	-	-	-	-	-
Gammaridea														
Unid. Gammaridea	-	2.2	2.2	-	-	-	-	-	-	-	-	-	-	-
Euphausiacae	**-**	**6.5**	**2.2**	**-**	**10.5**	**50.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Thysanoessa raschii	-	-	2.2	-	-	-	-	-	-	-	-	-	-	-
T. spinifera	-	2.2	-	-	-	-	-	-	-	-	-	-	-	-
Unid. euphausiid	-	4.3	-	-	10.5	50.0	-	-	-	-	-	-	-	-
Decapoda	**-**	**4.3**	**-**	**-**	**-**	**50.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. crab	-	2.2	-	-	-	-	-	-	-	-	-	-	-	-
Unid. shrimp	-	2.2	-	-	-	-	-	-	-	-	-	-	-	-
Unid. decapod	-	-	-	-	-	50.0	-	-	-	-	-	-	-	-
Unid. crustacean	-	-	-	20.0	-	-	-	-	-	-	-	-	-	-
Nereidae	-	4.3	4.4	20.0	10.5	50.0	-	-	-	-	-	-	-	-
Fish	**100.0**	**91.3**	**97.8**	**80.0**	**100.0**	**50.0**	**80.0**	**-**	**100.0**	**-**	**-**	**100.0**	**100.0**	**100.0**
Osmeridae														
Mallotus villosus	-	4.3	-	-	-	-	-	-	-	-	-	-	-	-
Myctophidae	-	63.0	73.3	20.0	5.3	-	20.0	-	-	-	-	-	100.0	100.0
Gadidae														
Theragra chalcogramma	-	-	-	40.0	100.0	-	40.0	-	100.0	-	-	100.0	-	-
Unid. gadid	50.0	19.6	51.1	-	-	-	-	-	-	-	-	-	-	-
Unid. fish	50.0	17.4	2.2	20.0	-	50.0	20.0	-	-	-	-	-	100.0	-

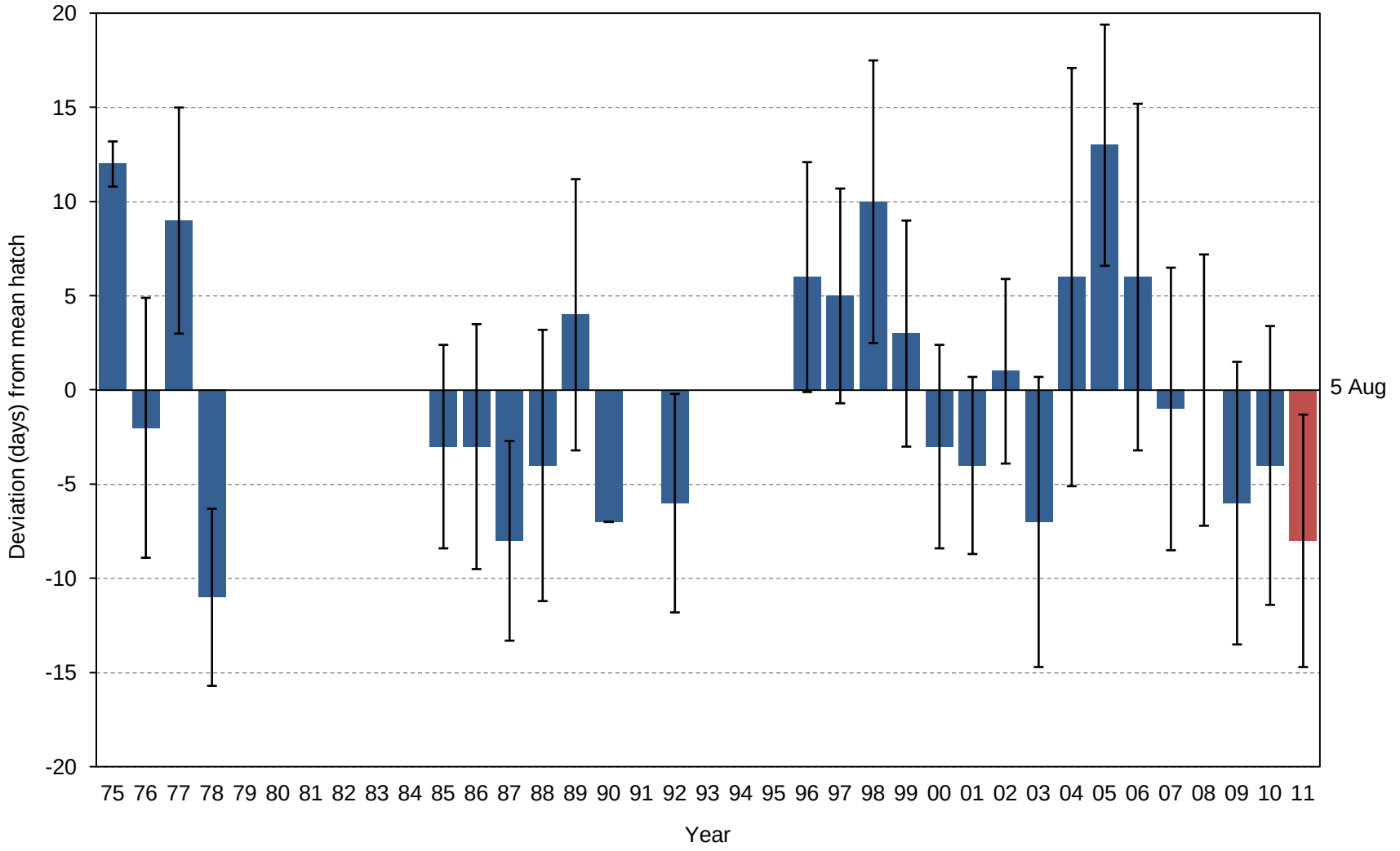


Figure 21. Yearly hatch date deviation (from the 1975-2010 mean of 5 August) for common murres at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 43. Breeding chronology of common murres at St. Paul Island, Alaska.

Year	Mean hatch	SD	*n*[a]	First hatch	Last hatch	First "jump"
1975	17 Aug	1.2	3	xx[b]	xx	xx
1976	2 Aug	6.9	3	xx	xx	xx
1977	14 Aug	6.0	14	xx	xx	xx
1978	25 Jul	4.7	7	xx	xx	xx
1979	*no data*	-	-	-	-	-
1980	*no data*	-	-	-	-	-
1981	*no data*	-	-	-	-	-
1982	*no data*	-	-	-	-	-
1983	*no data*	-	-	-	-	-
1984	*no data*	-	-	-	-	-
1985	2 Aug	5.4	5	xx	xx	xx
1986	2 Aug	6.5	33	xx	xx	xx
1987	28 Jul	5.3	39	xx	xx	xx
1988	31 Jul	7.2	116	xx	xx	xx
1989	9 Aug	7.2	165	xx	xx	xx
1990	29 Jul	-	-	xx	xx	xx
1991	*no data*	-	-			
1992	29 Jul	5.8	74	xx	xx	xx
1993	*no data*	-	-	-	-	-
1994	*no data*	-	-	-	-	-
1995	*no data*	-	-	-	-	-
1996	10 Aug	6.1	55	xx	xx	xx
1997	10 Aug	5.7	30	xx	xx	xx
1998	15 Aug	7.5	10	8 Aug	28 Aug	xx
1999	8 Aug	6.0	97	23 Jul	26 Aug	xx
2000	1 Aug	5.4	107	20Jul	16 Aug	xx
2001	1 Aug	4.7	103	20 Jul	xx	xx
2002	6 Aug	4.9	82	xx	xx	xx
2003	29 Jul	7.7	51	xx	xx	xx
2004	10 Aug	11.1	40	xx	xx	xx
2005	18 Aug	6.4	10	xx	xx	xx
2006	11 Aug	9.2	31	xx	xx	xx
2007	4 Aug	7.5	40	xx	xx	xx
2008	4 Aug	7.2	48	xx	xx	xx
2009	30 Jul	7.5	54	17 Jul	24 Aug	xx
2010	1 Aug	7.4	50	21 Jul	24 Aug	10 Aug
2011	28 Jul	6.7	24	17 Jul	18 Aug	12 Aug

[a]Sample sizes for mean hatch dates are a sub-sample of total nests for which egg to chick interval is ≤ 7 days.
[b]xx indicates data potentially exist but have not yet been summarized.

Table 44. Frequency distribution of hatch dates for common murres at St. George Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days.

Julian date[a]	No. nests hatching on Julian date																		
	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
193	xx[b]	xx	xx	xx	*no data*	*no data*	*no data*	*no data*	*no data*	*no data*	xx	xx	xx	xx	xx	*no data*	*no data*	xx	*no data*
194	xx	xx	xx	xx							xx	xx	xx	xx	xx			xx	
195	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
196	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
197	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
198	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
199	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
200	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
201	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
202	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
203	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
204	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
205	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
206	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
207	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
208	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
209	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
210	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
211	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
212	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
213	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
214	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
215	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
216	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
217	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
218	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
219	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
220	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
221	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
222	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
223	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
224	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
225	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
226	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
227	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
228	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
229	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
230	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
231	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
232	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
233	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
234	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
235	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
236	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
237	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
238	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	-	-	xx	-
n	3	3	14	7	-	-	-	-	-	-	5	33	39	116	165	-	-	74	-

[a]Julian dates are adjusted by one day in leap years.
[b]xx indicates data potentially exist but have not yet been summarized.

Table 44 (continued). Frequency distribution of hatch dates for common murres at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days.

Julian date[a]	No. nests hatching on Julian date																	
	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11
193	*no data*	*no data*	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
194			xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
195	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
196	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
197	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
198	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	1
199	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
200	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	2
201	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
202	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3	1	2
203	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
204	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	1
205	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	2	-
206	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	4	3	-
207	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	3	-
208	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	7	4	9
209	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
210	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	8	6	-
211	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
212	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	4	9	6
213	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
214	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	12	6	-
215	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	3	-
216	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3	3	1
217	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
218	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
219	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
220	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	2	2	1
221	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
222	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	1	-
223	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
224	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	1	-
225	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
226	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	2	-
227	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
228	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	1	-
229	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
230	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	1
231	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
232	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
233	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
234	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
235	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
236	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	2	-
237	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
238	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
n	-	-	55	30	10	97	107	103	82	51	40	10	31	40	48	54	50	24

[a]Julian dates are adjusted by one day in leap years.
[b]xx indicates data potentially exist but have not yet been summarized.

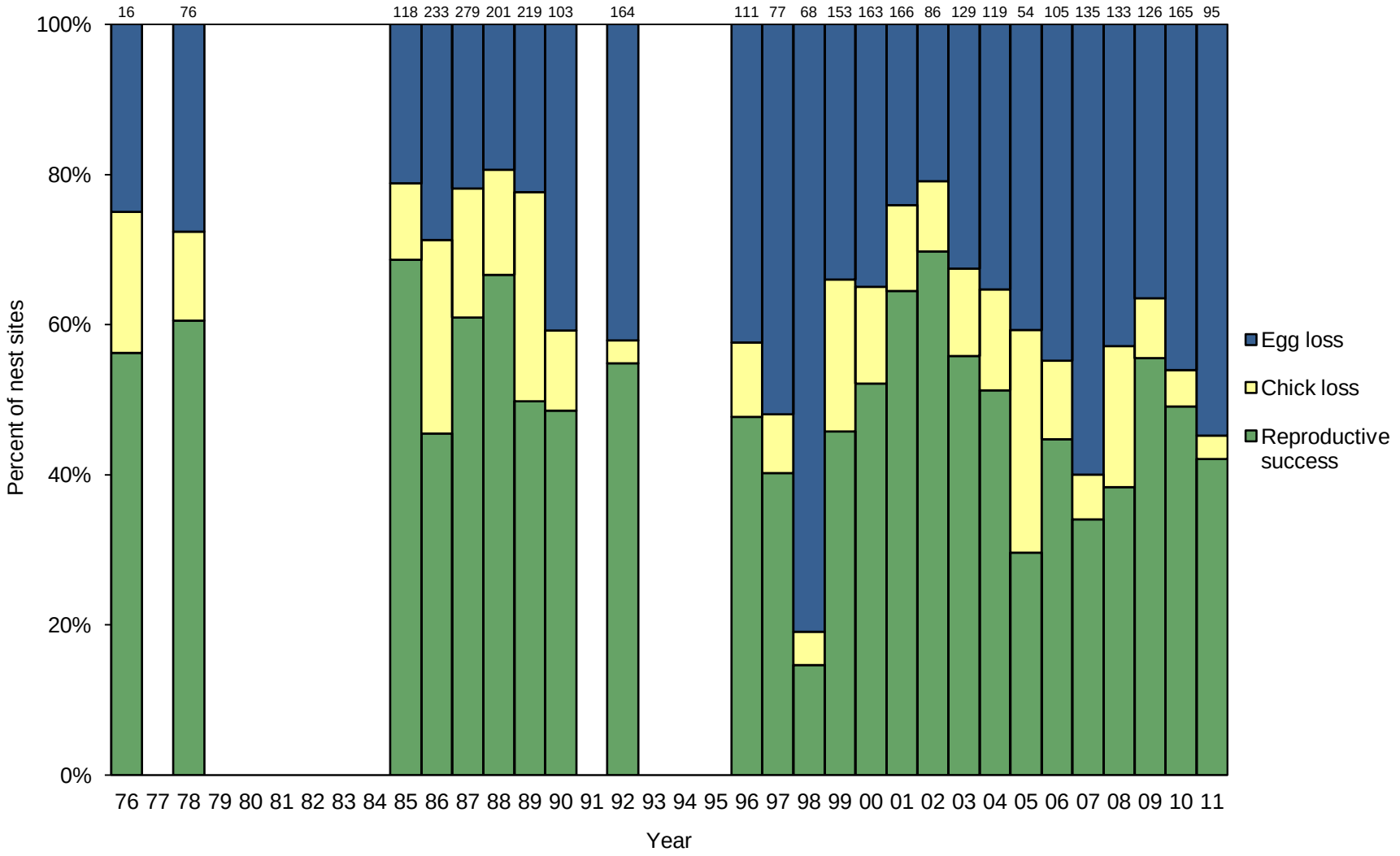


Figure 22. Reproductive performance of common murres at St. Paul Island, Alaska. Egg loss=(B-D)/B; Chick loss=(D-F)/B; Reproductive success=F/B, where B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns indicate sample sizes (B).

Table 45. Reproductive performance of common murres at St. Paul Island, Alaska.

Year	Nest sites w/ eggs (B)	Nest sites w/ chicks (D)	Nest sites w/ chicks fledged (F)	Nesting success (D/B)[a]	Fledging success (F/D)[b]	Reproductive success (F/B)
1976	16	12	9	0.75	0.75	0.56
1977	*no data*	-	-	-	-	-
1978	76	55	46	0.72	0.84	0.61
1979	*no data*	-	-	-	-	-
1980	*no data*	-	-	-	-	-
1981	*no data*	-	-	-	-	-
1982	*no data*	-	-	-	-	-
1983	*no data*	-	-	-	-	-
1984	*no data*	-	-	-	-	-
1985	118	93	81	0.79	0.87	0.69
1986	233	166	106	0.71	0.64	0.45
1987	279	218	170	0.78	0.78	0.61
1988	201	162	134	0.81	0.83	0.67
1989	219	170	109	0.78	0.64	0.50
1990	103	61	50	0.59	0.82	0.49
1991	*no data*	-	-	-	-	-
1992	164	95	90	0.58	0.92	0.55
1993	*no data*	-	-	-	-	-
1994	*no data*	-	-	-	-	-
1995	*no data*	-	-	-	-	-
1996	111	64	53	0.58	0.83	0.48
1997	77	37	31	0.48	0.84	0.40
1998	68	13	10	0.19	0.77	0.15
1999	153	101	70	0.66	0.69	0.46
2000	163	106	85	0.65	0.80	0.52
2001	166	126	107	0.76	0.85	0.64
2002	86	68	60	0.79	0.88	0.70
2003	129	87	72	0.67	0.83	0.56
2004	119	77	61	0.65	0.79	0.51
2005	54	32	16	0.59	0.50	0.30
2006	105	58	47	0.55	0.81	0.45
2007	135	54	46	0.40	0.85	0.34
2008	133	76	51	0.57	0.67	0.38
2009	126	80	70	0.63	0.88	0.56
2010	165	89	81	0.54	0.91	0.49
2011	95	43	40	0.45	0.93	0.42

[a]For single-egg species, nesting success (D/B) is the same as hatching success (E/C) because nest sites w/ eggs (B)=total eggs (C) and nest sites w/ chicks (D)=total chicks (E).

[b]For single-egg species, fledging success (F/B) is the same as chick success (G/E) because nest sites w/ chicks (D)=total chicks (E) and nest sites w/ chicks fledged (F)=total chicks fledged (G).

Table 46. Standard deviation in reproductive performance parameters of common murres at St. Paul Island, Alaska. For sampling clustered by plot, values are calculated using ratio estimator spreadsheets.

Year	No. plots[a]	Sampling design	Nesting success	Fledging success	Reproductive success
1976	xx[b]	xx	xx	xx	xx
1977	*no data*	-	-	-	-
1978	xx	xx	xx	xx	xx
1979	*no data*	-	-	-	-
1980	*no data*	-	-	-	-
1981	*no data*	-	-	-	-
1982	*no data*	-	-	-	-
1983	*no data*	-	-	-	-
1984	*no data*	-	-	-	-
1985	xx	xx	xx	xx	xx
1986	xx	xx	xx	xx	xx
1987	xx	xx	xx	xx	xx
1988	xx	xx	xx	xx	xx
1989	xx	xx	xx	xx	xx
1990	xx	xx	xx	xx	xx
1991	*no data*	-	-	-	-
1992	xx	xx	xx	xx	xx
1993	*no data*	-	-	-	-
1994	*no data*	-	-	-	-
1995	*no data*	-	-	-	-
1996	5	Cluster by plot	0.07	0.15	0.07
1997	4	Cluster by plot	0.14	0.27	0.17
1998	3	Cluster by plot	0.04	0.08	0.04
1999	7	Cluster by plot	0.06	0.11	0.08
2000	7	Cluster by plot	0.04	0.08	0.04
2001	6	Cluster by plot	0.05	0.04	0.18
2002	6	Cluster by plot	0.08	0.05	0.09
2003	6	Cluster by plot	0.04	0.05	0.05
2004	6	Cluster by plot	0.15	0.07	0.16
2005	4	Cluster by plot	0.04	0.15	0.10
2006	6	Cluster by plot	0.10	0.20	0.13
2007	9	Cluster by plot	0.08	0.04	0.06
2008	8	Cluster by plot	0.08	0.05	0.08
2009	7	Cluster by plot	0.05	0.03	0.05
2010	8	Cluster by plot	0.09	0.05	0.10
2011	7	Cluster by plot	0.09	0.03	0.11

[a]Plots that are combined for analysis are counted as a single "plot".
[b]xx indicates data potentially exist but have not yet been summarized.

Table 47. Reproductive performance of common murres at St. Paul Island, Alaska in 2011.

Parameter	Plot							Total	SD[b]
	61-68[a]	81	86	89	90L	104	114		
Nests w/ eggs (B)	21	13	9	7	19	8	18	95	-
Nests w/ chicks (D)	9	10	5	4	0	5	10	43	-
Nests w/ chicks fledged (F)	8	9	4	4	0	5	10	40	-
Nesting success (D/B)[c]	0.43	0.77	0.56	0.57	0.00	0.63	0.56	0.45	0.09
Fledging success (F/D)[d]	0.89	0.90	0.80	1.00	0.00	1.00	1.00	0.93	0.03
Reproductive success (F/B)	0.38	0.69	0.44	0.57	0.00	0.63	0.56	0.42	0.11

[a]Plots 61, 64, 66, 67, and 68 were combined for statistical purposes.

[b]Standard deviations are calculated from ratio estimator spreadsheets, based on plot as a sample unit.

[c]For single-egg species, nesting success (D/B) is the same as hatching success (E/C) because nest sites w/ eggs (B)=total eggs (C) and nest sites w/ chicks (D)=total chicks (E).

[d]For single-egg species, fledging success (F/B) is the same as chick success (G/E) because nest sites w/ chicks (D)=total chicks (E) and nest sites w/ chicks fledged (F)=total chicks fledged (G).

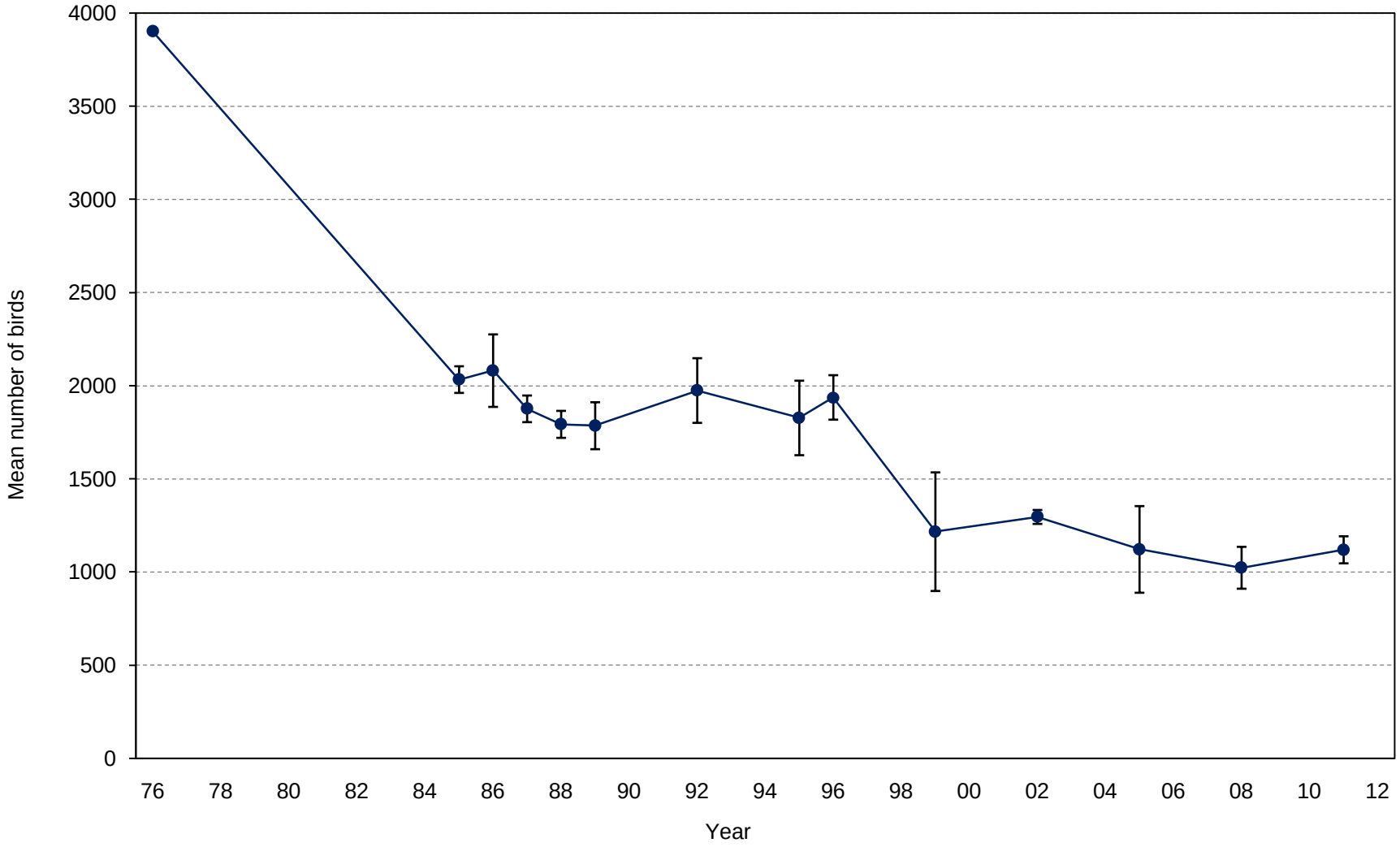


Figure 23. Mean numbers of common murres counted on index at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 48. Numbers of common murres counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 and 1984 are excluded because not all plots were counted.

Replicate	1976	1985	1986	1987	1988	1989	1992	1995	1996	1999	2002	2005	2008	2011
1	3903	2071	1808	1798	1688	1847	1858	1681	1999	855	1252	673	993	1249
2	-	2114	1956	1850	1772	1819	1996	1745	1790	1161	1305	924	868	1062
3	-	1962	2178	1853	1742	1688	2092	2055	1843	884	1324	1059	876	1047
4	-	1985	2174	1871	1775	1776	1709	-	1926	1358	1350	1313	980	1139
5	-	-	2289	1873	1838	1576	2203	-	1936	1349	1268	1394	1052	1094
6	-	-	-	2011	1913	1716	1987	-	2129	1691	1274	1190	1139	1148
7	-	-	-	-	1820	1986	-	-	-	-	-	1162	1147	1038
8	-	-	-	-	-	1874	-	-	-	-	-	1254	1126	1175
Mean	3903	2033	2081	1876	1793	1785	1974	1827	1937	1216	1296	1121	1023	1119
n	1	4	5	6	7	8	6	3	6	6	6	8	8	8
SD	-	72	195	72	73	126	174	200	119	318	37	233	113	73
First count	17 Jul	xx[a]	6 Jul	9 Jul	12 Jul	17 Jul	12 Jul	9 Jul	10 Jul	7 Jul	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	29 Jul	23 Jul	7 Aug	9 Aug	7 Aug	3 Aug	2 Aug	7 Aug	1 Aug	31 Jul	31 Jul	1 Aug

[a]xx indicates data potentially exist but have not yet been summarized

Table 49. Numbers of common murres counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate								Mean	SD
	1	2	3	4	5	6	7	8		
	6-8 Jul	9-10 Jul	12-14 Jul	14-17 Jul	19-21 Jul	25-26 Jul	28-29 Jul	30 Jul-1 Aug		
1	0	0	0	0	0	0	0	0	-	-
2sw	0	0	0	0	0	0	0	0	-	-
2ne	0	0	0	0	0	0	0	0	-	-
3	0	0	0	0	0	0	0	0	-	-
4	0	0	0	0	0	0	0	0	-	-
5sw	0	2	3	0	0	0	3	0	-	-
5ne	0	0	0	0	0	0	0	0	-	-
6[a]	-	-	-	-	-	-	-	-	-	-
7	0	0	0	0	0	0	0	0	-	-
8	0	0	0	0	0	0	0	0	-	-
9	-	-	-	-	-	-	-	-	-	-
10	0	0	0	0	0	0	0	0	-	-
11	0	0	0	0	0	0	0	0	-	-
12	0	0	0	0	0	0	0	0	-	-
13	0	0	0	0	0	0	0	0	-	-
14	25	2	23	28	39	42	14	40	-	-
15	0	0	0	0	0	0	0	0	-	-
16[a]	-	-	-	-	-	-	-	-	-	-
17[a]	-	-	-	-	-	-	-	-	-	-
18	0	0	0	0	0	0	0	0	-	-
19top	1	0	0	0	0	0	0	0	-	-
19btm	45	49	53	54	64	59	57	72	-	-
20top	1	0	0	0	0	0	0	0	-	-
20btm	0	0	0	0	0	0	0	0	-	-
21[a]	-	-	-	-	-	-	-	-	-	-
22	0	4	0	0	0	0	0	0	-	-
23	0	4	0	0	0	0	0	0	-	-
24	0	0	0	0	0	0	0	0	-	-
25	0	0	0	0	0	0	0	0	-	-
26	14	12	18	10	25	23	26	14	-	-
27	0	0	0	0	0	0	0	0	-	-
28	2	0	0	0	0	0	0	0	-	-
29[a]	-	-	-	-	-	-	-	-	-	-
29new	0	0	0	0	0	0	0	0	-	-
30	0	0	0	0	0	0	0	0	-	-
31	319	220	212	249	231	229	227	217	-	-
32	287	317	276	307	245	257	266	348	-	-
33	600	501	515	545	554	597	502	556	-	-
Total[b]	1249	1062	1047	1139	1094	1148	1038	1175	1119	73

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.

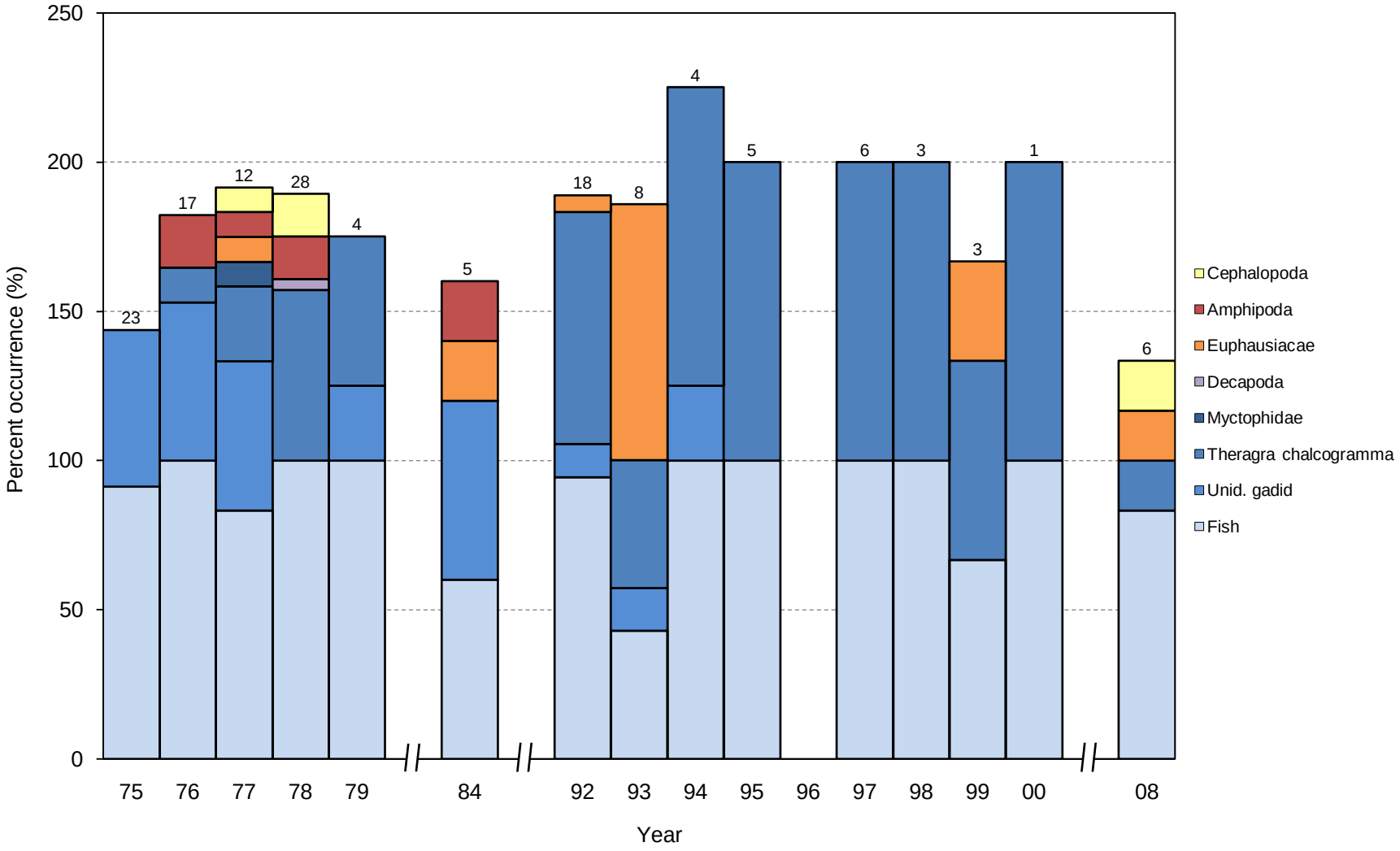


Figure 24. Frequency of occurrence of selected prey items in diets of common murres at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1980-1983, 1985-1991, 2001-2007, or after 2008.

Table 50. Frequency of occurrence of prey in diets of common murres at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult lavage samples. No samples were collected 1980-1983, 1985-1991, 2001-2007, or after 2008.

	1975	1976	1977	1978	1979	1984	1992	1993	1994	1995	1996	1997	1998	1999	2000	2008
No. samples	23	17	12	28	4	5	18	8	4	5	*no samples*	6	3	3	1	6
Cephalopoda	**-**	**-**	**8.3**	**14.3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**16.7**
Unid. squid	-	-	8.3	14.3	-	-	-	-	-	-	-	-	-	-	-	16.7
Amphipoda	**-**	**17.6**	**8.3**	**14.3**	**-**	**20.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Hyperiidea																
Themisto libellula	-	11.8	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-
Parathemisto pacifica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parathemisto/Themisto spp.	-	-	8.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Unid. amphipod	-	5.9	-	10.7	-	20.0	-	-	-	-	-	-	-	-	-	-
Euphausiacae	**-**	**-**	**8.3**	**-**	**-**	**20.0**	**5.6**	**85.7**	**-**	**-**	**-**	**-**	**-**	**33.3**	**-**	**16.7**
Thysanoessa spp.	-	-	-	-	-	-	-	85.7	-	-	-	-	-	-	-	-
Unid. euphausiid	-	-	8.3	-	-	20.0	5.6	-	-	-	-	-	-	33.3	-	16.7
Decapoda	**-**	**-**	**-**	**3.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. shrimp	-	-	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-
Unid. crustacean	8.7	-	8.3	-	-	-	-	-	25.0	20.0	-	16.7	-	-	-	-
Nereidae	4.3	-	-	7.1	-	-	-	-	-	-	-	-	-	-	-	-
Unid. invertebrate	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fish	**91.3**	**100.0**	**83.3**	**100.0**	**100.0**	**60.0**	**94.4**	**42.9**	**100.0**	**100.0**	**-**	**100.0**	**100.0**	**66.7**	**100.0**	**83.3**
Myctophidae	-	-	8.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Gadidae																
Theragra chalcogramma	-	11.8	25.0	57.1	50.0	-	77.8	42.9	100.0	100.0	-	100.0	100.0	66.7	100.0	16.7
Unid. gadid	52.4	52.9	50.0	-	25.0	60.0	11.1	14.3	25.0	-	-	-	-	-	-	-
Ammodytidae																
Ammodytes hexapterus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.7
Unid. fish	43.5	41.2	16.7	89.3	25.0	-	5.6	12.5	-	-	-	-	-	-	-	50.0

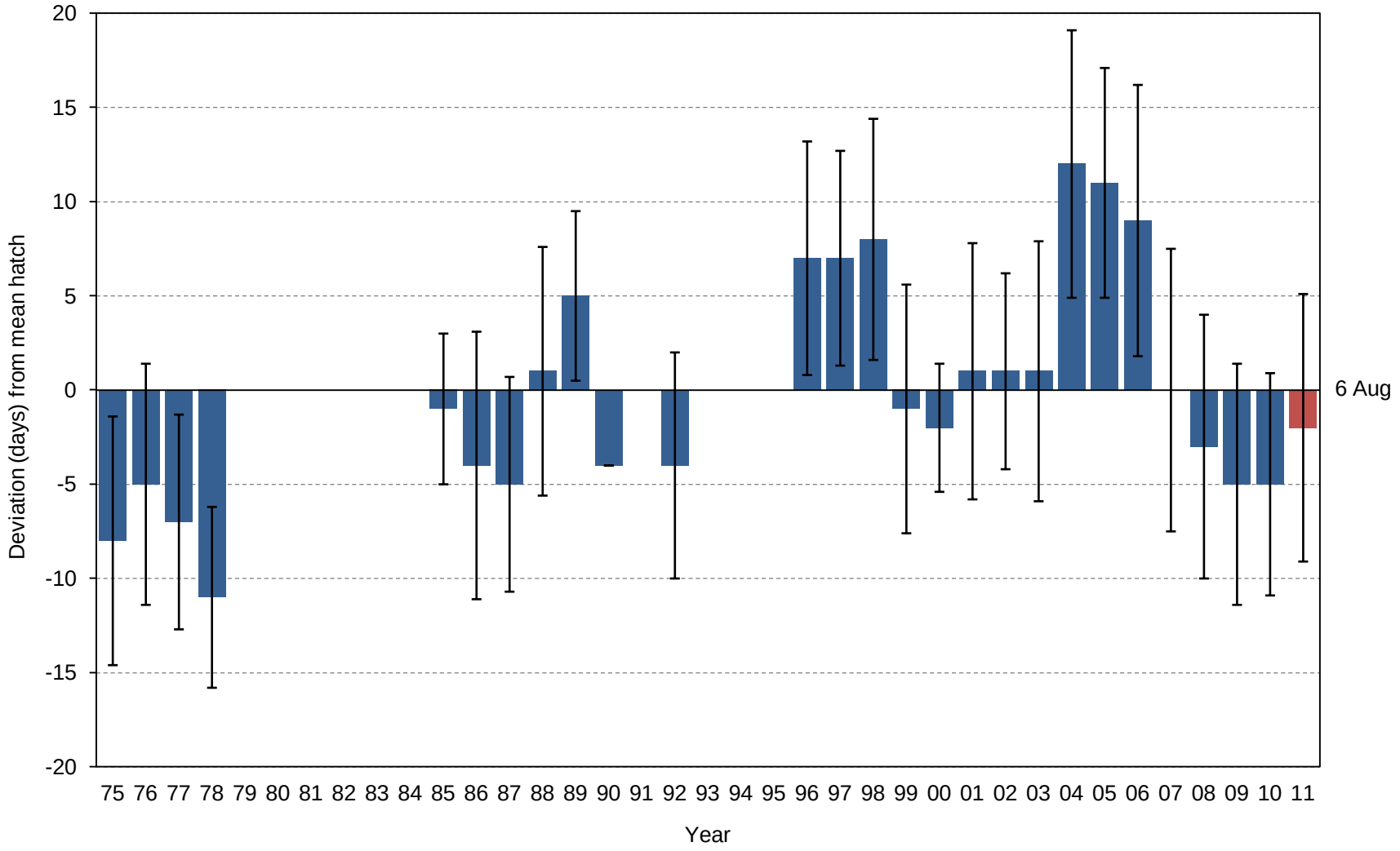


Figure 25. Yearly hatch date deviation (from the 1975-2010 mean of 6 August) for thick-billed murres at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 51. Breeding chronology of thick-billed murres at St. Paul Island, Alaska.

Year	Mean hatch	SD	*n*[a]	First hatch	Last hatch	First "jump"
1975	29 Jul	6.6	23	xx[b]	xx	xx
1976	31 Jul	6.4	83	xx	xx	xx
1977	30 Jul	5.7	34	xx	xx	xx
1978	26 Jul	4.8	50	xx	xx	xx
1979	*no data*	-	-	-	-	-
1980	*no data*	-	-	-	-	-
1981	*no data*	-	-	-	-	-
1982	*no data*	-	-	-	-	-
1983	*no data*	-	-	-	-	-
1984	*no data*	-	-	-	-	-
1985	5 Aug	4.0	16	xx	xx	xx
1986	2 Aug	7.1	72	xx	xx	xx
1987	1 Aug	5.7	260	xx	xx	xx
1988	6 Aug	6.6	45	xx	xx	xx
1989	11 Aug	4.5	205	xx	xx	xx
1990	2 Aug	-	-	xx	xx	xx
1991	*no data*	-	-	-	-	-
1992	1 Aug	6.0	220	xx	xx	xx
1993	*no data*	-	-	-	-	-
1994	*no data*	-	-	-	-	-
1995	*no data*	-	-	-	-	-
1996	12 Aug	6.2	204	xx	xx	xx
1997	13 Aug	5.7	133	29 Jul	xx	xx
1998	14 Aug	6.4	66	1 Aug	30 Aug	xx
1999	5 Aug	6.6	241	23 Jul	22 Aug	xx
2000	3 Aug	3.4	321	xx	16 Aug	xx
2001	7 Aug	6.8	52	23 Jul	xx	xx
2002	7 Aug	5.2	153	xx	xx	xx
2003	7 Aug	6.9	145	xx	xx	xx
2004	17 Aug	7.1	192	xx	xx	xx
2005	17 Aug	6.1	106	xx	xx	xx
2006	15 Aug	7.2	131	xx	xx	xx
2007	6 Aug	7.5	287	xx	xx	xx
2008	2 Aug	7.0	113	xx	xx	xx
2009	1 Aug	6.4	142	20 Jul	24 Aug	xx
2010	1 Aug	5.9	183	17 Jul	18 Aug	9 Aug
2011	4 Aug	7.1	122	21 Jul	22 Aug	12 Aug

[a]Sample sizes for mean hatch dates are a sub-sample of total nests for which egg to chick interval is ≤ 7 days.
[b]xx indicates data potentially exist but have not yet been summarized.

Table 52. Frequency distribution of hatch dates for thick-billed murres at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick ≤ 7 days.

Julian date[a]	No. nests hatching on Julian date																		
	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
193	xx[b]	xx	xx	xx	*no data*	*no data*	*no data*	*no data*	*no data*	*no data*	xx	xx	xx	xx	xx	xx	*no data*	xx	*no data*
194	xx	xx	xx	xx							xx	xx	xx	xx	xx	xx		xx	
195	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
196	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
197	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
198	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
199	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
200	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
201	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
202	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
203	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
204	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
205	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
206	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
207	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
208	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
209	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
210	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
211	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
212	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
213	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
214	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
215	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
216	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
217	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
218	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
219	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
220	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
221	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
222	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
223	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
224	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
225	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
226	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
227	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
228	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
229	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
230	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
231	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
232	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
233	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
234	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
235	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
236	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
237	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
238	xx	xx	xx	xx	-	-	-	-	-	-	xx	xx	xx	xx	xx	xx	-	xx	-
n	23	83	34	50	-	-	-	-	-	-	16	72	260	45	205	xx	-	220	-

[a]Julian dates are adjusted by one day in leap years.
[b]xx indicates data potentially exist but have not yet been summarized.

Table 52 (continued). Frequency distribution of hatch dates for thick-billed murres at St. Paul Island, Alaska. Data include only nests in which observations of egg to chick≤ 7 days.

Julian date[a]	No. nests hatching on Julian date																	
	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11
193	*no data*	*no data*	xx[b]	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
194			xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
195	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
196	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
197	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
198	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	2	-
199	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
200	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
201	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	4	-	-
202	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	8	3	4
203	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
204	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3	8	1
205	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	20	-
206	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	15	6	-
207	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	4	-
208	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	19	16	23
209	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	-
210	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	8	20	6
211	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	1
212	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	9	14	22
213	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	13	-
214	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	27	14	1
215	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	10	15	-
216	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3	7	5
217	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	7	-	-
218	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	10	8	6
219	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	7	11
220	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3	11	11
221	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	8
222	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	7	6	2
223	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
224	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	6	6	3
225	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	6
226	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	4
227	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	2
228	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
229	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	2
230	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1	2
231	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	1
232	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
233	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
234	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	1
235	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
236	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-	-
237	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
238	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-	-
n	-	-	204	133	66	241	321	52	153	145	192	106	131	287	113	142	183	122

[a]Julian dates are adjusted by one day in leap years.
[b]xx indicates data potentially exist but have not yet been summarized.

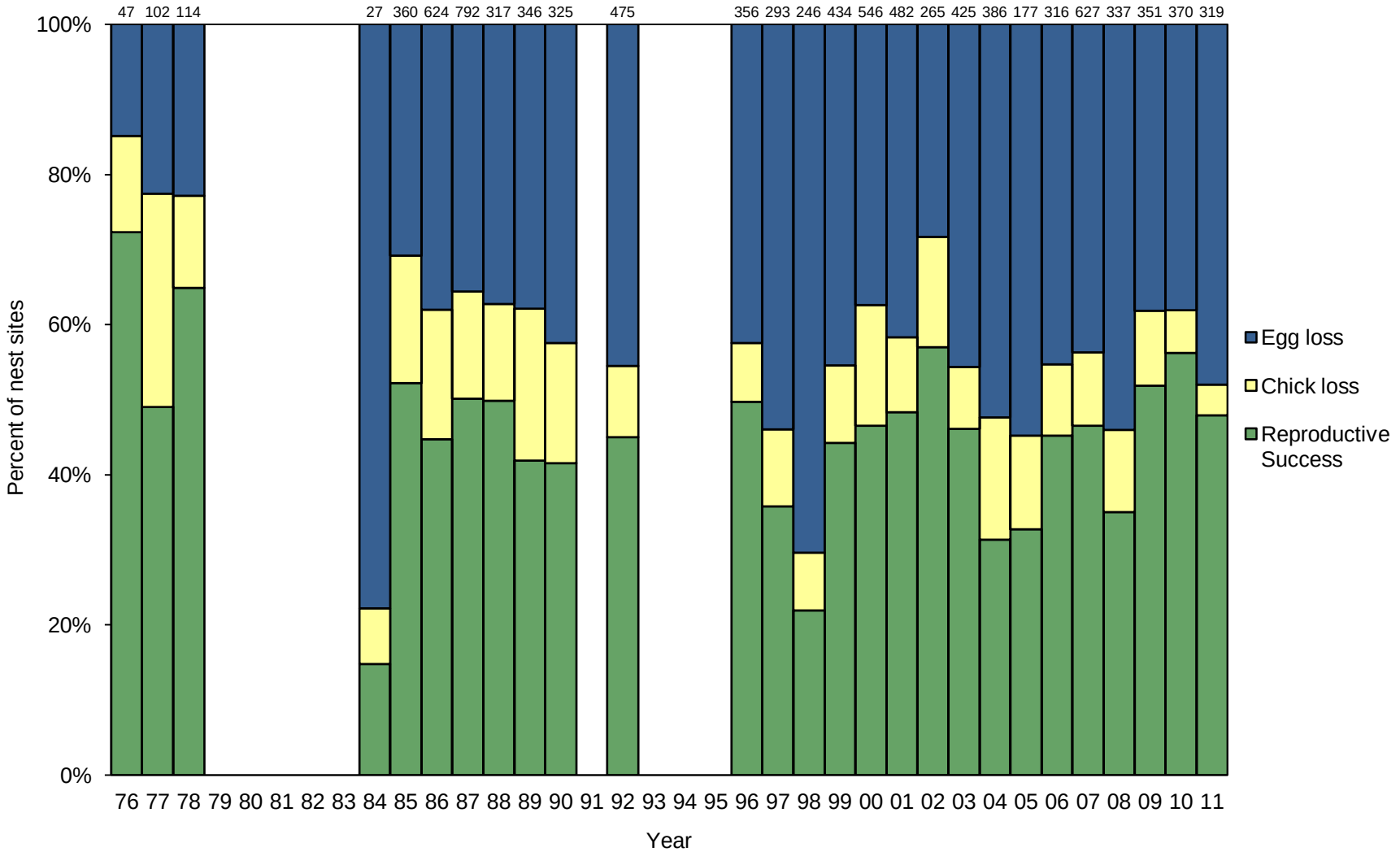


Figure 26. Reproductive performance of thick-billed murres at St. Paul Island, Alaska. Egg loss=(B-D)/B; Chick loss=(D-F)/B; Reproductive success=F/B, where B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns indicate sample sizes (B).

Table 53. Reproductive performance of thick-billed murres at St. Paul Island, Alaska.

Year	Nest sites w/ eggs (B)	Nest sites w/ chicks (D)	Nest sites w/ chicks fledged (F)	Nesting success (D/B)[a]	Fledging success (F/D)[b]	Reproductive success (F/B)
1976	47	40	34	0.85	0.85	0.72
1977	102	(79)[c]	(50)	0.75[d]	0.63[d]	0.49[d]
1978	114	(88)	(74)	0.77[d]	0.84[d]	0.65[d]
1979	*no data*	-	-	-	-	-
1980	*no data*	-	-	-	-	-
1981	*no data*	-	-	-	-	-
1982	*no data*	-	-	-	-	-
1983	*no data*	-	-	-	-	-
1984	27	6	4	0.22	0.67	0.15
1985	360	249	188	0.69	0.76	0.52
1986	624	387	279	0.62	0.72	0.45
1987	792	510	397	0.64	0.78	0.50
1988	317	199	158	0.63	0.79	0.50
1989	346	215	145	0.62	0.67	0.42
1990	325	187	135	0.58	0.72	0.42
1991	*no data*	-	-	-	-	-
1992	475	259	214	0.55	0.83	0.45
1993	*no data*	-	-	-	-	-
1994	*no data*	-	-	-	-	-
1995	*no data*	-	-	-	-	-
1996	356	205	177	0.58	0.86	0.50
1997	293	135	105	0.46	0.78	0.36
1998	246	73	54	0.30	0.74	0.22
1999	434	237	192	0.55	0.81	0.44
2000	546	342	254	0.63	0.74	0.47
2001	482	281	233	0.58	0.83	0.48
2002	265	190	151	0.72	0.79	0.57
2003	425	231	196	0.54	0.85	0.46
2004	386	184	121	0.48	0.66	0.31
2005	177	80	58	0.45	0.73	0.33
2006	316	173	143	0.55	0.83	0.45
2007	627	353	292	0.56	0.83	0.47
2008	337	155	118	0.46	0.76	0.35
2009	351	217	182	0.62	0.84	0.52
2010	370	229	208	0.62	0.91	0.56
2011	319	166	153	0.52	0.92	0.48

[a]For single-egg species, nesting success (D/B) is the same as hatching success (E/C) because nest sites w/ eggs (B)=total eggs (C) and nest sites w/ chicks (D)=total chicks (E).

[b]For single-egg species, fledging success (F/B) is the same as chick success (G/E) because nest sites w/ chicks (D)=total chicks (E) and nest sites w/ chicks fledged (F)=total chicks fledged (G).

[c]Values in parentheses were not reported by original investigators and are estimated from other known parameters.

[d]Reported values are the midpoint of a range (see Appendix E).

Table 54. Standard deviation in reproductive performance parameters of thick-billed murres at St. Paul Island, Alaska. For sampling clustered by plot, values are calculated using ratio estimator spreadsheets.

Year	No. plots[a]	Sampling design	Nesting success	Fledging success	Reproductive success
1976	xx[b]	xx	xx	xx	xx
1977	xx	xx	xx	xx	xx
1978	xx	xx	xx	xx	xx
1979	*no data*	-	-	-	-
1980	*no data*	-	-	-	-
1981	*no data*	-	-	-	-
1982	*no data*	-	-	-	-
1983	*no data*	-	-	-	-
1984	xx	xx	xx	xx	xx
1985	xx	xx	xx	xx	xx
1986	xx	xx	xx	xx	xx
1987	xx	xx	xx	xx	xx
1988	xx	xx	xx	xx	xx
1989	xx	xx	xx	xx	xx
1990	xx	xx	xx	xx	xx
1991	*no data*	-	-	-	-
1992	xx	xx	xx	xx	xx
1993	*no data*	-	-	-	-
1994	*no data*	-	-	-	-
1995	*no data*	-	-	-	-
1996	14	Cluster by plot	0.03	0.09	0.04
1997	13	Cluster by plot	0.04	0.12	0.08
1998	10	Cluster by plot	0.05	0.06	0.05
1999	17	Cluster by plot	0.04	0.04	0.04
2000	18	Cluster by plot	0.04	0.04	0.04
2001	17	Cluster by plot	0.03	0.03	0.03
2002	13	Cluster by plot	0.03	0.04	0.04
2003	20	Cluster by plot	0.03	0.02	0.03
2004	16	Cluster by plot	0.04	0.06	0.05
2005	16	Cluster by plot	0.12	0.07	0.11
2006	18	Cluster by plot	0.15	0.18	0.15
2007	24	Cluster by plot	0.03	0.02	0.03
2008	16	Cluster by plot	0.03	0.03	0.03
2009	12	Cluster by plot	0.02	0.02	0.03
2010	13	Cluster by plot	0.03	0.02	0.04
2011	14	Cluster by plot	0.04	0.02	0.04

[a]Plots that are combined for analysis are counted as a single "plot".
[b]xx indicates data potentially exist but have not yet been summarized.

Table 55. Reproductive performance of thick-billed murres at St. Paul Island, Alaska in 2011.

Parameter	Plot														Total	SD[b]
	48	53	54	61	64/65 /66[a]	67	68	80/ 81[a]	84	85/ 86[a]	87/ 104[a]	89	110	114		
Nest sites w/ eggs (B)	27	28	8	15	20	33	17	25	21	29	27	24	20	25	319	-
Nest sites w/ chicks (D)	17	8	5	8	15	13	11	17	7	17	12	10	14	12	166	-
Nest sites w/ chicks fledged (F)	16	7	5	8	13	13	9	16	6	17	11	9	13	10	153	-
Nesting success (D/B)[c]	0.63	0.29	0.63	0.53	0.75	0.39	0.65	0.68	0.33	0.59	0.44	0.42	0.70	0.48	0.52	0.04
Fledging success (F/D)[d]	0.94	0.88	1.00	1.00	0.87	1.00	0.82	0.94	0.86	1.00	0.92	0.90	0.93	0.83	0.92	0.02
Reproductive success (F/B)	0.59	0.25	0.63	0.53	0.65	0.39	0.53	0.64	0.29	0.59	0.41	0.38	0.65	0.40	0.48	0.04

[a]Plots were combined for statistical purposes.

[b]Standard deviations are calculated from ratio estimator spreadsheets, based on plot as a sample unit.

[c]For single-egg species, nesting success (D/B) is the same as hatching success (E/C) because nest sites w/ eggs (B)=total eggs (C) and nest sites w/ chicks (D)=total chicks (E).

[d]For single-egg species, fledging success (F/B) is the same as chick success (G/E) because nest sites w/ chicks (D)=total chicks (E) and nest sites w/ chicks fledged (F)=total chicks fledged (G).

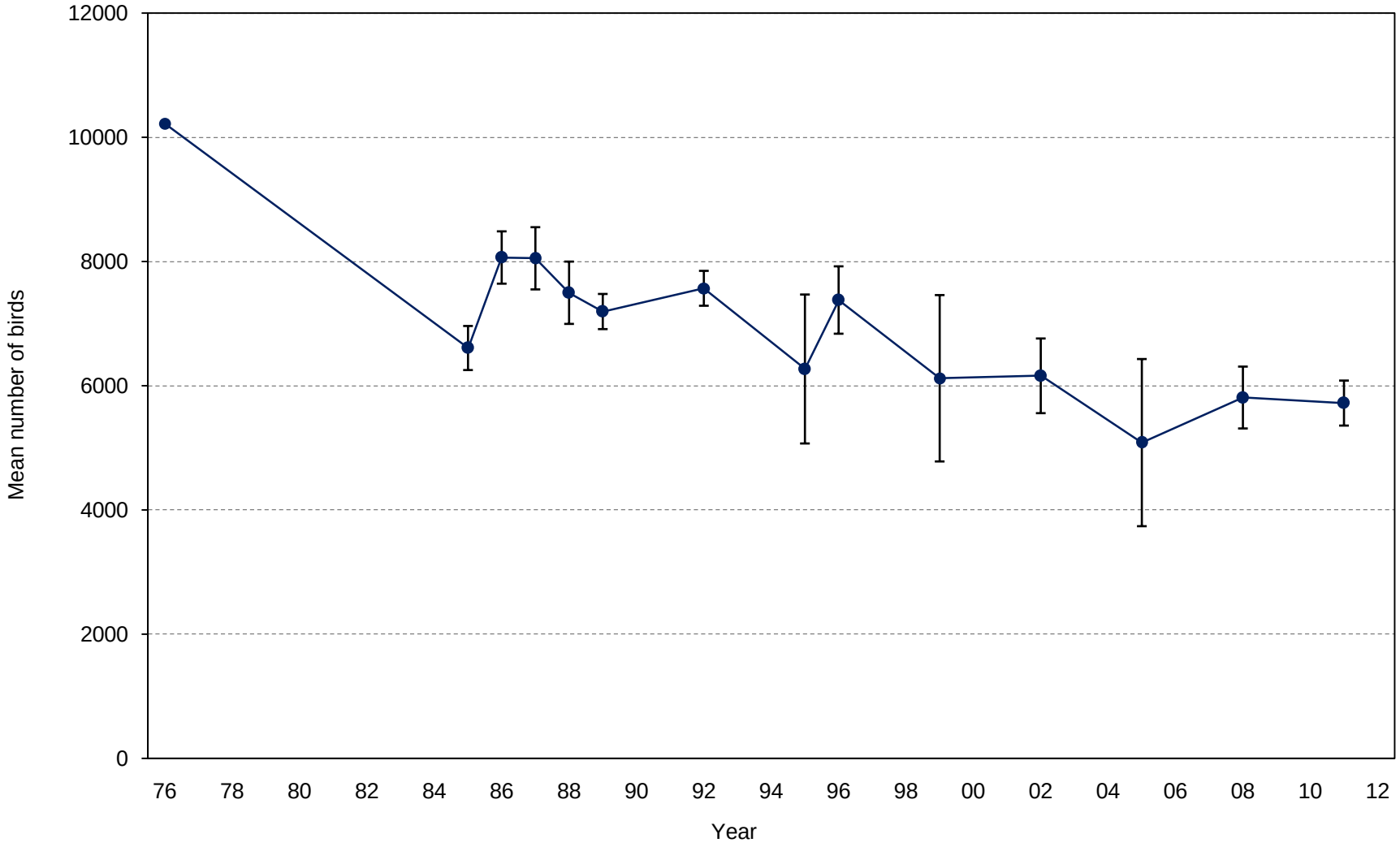


Figure 27. Mean numbers of thick-billed murres counted on index at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 56. Numbers of thick-billed murres counted on index plots at St. Paul Island, Alaska. Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30. No counts were conducted during years not listed; data from 1982 and 1984 are excluded because not all plots were counted.

Replicate	1976	1985	1986	1987	1988	1989	1992	1995	1996	1999	2002	2005	2008	2011
1	10223	6460	7473	7335	6877	6921	7216	5251	7121	4147	5165	2957	5662	6090
2	-	6478	8295	8152	6966	6904	7511	5966	6513	5139	6109	4156	5451	5886
3	-	6358	8499	7865	7813	6953	7381	7592	7561	5816	6109	3985	5075	6138
4	-	7134	8271	7763	7080	7406	7776	-	7552	7084	7050	4714	6656	5857
5	-	-	7789	8676	7755	7272	7854	-	7388	7750	6282	6223	5645	5771
6	-	-	-	8525	8046	7002	7766	-	8149	6786	6243	6918	6359	5465
7	-	-	-	-	7948	7560	-	-	-	-	-	6078	5784	5049
8	-	-	-	-	-	7544	-	-	-	-	-	5639	5849	5510
Mean	10223	6608	8065	8053	7498	7195	7581	6270	7381	6120	6160	5084	5810	5721
n	1	4	5	6	7	8	6	3	6	6	6	8	8	8
SD	-	355	421	501	502	283	252	1200	543	1340	602	1346	498	363
First count	17 Jul	xx[a]	6 Jul	9 Jul	12 Jul	17 Jul	12 Jul	9 Jul	10 Jul	7 Jul	8 Jul	11 Jul	1 Jul	6 Jul
Last count	21 Jul	xx	29 Jul	23 Jul	7 Aug	9 Aug	7 Aug	3 Aug	2 Aug	7 Aug	1 Aug	31 Jul	31 Jul	1 Aug

[a]xx indicates data potentially exist but have not yet been summarized.

Table 57. Numbers of thick-billed murres counted on index plots at St. Paul Island, Alaska in 2011.

Plot	Replicate								Mean	SD
	1	2	3	4	5	6	7	8		
	6-8 Jul	9-10 Jul	12-14 Jul	14-17 Jul	19-21 Jul	25-26 Jul	28-29 Jul	30 Jul-1 Aug		
1	0	5	2	2	0	2	0	2	-	-
2sw	0	0	0	0	0	0	0	0	-	-
2ne	0	0	0	0	0	0	0	0	-	-
3	30	34	33	30	39	41	28	34	-	-
4	40	37	25	41	29	19	21	25	-	-
5sw	158	146	162	161	200	161	117	132	-	-
5ne	41	36	28	31	21	25	13	21	-	-
6[a]	-	-	-	-	-	-	-	-	-	-
7	25	15	22	16	21	13	15	18	-	-
8	46	50	53	58	81	54	52	50	-	-
9	-	-	-	-	-	-	-	-	-	-
10	113	108	126	87	125	134	43	8	-	-
11	19	39	21	22	25	23	19	27	-	-
12	35	34	32	37	41	37	30	38	-	-
13	76	91	89	80	91	90	41	68	-	-
14	167	122	136	104	149	106	93	99	-	-
15	31	44	57	101	53	37	37	41	-	-
16[a]	-	-	-	-	-	-	-	-	-	-
17[a]	-	-	-	-	-	-	-	-	-	-
18	39	43	40	42	40	34	49	42	-	-
19top	32	39	36	47	71	45	61	33	-	-
19btm	160	178	171	198	184	130	137	139	-	-
20top	35	35	31	42	40	35	34	36	-	-
20btm	52	48	46	53	46	47	46	42	-	-
21[a]	-	-	-	-	-	-	-	-	-	-
22	196	142	283	190	268	166	167	173	-	-
23	135	136	118	135	164	114	110	131	-	-
24	49	50	36	39	42	45	40	35	-	-
25	33	32	32	31	32	29	25	25	-	-
26	94	88	90	83	73	78	81	60	-	-
27	0	0	0	0	0	0	0	0	-	-
28	25	29	27	25	26	29	31	26	-	-
29[a]	-	-	-	-	-	-	-	-	-	-
29new	65	57	62	73	87	52	63	61	-	-
30	92	96	103	136	150	125	111	118	-	-
31	1721	1509	1708	1303	1757	1675	1445	1519	-	-
32	1590	1672	1557	1592	766	1294	1383	1425	-	-
33	1360	1350	1394	1558	1617	1179	1114	1442	-	-
Total[b]	6090	5886	6138	5857	5771	5465	5049	5510	5721	363

[a]Historical plots no longer counted.
[b]Totals include all plots except 2ne, 6, 9, 16, 17, 19btm, 20btm, 21, 29, 29new, and 30.

Table 58. Total number of adult thick-billed murres banded on survival plots at St. Paul Island, Alaska. Data include birds banded with alphanumeric color bands and three color band combinations (2008 only).

Parameter	Year			
	2008	2009	2010	2011
New color bands	2	16	33	3
New metal and colors	2	14	29	0
New colors on previous metal-banded bird[a]	0	2	4	3
New color bands replace old color bands[b]	0	0	0	0
Cum. color-banded birds	2	18	51	54

[a]Bird previously banded with metal band only, caught subsequent year and given color band; adds one bird to number of new color bands.
[b]Bird previously banded with color band recaptured and given new color band; does not add to number of birds color-banded.

Table 59. Fates of cohorts of adult thick-billed murres banded on survival plots at St. Paul Island, Alaska. Data include birds banded with alphanumeric color bands and three color band combinations (2008 only).

Year	No. birds banded in year	No. birds resighted in:			Prop. birds resighted in 2011
		2009	2010	2011	
2008	2	2	2	1	0.50
2009	16	-	9	11	0.69
2010	33	-	-	23	0.70
2011	3[a]	-	-	-	-[a]
Birds seen in current year (A)		2	11	35	-
Birds potentially alive from prior year (B)[b]		2	18	48	-
Apparent annual survival (A/B)[c]		1.00	0.61	0.73	-
Resighting effort[d]					
Total no. resight days		4	11	22	-
Total no. resight hours		N/A[e]	18.9	11.3	-

[a]Birds banded in current year are not resighted until following year and not included in current year totals.

[b]Value equals the sum of birds resighted in prior year + birds not resighted in prior year but resighted in future years and thus known to have been alive in prior year + new birds banded in prior year.

[c]Survival should be considered a minimum estimate because it is likely not all birds present were observed each year.

[d]Resighting effort represents sum of time spent at survival plots and includes only dedicated resighting time, not incidental observations made during other work. Hours are calculated by people-hours: 2 people resighting for 1 hour each = 2 resight hours.

[e]N/A indicates total resight hours not recorded.

Table 60. Resight history of adult thick-billed murres banded on survival plots at St. Paul Island, Alaska. Values represent number of times birds were resighted each year. Color codes are recorded as color and # of band for birds banded with alphanumeric color bands, and as colors (in code) of bands on left (L) and right (R) legs for birds banded with three band combinations.

Codes:	Color combos		Location		Resight history
	DB = dark blue	R = red	ZD = Zapadni Dip	Z84 = Zapadni Plot 84	0 = not resighted
	DG = dark green	W = white	PZD = Past Zapadni Dip	TO = Tolstoi	x = band no longer resightable (dead, removed, etc.)
	O = orange	Y = yellow			

Color band		Metal band #	Year banded	Location banded	Notes	Year resighted		
Color or L leg	Band # or R leg					2009	2010	2011
DG/O	DB	1186-04112	2008	ZD		2	3	0
DG/R	DB	1186-04122	2008	ZD		3	5	1
Yellow	A5	1186-04115	2009	ZD		-	6	3
Yellow	A6	1186-04202	2009	ZD		-	0	3
Yellow	A7	1186-04203	2009	ZD		-	0	8
Yellow	A9	895-12792	2009	ZD		-	2	0
Yellow	A0	1186-04118	2009	ZD		-	5	1
Yellow	C1	895-12791	2009	ZD		-	1	0
Yellow	E1	1186-04223	2009	Z84		-	1	0
Yellow	E2	1186-04224	2009	Z84		-	4	2
Yellow	E3	1186-04225	2009	Z84		-	0	0
Yellow	E4	1186-04226	2009	Z84		-	4	0
Yellow	E5	1186-04784	2010	PZD		-	-	5
Yellow	E7	1186-04786	2010	PZD		-	-	9
Yellow	E0	1186-04766	2010	TO		-	-	1
Yellow	F7	1186-04770	2010	ZD		-	-	2
Yellow	H2	1186-04768	2010	TO		-	-	0
Yellow	H4	1186-04767	2010	TO		-	-	0
Yellow	H5	1186-04783	2010	PZD		-	-	4
Yellow	H6	1186-04785	2010	PZD		-	-	3
Yellow	H0	1186-04769	2010	TO		-	-	0
Yellow	J2	1186-04109	2009	Z84		-	0	5
Yellow	J3	1186-04110	2009	Z84		-	0	1
Yellow	L6	1186-04247	2010	TO		-	-	2
Yellow	L7	1186-04248	2010	TO		-	-	0
Yellow	L8	1186-04249	2010	TO		-	-	0
Yellow	L9	1186-04250	2010	ZD		-	-	6
Yellow	M1	1186-04243	2010	TO		-	-	0
Yellow	M2	1186-04244	2010	TO		-	-	0
Yellow	M3	1186-04245	2010	TO		-	-	4
Yellow	M4	1186-04137	2010	PZD		-	-	5
Yellow	M5	1186-04246	2010	ZD		-	-	1
Yellow	M6	1186-04761	2010	ZD		-	-	0
Yellow	M7	1186-04764	2010	ZD		-	-	6
Yellow	M8	1186-04782	2010	PZD		-	-	11

Table 60 (continued). Resight history of adult thick-billed murres banded on survival plots at St. Paul Island, Alaska. Values represent number of times birds were resighted each year. Color codes are recorded as color and # of band for birds banded with alphanumeric color bands, and as colors (in code) of bands on left (L) and right (R) legs for birds banded with three band combinations.

Codes:	Color combos		Location		Resight history
	DB = dark blue	R = red	ZD = Zapadni Dip	Z84 = Zapadni Plot 84	0 = not resighted
	DG = dark green	W = white	PZD = Past Zapadni Dip	TO = Tolstoi	x = band no longer resightable (dead, removed, etc.)
	O = orange	Y = yellow			

Color band		Metal band #	Year banded	Location banded	Notes	Year resighted		
Color or L leg	Band # or R leg					2009	2010	2011
Yellow	M9	1186-04781	2010	ZD		-	-	4
Yellow	M0	895-12797	2010	ZD		-	-	1
Yellow	N1	1186-04229	2010	TO		-	-	2
Yellow	N2	1186-04230	2010	TO		-	-	1
Yellow	N3	1186-04235	2010	TO		-	-	3
Yellow	N4	1186-04236	2010	TO		-	-	1
Yellow	N5	1186-04237	2010	TO		-	-	0
Yellow	N6	1186-04108	2010	PZD		-	-	1
Yellow	N7	1186-04116	2010	ZD		-	-	0
Yellow	N8	1186-04762	2010	ZD		-	-	2
Yellow	N9	1186-04765	2010	ZD		-	-	1
Yellow	N0	1186-04763	2010	ZD		-	-	5
Yellow	P1	1186-04231	2009	Z84		-	0	1
Yellow	P2	1186-04232	2009	Z84		-	1	3
Yellow	P3	1186-04233	2009	Z84		-	0	2
Yellow	P4	1186-04234	2009	Z84		-	1	4
Yellow	R0	846-00195	2011	ZD		-	-	-
Yellow	R7	118-604113	2011	ZD		-	-	-
Yellow	T1	1186-04206	2011	ZD		-	-	-
			Total birds resighted			2	11	35

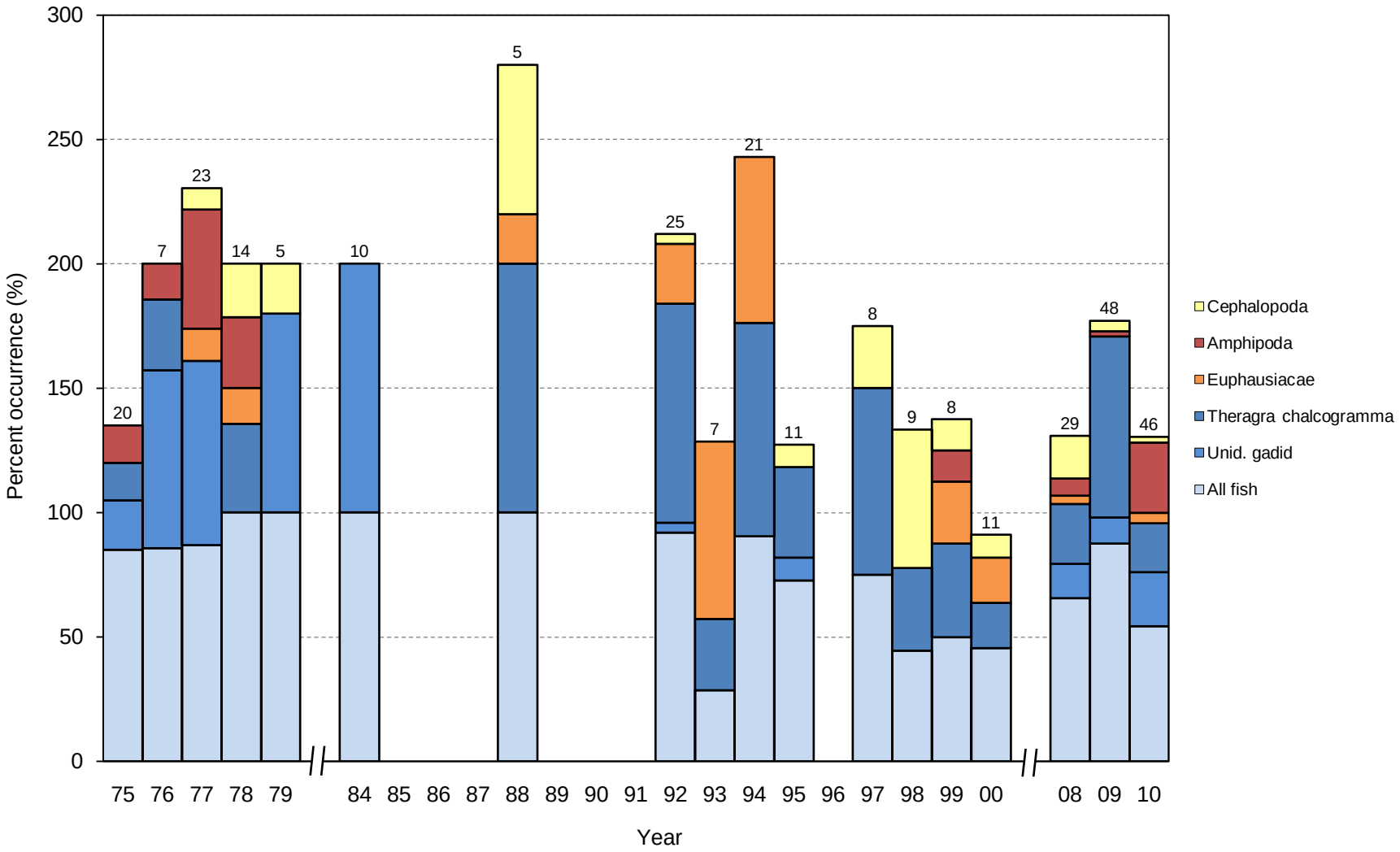


Figure 28. Frequency of occurrence of selected prey items in diets of thick-billed murres at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1980-1983, 2001-2007, or 2011.

Table 61. Frequency of occurrence of prey in diets of thick-billed murres at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult lavage samples. No samples were collected 1980-1983, 2001-2007, or 2011.

	1975	1976	1977	1978	1979	1984	1985	1986	1987	1988	1989	1990	1991
No. samples	20	7	23	14	5	10	*no samples*	*no samples*	*no samples*	5	*no samples*	*no samples*	*no samples*
Cephalopoda	**-**	**-**	**8.7**	**21.4**	**20.0**	**-**	**-**	**-**	**-**	**60.0**	**-**	**-**	**-**
Unid. squid	-	-	8.7	21.4	20.0	-	-	-	-	60.0	-	-	-
Unid. mollusca	-	-	4.3	-	-	-	-	-	-	-	-	-	-
Amphipoda	**15.0**	**14.3**	**47.8**	**28.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Hyperiidea													
Themisto libellula	5.0	14.3	43.5	28.6	-	-	-	-	-	-	-	-	-
Parathemisto/Themisto spp.	5.0	-	4.3	7.1	-	-	-	-	-	-	-	-	-
Unid. Hyperiidea	-	-	-	-	-	-	-	-	-	-	-	-	-
Gammaridea													
Unid. Gammaridea	-	-	-	-	-	-	-	-	-	-	-	-	-
Unid. amphipod	5.0	-	-	-	-	-	-	-	-	-	-	-	-
Euphausiacae	**-**	**-**	**13.0**	**14.3**	**-**	**-**	**-**	**-**	**-**	**20.0**	**-**	**-**	**-**
Thysanoessa raschii	-	-	-	-	-	-	-	-	-	-	-	-	-
T. inermis	-	-	4.3	-	-	-	-	-	-	-	-	-	-
Thysanoessa spp.	-	-	-	-	-	-	-	-	-	20.0	-	-	-
Unid. euphausiid	-	-	8.7	14.3	-	-	-	-	-	-	-	-	-
Unid. crustacean	20.0	14.3	-	-	-	-	-	-	-	-	-	-	-
Nereidae	-	-	4.3	7.1	20.0	-	-	-	-	-	-	-	-
Fish	**85.0**	**85.7**	**87.0**	**100.0**	**100.0**	**100.0**	**-**	**-**	**-**	**100.0**	**-**	**-**	**-**
Clupeidae													
Clupea pallasii	-	-	-	-	-	-	-	-	-	-	-	-	-
Osmeridae													
Mallotus villosus	-	-	4.3	7.1	-	-	-	-	-	20.0	-	-	-
Myctophidae	-	-	8.7	-	-	-	-	-	-	20.0	-	-	-
Gadidae													
Theragra chalcogramma	15.0	28.6	-	35.7	-	-	-	-	-	100.0	-	-	-
Gadus macrocephalus	-	-	-	-	-	-	-	-	-	-	-	-	-
Unid. gadid	20.0	71.4	73.9	-	80.0	100.0	-	-	-	-	-	-	-
Anoplopomatidae													
Anoplopoma fimbria	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexagrammidae	-	-	-	-	-	-	-	-	-	-	-	-	-
Cottidae	5.0	-	21.7	7.1	-	-	-	-	-	-	-	-	-
Zoarcidae													
Lycodes diapterus	-	-	-	-	-	-	-	-	-	-	-	-	-
Lycodes spp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Unid. Zoarcidae	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammodytidae													
Ammodytes hexapterus	-	-	-	7.1	-	-	-	-	-	-	-	-	-
Pleuronectidae	-	-	-	-	-	-	-	-	-	20.0	-	-	-
Unid. fish	45.0	14.3	26.1	78.6	80.0	-	-	-	-	40.0	-	-	-

Table 61 (continued). Frequency of occurrence of prey in diets of thick-billed murres at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult lavage samples. No samples were collected 1980-1983, 2001-2007, or 2011.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2008	2009	2010
No. samples	25	7	21	11	*no samples*	8	9	8	11	29	48	46
Cephalopoda	**4.0**	**-**	**-**	**9.1**	**-**	**25.0**	**55.6**	**12.5**	**9.1**	**17.2**	**4.2**	**2.2**
Unid. squid	4.0	-	-	9.1	-	25.0	55.6	12.5	9.1	17.2	4.2	2.2
Unid. mollusca	-	-	-	-	-	-	-	-	-	24.1	2.1	2.2
Amphipoda	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**12.5**	**-**	**6.9**	**2.1**	**28.3**
Hyperiidea												
Themisto libellula	-	-	-	-	-	-	-	-	-	-	-	13.0
Parathemisto/Themisto spp.	-	-	-	-	-	-	-	-	-	-	-	6.5
Unid. Hyperiidea	-	-	-	-	-	-	-	-	-	-	2.1	-
Gammaridea												
Unid. Gammaridea	-	-	-	-	-	-	-	-	-	6.9	-	-
Unid. amphipod	-	-	-	-	-	-	-	12.5	-	-	-	8.7
Euphausiacae	**24.0**	**71.4**	**66.7**	**-**	**-**	**-**	**-**	**25.0**	**18.2**	**3.4**	**-**	**4.3**
Thysanoessa raschii	-	-	-	-	-	-	-	-	-	-	-	4.3
T. inermis	-	-	-	-	-	-	-	-	-	-	-	4.3
Thysanoessa spp.	24.0	71.4	-	-	-	-	-	-	-	-	-	-
Unid. euphausiid	-	-	66.7	-	-	-	-	25.0	18.2	3.4	-	-
Unid. crustacean	4.0	14.3	33.3	36.4	-	12.5	-	-	45.5	-	-	-
Nereidae	-	-	-	-	-	-	-	-	-	29.2	-	2.2
Fish	**92.0**	**28.6**	**90.5**	**72.7**	**-**	**75.0**	**44.4**	**50.0**	**45.5**	**65.5**	**87.5**	**54.3**
Clupeidae												
Clupea pallasii	-	-	-	-	-	-	-	-	-	-	-	6.5
Osmeridae												
Mallotus villosus	-	-	-	-	-	-	-	12.5	-	-	-	-
Myctophidae	-	-	-	-	-	-	-	-	-	3.4	2.1	-
Gadidae												
Theragra chalcogramma	88.0	28.6	85.7	36.4	-	75.0	33.3	37.5	18.2	24.1	72.9	19.6
Gadus macrocephalus	-	-	-	-	-	-	-	-	-	-	-	4.3
Unid. gadid	4.0	-	-	9.1	-	-	-	-	-	13.8	10.4	21.7
Anoplopomatidae												
Anoplopoma fimbria	-	-	-	-	-	-	-	-	9.1	-	-	-
Hexagrammidae	-	-	-	-	-	-	-	-	9.1	3.4	-	-
Cottidae	-	-	-	-	-	-	-	-	-	-	-	-
Zoarcidae												
Lycodes diapterus	-	-	-	-	-	-	-	-	-	-	-	2.2
Lycodes spp.	-	-	-	-	-	-	-	-	-	20.7	-	17.4
Unid. Zoarcidae	-	-	-	-	-	-	-	-	-	-	-	13.0
Ammodytidae												
Ammodytes hexapterus	-	-	-	-	-	-	-	-	-	-	-	-
Pleuronectidae	-	-	-	-	-	-	-	-	-	6.9	-	-
Unid. fish	-	-	4.8	27.3	-	-	11.1	-	9.1	10.3	4.2	10.9

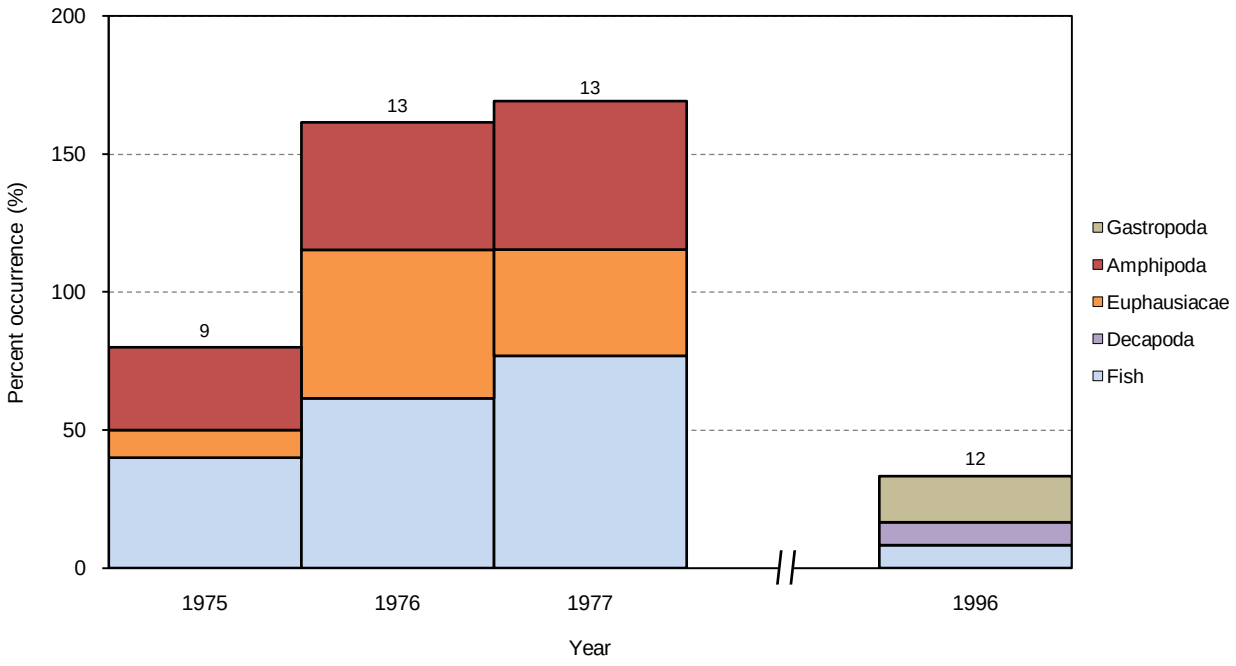


Figure 29. Frequency of occurrence of selected prey items in diets of parakeet auklets at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1978-1995 or after 1996.

Table 62. Frequency of occurrence of prey in diets of parakeet auklets at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult regurgitations. No samples were collected 1978-1995 or after 1996.

	1975	1976	1977	1996
No. samples	9	13	13	12
Gastropoda	**-**	**-**	**-**	**16.7**
Unid. pteropod	-	-	-	16.7
Amphipoda	**30.0**	**46.2**	**53.8**	**-**
Hyperiidea				
Themisto libellula	10.0	23.1	38.5	-
Unid. Hyperiidea	10.0	23.1	15.4	-
Euphausiacae	**10.0**	**53.8**	**38.5**	**-**
Thysanoessa raschii	-	23.1	23.1	-
T. inermis	-	15.4	-	-
Thysanoessa spp.	10.0	-	-	-
Unid. euphausiid	-	-	15.4	-
Decapoda	**-**	**-**	**-**	**8.3**
Lithodidae	-	-	-	8.3
Cumacea	-	-	7.7	-
Unid. crustacean	-	-	15.4	33.3
Nereidae	10.0	7.7	84.6	16.7
Unid. invertebrate	40.0	-	-	-
Fish	**40.0**	**61.5**	**76.9**	**8.3**
Gadidae				
Unid. gadid	-	-	46.2	8.3
Ammodytidae				
Ammodytes hexapterus	-	-	7.7	-
Pleuronectidae	-	-	7.7	-
Unid. fish	10.0	-	30.8	-

Table 63. Total number of least auklets banded on survival plot at St. Paul Island, Alaska. Banding dates were not recorded for some birds so these data are presented as a range of potential banding dates (e.g., ≤88). Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Parameter	Year																			
	87	≤88	≤89	90	91	≤92	92	93	94	95	≤96	96	≤97	97	98	99	≤00	00	01	02
Total new birds banded	89	74	4	0	0	1	6	0	0	0	1	84	3	82	27	10	1	44	5	0
New color band combinations (adults)	85	59	4	0	0	1	6	0	0	0	1	84	3	82	27	10	1	44	5	0
New color band combinations (subadults)	4	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cum. color-banded birds (adults only)	85	144	148	148	148	149	155	155	155	155	156	240	243	325	352	362	363	407	412	412
Cum. total birds banded (adults and subadults)	89	163	167	167	167	168	174	174	174	174	175	259	262	344	371	381	382	426	431	431

Table 64. Fates of cohorts of least auklets banded on survival plot at St. Paul Island, Alaska. Data do not include birds banded as subadults (*n*=19). Banding dates were not recorded for some birds so these data are presented as a range of potential banding dates (e.g., ≤ 1988). Annual resight effort data are unknown. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Year	No. birds banded in year[a]	No. birds resighted in:																Proportion banded birds alive in 2002
		87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	
1987	85	(85)[b]	67	58	0	0	57	21	0	14	9	13	10	9	7	10	1	0.01
≤1988	59		(59)	34	0	0	31	16	0	10	10	13	10	12	3	9	2	0.03
≤1989	4			(4)	-	-	2	0	0	2	1	1	1	0	0	0	0	0.00
1990	0				(0)	-	-	-	-	-	-	-	-	-	-	-	-	-
1991	0					(0)	-	-	-	-	-	-	-	-	-	-	-	-
≤1992	1						(1)	0	0	0	0	0	0	0	0	0	0	0.00
1992	6						(6)	1	0	2	2	3	1	1	2	1	1	0.17
1993	0							(0)	-	-	-	-	-	-	-	-	-	-
1994	0								(0)	-	-	-	-	-	-	-	-	-
1995	0									(0)	-	-	-	-	-	-	-	-
≤1996	1										(1)	1	1	1	1	0	0	0.00
1996	84										(84)	56	34	26	20	16	11	0.13
≤1997	3											(3)	0	0	0	1	0	0.00
1997	82											(82)	46	37	28	18	8	0.10
1998	27												(27)	17	14	14	4	0.15
1999	10													(10)	6	5	5	0.50
≤2000	1														(1)	0	0	0.00
2000	44														(44)	31	23	0.52
2001	5															(5)	4	0.80
No. birds seen in current year (A)		-	67	92	-	-	90	38	0	28	22	87	103	103	81	105	59	-
Birds potentially alive from prior year (B)[c]		-	85	144	-	-	148	155	117	94	94	164	223	191	162	165	123	-
Apparent annual survival (A/B)[d]		-	0.79	0.64	-	-	0.61	0.25	0.00	0.30	0.23	0.53	0.46	0.54	0.50	0.64	0.48	-

[a]Data include only those birds resighted at least once after banding (either in the year of banding or in future years); birds banded but never again seen on the plot are excluded from the survival dataset. Therefore, these values may be less than the total number of birds banded reported in Table 63.

[b]Not all birds banded in the current year had the opportunity to be resighted that year because banding often occurred towards the end of the resighting season. Therefore, the number of birds resighted the year they were banded should not be considered an accurate estimate of survival.

[c]Value equals the sum of birds resighted in prior year + birds not resighted in prior year but resighted in future years and thus known to have been alive in prior year + new birds banded in prior year. For these purposes, birds banded in ≤1996 and 1996 are lumped as birds banded the year prior to 1997; birds banded in ≤1997 and 1997 are lumped as birds banded in the year prior to 1998, birds banded in ≤2000 and 2000 are lumped as birds banded the year prior to 2001.

[d]Survival should be considered a minimum estimate because it is likely not all birds present were observed each year and, in some years, small numbers of birds with missing bands were observed and could not be individually identified.

Table 65. Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted															
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
O/BK	R	?	1987		y	y	y	*no data*	*no data*	2+	0	0	2+	2+	0	0	0	0	0	0
LG/DB	O	802-22776	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
DB/DB	Y	802-27606	1987		y	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
DB/Y	Y	802-27607	1987		y	y	y	-	-	2+	0	0	2+	0	2+	2+	0	0	0	0
DB/O	Y	802-27608	1987		y	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
DB/R	Y	802-27609	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
DB/BK	Y	802-27610	1987		y	0	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
DG/Y	BK	802-27622	1987		y	y	y	-	-	1	0	0	0	0	0	0	0	0	0	0
R/DG	DG	802-27626	1987		y	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
Y/R	BK	802-27630	1987		y	y	y	-	-	2+	1	0	1	2+	2+	2+	2+	2+	2+	0
DB/BK	R	802-27638	1987		y	0	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
R/Y	DG	802-27657	1987		y	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
Y/LG	DG	802-27658	1987		y	y	y	-	-	2+	2+	0	0	0	0	0	0	0	0	0
DG/LG	DB	802-27662	1987		y	y	y	-	-	2+	1	0	2+	0	0	0	0	0	0	0
Y/DG	LG	802-27665	1987		y	y	y	-	-	1	0	0	0	0	0	0	0	0	0	0
DG/Y	Y	802-27667	1987		y	0	0	-	-	0	0	0	0	0	0	0	0	0	1	0
DG/DG	R	802-27668	1987		y	y	y	-	-	2+	2+	0	0	0	0	0	0	0	0	0
O/DG	BK	802-27669	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
O/O	O	802-27671	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
BK/O	DG	802-27672	1987		y	y	0	-	-	1	0	0	0	0	0	0	0	0	0	0
R/DB	BK	802-27673	1987		y	y	y	-	-	0	1	0	0	0	0	0	0	0	0	0
Y/DB	BK	802-27674	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
Y/DG	R	802-27681	1987		y	y	y	-	-	0	0	0	1	0	0	0	0	0	0	0
Y/O	O	802-27685	1987		y	y	0	-	-	0	0	0	0	0	0	1	0	0	0	0
DB/DG	O	802-27686	1987		y	y	y	-	-	0	0	0	0	0	0	0	2+	0	0	0
BK/R	O	802-27687	1987		y	0	0	-	-	2+	1	0	0	0	0	0	0	0	0	0
Y/Y	O	802-27689	1987		y	y	0	-	-	0	0	0	0	0	0	2+	0	0	0	0
R/DB	O	802-27691	1987		y	0	0	-	-	1	0	0	0	0	0	0	0	0	0	0
DG/R	O	802-27695	1987		y	y	y	-	-	2+	0	0	1	0	0	0	0	0	0	0
O/DG	O	802-27696	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
DG/DB	LG	802-27741	1987		y	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
Y/DB	LG	802-27744	1987		y	0	0	-	-	2+	0	0	0	0	0	0	0	0	0	0
O/DG	DG	802-27745	1987		y	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
R/Y	LG	802-27746	1987		y	y	y	-	-	2+	2+	0	0	0	0	0	0	0	0	0
LG/R	DB	802-27758	1987		y	y	y	-	-	2+	0	0	0	0	2+	1	0	2+	0	0
Y/LG	LG	802-27759	1987		y	0	0	-	-	1	0	0	0	0	0	0	0	0	0	0
LG/Y	DB	802-27760	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	2+	0	1

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted														
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
LG/DB	DB	802-27764	1987		y	y	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DG/LG	R	802-27765	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
LG/O	Y	802-27769	1987		y	0	0	-	-	0	0	0	0	1	0	0	0	0	0	0
O/O	LG	802-58258	1987		y	y	y	-	-	2+	0	0	0	2+	2+	0	0	0	0	0
O/Y	DB	802-58267	1987		y	y	y	-	-	2+	0	0	2+	0	2+	2+	2+	2+	0	0
DB/R	O	802-58283	1987		y	y	y	-	-	2+	2+	0	2+	0	0	0	0	0	0	0
R/R	LG	802-58285	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
BK/DB	O	802-58343	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
O/DG	R	802-58357	1987		y	y	y	-	-	2+	0	0	2+	0	0	0	0	0	0	0
O/Y	LG	802-58361	1987		y	0	0	-	-	1	0	0	0	0	0	0	0	0	0	0
LG/DB	DG	802-58373	1987		y	y	0	-	-	2+	0	0	0	0	0	0	2+	0	0	0
LG/Y	BK	802-58378	1987		y	y	y	-	-	0	0	0	0	0	0	0	0	1	0	0
DB/DB	LG	802-58403	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
LG/LG	Y	802-58408	1987		y	y	y	-	-	2+	0	0	0	0	2+	0	0	0	0	0
LG/BK	Y	802-58409	1987		y	y	y	-	-	2+	2+	0	0	0	0	0	0	0	0	0
DG/LG	LG	802-58410	1987		y	0	0	-	-	0	0	0	0	0	0	0	0	0	1	0
LG/DG	BK	802-58411	1987		y	y	0	-	-	0	0	0	0	0	0	0	0	0	1	0
O/R	BK	802-58419	1987		y	y	y	-	-	2+	2+	0	0	0	0	0	0	0	1	0
O/LG	R	802-58428	1987		y	y	y	-	-	2+	0	0	1	2+	2+	2+	0	0	0	0
Y/BK	W	802-58432	1987		y	y	y	-	-	0	0	0	0	0	2+	2+	0	0	0	0
DB/O	W	802-58434	1987		y	0	0	-	-	0	0	0	0	0	0	0	0	0	2+	0
DG/DG	LG	802-58438	1987		y	y	0	-	-	0	1	0	0	0	0	0	0	0	0	0
O/BK	W	802-58440	1987		y	y	y	-	-	2+	0	0	1	2+	2+	2+	2+	0	0	0
R/LG	W	802-58444	1987		y	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DB/DB	W	802-58452	1987		y	y	y	-	-	0	0	0	0	0	0	0	0	2+	0	0
Y/Y	R	802-58458	1987		y	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
W/Y	LG	802-58466	1987		y	y	0	-	-	0	0	0	0	0	0	0	0	0	1	0
W/O	LG	802-58467	1987		y	y	y	-	-	0	0	0	0	0	0	0	0	0	1	0
W/LG	O	802-58468	1987		y	0	0	-	-	1	0	0	0	0	0	0	0	0	0	0
BK/R	BK	802-58471	1987		y	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
B/DG	BK	802-58472	1987		y	y	y	-	-	1	0	0	0	0	0	0	0	0	0	0
R/LG	Y	802-58503	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
DG/R	LG	802-58537	1987		y	y	y	-	-	0	0	0	0	0	0	0	0	0	1	0
DG/R	Y	802-58718	1987		y	y	y	-	-	2+	1	0	1	2+	0	0	2+	0	0	0
Y/O	LG	802-58739	1987		y	y	y	-	-	1	0	0	0	0	0	0	0	0	0	0
R/BK	BK	802-58744	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
O/DB	LG	802-58748	1987		y	y	y	-	-	0	0	0	0	0	0	0	0	0	1	0

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted														
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
BK/BK	R	none	1987		y	y	y	-	-	1	0	0	0	0	0	0	0	0	0	0
DB/DB	R	none	1987		y	y	y	-	-	2+	0	0	0	0	0	0	2+	0	0	0
DB/LG	LG	none	1987		y	y	0	-	-	0	0	0	0	0	0	1	0	0	0	0
DG/DG	O	none	1987		y	0	0	-	-	0	1	0	0	0	0	0	0	0	0	0
DG/O	Y	none	1987		y	y	0	-	-	1	0	0	0	0	0	0	0	0	0	0
LG/DB	BK	none	1987		y	y	y	-	-	1	0	0	1	1	0	0	0	0	0	0
LG/R	R	none	1987		y	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
LG/Y	DG	none	1987		y	0	y	-	-	0	0	0	0	0	0	0	0	1	0	0
R/DB	Y	none	1987		y	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
R/LG	DG	none	1987		y	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
Y/LG	BK	none	1987		y	y	y	-	-	2+	2+	0	1	0	0	0	0	0	0	0
R/W	BK	?	≤ 1988		0	y	y	-	-	0	0	0	2+	0	0	0	0	0	0	0
W/W	DB	802-58254	≤ 1988		0	y	y	-	-	2+	1	0	0	0	0	0	2+	0	0	0
W/DG	W	802-58260	≤ 1988		0	y	y	-	-	1	0	0	0	0	0	0	0	0	0	0
W/O	W	802-58261	≤ 1988		0	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
W/LG	W	802-58263	≤ 1988		0	y	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
W/BK	W	802-58265	≤ 1988		0	y	0	-	-	0	1	0	0	1	0	0	0	0	0	0
W/DB	W	802-58266	≤ 1988		0	y	y	-	-	2+	0	0	2+	2+	0	0	2+	0	0	0
DG/W	LG	802-58269	≤ 1988		0	y	y	-	-	0	0	0	0	0	0	0	2+	0	0	0
W/Y	DB	802-58270	≤ 1988		0	y	y	-	-	2+	2+	0	0	1	0	0	0	0	0	0
R/W	O	802-58271	≤ 1988		0	y	y	-	-	0	1	0	0	0	0	0	0	0	0	0
LG/DB	Y	802-58275	≤ 1988		0	y	y	-	-	1	1	0	0	0	0	0	0	0	0	0
DB/W	Y	802-58278	≤ 1988		0	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
BK/BK	Y	802-58280	≤ 1988		0	y	0	-	-	2+	1	0	1	0	0	0	0	0	0	0
DG/W	DB	802-58282	≤ 1988		0	y	y	-	-	2+	2+	0	2+	2+	2+	2+	2+	0	0	0
DB/LG	O	802-58286	≤ 1988		0	y	y	-	-	2+	0	0	2+	2+	2+	0	0	0	1	0
W/DG	O	802-58287	≤ 1988		0	y	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DB/R	LG	802-58288	≤ 1988		0	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
DG/Y	O	802-58292	≤ 1988		0	y	0	-	-	1	0	0	0	0	0	0	0	0	0	0
Y/O	R	802-58295	≤ 1988		0	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
BK/LG	LG	802-58296	≤ 1988		0	y	y	-	-	2+	0	0	0	0	0	0	0	0	0	0
BK/R	LG	802-58299	≤ 1988		0	y	0	-	-	2+	0	0	0	0	0	0	0	0	0	0
R/O	W	802-58315	≤ 1988		0	y	0	-	-	1	0	0	0	0	0	0	0	0	0	0
O/DB	DG	802-58317	≤ 1988		0	y	0	-	-	0	0	0	0	0	0	0	0	1	0	0
Y/BK	DG	802-58322	≤ 1988		0	y	0	-	-	0	0	0	0	0	0	0	0	0	1	0
DG/O	LG	802-58329	≤ 1988		0	y	0	-	-	2+	0	0	0	0	0	0	0	0	0	0
BK/W	DB	802-58342	≤ 1988		0	y	y	-	-	1	2+	0	1	1	2+	2+	0	0	0	0

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted														
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
O/LG	BK	802-58344	≤ 1988		0	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
W/R	LG	802-58353	≤ 1988		0	y	0	-	-	0	0	0	0	0	0	1	0	0	1	0
LG/DG	R	802-58358	≤ 1988		0	y	0	-	-	1	0	0	0	0	0	0	0	0	0	0
O/W	BK	802-58371	≤ 1988		0	y	0	-	-	0	0	0	0	0	0	0	0	0	1	0
LG/DB	R	802-58375	≤ 1988		0	y	y	-	-	2+	0	0	1	0	0	0	2+	0	0	0
LG/BK	O	802-58378	≤ 1988		0	y	0	-	-	0	1	0	0	0	0	0	0	0	0	0
Y/O	DB	802-58379	≤ 1988		0	y	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
W/BK	O	802-58381	≤ 1988		0	y	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
LG/W	R	802-58384	≤ 1988		0	y	0	-	-	0	0	0	0	0	2+	0	0	0	1	2+
W/R	W	802-58423	≤ 1988		0	y	0	-	-	1	0	0	0	0	2+	0	0	0	0	0
DB/LG	DB	802-58435	≤ 1988		0	y	0	-	-	0	0	0	0	0	2+	1	0	0	0	0
DB/W	LG	802-58470	≤ 1988		0	y	y	-	-	0	0	0	0	0	2+	2+	0	0	0	0
W/W	R	802-58499	≤ 1988		0	y	0	-	-	0	0	0	0	1	0	0	0	0	0	0
W/W	DG	802-58500	≤ 1988		0	y	0	-	-	1	0	0	0	0	0	0	0	0	0	0
BK/Y	DB	802-58504	≤ 1988		0	y	y	-	-	2+	2+	0	0	0	0	0	0	0	0	0
DG/Y	R	802-58509	≤ 1988		0	y	y	-	-	2+	1	0	1	0	0	0	2+	2+	1	0
DB/W	DG	802-58513	≤ 1988		0	y	y	-	-	0	0	0	0	1	0	0	2+	0	0	0
O/LG	DG	802-58518	≤ 1988		0	y	y	-	-	2+	1	0	0	0	0	0	0	0	0	0
LG/W	BK	802-58525	≤ 1988		0	y	y	-	-	0	1	0	0	0	0	0	0	0	0	0
LG/W	DB	802-58531	≤ 1988		0	y	y	-	-	2+	2+	0	0	0	0	0	0	0	0	0
R/LG	DB	802-58533	≤ 1988		0	y	y	-	-	0	0	0	0	0	1	0	0	0	0	0
R/O	BK	802-58547	≤ 1988		0	y	y	-	-	2+	0	0	2+	2+	2+	2+	2+	2+	2+	0
W/Y	DG	802-58560	≤ 1988		0	y	y	-	-	2+	0	0	0	0	0	0	0	0	1	0
Y/R	DB	802-58561	≤ 1988		0	y	y	-	-	0	0	0	0	0	0	1	0	0	0	0
O/W	DB	802-58566	≤ 1988		0	y	y	-	-	0	0	0	0	0	0	0	0	0	2+	0
LG/W	O	802-58577	≤ 1988		0	y	y	-	-	2+	0	0	1	0	0	0	0	0	0	1
O/DB	O	802-58708	≤ 1988		0	y	0	-	-	0	1	0	0	0	0	0	0	0	0	0
Y/R	LG	802-58736	≤ 1988		0	y	y	-	-	0	0	0	0	2+	2+	2+	0	0	0	0
DG/W	O	802-58740	≤ 1988		0	y	0	-	-	0	0	0	0	0	0	1	0	0	0	0
O/W	O	802-58766	≤ 1988		0	y	0	-	-	1	0	0	0	0	0	0	0	0	0	0
W/LG	R	802-58769	≤ 1988		0	y	y	-	-	0	0	0	0	0	2+	0	0	0	0	0
DG/W	R	802-58771	≤ 1988		0	y	0	-	-	0	0	0	0	0	0	1	2+	0	0	0
O/LG	O	802-58779	≤ 1988		0	y	y	-	-	0	0	0	0	0	0	0	2+	0	0	0
DB/DB	DB	802-58344	≤ 1989		0	0	y	-	-	0	0	0	1	0	0	0	0	0	0	0
W/BK	BK	802-58345	≤ 1989		0	0	y	-	-	2+	0	0	1	0	2+	2+	0	0	0	0
O/DB	DB	802-58356	≤ 1989		0	0	y	-	-	1	0	0	0	0	0	0	0	0	0	0
DB/R	DB	802-58383	≤ 1989		0	0	y	-	-	0	0	0	0	1	0	0	0	0	0	0

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted														
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
O/BK	Y	802-58276	≤ 1992		0	0	0	-	-	1	0	0	0	0	0	0	0	0	0	0
LB/DB	R	802-00301	1992		0	0	0	-	-	2+	0	0	1	2+	2+	0	0	1	0	0
LB/R	Y	802-00302	1992		0	0	0	-	-	2+	0	0	0	0	2+	0	0	0	0	0
LB/Y	DB	802-00308	1992		0	0	0	-	-	2+	2+	0	2+	2+	2+	2+	2+	2+	2+	1
LB/LB	LB	802-00309	1992		0	0	0	-	-	2+	0	0	0	0	0	0	0	0	0	0
Y/LB	Y	802-00310	1992		0	0	0	-	-	2+	0	0	0	0	0	0	0	0	0	0
LB/R	W	802-58386	1992		0	0	0	-	-	2+	0	0	0	0	0	0	0	0	0	0
W/R	DB	?	≤ 1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	1	0	0
Y/LB	R	802-00312	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
R/Y	LB	802-00313	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
DB/R	LB	802-00314	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	1	2+
LB/R	LB	802-00315	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	0	0
DB/W	LB	802-00316	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	2+	0	0	0
LB/R	R	802-00317	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
Y/R	LB	802-00318	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	0	0	0	1
LB/DB	DB	802-00319	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	0	0
W/DB	LB	802-00320	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
R/LB	DB	802-00321	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
R/R	LB	802-00322	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	2+	0
R/LB	LB	802-00323	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	1	0
R/LB	Y	802-00324	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	0	0	0
DB/Y	LB	802-00325	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	0	0	0	0
LB/LB	Y	802-00326	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
LB/LG	LB	802-00327	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	2+	2+
LB/Y	Y	802-00328	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	0	0	0
R/DB	LB	802-00329	1996		0	0	0	-	-	0	0	0	0	2+	0	0	2+	0	0	0
R/LB	R	802-00330	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
DB/LB	W	802-00331	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
W/R	LB	802-00332	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	0	0	0
DB/LB	LB	802-00333	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	2+	0	0
LB/DB	W	802-00334	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
DB/LB	R	802-00335	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
W/LB	R	802-00336	1996		0	0	0	-	-	0	0	0	0	2+	2+	1	0	0	0	0
Y/DB	LB	802-00337	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
Y/LB	DB	802-00338	1996		0	0	0	-	-	0	0	0	0	2+	0	1	2+	0	0	0
W/LB	Y	802-00339	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
DB/LB	Y	802-00340	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	1

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted															
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
LB/LB	R	802-00341	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	1	0	0
DB/LB	DB	802-00342	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	2+	1
LB/LB	DB	802-00342	1996		0	0	0	-	-	0	0	0	0	2+	0	0	2+	0	0	0
Y/LB	LB	802-00344	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
W/LB	DB	802-00345	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	0	0	0	0
W/Y	LB	802-00346	1996		0	0	0	-	-	0	0	0	0	2+	0	1	0	0	0	1
DB/DB	LB	802-00347	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
W/LG	LB	802-00348	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	0	0	1	0
LG/LB	R	802-00349	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
Y/LG	LB	802-00350	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
R/LB	LG	802-00351	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
W/LB	LG	802-00352	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
DB/LG	LB	802-00353	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
DB/LB	LG	802-00354	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	0	0	0
LB/LG	R	802-00355	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LB/LG	DB	802-00356	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	0	0	0	0
Y/LB	LG	802-00357	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
R/LG	LB	802-00358	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
LG/LB	DB	802-00359	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LB/LG	W	802-00360	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	2+	0	0
LB/R	LG	802-00361	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LG/LB	LG	802-00362	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LB/Y	LG	802-00363	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	2+	0
Y/LB	W	802-00364	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
Y/W	LB	802-00365	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LB/LG	Y	802-00366	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
LB/W	LG	802-00367	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
LG/R	LB	802-00368	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	2+	2+	2+	1
LB/LG	LG	802-00369	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LB/LB	LG	802-00370	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	0	0	0	0
LG/LB	Y	802-00371	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LB/DB	LG	802-00372	1996		0	0	0	-	-	0	0	0	0	2+	0	1	0	0	0	0
LB/W	DB	802-00373	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
LG/Y	LB	802-00375	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	0	2+	2+
LG/DB	LB	802-00376	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
R/W	LB	802-00377	1996		0	0	0	-	-	0	0	0	0	2+	0	1	0	0	0	0
Y/Y	LB	802-00378	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted															
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
LB/Y	LB	802-00379	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	0	0	0	1
LB/DB	LB	802-00380	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LB/W	LB	802-00381	1996		0	0	0	-	-	0	0	0	0	2+	2+	1	2+	0	0	0
W/LB	LB	802-00382	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	1	0
W/W	LB	802-00383	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	0	2+	2+
LG/LB	LB	802-00384	1996		0	0	0	-	-	0	0	0	0	2+	0	1	0	1	0	0
LG/W	LB	802-00385	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	1	0
LG/LG	LB	802-00386	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	0	1	2+	0
LG/LB	W	802-00387	1996		0	0	0	-	-	0	0	0	0	2+	0	0	0	0	0	0
LB/Y	R	802-00388	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	2+	2+	0	0
LB/DB	Y	802-00389	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
LB/R	DB	802-00390	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	2+	0	0
LB/Y	W	802-00391	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	1	0
LB/W	R	802-00392	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	0	2+	1
LB/W	Y	802-00393	1996		0	0	0	-	-	0	0	0	0	2+	0	1	2+	1	1	0
LB/W	W	802-00394	1996		0	0	0	-	-	0	0	0	0	2+	2+	2+	2+	1	0	0
LB/LB	W	802-00395	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	0	0	0
W/LB	W	802-00396	1996		0	0	0	-	-	0	0	0	0	2+	2+	0	0	1	0	0
BK/W	LB	?	≤ 1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DB/W	DB	?	≤ 1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	1	0
LB/LG	O	?	≤ 1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
W/GY	B	1313-32038	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	0	0	0
GY/R	W	1313-32039	1997		0	0	0	-	-	0	0	0	0	0	2+	0	1	0	0	0
R/GY	W	1313-32040	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	0
GY/W	W	1313-32041	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/R	O	1313-32042	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
BK/GY	O	1313-32043	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/Y	O	1313-32044	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	1
GY/R	DB	1313-32045	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
B/GY	R	1313-32046	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DB/GY	O	1313-32047	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
GY/DB	R	1313-32048	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	0
GY/O	R	1313-32049	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	0	0	0
GY/BK	R	1313-32050	1997		0	0	0	-	-	0	0	0	0	0	2+	0	2+	0	0	0
R/GY	O	1313-32051	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	0	0	0	0
W/GY	O	1313-32052	1997		0	0	0	-	-	0	0	0	0	0	2+	0	2+	0	0	0
GY/DB	O	1313-32053	1997		0	0	0	-	-	0	0	0	0	0	2+	1	0	0	0	0

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted															
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
GY/O	O	1313-32054	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
R/GY	Y	1313-32055	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	1	0	0
R/GY	DG	1313-32056	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DB/GY	DG	1313-32057	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
Y/GY	DG	1313-32058	1997		0	0	0	-	-	0	0	0	0	0	2+	1	0	0	0	0
BK/GY	DG	1313-32059	1997		0	0	0	-	-	0	0	0	0	0	2+	1	0	0	0	0
W/GY	DG	1313-32060	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	2+
GY/R	DG	1313-32061	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	0	0	0	0
GY/DG	DG	1313-32062	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	0	1	0	0
GY/DB	DG	1313-32063	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/Y	DG	1313-32064	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
R/GY	DB	1313-32065	1997		0	0	0	-	-	0	0	0	0	0	2+	0	2+	0	0	0
Y/GY	DB	1313-32066	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
BK/GY	DB	1313-32067	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	2+	0
GY/DB	DB	1313-32068	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	2+
GY/Y	DB	1313-32069	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	0	1	2+	0
GY/BK	DB	1313-32070	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
Y/GY	Y	1313-32071	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	1	0
DG/GY	DB	1313-32072	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
O/GY	DB	1313-32073	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	0	0	0
W/GY	DB	1313-32074	1997		0	0	0	-	-	0	0	0	0	0	2+	1	0	0	0	0
GY/DG	DB	1313-32075	1997		0	0	0	-	-	0	0	0	0	0	2+	0	2+	2+	0	0
GY/O	DB	1313-32076	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	0
O/GY	DG	1313-32077	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
GY/O	DG	1313-32078	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/BK	DG	1313-32080	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/W	DG	1313-32081	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
DG/GY	O	1313-32082	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	0	2+	0
GY/BK	O	1313-32083	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/W	O	1313-32084	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DG/GY	Y	1313-32085	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
O/GY	Y	1313-32086	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
BK/GY	Y	1313-32087	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/R	Y	1313-32088	1997		0	0	0	-	-	0	0	0	0	0	2+	0	2+	0	0	0
GY/DG	Y	1313-32089	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	0	0	0	0
GY/BK	Y	1313-32090	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	0	0	0	0
GY/W	Y	1313-32091	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	0

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted															
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
DB/GY	BK	1313-32092	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
O/GY	BK	1313-32093	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
Y/GY	BK	1313-32094	1997		0	0	0	-	-	0	0	0	0	0	2+	1	0	0	0	0
BK/GY	BK	1313-32095	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	2+
R/GY	R	1313-32374	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DG/GY	DG	1313-32375	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	0	2+	1
DB/GY	DB	1313-32376	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	0	0	1
Y/GY	R	1313-32377	1997		0	0	0	-	-	0	0	0	0	0	2+	1	0	0	0	0
W/GY	R	1313-32379	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
GY/DG	R	1313-32380	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/Y	R	1313-32381	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	2+
GY/W	R	1313-32382	1997		0	0	0	-	-	0	0	0	0	0	2+	0	2+	1	2+	0
DB/GY	W	1313-32383	1997		0	0	0	-	-	0	0	0	0	0	2+	1	0	0	0	0
DB/GY	R	1313-32384	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	2+	2+
GY/R	R	1313-32385	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
DG/GY	W	1313-32386	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
GY/Y	Y	1313-32387	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	1	0	0
GY/W	DB	1313-32389	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DB/GY	Y	1313-32390	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	1	0
W/GY	Y	1313-32391	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
R/GY	BK	1313-32392	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DG/GY	BK	1313-32393	1997		0	0	0	-	-	0	0	0	0	0	2+	1	0	1	0	0
O/GY	O	1313-32394	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	2+	0	0
Y/GY	O	1313-32395	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
DG/GY	R	1313-32396	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	0	0	1	0
GY/DG	O	1313-32397	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	2+	0	0	0
GY/DB	Y	1313-32398	1997		0	0	0	-	-	0	0	0	0	0	2+	0	0	0	0	0
O/GY	R	1313-32399	1997		0	0	0	-	-	0	0	0	0	0	2+	1	2+	2+	0	0
GY/O	Y	1313-32400	1997		0	0	0	-	-	0	0	0	0	0	2+	2+	0	0	0	0
O/LB	Y	1313-32096	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	0	0
O/DB	Y	1313-32097	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	0	0
O/Y	Y	1313-32098	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	0	0
O/R	Y	1313-32099	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	0	0
R/R	Y	1313-32100	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	1	0
Y/Y	LG	1313-32118	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	0	0
R/LG	LG	1313-32119	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	0	0
R/W	LG	1313-32120	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	2+	0

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted															
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
R/DB	LG	1313-32121	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	0	0
DB/W	R	1313-32122	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	1	0
DB/Y	R	1313-32123	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	1	0
Y/LG	R	1313-32124	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	0	0
Y/W	R	1313-32125	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	1	0
W/W	DG	1313-32126	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	2+	2+
Y/R	W	1313-32127	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	2+	0
Y/LG	DB	1313-32128	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	0	0
Y/W	DB	1313-32129	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	1	0
DB/LG	R	1313-32130	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	0	1	0
LG/W	Y	1313-32131	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	0	0
LG/LG	R	1313-32132	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	2+	0
DG/W	LB	1313-32134	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	2+	2+
DG/BK	LB	1313-32135	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	2+	0
DB/BK	W	1313-32136	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	0	0	0
LB/BK	LB	1313-32137	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	0	0	0
LB/BK	R	1313-32138	1998		0	0	0	-	-	0	0	0	0	0	0	2+	0	0	0	0
Y/DB	DG	1313-32139	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	2+	1
Y/W	Y	1313-32141	1998		0	0	0	-	-	0	0	0	0	0	0	2+	2+	2+	2+	2+
Y/DB	DB	1313-32142	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
Y/R	Y	1313-32143	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
DB/W	W	1313-32144	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	2+	2+	2+
Y/Y	W	1313-32146	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	2+	2+	2+
Y/LG	W	1313-32147	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
LG/R	LG	1313-32149	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	2+	2+	2+
DB/O	DG	1313-32150	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
DB/Y	DB	1313-32151	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	2+	2+	2+
LG/Y	LG	1313-32152	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	2+	1	2+
Y/W	LG	1313-32153	1999		0	0	0	-	-	0	0	0	0	0	0	0	2+	2+	0	0
DB/BK	LB	?	≤ 2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
Y/B	R	1313-32133	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	2+
O/DB	LB	1313-32154	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
O/LB	LB	1313-32155	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	1
O/W	LB	1313-32156	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
O/BK	LB	1313-32157	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
O/LG	LB	1313-32158	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
LB/DG	BK	1313-32159	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green; 2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted															
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
LB/Y	BK	1313-32160	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
LB/W	BK	1313-32161	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
LB/R	BK	1313-32162	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
LB/O	BK	1313-32163	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
DG/R	LB	1313-32164	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
DG/O	LB	1313-32165	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
DG/Y	LB	1313-32166	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0
DG/DB	LB	1313-32167	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
DG/LB	LB	1313-32168	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
DG/LG	LB	1313-32169	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	1
O/DB	W	1313-32170	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0
O/DG	W	1313-32171	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
O/LB	DB	1313-32172	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0
O/DG	DB	1313-32173	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
R/Y	R	1313-32174	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0
R/DB	R	1313-32175	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0
DB/R	W	1313-32176	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	2+
DB/DG	W	1313-32177	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
Y/DG	Y	1313-32178	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
Y/DG	W	1313-32180	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
Y/R	DG	1313-32181	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
W/R	R	1313-32182	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	1
DB/Y	W	1313-32183	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
DB/Y	LG	1313-32184	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	1	0
W/Y	R	1313-32185	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	1
LG/Y	Y	1313-32187	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0
LG/Y	W	1313-32188	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0
W/R	Y	1313-32189	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	1
W/Y	Y	1313-32190	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
DB/LG	Y	1313-32191	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
DB/R	R	1313-32192	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
Y/DB	R	1313-32193	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
Y/DB	W	1313-32194	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	0	0
Y/BK	DB	1313-32297	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	1
R/BK	LB	1313-32298	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	0
R/BK	Y	1313-32299	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+
R/BK	DB	1313-32300	2000		0	0	0	-	-	0	0	0	0	0	0	0	0	2+	2+	2+

Table 65 (continued). Resight history of least auklets banded on survival plot at St. Paul Island, Alaska. All birds were banded as adults unless otherwise noted. Data do not include six color-combinations used on duplicate birds, making individual resight history impossible to determine. Monitoring of auklet survival ended at St. Paul after 2002 and moved to neighboring St. George Island in 2003.

Codes: BK = black; DG = dark green; O = orange; W = white; GY = gray; LB = light blue; R = red; Y = yellow; DB = dark blue; LG = light green

2+ = resighted at least twice; 1 = resighted once only; y = resighted (# times unknown); 0 = not resighted

Color bands		Metal band #	Year banded	Notes	Year resighted														
L	R				87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
R/R	R	1313-32201	2001		0	0	0	-	-	0	0	0	0	0	0	0	0	0	2+	2+
R/R	DB	1313-32202	2001		0	0	0	-	-	0	0	0	0	0	0	0	0	0	2+	1
R/Y	Y	1313-32203	2001		0	0	0	-	-	0	0	0	0	0	0	0	0	0	2+	1
R/Y	DB	1313-32204	2001		0	0	0	-	-	0	0	0	0	0	0	0	0	0	2+	0
R/DB	DB	1313-32205	2001		0	0	0	-	-	0	0	0	0	0	0	0	0	0	2+	2+
BK/R	Y	802-58714	≤ 1988	subadult	0	y	0	-	-	0	0	0	0	0	0	0	0	0	1	0
BK/Y	Y	802-58784	≤ 1988	subadult	0	y	y	-	-	0	0	0	0	1	0	0	0	0	0	0
LG/DG	DB	802-58340	≤ 1988	subadult	0	y	0	-	-	0	1	0	0	0	0	0	0	1	1	0
LG/W	W	802-58704	≤ 1988	subadult	0	y	0	-	-	0	0	0	0	0	0	0	1	0	0	0
O/LG	LG	802-58775	≤ 1988	subadult	0	y	0	-	-	2+	0	0	0	0	0	0	0	1	0	0
O/W	R	802-58770	≤ 1988	subadult	0	y	0	-	-	0	0	0	0	0	2+	0	0	0	1	0
R/BK	W	802-58389	≤ 1988	subadult	0	y	0	-	-	0	0	0	0	0	0	0	0	0	1	0
R/DG	W	802-58341	≤ 1988	subadult	0	y	0	-	-	0	0	0	0	0	0	0	0	0	1	0
R/R	W	802-58394	≤ 1988	subadult	0	y	0	-	-	0	0	0	0	0	2+	0	2+	0	0	0
R/Y	W	802-58448	≤ 1987	subadult	y	0	0	-	-	0	0	0	0	0	0	0	2+	0	0	0
W/BK	Y	802-58712	≤ 1988	subadult	0	y	0	-	-	0	0	0	0	0	0	1	0	0	0	0
W/DB	DB	802-58781	≤ 1988	subadult	0	y	0	-	-	0	0	0	0	0	2+	0	0	0	0	1
W/DB	R	802-58745	≤ 1988	subadult	0	y	0	-	-	0	1	0	0	2+	0	0	2+	0	2+	0
W/LG	DB	802-58469	≤ 1987	subadult	y	0	0	-	-	0	0	0	0	0	2+	1	0	0	0	0
W/LG	LG	802-58730	≤ 1988	subadult	0	y	y	-	-	2+	0	0	2+	2+	2+	2+	2+	2+	1	0
W/O	DB	802-58475	≤ 1987	subadult	y	0	0	-	-	0	0	0	0	0	0	0	0	0	1	0
Y/DG	BK	none	≤ 1987	subadult	y	0	0	-	-	2+	0	0	0	0	0	0	0	0	0	0
Y/W	BK	802-58742	≤ 1988	subadult	0	y	0	-	-	0	1	0	0	0	0	0	0	0	0	0
Y/W	W	802-58396	≤ 1988	subadult	0	y	0	-	-	1	0	0	0	0	0	0	0	0	0	0

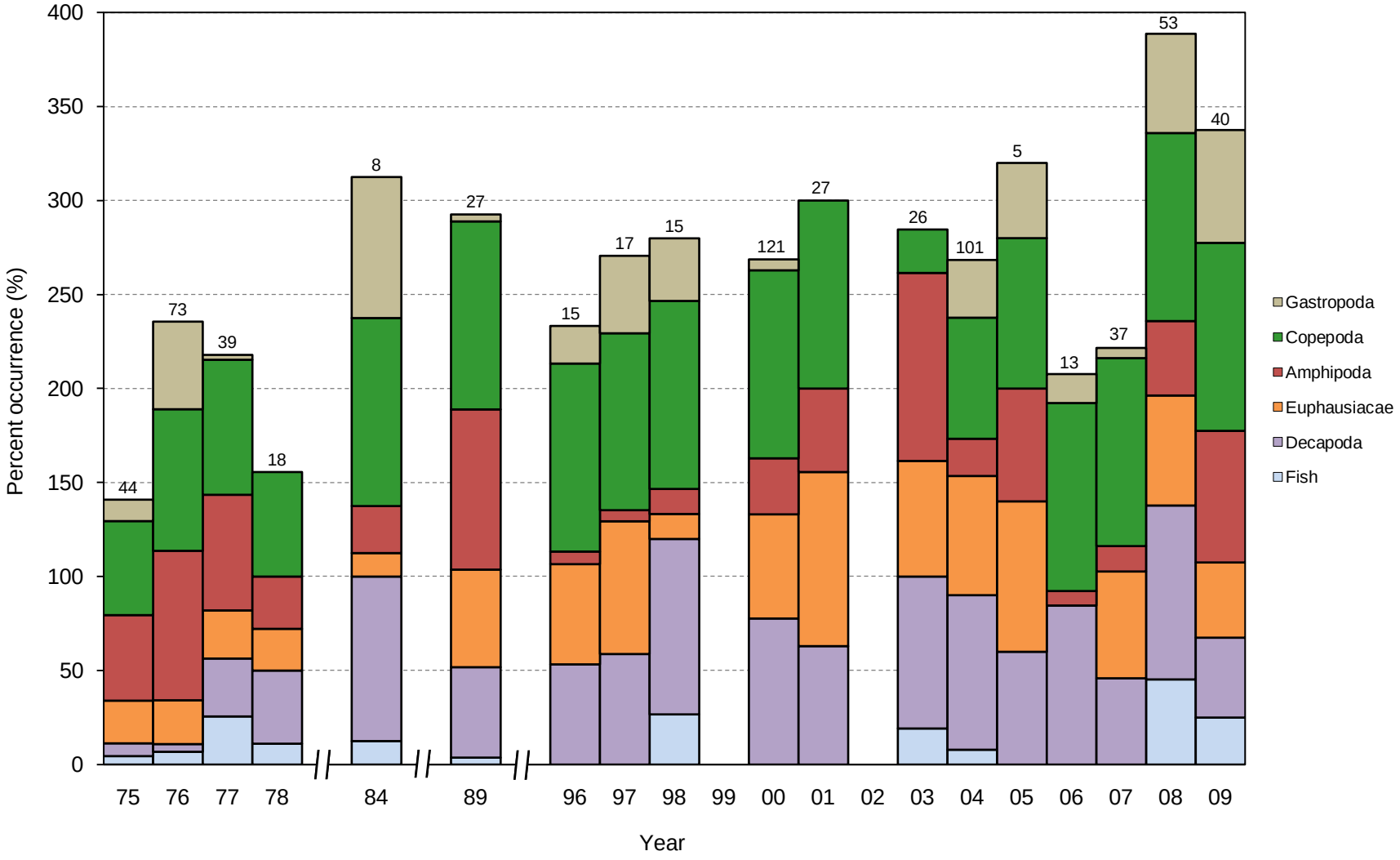


Figure 30. Frequency of occurrence of selected prey items in diets of least auklets at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1979-1983, 1985-1998, or 1990-1995; samples were collected in 2010 and 2011 but have not yet been summarized.

Table 66. Frequency of occurrence of prey in diets of least auklets at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult regurgitations. No samples were collected 1979-1983, 1985-1998, or 1990-1995; samples were collected in 2010 and 2011 but have not yet been summarized.

	1975	1976	1977	1978	1984	1989	1996	1997	1998	1999
No. samples	44	73	39	18	8	27	15	17	15	*no samples*
Gastropoda	**11.4**	**46.6**	**2.6**	**-**	**75.0**	**3.7**	**20.0**	**41.2**	**33.3**	**-**
Limacina helicina	11.4	45.2	2.6	-	25.0	-	-	-	-	-
Unid. snail	-	1.4	-	-	-	-	-	-	-	-
Unid. pteropod	-	-	-	-	-	-	20.0	41.2	33.3	-
Unid. gastropod	-	-	-	-	-	3.7	-	-	-	-
Unid. mollusca	-	-	2.6	-	-	-	-	-	-	-
Copepoda	**50.0**	**75.3**	**71.8**	**55.6**	**100.0**	**100.0**	**100.0**	**94.1**	**100.0**	**-**
Neocalanus cristatus	2.3	46.6	46.2	44.4	37.5	100.0	33.3	35.3	46.7	-
N. plumchrus	-	46.6	-	11.1	12.5	29.6	-	64.7	100.0	-
N. plumchrus or *flemingeri*	-	-	-	-	-	-	80.0	-	-	-
Calanus marshalle	34.1	-	-	-	25.0	29.6	13.3	88.2	53.3	-
C. marshalle or *glacialis*	-	53.4	-	16.7	-	-	-	-	-	-
Neocalanus/Calanus spp.	9.1	4.1	69.2	22.2	62.5	3.7	-	-	-	-
Amphipoda	**45.5**	**79.5**	**61.5**	**27.8**	**25.0**	**85.2**	**6.7**	**5.9**	**13.3**	**-**
Hyperiidea										
Themisto libellula	38.6	42.5	41.0	11.1	-	3.7	-	-	-	-
Parathemisto pacifica	-	1.4	-	5.6	-	14.8	6.7	-	13.3	-
Parathemisto/Themisto spp.	2.3	1.4	2.6	-	12.5	7.4	-	5.9	-	-
Hyperoche medusarum	-	21.9	-	5.6	-	70.4	-	-	-	-
Hyperoche spp.	-	-	-	-	-	-	-	-	-	-
Unid. Hyperiidea	2.3	9.6	25.6	-	-	33.3	-	-	-	-
Gammaridea										
Ischyrocerus spp.	-	1.4	-	-	-	-	-	-	-	-
Atylus spp.	-	1.4	-	-	-	-	-	-	-	-
Unid. Gammaridea	4.5	4.1	7.7	5.6	-	-	-	-	-	-
Unid. amphipod	-	-	-	-	12.5	3.7	-	-	-	-
Euphausiacae	**22.7**	**23.3**	**25.6**	**22.2**	**12.5**	**51.9**	**53.3**	**70.6**	**13.3**	**-**
Thysanoessa raschii	6.8	8.2	5.1	5.6	-	44.4	-	-	-	-
T. inermis	2.3	2.7	2.6	-	12.5	7.4	-	-	-	-
T. spinifera	-	2.7	-	5.6	-	3.7	-	-	-	-
T. longipes	-	1.4	-	-	-	-	-	-	-	-
Thysanoessa spp.	-	8.2	5.1	-	-	-	-	-	-	-
Euphausia furcillia	-	-	-	-	-	-	-	64.7	6.7	-
E. pacifica	-	-	-	-	-	-	-	-	-	-
Euphausia spp.	-	-	-	-	-	-	-	-	-	-
Calliopus laevis	-	-	-	-	-	-	-	-	-	-
Unid. euphausiid	-	-	17.9	16.7	-	29.6	53.3	17.6	6.7	-
Decapoda	**6.8**	**4.1**	**30.8**	**38.9**	**87.5**	**48.1**	**53.3**	**58.8**	**93.3**	**-**
Pandalus	-	-	-	-	-	-	-	-	-	-
Unid. shrimp	-	-	-	-	-	-	6.7	11.8	40.0	-
Paguridae	-	-	-	-	-	25.9	-	17.6	33.3	-
Atelecyclidae	-	-	-	-	-	-	-	-	60.0	-
Brachyura	-	-	-	-	-	33.3	-	-	-	-
Cheiragonus	-	-	-	-	-	-	-	29.4	-	-
Lithodidae	-	1.4	-	-	25.0	3.7	-	-	-	-
Unid. crab	2.3	2.7	30.8	16.7	12.5	-	46.7	41.2	46.7	-
Unid. decapod	4.5	-	-	22.2	62.5	-	-	-	-	-
Cumacea	**-**	**20.5**	**10.3**	**16.7**	**-**	**-**	**-**	**-**	**-**	**-**
Lamprops spp.	-	-	-	-	-	-	-	-	-	-
Unid. cumacean	-	20.5	10.3	16.7	-	-	-	-	-	-
Isopoda	**-**	**1.4**	**-**	**5.6**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. isopod	-	1.4	-	5.6	-	-	-	-	-	-
Unid. crustacean	18.2	-	25.6	27.8	-	-	-	-	-	-
Unid. invertebrate	-	-	-	-	-	-	-	-	-	-
Fish	**4.5**	**6.8**	**25.6**	**11.1**	**12.5**	**3.7**	**-**	**-**	**26.7**	**-**
Unid. fish	4.5	6.8	25.6	11.1	12.5	3.7	-	-	26.7	-

Table 66 (continued). Frequency of occurrence of prey in diets of least auklets at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult regurgitations. No samples were collected 1979-1983, 1985-1998, or 1990-1995; samples were collected in 2010 and 2011 but have not yet been summarized.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
No. samples	121	27	*no samples*	26	101	5	13	37	53	40[a]
Gastropoda	**5.8**	**-**	**-**	**-**	**30.7**	**40.0**	**15.4**	**5.4**	**52.8**	**60.0**
Limacina helicina	-	-	-	-	-	40.0	-	5.4	52.8	60.0
Unid. snail	-	-	-	-	-	-	-	-	-	-
Unid. pteropod	5.8	-	-	-	30.7	-	15.4	-	-	-
Unid. gastropod	-	-	-	-	-	-	-	-	-	-
Unid. mollusca	-	-	-	-	-	-	-	-	-	-
Copepoda	**100.0**	**100.0**	**-**	**23.1**	**64.4**	**80.0**	**100.0**	**100.0**	**100.0**	**100.0**
Neocalanus cristatus	70.2	3.7	-	15.4	26.7	-	100.0	97.3	100.0	72.5
N. plumchrus	-	-	-	-	-	-	-	81.1	-	-
N. plumchrus or *flemingeri*	68.6	7.4	-	3.8	64.4	-	38.5	-	98.1	100.0
Calanus marshalle	97.5	100.0	-	11.5	3.0	80.0	38.5	78.4	83.0	95.0
C. marshalle or *glacialis*	-	-	-	-	-	-	-	-	-	-
Neocalanus/Calanus spp.	100.0	100.0	-	-	-	-	-	91.9	56.6	-
Amphipoda	**29.8**	**44.4**	**-**	**100.0**	**19.8**	**60.0**	**7.7**	**13.5**	**39.6**	**70.0**
Hyperiidea										
Themisto libellula	29.8	25.9	-	-	1.0	-	-	-	-	50.0
Parathemisto pacifica	-	-	-	73.1	5.9	60.0	-	5.4	1.9	12.5
Parathemisto/Themisto spp.	-	22.2	-	-	9.9	-	7.7	8.1	-	35.0
Hyperoche medusarum	-	-	-	53.8	5.0	-	-	-	35.8	-
Hyperoche spp.	-	-	-	23.1	-	-	-	-	-	-
Unid. Hyperiidea	-	-	-	-	-	-	-	-	-	-
Gammaridea										
Ischyrocerus spp.	-	-	-	-	-	-	-	-	-	-
Atylus spp.	-	-	-	-	-	-	-	-	7.5	5.0
Unid. Gammaridea	-	-	-	3.8	-	-	-	-	15.1	15.0
Unid. amphipod	-	-	-	-	-	-	-	-	1.9	-
Euphausiacae	**55.4**	**92.6**	**-**	**61.5**	**63.4**	**80.0**	**-**	**56.8**	**58.5**	**40.0**
Thysanoessa raschii	-	-	-	-	8.9	-	-	-	-	-
T. inermis	-	-	-	-	-	20.0	-	-	-	35.0
T. spinifera	-	-	-	-	-	-	-	-	-	-
T. longipes	-	-	-	-	-	-	-	-	-	-
Thysanoessa spp.	53.7	11.1	-	26.9	23.8	80.0	-	21.6	22.6	-
Euphausia furcillia	-	-	-	-	-	-	-	-	-	-
E. pacifica	-	-	-	3.8	-	-	-	-	-	-
Euphausia spp.	-	-	-	-	-	-	-	-	-	-
Calliopus laevis	2.5	-	-	-	-	-	-	-	-	-
Unid. euphausiid	-	85.2	-	34.6	41.6	-	-	48.6	39.6	5.0
Decapoda	**77.7**	**63.0**	**-**	**80.8**	**82.2**	**60.0**	**84.6**	**45.9**	**92.5**	**42.5**
Pandalus	-	-	-	26.9	36.6	20.0	-	-	34.0	10.0
Unid. shrimp	41.3	22.2	-	-	-	-	-	-	77.4	22.5
Paguridae	27.3	33.3	-	57.7	45.5	40.0	-	10.8	69.8	10.0
Atelecyclidae			-	23.1	40.6	20.0	-	18.9	3.8	5.0
Brachyura	50.4	3.7	-	-	-	-	-	5.4	15.1	-
Cheiragonus	-	-	-	-	-	-	-	-	-	-
Lithodidae	-	-	-	61.5	32.7	-	-	18.9	1.9	27.5
Unid. crab	-	37.0	-	-	-	20.0	7.7	-	18.9	-
Unid. decapod	-	-	-	-	-	-	-	-	-	-
Cumacea	**-**	**-**	**-**	**-**	**-**	**-**	**15.4**	**-**	**7.5**	**15.0**
Lamprops spp.	-	-	-	-	-	-	15.4	-	-	15.0
Unid. cumacean	-	-	-	-	-	-	-	-	7.5	-
Isopoda	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Unid. isopod	-	-	-	-	-	-	-	-	-	-
Unid. crustacean	-	-	-	-	-	-	-	-	-	-
Unid. invertebrate	-	-	-	-	-	-	-	-	7.5	-
Fish	**-**	**-**	**-**	**19.2**	**7.9**	**-**	**-**	**-**	**45.3**	**25.0**
Unid. fish	-	-	-	19.2	7.9	-	-	-	45.3	25.0

[a]Sixty-five samples were collected in 2009 but only 40 have yet been identified and summarized.

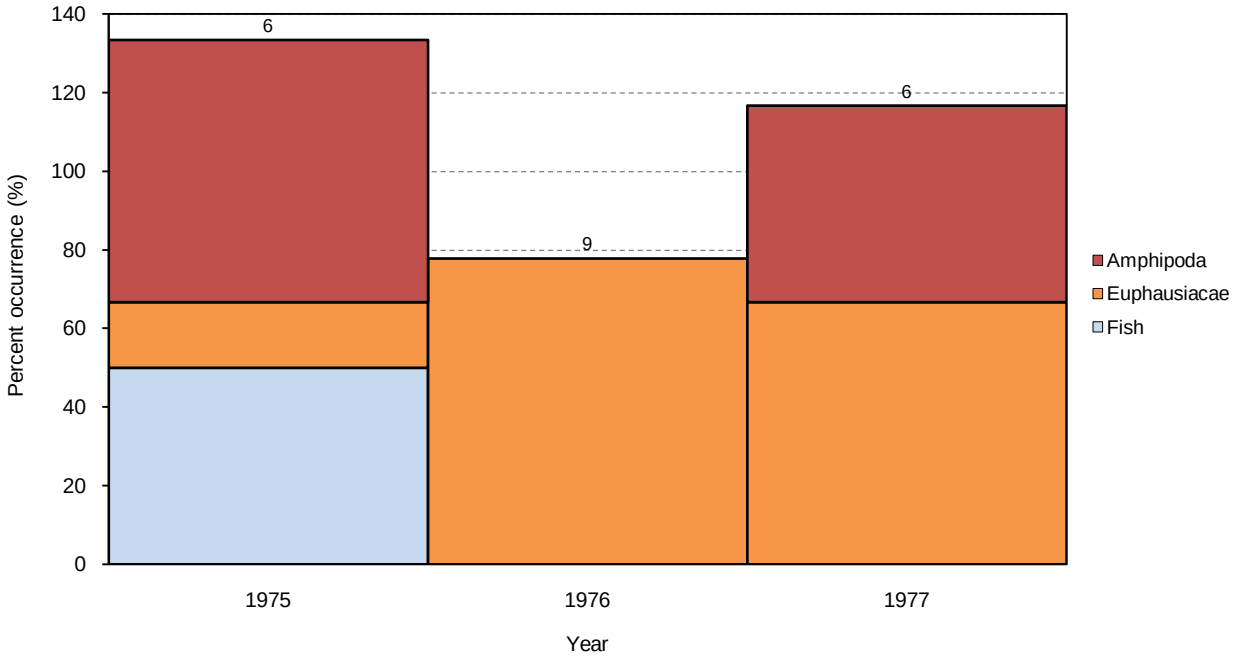


Figure 31. Frequency of occurrence of selected prey items in diets of crested auklets at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected after 1977.

Table 67. Frequency of occurrence of prey in diets of crested auklets at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents and adult regurgitations. No samples were collected after 1977.

	1975	1976	1977
No. samples	6	9	6
Amphipoda	**66.7**	**-**	**50.0**
Hyperiidea			
Themisto libellula	50.0	-	33.3
Parathemisto/Themisto spp.	16.7	-	-
Unid. Hyperiidea	-	-	16.7
Euphausiacae	**16.7**	**77.8**	**66.7**
Thysanoessa raschii	-	-	33.3
T. inermis	16.7	11.1	-
Thysanoessa spp.	-	33.3	-
Unid. euphausiid	-	-	33.3
Unid. crustacean	16.7	-	-
Unid. invertebrate	-	22.2	-
Fish	**50.0**	**-**	**-**
Unid. fish	50.0	-	-

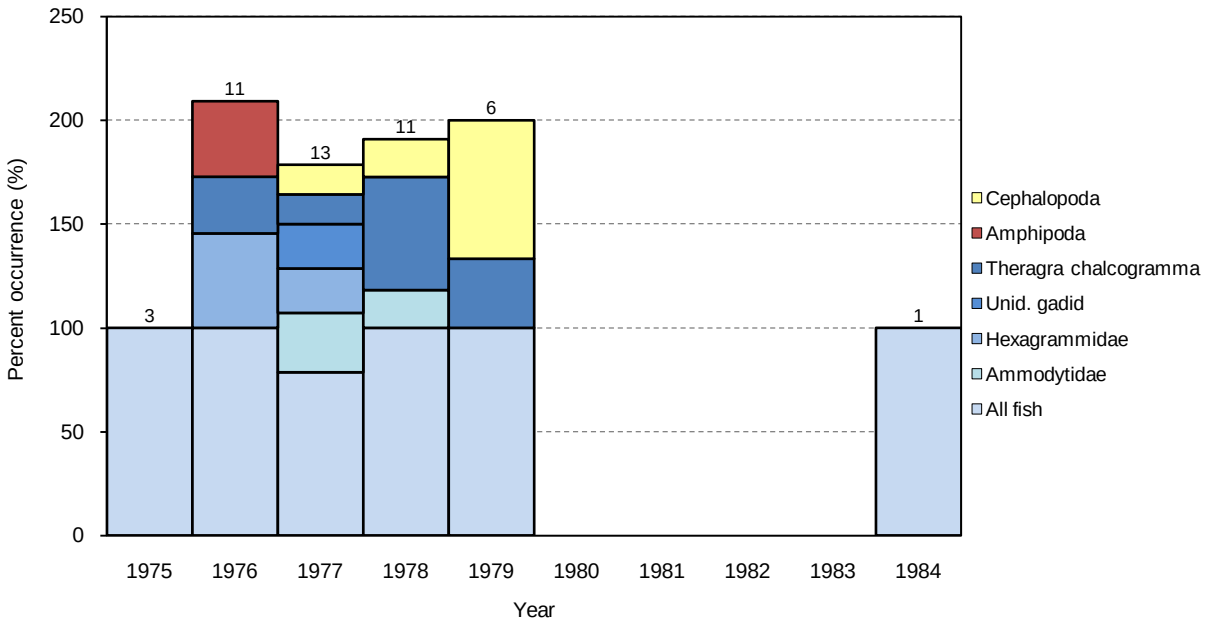


Figure 32. Frequency of occurrence of selected prey items in diets of horned puffins at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected after 1984.

Table 68. Frequency of occurrence of prey in diets of horned puffins at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents. No samples were collected 1980-1983 or after 1984.

	1975	1976	1977	1978	1979	1984
No. samples	3	11	13	11	6	1
Cephalopoda	**-**	**-**	**14.3**	**18.2**	**66.7**	**-**
Unid. squid	-	-	14.3	18.2	66.7	-
Amphipoda	**-**	**36.4**	**-**	**-**	**-**	**-**
Hyperiidea						
Themisto libellula	-	9.1	-	-	-	-
Unid. amphipod	-	27.3	-	-	-	-
Unid. crustacean	-	-	7.1	9.1	-	-
Nereidae	-	18.2	42.9	36.4	66.7	-
Fish	**100.0**	**100.0**	**78.6**	**100.0**	**100.0**	**100.0**
Osmeridae						
Mallotus villosus	-	9.1	-	-	-	-
Gadidae						
Theragra chalcogramma	-	27.3	14.3	54.5	33.3	-
Unid. gadid	-	-	21.4	-	-	-
Hexagrammidae						
Hexagrammos stellerii	-	45.5	21.4	-	-	-
Cottidae	-	-	-	-	16.7	-
Bathymasteridae	-	9.1	-	-	-	-
Trichodontidae						
Trichodon trichodon	-	-	21.4	-	-	-
Ammodytidae						
Ammodytes hexapterus	-	-	28.6	18.2	-	-
Pleuronectidae						
Atheresthes stomias	-	9.1	-	-	-	-
Unid. flatfish	-	-	7.1	9.1	-	-
Unid. fish	100.0	36.4	50.0	45.5	83.3	100.0

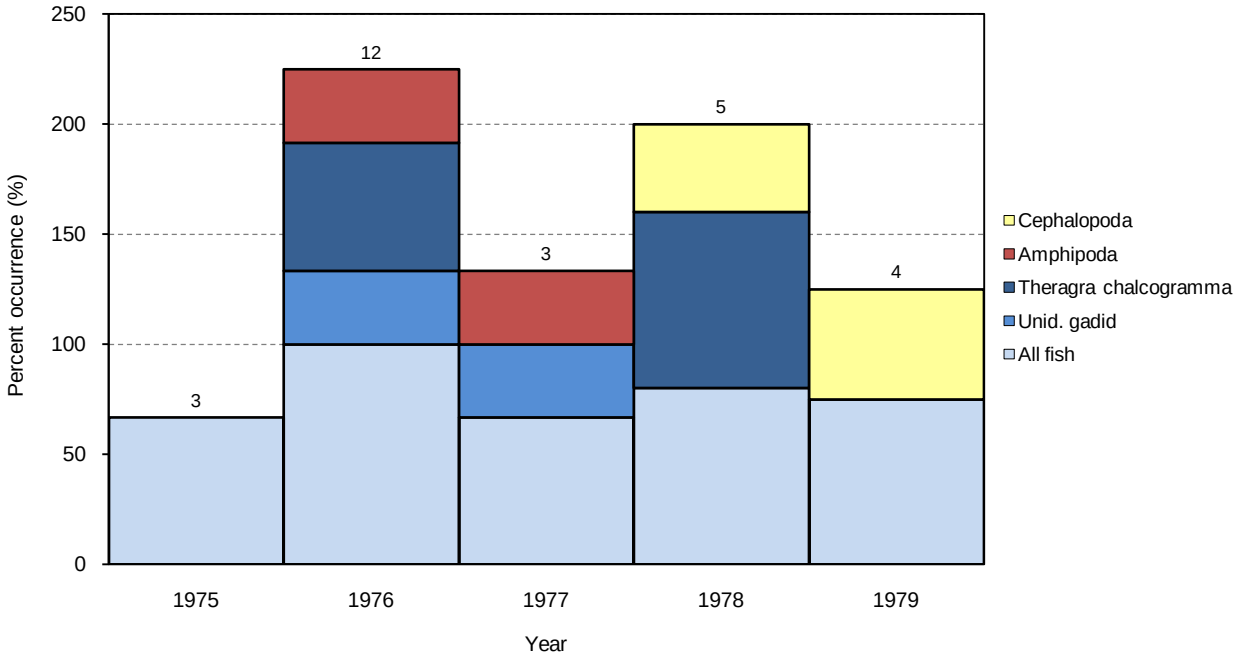


Figure 33. Frequency of occurrence of selected prey items in diets of tufted puffins at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected after 1979.

Table 69. Frequency of occurrence of prey in diets of tufted puffins at St. Paul Island, Alaska. Frequency is expressed as the percentage of food samples in which each prey item was present; values in bold represent totals for that taxonomic group. Samples consist of adult stomach contents. No samples were collected after 1979.

	1975	1976	1977	1978	1979
No. samples	3	12	3	5	4
Cephalopoda	**-**	**-**	**-**	**40.0**	**50.0**
Unid. squid	-	-	-	40.0	50.0
Amphipoda	**-**	**33.3**	**33.3**	**-**	**-**
Hyperiidea					
Themisto libellula	-	16.7	-	-	-
Unid. Hyperiidea	-		33.3	-	-
Unid. amphipod	-	16.7	-	-	-
Unid. crustacean	-	-	33.3	-	-
Nereidae	33.3	50.0	66.7	40.0	75.0
Fish	**66.7**	**100.0**	**66.7**	**80.0**	**75.0**
Osmeridae					
Mallotus villosus	-	16.7	-	-	-
Gadidae					
Theragra chalcogramma	-	58.3	-	80.0	-
Unid. gadid	-	33.3	33.3	-	-
Unid. fish	66.7	41.7	33.3	-	75.0

Table 70. Mean numbers of birds detected on beach transect surveys along Lukanin Beach, St. Paul Island, Alaska. Data represent species' presence but not necessarily absence in all years (dashes indicate species not recorded but whether individuals were present and not recorded or not present is unknown). No surveys were conducted 2004-2007.

Species	2003	2008	2009	2010	2011
Rock sandpiper	6	*no count*	*no count*	1	1
Pacific wren	0	-	-	0	0
Lapland longspur	22	-	-	1	3
Snow bunting	0	-	-	0	0
Gray-crowned rosy finch	7	-	-	0	1
n	5	-	-	4	5
First survey	10 Jun	-	-	18 Jun	12 Jun
Last survey	30 Jun	-	-	30 Jun	19 Jun

Table 71. Mean numbers of birds detected on beach transect surveys along Zapadni Beach, St. Paul Island, Alaska. Data represent species' presence but not necessarily absence in all years (dashes indicate species not recorded but whether individuals were present and not recorded or not present is unknown). No surveys were conducted 2004-2007.

Species	2003	2008	2009	2010	2011
Rock sandpiper	24	0	*no count*	1	<1
Pacific wren	0	0	-	0	0
Lapland longspur	7	0	-	1	2
Snow bunting	3	0	-	1	<1
Gray-crowned rosy finch	69	1	-	12	9
n	5	2	-	4	5
First survey	14 Jun	11 Jun	-	18 Jun	12 Jun
Last survey	4 Jul	20 Jun	-	29 Jun	18 Jun

Table 72. Numbers of birds detected on beach transect surveys along Lukanin Beach, St. Paul Island, Alaska in 2011.

Species	Date					Mean	SD
	12 Jun	13 Jun	14 Jun	15 Jun	19 Jun		
Rock sandpiper	0	2	3	0	1	1	1
Pacific wren	0	0	0	0	0	0	0
Lapland longspur	6	2	3	0	4	3	2
Snow bunting	0	0	0	0	0	0	0
Gray-crowned rosy finch	0	3	0	0	2	1	1
Start time (AKST)	0910	0920	0819	0920	0808	-	-
End time (AKST)	0945	0940	0902	0942	0825	-	-

Table 73. Numbers of birds detected on beach transect surveys along Zapadni Beach, St. Paul Island, Alaska in 2011.

Species	Date					Mean	SD
	12 Jun	13 Jun	14 Jun	15 Jun	18 Jun		
Rock sandpiper	0	0	1	1	0	<1	1
Pacific wren	0	0	0	0	0	0	0
Lapland longspur	1	0	1	4	3	2	2
Snow bunting	0	1	0	0	0	<1	<1
Gray-crowned rosy finch	4	3	3	20	15	9	8
Start time (AKST)	0910	0935	0810	0929	0900	-	-
End time (AKST)	0945	0957	0835	0954	0930	-	-

Table 74. Mean numbers of individuals found and encounter rates during COASST surveys along Benson Beach North, St. Paul Island, Alaska. Mean number of individuals comprises the average number of new birds found per survey and do not include birds still present and re-encountered from previous surveys. Encounter rate is defined as the number of all birds (including both new individuals and re-encountered birds) found per km beach surveyed (1 km for Benson Beach North) divided by the number of surveys. Surveys were conducted in 2011 but have not yet been summarized.

Species	2006		2007		2008		2009		2010	
	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate
Northern fulmar	0.4	0.4	0.2	0.3	0.1	0.3	0.3	0.3	-	-
Short-tailed shearwater	-	-	1.2	1.5	0.1	0.3	0.1	0.1	-	-
Leach's storm-petrel	-	-	0.2	0.2	-	-	-	-	-	-
Unidentified petrel	-	-	0.4	0.4	-	-	-	-	-	-
Red-faced cormorant	-	-	0.1	0.2	-	-	-	-	-	-
Black-legged kittiwake	0.2	0.2	-	-	-	-	-	-	-	-
Unidentified kittiwake	-	-	0.1	0.3	-	-	-	-	-	-
Common murre	-	-	-	-	-	-	0.1	0.1	-	-
Thick-billed murre	0.2	0.2	-	-	-	-	-	-	-	-
Parakeet auklet	0.2	0.2	-	-	-	-	-	-	-	-
Crested auklet	0.2	0.2	-	-	-	-	-	-	-	-
Unidentified auklet	0.4	0.4	-	-	-	-	-	-	-	-
Unidentified alcid	-	-	0.2	0.2	-	-	0.1	0.1	-	-
Unidentified bird	-	-	-	-	0.1	0.6	-	-	-	-
All species	1.6	1.6	2.4	3.1	0.4	0.6	0.6	0.6	0.0	0.0
n	5		10		8		16		17	
First survey	7 Jul		12 Feb		1 Jun		26 Feb		6 Jan	
Last survey	15 Dec		12 Sep		24 Nov		23 Dec		30 Dec	

Table 75. Numbers of birds encountered on COASST surveys along Benson Beach North, St. Paul Island, Alaska in 2010. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date																	Individuals[a]			Encounters[b]	
	6 Jan	5 Feb	11 Jun	25 Jun	9 Jul	23 Jul	9 Aug	20 Aug	3 Sep	17 Sep	1 Oct	14 Oct	26 Oct	9 Nov	24 Nov	17 Dec	30 Dec	Total	Mean	SD	Total	Enc. rate[c]
Total new individuals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	-	-
Total encounters	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	0	0.0

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Benson Beach North) / number of surveys.

Table 76. Numbers of birds encountered on COASST surveys along Benson Beach North, St. Paul Island, Alaska in 2009. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date																Individuals[a]			Encounters[b]	
	26 Feb	8 May	22 May	12 Jun	19 Jun	9 Jul	23 Jul	4 Aug	21 Aug	18 Sep	30 Sep	8 Oct	21 Oct	30 Oct	13 Nov	23 Dec	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5	0.3	1.0	5	0.3
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Common murre	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1	0.1	0.3	1	0.1
Unidentified alcid	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2	0.1	0.3	2	0.1
Total new individuals	0	0	0	0	0	4	1	2	1	0	0	0	0	0	0	1	9	0.6	1.1	-	-
Total encounters	0	0	0	0	0	4	1	2	1	0	0	0	0	0	0	1	-	-	-	9	0.6

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Benson Beach North) / number of surveys.

Table 77. Numbers of birds encountered on COASST surveys along Benson Beach North, St. Paul Island, Alaska in 2008. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date								Individuals[a]			Encounters[b]	
	1 Jun	15 Jun	3 Jul	5 Sep	30 Sep	30 Oct	14 Nov	24 Nov	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	1 (0)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	2	0.3
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	1 (0)	0 (1)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	2	0.3
Unidentified bird	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	1	0.1
Total new individuals	0	2	0	1	0	0	0	0	3	0.4	0.7	-	-
Total encounters	0	2	1	1	1	0	0	0	-	-	-	5	0.6

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Benson Beach North) / number of surveys.

Table 78. Numbers of birds encountered on COASST surveys along Benson Beach North, St. Paul Island, Alaska in 2007. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date										Individuals[a]			Encounters[b]	
	12 Feb	12 Mar	13 Apr	11 May	13 Jun	9 Jul	23 Jul	7 Aug	24 Aug	12 Sep	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (1)	1 (0)	2	0.2	0.4	3	0.3
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	5 (1)	5 (2)	1 (0)	12	1.2	2.0	15	1.5
Leach's storm-petrel	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	1 (0)	0 (0)	0 (0)	2	0.2	0.4	2	0.2
Unidentified petrel	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (0)	1 (0)	4	0.4	1.0	4	0.4
Red-faced cormorant	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (1)	0 (0)	1	0.1	0.3	2	0.2
Unidentified kittiwake	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (1)	0 (1)	0 (0)	0 (0)	1	0.1	0.3	3	0.3
Unidentified alcid	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	0 (0)	2	0.2	0.4	2	0.2
Total new individuals	0	0	0	0	0	2	1	9	9	3	24	2.4	3.6	-	-
Total encounters	0	0	0	0	0	2	2	11	13	3	-	-	-	31	3.1

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Benson Beach North) / number of surveys.

Table 79. Numbers of birds encountered on COASST surveys along Benson Beach North, St. Paul Island, Alaska in 2006. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date					Individuals[a]			Encounters[b]	
	7 Jul	15 Aug	19 Sep	15 Nov	15 Dec	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	2 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2	0.4	0.9	2	0.4
Black-legged kittiwake	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.2	0.4	1	0.2
Thick-billed murre	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	1	0.2	0.4	1	0.2
Parakeet auklet	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.2	0.4	1	0.2
Crested auklet	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.2	0.4	1	0.2
Unidentified auklet	0 (0)	1 (0)	1 (0)	0 (0)	0 (0)	2	0.4	0.5	2	0.4
Total new individuals	5	2	1	0	0	8	1.6	2.1	-	-
Total encounters	5	2	1	0	0	-	-	-	8	1.6

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Benson Beach North) / number of surveys.

Table 80. Mean numbers of individuals found and encounter rates during COASST surveys along Lukanin South, St. Paul Island, Alaska. Mean number of individuals comprises the average number of new birds found per survey and do not include birds still present and re-encountered from previous surveys. Encounter rate is defined as the number of all birds (including both new individuals and re-encountered birds) found per km beach surveyed (1 km for Lukanin South) divided by the number of surveys. Surveys were conducted in 2011 but have not yet been summarized.

Species	2006		2007		2008		2009		2010	
	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate
Mallard	-	-	-	-	-	-	-	-	0.1	0.1
Northern fulmar	0.1	0.1	0.2	0.2	-	-	0.2	0.2	-	-
Short-tailed shearwater	-	-	0.9	0.9	-	-	0.4	1.4	0.1	0.1
Unidentified shearwater	-	-	-	-	-	-	0.1	0.1	-	-
Fork-tailed storm-petrel	0.1	0.1	-	-	-	-	-	-	-	-
Unidentified petrel	-	-	0.1	0.1	-	-	-	-	-	-
Western sandpiper	-	-	-	-	0.1	0.1	-	-	-	-
Black-legged kittiwake	-	-	-	-	-	-	0.1	0.1	-	-
Glaucous-winged gull	0.2	0.2	-	-	0.1	0.4	-	-	-	-
Thick-billed murre	-	-	-	-	-	-	0.1	0.1	-	-
Horned puffin	-	-	-	-	-	-	0.1	0.1	-	-
Unidentified auklet	-	-	-	-	-	-	0.2	0.2	-	-
Unidentified alcid	-	-	0.1	0.1	-	-	-	-	-	-
Unidentified bird	0.2	0.4	0.1	0.1	-	-	0.1	0.1	-	-
All species			1.4	1.4	0.3	0.5	1.2	1.3	0.1	0.1
n	9		11		8		16		17	
First survey	20 Jun		12 Jan		31 May		30 Apr		5 Feb	
Last survey	15 Dec		12 Sep		12 Dec		31 Dec		23 Dec	

Table 81. Numbers of birds encountered on COASST surveys along Lukanin South, St. Paul Island, Alaska in 2010. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date																	Individuals[a]			Encounters[b]	
	5 Feb	14 May	4 Jun	18 Jun	2 Jul	16 Jul	30 Jul	13 Aug	27 Aug	10 Sep	24 Sep	8 Oct	21 Oct	5 Nov	19 Nov	10 Dec	23 Dec	Total	Mean	SD	Total	Enc. rate[c]
Mallard	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.2	1	0.1
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.2	1	0.1
Total new individuals	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	0.1	0.3	-	-
Total encounters	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-	-	-	2	0.1

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Lukanin South) / number of surveys.

Table 82. Numbers of birds encountered on COASST surveys along Lukanin South, St. Paul Island, Alaska in 2009. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date																	Individuals[a]			Encounters[b]	
	30 Apr	15 May	15 Jun	25 Jun	9 Jul	30 Jul	13 Aug	28 Aug	18 Sep	24 Sep	21 Oct	9 Nov	20 Nov	11 Dec	17 Dec	31 Dec		Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		3	0.2	0.5	3	0.2
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	0 (0)	6 (0)	0 (0)	0 (0)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		6	0.4	1.5	7	1.4
Unidentified shearwater	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		2	0.1	0.5	2	0.1
Black-legged kittiwake	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		1	0.1	0.3	1	0.1
Thick-billed murre	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		1	0.1	0.3	1	0.1
Horned puffin	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		1	0.1	0.3	2	0.1
Unidentified auklet	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (0)	0 (0)	0 (0)		3	0.2	0.8	3	0.2
Unidentified bird	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)		2	0.1	0.5	2	0.1
Total new individuals	0	0	0	0	13	2	1	0	0	0	0	0	0	3	0	0		19	1.2	3.3	-	-
Total encounters	0	0	0	0	13	2	1	2	0	0	0	0	0	3	0	0		-	-	-	21	1.3

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Lukanin South) / number of surveys.

Table 83. Numbers of birds encountered on COASST surveys along Lukanin South, St. Paul Island, Alaska in 2008. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date								Individuals[a]			Encounters[b]	
	31 May	15 Jun	29 Jun	30 Sep	30 Oct	14 Nov	24 Nov	12 Dec	Total	Mean	SD	Total	Enc. rate[c]
Western sandpiper	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	1	0.1
Glaucous-winged gull	1 (0)	0 (1)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	3	0.4
Total new individuals	2	0	0	0	0	0	0	0	2	0.3	0.7	-	-
Total encounters	2	1	1	0	0	0	0	0	-	-	-	4	0.5

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Lukanin South) / number of surveys.

Table 84. Numbers of birds encountered on COASST surveys along Lukanin South, St. Paul Island, Alaska in 2007. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date											Individuals[a]			Encounters[b]	
	12 Jan	12 Feb	12 Mar	13 Apr	11 May	13 Jun	9 Jul	23 Jul	7 Aug	22 Aug	12 Sep	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)	0 (0)	2	0.2	0.6	2	0.2
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	10 (0)	0 (0)	10	0.9	3.0	10	0.9
Unidentified petrel	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1	0.1	0.3	1	0.1
Unidentified alcid	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1	0.1	0.3	1	0.1
Unidentified bird	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Total new individuals	0	1	0	0	0	0	0	0	0	12	2	15	1.4	3.6	-	-
Total encounters	0	1	0	0	0	0	0	0	0	12	2	-	-	-	15	1.4

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Lukanin South) / number of surveys.

Table 85. Numbers of birds encountered on COASST surveys along Lukanin South, St. Paul Island, Alaska in 2006. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date									Individuals[a]			Encounters[b]	
	20 Jun	7 Jul	17 Jul	2 Aug	16 Aug	30 Aug	22 Sep	15 Nov	15 Dec	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Fork-tailed storm-petrel	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Glaucous-winged gull	2 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2	0.2	0.7	2	0.2
Unidentified bird	0 (0)	1 (0)	0 (0)	0 (1)	1 (0)	0 (1)	0 (0)	0 (0)	0 (0)	2	0.2	0.4	4	0.4
Total new individuals	2	3	0	0	1	0	0	0	0	6	0.7	1.1	-	-
Total encounters	2	3	0	1	1	1	0	0	0	-	-	-	8	0.9

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Lukanin South) / number of surveys.

Table 86. Mean numbers of individuals found and encounter rates during COASST surveys along North Beach, St. Paul Island, Alaska. Mean number of individuals comprises the average number of new birds found per survey and do not include birds still present and re-encountered from previous surveys. Encounter rate is defined as the number of all birds (including both new individuals and re-encountered birds) found per km beach surveyed (1 km for North Beach) divided by the number of surveys. Surveys were conducted in 2011 but have not yet been summarized.

Species	2006		2007		2008		2009		2010	
	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate
Northern fulmar	-	-	0.4	0.4	-	-	0.3	0.3	-	-
Sooty shearwater	-	-	-	-	0.8	0.8	-	-	-	-
Short-tailed shearwater	-	-	0.7	0.7	-	-	-	-	-	-
Leach's storm-petrel	-	-	0.1	0.1	-	-	-	-	-	-
Black-legged kittiwake	-	-	-	-	0.1	0.1	0.1	0.1	-	-
Unidentified kittiwake	-	-	-	-	0.1	0.1	-	-	-	-
Glaucous-winged gull	-	-	-	-	-	-	0.1	0.1	0.1	0.1
Common murre	-	-	-	-	0.1	0.1	-	-	-	-
Thick-billed murre	-	-	0.1	0.1	-	-	-	-	-	-
Unidentified murre	-	-	-	-	0.1	0.1	-	-	-	-
Tufted puffin	-	-	-	-	-	-	-	-	0.1	0.1
Unidentified alcid	-	-	0.1	0.1	-	-	-	-	-	-
Unidentified bird	0.1	0.1	-	-	-	-	-	-	-	-
									-	-
All species	0.1	0.1	1.4	1.4	1.3	1.3	0.4	0.5	0.1	0.1
n	10		10		8		15		17	
First survey	7 Jun		12 Feb		1 Jun		8 May		6 Jan	
Last survey	15 Dec		12 Sep		24 Nov		23 Dec		30 Dec	

Table 87. Numbers of birds encountered on COASST surveys along North Beach, St. Paul Island, Alaska in 2010. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date																	Individuals[a]			Encounters[b]	
	6 Jan	5 Feb	11 Jun	25 Jun	9 Jul	23 Jul	9 Aug	20 Aug	3 Sep	17 Sep	1 Oct	14 Oct	26 Oct	9 Nov	24 Nov	17 Dec	30 Dec	Total	Mean	SD	Total	Enc. rate[c]
Glaucous-winged gull	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.2	1	0.1
Tufted puffin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.2	1	0.1
Total new individuals	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0.1	0.3	-	-
Total encounters	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-	-	-	2	0.1

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for North Beach) / number of surveys.

Table 88. Numbers of birds encountered on COASST surveys along North Beach, St. Paul Island, Alaska in 2009. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date															Individuals[a]			Encounters[b]	
	8 May	22 May	12 Jun	19 Jun	14 Jul	23 Jul	4 Aug	21 Aug	18 Sep	30 Sep	8 Oct	21 Oct	30 Oct	13 Nov	23 Dec	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (0)	0 (0)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4	0.3	1.0	5	0.3
Black-legged kittiwake	0 (0)	0 (0)	1 (0)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.3	2	0.1
Glaucous-winged gull	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Total new individuals	0	0	1	0	0	4	0	0	0	0	0	0	1	0	0	6	0.4	1.1	-	-
Total encounters	0	0	1	1	0	4	0	1	0	0	0	0	1	0	0	-	-	-	8	0.5

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for North Beach) / number of surveys.

Table 89. Numbers of birds encountered on COASST surveys along North Beach, St. Paul Island, Alaska in 2008. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date								Individuals[a]			Encounters[b]	
	1 Jun	15 Jun	3 Jul	5 Sep	3 Oct	30 Oct	14 Nov	24 Nov	Total	Mean	SD	Total	Enc. rate[c]
Sooty shearwater	0 (0)	0 (0)	0 (0)	6 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6	0.8	2.1	6	0.8
Black-legged kittiwake	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	1	0.1
Unidentified kittiwake	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	1	0.1
Common murre	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	1	0.1
Unidentified murre	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.4	1	0.1
Total new individuals	0	0	1	8	1	0	0	0	10	1.3	2.8	-	-
Total encounters	0	0	1	8	1	0	0	0	-	-	-	10	1.3

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for North Beach) / number of surveys.

Table 90. Numbers of birds encountered on COASST surveys along North Beach, St. Paul Island, Alaska in 2007. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date										Individuals[a]			Encounters[b]	
	12 Feb	12 Mar	13 Apr	11 May	13 Jun	9 Jul	23 Jul	7 Aug	24 Aug	12 Sep	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)	1 (0)	1 (0)	0 (0)	0 (0)	4	0.4	0.7	4	0.4
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (0)	3 (0)	0 (0)	7	0.7	1.5	7	0.7
Leach's storm-petrel	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Thick-billed murre	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	1	0.1	0.3	1	0.1
Unidentified alcid	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Total new individuals	0	0	0	0	0	3	1	6	4	0	14	1.4	2.2	-	-
Total encounters	0	0	0	0	0	3	1	6	4	0	-	-	-	14	1.4

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for North Beach) / number of surveys.

Table 91. Numbers of birds encountered on COASST surveys along North Beach, St. Paul Island, Alaska in 2006. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date										Individuals[a]			Encounters[b]	
	7 Jun	23 Jun	5 Jul	17 Jul	2 Aug	16 Aug	30 Aug	21 Sep	20 Nov	15 Dec	Total	Mean	SD	Total	Enc. rate[c]
Unidentified bird	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Total new individuals	1	0	0	0	0	0	0	0	0	0	1	0.1	0.3	-	-
Total encounters	0	0	0	0	0	0	0	0	0	0	-	-	-	1	0.1

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for North Beach) / number of surveys.

Table 92. Mean numbers of individuals found and encounter rates during COASST surveys along Polovina, St. Paul Island, Alaska. Mean number of individuals comprises the average number of new birds found per survey and do not include birds still present and re-encountered from previous surveys. Encounter rate is defined as the number of all birds (including both new individuals and re-encountered birds) found per km beach surveyed (1 km for Polovina) divided by the number of surveys. Surveys were conducted in 2011 but have not yet been summarized.

Species	2006		2007		2008		2009		2010	
	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate	Mean # ind.	Enc. rate
Northern fulmar	0.2	0.2	0.2	0.2	0.1	0.1	-	-	0.1	0.1
Short-tailed shearwater	-	-	0.7	0.9	-	-	0.1	0.1	-	-
Unidentified petrel	-	-	0.1	0.1	-	-	-	-	-	-
Black-legged kittiwake	-	-	0.1	0.1	-	-	-	-	-	-
Unidentified kittiwake	-	-	0.2	0.4	-	-	-	-	-	-
Glaucous-winged gull	-	-	0.1	0.2	-	-	-	-	0.1	0.1
Parakeet auklet	-	-	-	-	-	-	-	-	0.1	0.1
Horned puffin	-	-	-	-	-	-	-	-	0.1	0.1
Unidentified alcid	-	-	0.1	0.1	-	-	0.1	0.2	-	-
All species	0.2	0.2	1.5	1.9	0.1	0.1	0.2	0.2	0.3	0.3
n	6		11		10		17		17	
First survey	8 Jul		12 Jan		31 May		30 Apr		5 Feb	
Last survey	15 Dec		12 Sep		29 Dec		31 Dec		23 Dec	

Table 93. Numbers of birds encountered on COASST surveys along Polovina, St. Paul Island, Alaska in 2010. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date																	Individuals[a]			Encounters[b]	
	5 Feb	16 Apr	14 May	4 Jun	18 Jun	2 Jul	30 Jul	13 Aug	27 Aug	10 Sep	24 Sep	8 Oct	21 Oct	5 Nov	19 Nov	10 Dec	23 Dec	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2	0.1	0.5	2	0.1
Glaucous-winged gull	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.2	1	0.1
Parakeet auklet	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.2	1	0.1
Horned puffin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.2	1	0.1
Total new individuals	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0	5	0.3	1.0	-	-
Total encounters	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0	-	-	-	5	0.3

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Polovina) / number of surveys.

Table 94. Numbers of birds encountered on COASST surveys along Polovina, St. Paul Island, Alaska in 2009. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date																	Individuals[a]			Encounters[b]	
	30 Apr	15 May	15 Jun	25 Jun	9 Jul	17 Jul	30 Jul	13 Aug	28 Aug	18 Sep	24 Sep	21 Oct	9 Nov	20 Nov	11 Dec	17 Dec	31 Dec	Total	Mean	SD	Total	Enc. rate[c]
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.2	1	0.1
Unidentified alcid	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	0 (0)	0 (0)	0 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2	0.1	0.3	3	0.2
Total new individuals	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3	0.2	0.5	-	-
Total encounters	0	0	0	0	1	2	0	0	1	0	0	0	0	0	0	0	0	-	-	-	4	0.2

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Polovina) / number of surveys.

Table 95. Numbers of birds encountered on COASST surveys along Polovina, St. Paul Island, Alaska in 2008. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date										Individuals[a]			Encounters[b]	
	31 May	15 Jun	29 Jun	8 Sep	30 Sep	30 Oct	14 Nov	24 Nov	12 Dec	29 Dec	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Total new individuals	0	0	0	0	1	0	0	0	0	0	1	0.1	0.3	-	-
Total encounters	0	0	0	0	1	0	0	0	0	0	-	-	-	1	0.1

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Polovina) / number of surveys.

Table 96. Numbers of birds encountered on COASST surveys along Polovina, St. Paul Island, Alaska in 2007. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date											Individuals[a]			Encounters[b]	
	12 Jan	17 Feb	12 Mar	13 Apr	11 May	13 Jun	9 Jul	23 Jul	7 Aug	24 Aug	12 Sep	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)	0 (0)	2	0.2	0.6	2	0.2
Short-tailed shearwater	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (1)	2 (1)	5 (0)	0 (0)	8	0.7	1.6	10	0.9
Unidentified petrel	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	1	0.1	0.3	1	0.1
Black-legged kittiwake	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	1	0.1	0.3	1	0.1
Unidentified kittiwake	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)	0 (1)	0 (1)	0 (0)	0 (0)	2	0.2	0.6	4	0.4
Glaucous-winged gull	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (1)	0 (0)	1	0.1	0.3	2	0.2
Unidentified alcid	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	1	0.1	0.3	1	0.1
Total new individuals	0	0	0	0	0	1	3	0	3	8	1	16	1.5	2.5	-	-
Total encounters	0	0	0	0	0	1	3	2	5	9	1	-	-	-	21	1.9

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Polovina) / number of surveys.

Table 97. Numbers of birds encountered on COASST surveys along Polovina, St. Paul Island, Alaska in 2006. Data represent numbers of new individual birds found each survey; numbers of birds still present and re-encountered on each survey are shown parentheses.

Species	Date						Individuals[a]			Encounters[b]	
	8 Jul	18 Jul	17 Aug	22 Sep	15 Nov	15 Dec	Total	Mean	SD	Total	Enc. rate[c]
Northern fulmar	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1	0.2	0.4	1	0.2
Total new individuals	0	1	0	0	0	0	1	0.2	0.4	-	-
Total encounters	0	1	0	0	0	0	-	-	-	1	0.2

[a]Individuals represent new birds seen on surveys only and do not include birds still present and re-encountered on surveys.
[b]Encounters represent all birds seen on surveys, including both new individuals and all instances of re-encountered birds.
[c]Encounter rate = number of birds encountered / km beach surveyed (1 km for Polovina) / number of surveys.

Annotated list of wildlife species observed at St. Paul Island, Alaska in 2011 (23 May-4 September).

Abundance categories were defined as follows:

- Abundant: annual, sure to see many
- Common: annual, sure to see some
- Uncommon: annual, likely to see some
- Rare: annual but not guaranteed to see any
- Irregular: not annual but numerous records
- Casual: not annual, only a few records
- Accidental only one or two records ever

Status categories are defined as follows:

- Breeder: evidence breeding, either confirmed (observations of current nests, eggs, or chicks; adults carrying nesting materials or food to nests or chicks; recently fledged young; distraction displays) or probably (observations of pairs or territorial behavior)
- Resident non-breeder: occurs throughout season but does not breed at site
- Migrant: through-migrant

BIRDS

Greater white-fronted goose (*Anser albifrons*). Casual migrant. Two birds were on Polovina Lake on 28 May, and 3 were seen in the same area the next day.

Aleutian cackling goose (*Branta hutchinsii leucopareia*). Rare migrant**.** There five birds of this species at Tsamana Lake on 1 June. Another bird was at Salt Lagoon on 1 June and 2 June. One bird was at Salt Lagoon on 4 and 5 June. Another bird was seen at Webster Lake on 19 June. A flock of 19 birds were flying south from Tsamana on 22 June.

Tundra swan (*Cygnus columbianus*). Uncommon migrant. One bird was on Tsamana Lake on 27 May, 28 May, 1 June, and 4 June. On 6 June this bird was in the grass and lethargic and hardly moving even upon close approach. The bird was swimming in the lake and flew off toward North Hill on 12 June.

Eurasian wigeon (*Anas penelope*). Uncommon migrant. Two pairs were on Anton Lake on 24 May and 25 May. One male was seen on Tsamana Lake on 25 May. A male and female were on Webster Lake on 28 May. A male and female were at Salt Lagoon on 1 June, 2 June, 4 and 5 June .

Northern pintail (*Anas acuta*). Common breeder. A pair was seen on Marunich Pond on 25 May. A male bird was on Tea Cup Pond on 26 May. Two pair of this species was at Salt Lagoon on 2 June. Two pairs were at Tsamana Lake on 4 June. A female with five or six ducklings was seen on Anton Lake on 30 July.

Eurasian green-winged teal (*Anas crecca crecca*). Common breeder. Two birds were seen on Tsamana Lake and two birds were on Marunich Pond on 25 May. Two pairs were on Tea Cup Pond on 1 July.

American green-winged teal (*Anas crecca carolinensis*). Uncommon possible breeder. A male and female were at the Lake Hill Lake on 12 June. A male bird was on Ice House Lake on 13 June.

Ring-necked duck (*Aythya collaris*). Casual migrant. A male and female were seen at Marunich Pond on 27 May and a female was there the next day.

Greater scaup (*Aythya marila*). Uncommon migrant. Three birds were on Anton Lake on 24 May and 1 bird on 2 June, and 1 bird was at Polovina Lake on 4 June. A pair was on Salt Lagoon on 4 June. Two pair were on Ice House Lake on 11 June. A pair was at Rocky Lake on 12 June. Two males were on Polovina Lake on 13 June. A male and female were on Tsamana Pond on 18 June. A male and female were on Rocky Lake on 19 June. Three male birds were on Polovina Lake on 1 July.

Lesser scaup (*Aythya affinis*). Uncommon migrant. A pair was seen on Polovina Lake on 9 June and 19 June.

Steller's eider (*Polysticta stelleri*). Rare migrant. Four females were seen at Salt Lagoon on 21 May. Four females were on Salt Lagoon's Tattler Cove on 27 May. Seven birds were on Salt Lagoon on 2 June and five birds were there on 6 June. Four female birds were on Salt Lagoon's Tattler Cove on 27 May. Seven birds were on Salt Lagoon on 2 June and five birds were there on 6 June.

King eider (*Somateria spectabilis*). Uncommon migrant. There were about a half dozen birds in eclipse plumage seen off shore of Slade's Arch on 4 June. Three birds including a male in eclipse plumage were in the harbor on 11 August. Two males were at the east end of Lincoln Bight on 15 August.

Common eider (*Somateria mollissima*). Casual. One bird was on Webster Lake on 4 June. A female was at the Tonki Point wetlands on 17 June. One bird was seen on Webster Lake on 19 June.

Harlequin duck (*Histrionicus histrionicus).* Abundant resident non-breeder*.* About 150 birds, mostly males, were counted in the small cove opposite Marunich Pond on 4 June. There were 60 in a flock on nearshore waters west of Zapadni on 12 June, and two flocks, of 17 and 75 birds, were in the same area on 18 June. A flock of 90 birds were in the little cove at Tsamana on 15 June. About 109 were counted on a tidal rock at the east end of Lincoln Bight on 28 July. Eighty birds were at the east end of Lincoln bight on 15 August.

Long-tailed duck (*Clangula hyemalis*). Common breeder. Three female and one male were on Anton Lake on 24 May. A pair was seen at Tsamana Lake, and four birds on Marunich Pond, and a pair at Anton Lake, on 25 May. A male and female were on Cup Pond on 26 May and two more birds were on Weather Station Lake on 26 May. Twelve were counted on Webster Lake on 28 May.

Bufflehead (*Bucephala albeola*). Uncommon migrant. A female bird was on Anton Lake on 24 May. A male and female were seen on Salt Lagoon, Tsamana Lake and Anton Lake on 25 May. A female was seen at Marunick Pond on 19 June. Three birds were on Tsamana Lake on 28 July.

Common goldeneye (*Bucephala clangula*). Uncommon migrant. A male and female of this species was at Tsamana Lake on 1 June.

Red-breasted merganser (*Mergus serrator*). Rare migrant. A female was on Anton Lake on 14 June.

Pacific loon (*Gavia pacifica*). Rare migrant. Four birds were seen on the ocean between Marunich and Northeast Point on 22 June.

Red-necked grebe (*Podiceps grisegena*)*.* Uncommon migrant. A male and female were swimming near the entrance of the town harbor on 8 June.

Northern fulmar (*Fulmarus glacialis*). Abundant breeder. Both dark phase and light phase birds are seen at St. Paul Island, with the light phase more abundant in numbers. A bird with an egg kicked askew near it was on plot 53 on 6 June. Approximately 300-400 birds were feeding off Black Face Cliffs/Black Bluffs on 19 June. Eighteen counts of this species were made on productivity plot 53 from 6 June to 2 September. The high count was 48 (6 June) and the low count 11 (29 June). The first chick was large but

still downy, was seen on plot 53 was 1 August. The highest chick count on plot 53 was five, on 15 August and 19 August.

Short-tailed shearwater (*Puffinus tenuirostris*). Uncommon. One bird of this species was observed swimming on near shore waters below Tolstoi cliffs on 23 June.

Red-faced cormorant (*Phalacrocorax urile*). Abundant resident breeder. One bird was on Anton Lake on 2 June. The first eggs were noted on our first check of nests on 26 June. The first chick was seen on 17 June. In 2010 banded cormorants were seen on headlands adjacent to Marunich and Slade's Arch (adjacent to North Hill, about 1 km distant from one another). These two sites are daily roosting areas for cormorants and is where most of the 42 banded cormorants were seen in 2011. No bird banded prior to 2009 was observed. Two resighted birds had adult plumage: band No.145 and No.147, siblings banded in the nest on 3 August 2009. They were observed on 27 May and 4 June 2011 respectively. However No. 147 lacked the white flank patches. Thus they both are about a month shy of two years old. On 22 August No.147 was observed in winter plumage. (See photos on page 6)

Pelagic cormorant (*Phalacrocorax pelagicus*). Uncommon resident breeder. Two birds were at Slade's Arch on 4 June. Four birds were seen at Marunick on 29 July. Four birds were at Marunich on 11 August.

Bald eagle (*Haliaeetus leucocephalus*). Casual Irregular migrant. An adult bird flew past rush Hill on 9 June. An adult was sitting on a hill top at Otter Island on 14 June. An adult bird was perch on an inland rocky crag at Southwest Point on 18 June

Pacific golden-plover (*Pluvialis fulva*). Common migrant. One bird was seen flying near Juan's cabin at Southwest Point on 24 May. Casual observations along the west coast four wheeler tract, which is used every four to five days throughout the summer by this crew, had considerable less sightings of individual and small flocks of this species compared to the past 5 years .

Semipalmated plover (*Charadrius semipalmatus*). Common breeder. One bird was at the Rock Quarry on 5 June. One bird was at Southwest Point on 6 June. A pair was seen on Sand Dunes on 19 June. About six birds were at Rocky Lake on 6 July.

Gray-tailed tattler (*Tringa brevipes*). Common migrant. One bird was seen at Salt Lagoon on 12 August.

Wandering tattler (*Tringa incanus*). Common migrant. One bird was seen on 25 May and then three birds were flying and calling along the north coast west of Marunich on 28 May. One bird was seen near Marunich on 28 July. One bird was seen at Anton Lake and another along the Ridgewall West population count route on 30 July. One bird was at Marunich on 11 August.

Lesser yellowlegs (*Tringa flavipes*). Irregular migrant. One bird was photographed at the Salt Lagoon on 24 May and observed the next day.

Wood sandpiper (*Tringa glareola*). Rare migrant. One was seen at Salt Lagoon on 22 May.

Whimbrel (*Numenius phaeopus*). Uncommon migrant. Four birds were wandering about the Zapadni seal blind area on 25 May. One bird flew over the crab pots near Salt Lagoon on 25 May. Two birds were seen flying near the Zapadni seal blind on 27 August.

Bristle-thighed curlew (*Numenius tahitiensis*). Rare migrant. Four were seen flying near the Zapadni fur seal blind on 27 August.

Bar-tailed godwit (*Limosa lapponica*). Uncommon migrant. One bird was at Salt Lagoon on 26 May. Two birds were at Salt Lagoon on 2 June.

Ruddy turnstone (*Arenaria interpres*). Abundant migrant. One bird was seen on Marunich on 6 June. Another bird was seen on 19 June at Sand Dunes north of Big Lake. This species began arriving in fair numbers by mid-July: flocks as large as 20 to 30 birds were seen. Twenty four were counted in one flock on the High Bluff trail on 26 July. Over 100 birds were on a sand beach feeding in kelp at Marunich on 28 July. A flock of six birds was on the boulder beach of the Ridgewall population route on 30 July.

Western sandpiper (*Calidris mauri*). Rare migrant. One bird was in the town marsh on 22 August.

Red-necked stint (*Calidris ruficollis*). Rare migrant. One bird was in the town marsh on 22 August.

Long-toed stint (*Calidris subminuta*). Casual migrant. One bird was at town marsh on 26 August.

Least sandpiper (*Calidris minutilla*). Rare breeder. One bird was feeding at Tsamana Lake on 28 May.

Pectoral sandpiper (*Calidris melanotos*). Uncommon migrant. One bird was seen with a least sandpiper at Tsamana Lake on 28 May.

Sharp-tailed sandpiper *(Calidris acuminata).* Uncommon migrant. One bird was at the town marsh on 12 August. Three birds were in town Marsh on 26 August.

Pribilof rock sandpiper (*Calidris ptilocnemis ptilocnemis*). Abundant breeder. A pair exhibiting territorial behavior was near Juan's cabin at Southwest Point on 24 May. A nest with three eggs was found just off the four wheeler track near the gate at Southwest Point on 27 May. At Big Lake, there was a flock of 12 at the south end and a flock of 10 at the north shore on 29 May. There were 15 birds bathing in Lake Hill on 19 June. Numerous fledglings were seen in late July. Flocks feed on all beach around the island and the Salt Lagoon tidal flats will have hundreds of birds of this species on it daily in August.

Ruff *(Philomachus pugnax)*. Rare migrant. A nice male bird was seen at Pump House Lake and again at the Harbor on 31 May.

Wilson's snipe (*Gallinago delicata*). Casual migrant. This species was seen at Marunich on 27 May.

Red-necked phalarope (*Phalaropus lobatus*). Common breeder. There were 11 birds on Marunich Pond on 25 May. Twelve birds were counted in a group on Webster Lake on 28 May.

Red phalarope (*Phalaropus fulicarius*). Ucommon migrant. Five birds were at Tsamana Lake and an additional 200 to 300 birds on nearshore waters near Marunich on 1 June, and on 4 June there were at least 50 birds at Marunich. A nice juvenile bird was in town marsh on 26 August.

Black-legged kittiwake (*Rissa tridactyla*). Abundant breeder. This species experienced reproductive failure this year. Only two chicks fledged from our monitoring plots. All of our productivity plots had signs of failure early in the nesting cycle. On 3 June it was noted the kittiwakes were just standing around and not interested in building nests. The usually prolific plot 91 had only half the number of nest built as seen

in previous years. By mid June on many of our productivity plots only half the usual nest sites were active. Most of the adults attending nests were just standing around. Then hopeful signs of a renewed effort in nesting was seen at Zapadni, where several new nests were seen and the beginnings of others being made, with birds stomping down a mud base they had recently made. More nests were established on plot 91 at Tolstoi between 13 June and 17 June. However, this effort failed, and only eight chicks were hatched on plots, and only two fledged. Approximately 75 birds were on Tsamana Lake on 25 May. The first egg was seen on 1 June at plot 53. Plot 53 had one nest with a three egg clutch on 29 June. This nest eventually failed with none of the eggs hatching. The first chick was seen on 9 July.

Red-legged kittiwake (*Rissa brevirostris*). Abundant breeder. The first egg was seen on 6 June. The first chick was seen on 7 July. The number of kittiwakes on Index Plots continues to decline.

Vega herring gull (*Larus agentatus vegae*). Casual migrant. One bird was on the tidal flats of the Salt Lagoon on 24 May. One bird was seen at Weather Station Lake on 26 May.

Glaucous-winged gull (*Larus glaucescens*). Abundant resident breeder. This species can be seen in most areas of the island. Four immature birds were on Weather station Lake on 26 May. Four adult birds were seen **on** Webster Lake on 28 May. Seven birds were on Weather Station Lake on 1 July.

Glaucous gull (*Larus hyperboreus).* Common. One adult bird was at Tsamana Lake on 25 May. A third year bird was hanging out with four immature glaucous-winged gulls at Weather Station Lake on 26 May. Three adult birds were on Webster Lake on 28 May. Seven immature birds were at Weather Station Lake on 19 June. One bird was on Weather Station Lake on 1 July.

Common tern (*Sterna hirundo*). Casual migrant. One bird was flushed from the side of the road by Big Lake and observed for several minutes flying in the area on 27 May.

Pomarine jaeger (*Stercorarius pomarinus*). Uncommon migrant. One bird was seen near Ridgewall flying towards Southwest Point on 13 June. One bird was seen at Weather Station Lake on 23 June.

Parasitic jaeger (*Stercorarius parasiticus*). Uncommon migrant. A dark phase bird of this species was seen flying along the coast at Northeast Point on 28 May. A bird flying over Salt Lagoon scared off a flock of about 25 red-legged kittiwakes and over 100 black-legged kittiwakes resting on a tidal sand bar on 13 June. Five birds were near Hutch Hill on 6 July.

Long-tailed jaeger (*Stercorarius longicaudus*). Uncommon migrant. There was one bird flying near Polovina on 2 June. One was seen flying at Tsamana Lake on 19 June. A group of five birds was seen near Novastashna Wetlands on 6 July. One bird was seen at Anton Lake and another at West Cliffs on 24 July.

Common murre (*Uria aalge*). Abundant breeder. The first egg was seen on 16 June. The first chick was seen on 17 July. Reproductive success for this species was 42%, historically an average year. Interestingly however, on one of the best plots for monitoring reproductive success this species, 90L at Tolstoi, totally failed. Arriving at this plot on 18 July we expected to find at least the same 19 birds on eggs that were there three days prior. However, inexplicably, only four eggs remained. Although bird attendance on the plot was normal for this year, from 18 July on the birds made no nesting effort. A non-monitored bird had a chick on 18 July, but on 21 July the chick was gone. A fox killed adult bird that fluttered to the boulder beach below plot 89 and carried it away on 10 August.

Thick-billed murre (*Uria lomvia).* Abundant breeder. Four carcasses were found along the length of Sand Dunes beach (north coast) on 28 May. The first egg was seen on 17 June. The first chick was seen on 24 July. One interesting event was a thick-billed murre and common murre incubating the same egg and attending the chick; behaving as mates. On Tolstoi plot 114 on 18, 21, and 25 July a thick-billed murre was incubating the egg. On 28 July and 2, 5 ,9, and 12 August a common murre was incubating the egg. Then on 16 August the thick-billed was back to incubating the egg. On 20 August the thick-billed was on a chick, with the common murre at its side preening the thick-billed and otherwise acting like the mate.

Ancient murrelet (*Synthliboramphus antiquus*). Rare. One bird was seen on the ocean when crossing to Otter island on 14 June.

Parakeet auklet (*Aethia psittacula*). Abundant breeder. This species can be seen daily on most cliffs of the island.

Least auklet (*Aethia pusilla*). Abundant breeder. This species breed on boulder beaches below most cliffs including Ridgewall, Zapadni and Tolstoi. Additional colonies are at East Landing, the Anton Lake seawall, and the east end of Lincoln Bight. A storm driven tide on 4 August is thought to have flooded the colony at the Anton Lake seawall and killed most of the chicks, which were then in the late chick-rearing phase of the nesting cycle. By 10 and 11 August few adult birds were returning to this colony. A diet sample was collected at Zapadni from a bird with metal band number 1252-02466 on 19 July.

Crested auklet (*Aethia cristatella*). Abundant breeder. Observed daily, this species was seen in the most numbers at Zapadni and Tolstoi.

Horned puffin (*Fratercula corniculata*). Abundant breeder. This species is found along all the cliffs of the island. A bird incubating an egg was seen at Zapadni's plot 89 on 19 July.

Tufted puffin (*Fratercula cirrhata*). Abundant breeder. Though less abundant than *F. corniculata,* this species was observed at most major seabird colony cliffs. Typically, predatory arctic foxes prevent them from burrowing along bluff tops and restrict their breeding effort to inaccessible cliffs.

Short-eared owl (*Asio flammeus*). Rare. One bird was seen near Marunich Pond on 6 June. One was near Zapadni on 11 June.

Common raven (*Corvus corax*). Common. One bird was seen at Southwest Point on 27 May. One bird was at Southwest Point on 9 June. Two birds were patrolling the west cliffs (High Bluffs) throughout the day on 12 June. One seen flying by on high bluffs on 18 June.

Tree swallow (*Tachycineta bicolor*). Rare. One bird was flying about Marunich Pond on 4 June.

Bank swallow (*Riparia riparia*). Rare. One bird was flying about Tsamana Lake on 4 June. A single bird seen flying by at Marunich.

Pacific wren (*Troglodytes pacifica*). Uncommon resident breeder. A bird was singing at Zapadni dip on 11 June. Singing birds routinely attract attention at the summit of the trail to the top of the bluff and at plot 80. On 9 July a bird was signing on the beach near Zapadni population plot segment F.

Dark-sided flycatcher (*Muscicapa sibirica*) Casual. One bird was seen in the crab pots on 23 August.

Golden-crowned sparrow (*Zonotrichia atricapilla*). Casual. One bird was seen singing in the crab pot by Salt Lagoon on 4 and 5 June.

Dark-eyed junco (*Junco hyemalis*). Casual. One male was calling at the crab pots by Salt Lagoon on 26 May. Another bird was seen at Northeast point on 4 June.

Lapland longspur (*Calcarius lapponicus*). Abundant breeder.

Snow bunting (*Plectrophenax nivalis*). Abundant breeder. Several birds were at the Quarry on 5 June. Several birds were seen at the Quarry and then Polovina Hill on 29 May. At least four birds were at Southwest Point on 6 June. Two birds were bathing in Lake Hill on 13 June. Four birds were flying about Lake Hill on 17 June.

Gray-crowned rosy finch (*Leucosticte tephrocotis*). Abundant breeder. Probably the most common passerine on the island, this species was observed daily throughout the island. The first fledgling was seen on 1 July near Big Lake.

Common redpoll (*Carduelis flammea*). Rare. One bird was seen at the crab pots near Salt Lagoon on 4 June.

MAMMALS

Sea otter (*Enhydra lutris*). A carcass was found on the beach near Tonki Point on 7 August.

Harbor seal (*Phoca vitulina*). At least eight animals were offshore east of Slade's Arch on 28 May. One animal was seen off shore at Tsamana on 4 June. There were approximately 90 at Otter Island on 14 June, 75 on the north coast and 15 on the south coast. A lone animal was laying among the fur seal s at the Lukanin Beach haul out on 23 July.

Fur seal (*Callorhinus ursinus*). The first animals seen on the Zapadni sand beach were five males on 1 June. Six animals were on a tidal sand bar in Salt Lagoon on 1 July. Several times this summer we encountered wandering males near our productivity plots at Zapadni. Also, the beach population plot routes at Zapadni and Tolstoi saw routine encounters with bachelor males. Over all populations on the island appear to continue to decline.

Sea lion (*Eumetopias jubatus*). A carcass was found on the beach northwest of Marunich on 27 May. A large bull was hauled out at Southwest Point on 6 June. We counted 18 at Otter Island north landing on 14 June, their usual hangout there.

Pacific walrus (*Odobenus rosmarus*). A carcass was in the surf at English Bay on 4 June.

Reindeer (*Rangifer tarandus*). Abundant breeder. The reindeer herd was seen several times this season including a herd of about 200 animals at Rush Hill on 29 June, and a herd of about 300 animals at Rush Hill on 7 July.

Arctic fox (*Alopex lagopus*). Abundant breeder. Arctic fox (*Alopex lagopus*). Foxes continue to thrive on the Island. The usual dens were active at Zapadni, at Tolstoi beach below plot 114, at the bluff top at Tolstoi Point and near plot 110, to name a few. A fox was seen carrying a parakeet auklet in to a den at Zapadni Point on 14 June. The fox den below plot 53 is active again this year; seven pups were seen outside the den on 7 July. A common murre fluttered down to the boulder beach from the cliffs at Zapadni's plot 89 and was immediately pounced on by an arctic fox. The fox hurriedly carried the carcass away.

Table 98. Observations and breeding status of birds and selected mammals at St. Paul Island, Alaska. Data represent observations made during the monitoring season only (see dates at end of table) and may not include sightings made by other researchers or community members on the island. Information comes from annotated lists, which were not included in reports prior to 2003, although incidental observations of wildlife were undoubtedly made 1975-2002. Dashes indicate species not recorded that year but may not necessarily indicate absence from the island during the time period (e.g., species not observed although present, or species not recorded although observed). Species observed only at Otter or Walrus islands and not St. Paul in a given year are noted as "Otter I." and "Walrus I.", respectively.

Codes: B=confirmed breeder, P=probable/possible breeder, X=observed non-breeder
X/B?=bred in other years but not specified in current year

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bean goose	X	X	-	-	-	-	-	-	-
Greater white-fronted goose	X	X	-	-	-	X	-	-	X
Emperor goose	X	(X)[a]	X	-	Otter I.	X	-	-	-
Snow goose	-	-	X	-	-	Otter I.	-	-	-
Brant	X	X	-	-	X	X	-	-	-
Aleutian cackling goose	X	X	-	X	X	X	X	X	X
Cackling goose	-	X	X	X	-	X	-	-	-
Tundra swan	X	-	-	X	-	-	X	-	X
Gadwall	-	-	X	-	-	-	-	-	-
Eurasian wigeon	X	X	-	X	X	X	X	-	X
American wigeon	X	X	-	X	-	-	X	-	-
Mallard	X	X	-	-	-	X	-	X	-
Northern shoveler	X	X	-	X	-	X	X	-	-
Northern pintail	B	B	B	X/B?	X/B?	P	B	X	B
Eurasian green-winged teal (*A. c. crecca*)	B	B	-	-	X	X	-	-	B
American green-winged teal (*A. c. carolinensis*)	B	B	-	-	-	X	-	X	P
Green-winged teal (unspecified subsp.)	-	-	B	X	-	B	X	B	-
Canvasback	-	-	X	-	-	-	-	-	-
Common pochard	-	-	-	X	X	-	-	-	-
Ring-necked duck	-	-	X	-	-	-	X	-	X
Tufted duck	X	X	-	X	-	X	X	-	-
Greater scaup	X	X	-	-	X	X	X	X	X
Lesser scaup	-	-	-	-	-	X	-	X	X
Steller's eider	-	(X)	-	X	X	-	-	X	X
King eider	X	X	X	X	X	X	X	X	X
Common eider	-	-	-	-	-	-	-	-	X
Harlequin duck	X	X	X	X	X	X	X	X	X
White-winged scoter	X	X	-	-	-	X	-	-	-
American (formerly black) scoter	X	X	-	-	-	X	-	-	-
Long-tailed duck	B	B	B	X/B?	X/B?	B	X/B?	B	B
Bufflehead	X	X	-	X	-	X	X	X	X
Common goldeneye	X	X	-	-	-	X	X	-	X
Smew	-	-	-	X	X	-	-	-	-
Common merganser	-	(X)	-	X	X	X	-	-	-
Red-breasted merganser	X	X	-	-	X	X	X	X	X
Pacific loon	X	X	-	-	-	-	X	-	X
Common loon	-	-	X	-	-	X	X	-	-
Yellow-billed loon	X	X	-	-	X	X	-	-	-
Horned grebe	-	X	-	-	-	-	-	-	-
Red-necked grebe	X	-	-	-	X	X	X	-	X
Black-footed albatross	X	-	-	-	-	-	-	-	-
Laysan albatross	-	-	-	-	-	X	-	-	-
Northern fulmar	B	B	B	B	B	B	B	B	B
Mottled petrel	X	-	-	-	-	-	-	-	-
Sooty shearwater	-	-	-	-	X	-	-	-	-
Short-tailed shearwater	X	X	-	X	X	X	X	X	X
Fork-tailed storm-petrel	X	X	-	-	-	X	X	X	-
Leach's storm-petrel	-	-	-	-	X	-	-	-	-
Double-crested cormorant	X	-	-	-	-	-	X	-	-
Red-faced cormorant	B	B	B	B	B	B	B	B	B
Pelagic cormorant	X	X	X	-	-	X	X	X	X
Bald eagle	X	X	X	X	X	X	X	-	X
Northern harrier	-	(X)	-	-	-	-	-	-	-
Rough-legged hawk	-	X	-	-	-	-	-	-	-
Eurasian hobby	X	-	-	-	-	-	-	-	-
Gyrfalcon	-	X	-	-	-	X	-	-	-
Peregrine falcon	X	X	-	X	-	-	-	-	-
Sandhill crane	-	(X)	-	X	X	X	X	-	-
Black-bellied plover	X	X	-	-	-	-	-	-	-

[a]Data in parentheses were observed only during late-season observations 2 Sep-7 Oct.

Table 98 (continued). Observations and breeding status of birds and selected mammals at St. Paul Island, Alaska. Data represent observations made during the monitoring season only (see dates at end of table) and may not include sightings made by other researchers or community members on the island. Information comes from annotated lists, which were not included in reports prior to 2003, although incidental observations of wildlife were undoubtedly made 1975-2002. Dashes indicate species not recorded that year but may not necessarily indicate absence from the island during the time period (e.g., species not observed although present, or species not recorded although observed). Species observed only at Otter or Walrus islands and not St. Paul in a given year are noted as "Otter I." and "Walrus I.", respectively.

Codes: B=confirmed breeder, P=probable/possible breeder, X=observed non-breeder
X/B?=bred in other years but not specified in current year

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
American golden-plover	X	-	-	-	-	-	-	-	-
Pacific golden-plover	X	X	-	X	X	X	X	X	X
Lesser sand-(Mongolian) plover	X	X	X	-	-	-	X	-	-
Semipalmated plover	B	B	-	X/B?	X/B?	B	B	P	B
Terek sandpiper	X	-	-	-	-	-	-	-	-
Common sandpiper	X	X	-	-	-	X	-	-	-
Gray-tailed tattler	X	X	X	X	X	X	X	X	X
Wandering tattler	X	X	-	X	X	X	X	X	X
Spotted redshank	-	(X)[a]	-	-	-	-	-	-	-
Greater yellowlegs	X	(X)	-	X	-	-	-	-	-
Common greenshank	X	X	-	-	-	-	X	-	-
Lesser yellowlegs	X	X	-	-	X	-	-	-	X
Wood sandpiper	X	X	-	-	-	-	X	-	X
Whimbrel	X	X	X	X	-	X	X	X	X
Bristle-thighed curlew	X	X	X	-	-	X	X	X	X
Far-eastern curlew	-	-	-	-	X	-	-	-	-
Black-tailed godwit	-	-	-	-		-	X	X	-
Bar-tailed godwit	X	X	-	-	X	X	X	X	X
Ruddy turnstone	X	X	-	X	X	X	X	X	X
Black turnstone	X	-	-	-	-	-	-	-	-
Great knot	-	-	-	-	X	-	-	X	-
Red knot	X	-	-	-	-	-	-	-	-
Sanderling		X	X	X	X	X	-	-	-
Semipalmated sandpiper	X	X	X	-	-	X	-	-	-
Western sandpiper	X	X	-	-	X	X	X	X	X
Red-necked stint	X	X	-	X	X	X	X	X	X
Little stint	X	-	-	-	X	-	-	-	-
Temmick's stint	-	-	-	-	-	-	X	-	-
Long-toed stint	X	-	-	-	-	-	-	-	X
Least sandpiper	P	B	-	X/B?	X/B?	B	X/B?	X	X
Baird's sandpiper	X	X	-	-	-	-	-	-	-
Pectoral sandpiper	X	X	-	X	-	X	X	X	X
Sharp-tailed sandpiper	X	X	-	-	X	X	X	X	X
Pribilof rock sandpiper (*C. p. ptilocnemis*)	B	B	B	B	B	B	B	B	B
Northern rock sandpiper (*C. p. tschuktschorum*)	X	-	-	-	-	X	-	-	-
Dunlin	X	X	-	X	X	-	X	-	-
Broad-billed sandpiper	-	-	-	-	-	-	X	-	-
Buff-breasted sandpiper	-	X	X	-	-	X	X	-	-
Ruff	X	X	X	-	X	-	X	X	X
Long-billed dowitcher	X	X	-	-	-	-	X	X	-
Short-billed dowitcher	X	X	-	-	-	X	-	-	-
Jack snipe	-	X	-	-	-	-	-	-	-
Wilson's snipe	-	X	-	-	-	X	-	-	X
Common snipe	X	X	-	-	-	-	X	-	-
Red-necked phalarope	X	B	B	X	X	X	X	B	B
Red phalarope	X	X	-	X	X	P	X	X	P
Black-legged kittiwake	B	B	B	B	B	B	B	B	B
Red-legged kittiwake	B	B	B	B	B	B	B	B	B
Sabine's gull	X	X	-	-	X	X	X	-	-
Bonaparte's gull	-	-	-	X	X	-	-	-	-
Black-headed gull	X	X	-	-	-	X	-	-	-
Ross's gull	-	-	-	X	-	-	-	-	-
Mew gull	-	-	-	-	X	-	X	-	-
Herring gull	X	X	X	X	X	X	-	-	X
Slaty-backed gull	X	X	-	X	X	X	X	-	-
Glaucous-winged gull	X	X	-	X	X	X	X	X	X
Glaucous gull	X	X	-	-	X	X	X	-	X
Aleutian tern	X	-	-	-	-	-	-	-	-

[a]Data in parentheses were observed only during late-season observations 2 Sep-7 Oct.

Table 98 (continued). Observations and breeding status of birds and selected mammals at St. Paul Island, Alaska. Data represent observations made during the monitoring season only (see dates at end of table) and may not include sightings made by other researchers or community members on the island. Information comes from annotated lists, which were not included in reports prior to 2003, although incidental observations of wildlife were undoubtedly made 1975-2002. Dashes indicate species not recorded that year but may not necessarily indicate absence from the island during the time period (e.g., species not observed although present, or species not recorded although observed). Species observed only at Otter or Walrus islands and not St. Paul in a given year are noted as "Otter I." and "Walrus I.", respectively.

Codes: B=confirmed breeder, P=probable/possible breeder, X=observed non-breeder
X/B?=bred in other years but not specified in current year

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Common tern	-	X	-	-	-	-	X	-	X
Arctic tern	X	X	-	-	-	X	X	X	-
Pomarine jaeger	X	X	-	X	X	X	X	-	X
Parasitic jaeger	X	X	-	X	X	X	X	-	X
Long-tailed jaeger	X	X	-	-	X	X	X	X	X
Dovekie	-	-	-	-	-	X	Walrus I.	-	-
Common murre	B	B	B	B	B	B	B	B	B
Thick-billed murre	B	B	B	B	B	B	B	B	B
Black guillemot	X	-	-	-	-	-	-	-	-
Pigeon guillemot	X	X	X	X	X	X	X	X	-
Long-billed murrelet	-	X	-	-	-	-	-	-	-
Marbled murrelet	X	X	-	-	-	X	-	-	-
Ancient murrelet	X	X	X	X	X	X	X	X	X
Parakeet auklet	B	B	B	B	B	B	B	B	B
Least auklet	B	B	B	B	B	B	B	B	B
Whiskered auklet	-	-	-	-	X	-	-	-	-
Crested auklet	B	B	B	B	B	B	B	B	B
Rhinoceros auklet	X	X	X	-	X	X	-	-	-
Horned puffin	B	B	B	B	B	B	B	B	B
Tufted puffin	B	B	B	B	B	B	B	B	B
Common cuckoo	-	X	X	-	-	-	-	-	-
Oriental cuckoo	-	(X)[a]	-	-	-	-	-	-	-
Snowy owl	X	X	-	X	X	X	-	-	-
Short-eared owl	X	X	-	X	X	X	X	-	X
Brown hawk-owl	-	-	-	-	X	-	-	-	-
Belted kingfisher	X	X	-	-	-	-	-	-	-
Olive-sided flycatcher	X	-	-	-	-	-	-	-	-
Say's phoebe	-	-	X	-	-	-	-	-	-
Eastern kingbird	-	-	-	-	X	-	-	-	-
Northern shrike	-	(X)	-	-	-	-	-	-	-
Warbling vireo	-	(X)	-	-	-	-	-	-	-
Common raven	X	(X)	X	X	X	X	X	X	X
Sky lark	-	(X)	-	-	-	-	-	-	-
Purple martin	X	-	-	-	-	-	-	-	-
Tree swallow	X	X	-	-	-	X	-	-	X
Bank swallow	X	X	-	-	X	X	X	X	X
Cliff swallow	-	-	-	-	-	-	-	X	-
Barn swallow	X	X	X	-	-	X	-	-	-
Common house martin	-	-	-	-	-	X	Otter I.	-	-
Red-breasted nuthatch	-	(X)	-	-	-	-	-	X	-
Pacific (formerly winter) wren	B	B	B	-	B	B	B	B	B
Golden-crowned kinglet	-	(X)	-	-	-	-	-	-	-
Ruby-crowned kinglet	-	X	-	-	Walrus I.	-	-	-	-
Wood warbler	-	(X)	-	-	-	-	-	-	-
Arctic warbler	-	(X)	X	-	-	-	-	-	-
Taiga flycatcher	-	-	-	-	-	-	X	-	-
Dark-sided (Siberian) flycatcher	X	X	X	-	-	-	X	-	X
Gray-streaked flycatcher	X	X	X	-	-	-	-	-	-
Siberian rubythroat	X	-	-	-	-	-	-	-	-
Bluethroat	X	-	-	-	-	-	-	-	-
Rufus-tailed robin	-	-	-	-	-	X	-	-	-
Northern wheatear	X	-	X	X	-	X	X	X	-
Gray-cheeked thrush	-	X	-	-	-	X	-	-	-
Swainson's thrush	-	(X)	-	-	-	-	-	-	-
Hermit thrush	X	X	-	-	-	-	-	-	-
Eyebrowed thrush	X	X	-	-	-	-	X	-	-
Dusky thrush	X	-	-	-	-	-	-	-	-
American robin	-	(X)	-	-	-	-	-	-	-

[a]Data in parentheses were observed only during late-season observations 2 Sep-7 Oct.

Table 98 (continued). Observations and breeding status of birds and selected mammals at St. Paul Island, Alaska. Data represent observations made during the monitoring season only (see dates at end of table) and may not include sightings made by other researchers or community members on the island. Information comes from annotated lists, which were not included in reports prior to 2003, although incidental observations of wildlife were undoubtedly made 1975-2002. Dashes indicate species not recorded that year but may not necessarily indicate absence from the island during the time period (e.g., species not observed although present, or species not recorded although observed). Species observed only at Otter or Walrus islands and not St. Paul in a given year are noted as "Otter I." and "Walrus I.", respectively.

Codes: B=confirmed breeder, P=probable/possible breeder, X=observed non-breeder
X/B?=bred in other years but not specified in current year

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
Varied thrush	-	(X)	-	-	-	-	-	-	-
Northern mockingbird	-	-	-	-	-	-	-	X	-
Eastern yellow wagtail	X	X	-	-	-	X	X	X	-
Gray wagtail	-	-	-	-	-	X	-	-	-
White (black-backed) wagtail	X	-	-	-	-	-	-	-	-
Olive-backed pipit	X	X	X	-	-	-	-	-	-
American pipit	X	X	-	X	X	X	-	-	-
Red-throated pipit	X	(X)[a]	-	-	-	-	-	-	-
Orange-crowned warbler	-	X	-	-	-	-	-	-	-
Yellow warbler	-	X	-	-	-	-	-	-	-
Yellow-rumped warbler	X	(X)	-	-	-	-	-	X	-
Townsend's warbler	-	(X)	-	-	-	-	-	-	-
Northern waterthrush	-	X	-	-	-	-	-	-	-
Wilson's warbler	-	X	-	-	-	-	-	-	-
American tree sparrow	-	X	-	-	-	-	-	-	-
Chipping sparrow	-	(X)	-	-	-	-	-	-	-
Savannah sparrow	-	X	-	-	-	-	-	-	-
Fox sparrow	-	X	-	-	X	-	-	-	-
Lincoln's sparrow	-	(X)	-	-	-	-	-	-	-
White-crowned sparrow	-	(X)	-	-	-	-	-	-	-
Golden-crowned sparrow	-	X	-	-	-	X	-	-	X
Dark-eyed junco	-	X	-	-	-	X	-	-	X
Lapland longspur	B	B	B	B	B	B	B	B	B
Rustic bunting	X	-	-	-	-	-	X	-	-
Snow bunting	B	B	B	B	B	B	B	B	B
McKay's bunting	-	X	X	-	X	X	-	-	-
Brambling	X	X	-	X	-	-	B	-	-
Gray-crowned rosy-finch	B	B	B	B	B	B	B	B	B
Common rosefinch	-	-	-	-	-	X	X	-	-
Red crossbill	X	X	-	-	-	-	-	-	-
White-winged crossbill	X	-	-	-	-	-	-	-	-
Common redpoll	B	B	-	-	-	X	X	-	X
Hoary redpoll	X	B	-	X	-	X	X	X	-
Pine siskin	X	-	-	-	-	-	X	-	-
Hawfinch	X	-	-	-	-	-	-	-	-
Sea otter	NR[b]	NR	NR	X	-	-	-	-	X
Harbor seal	NR	NR	NR	X	X	-	X	X	X
Northern fur seal	NR	NR	NR	B	B	B	B	B	B
Steller's sea lion	NR	NR	NR	-	X	X	X	X	X
Pacific walrus	-	-	-	-	-	-	-	-	X
Orca	NR	NR	NR	X	-	X	-	X	-
Gray whale	-	-	-	-	-	-	-	x	-
Minke whale	NR	NR	NR	-	-	-	-	-	-
Dall's porpoise	NR	NR	NR	-	X	-	-	X	-
Red fox	NR	NR	NR	-	X	B	-	-	-
Arctic fox	NR	NR	NR	-	B	B	B	B	B
Reindeer	NR	NR	NR	-	B	B	B	B	B
Observation dates	14 May-5 Sep	3 May-2 Sep	8 May-5 Sep	24 May-15 Sep	25 May-12 Sep	25 May-12 Sep	25 May-1 Sep	26 May-5 Sep	23 May-4 Sep

[a]Data in parentheses were observed only during late-season observations 2 Sep-7 Oct.
[b]Mammals not recorded (NR) in all years.

Table 99. First flowering dates of plants identified on St. Paul Island, Alaska. Data represent the day a fully-opened flower was first observed on the island each year. Dates may be poor indicators of actual phenology because observations of initial flowering events for uncommon or inconspicuous plants may be missed or depend on timing of field crew activities. Identifications are made by field personnel on-island and have not been confirmed by other authorities. Data may potentially exist before 2000 and 2002-2006 but have not yet been summarized.

Family	Species	Common name	2001	2007	2008	2009	2010	2011
Apiaceae	*Angelica lucida*	Wild celery	-	21 Jun	12 Jul	16 Jul	*no data*	13 Jul
(Umbelliferae)	*Conioselinum chinense*	Hemlock parsley	15 Jul	31 Jul	7 Aug	1 Aug	-	21 Jul
	Ligustocum scotisum	Lovage	27 Jul	-	-	-	-	-
Asteraceae	*Achillea borealis*	Northern yarrow	13 Jul	19 Jul	12 Jul	16 Jul	-	7 Jul
(Compositae)	*Antennaria monocephala*	Arctic pussytoes	-	19 Jul	-	-	-	-
	Arnica unalaschensis	Unalaska arnica	-	-	12 Aug	1 Aug	-	14 Aug
	Artemesia arctica	Arctic sage	-	26 Aug	3 Aug	-	-	14 Aug
	Artemesia globularia	Globe wormwood	-	29 Jun	-	-	-	2 Jul
	Artemesia titesii	Northern wormwood	13 Jul	1 Aug	3 Aug	25 Jul	-	14 Jul
	Aster sibiricus	Siberian aster	2 Aug	-	25 Jul	24 Jul	-	23 Jul
	Chyrsanthemum arcticum	Arctic daisy	16 Jul	-	23 Jul	24 Jul	-	15 Jul
	Matricaria matricarioides	Pineapple weed	-	-	-	-	-	20 Aug
	Petasites hyperboreus	Sweet coltsfoot	31 May	6 Jun	6 Jun	26 May	-	29 May
	Senecio pseudo-arnica	Beach sunflower	16 Jul	1 Aug	1 Aug	29 Jul	-	4 Aug
	Taraxacum ceratophorum	Horned dandelion	-	22 Jun	-	26 Jun	-	21 Jun
	Taraxacum kamtschaticum	Kamchatka dandilion	-	22 Jun	2 Jul	-	-	-
	Taraxacum officinale	Common dandelion	-	18 Jun	27 Jun	11 Jul	-	-
Boraginaceae	*Eritrichium chamissonis*	Arctic forget-me-not	2 Aug	23 Jun	1 Jul	-	-	28 Jun
	Mertensia maritima	Beach bluebells	-	23 Jun	23 Jul	6 Jul	-	6 Aug
Brassicaceae	*Barbarea orthoceras*	Wintercress	-	-	1 Aug	16 Jul	-	23 Jul
(Cruciferae)	*Cardamine pratensis angustfolia*	Cuckoo flower	13 Jul	9 Jul	22 Jul	3 Jul	-	29 Jun
	Cardamine umbellata	Siberian bittercress	-	24 Jun	12 Jul	-	-	-
	Cochlearia officionalis oblongifolia	Scurvy grass	-	3 Jun	31 May	9 Jun	-	8 Jun
	Draba aleutica	Aleutian draba	-	-	12 Jul	-	-	-
	Draba borealis	Arctic whitlow-grass	-	23 Jun	10Jul	16 Jun	-	23 May
	Draba hyperborea	Northern draba	-	25 May	28 May	-	-	23 May
	Draba lactea	Arctic draba	-	-	-	6 Jul	-	-
Campanulaceae	*Campanula lasiocarpa*	Mountain harebell	2 Aug	5 Aug	12 Aug	26 Jul	-	1 Aug
	Campanula uniflora	Arctic harebell	-	26 Jun	7 Jun	-	-	1 Aug
Caryophyllaceae	*Cerastium beeringianum*	Mouse-eared chickweed	-	-	-	3 Jul	-	-
	Cerastium beeringianum var. *grandifolium*	Bering Sea chickweed	-	6 Jul	28 Jul	27 Jul	-	20 Aug
	Unid. *Cerastium* sp.	Unid. chickweed	14 Jun	-	-	-	-	-
	Honckenya peploides	Beach greens	-	20 Jul	12 Jul	-	-	14 Jun
	Minuartia arctica	Arctic sandwort	-	6 Jul	23 Jul	-	-	10 Jul
	Silene acaulis	Moss campion	-	3 Jul	22 Jul	26 Jul	-	10 Jul
	Stellaria calycnatha	Northern starwort	-	19 Jul	-	-	-	-
	Stellaria crassifolia	Fleshy stitchwort	-	-	-	-	-	22 Aug
Cornus	*Cornus suecica*	Dogwood	-	20 Jul	-	26 Jul	-	10 Jul
Fabaceae	*Lathyrus maritimus*	Beach pea	17 Jun	9 Jul	6 Jul	-	-	1 Jul
(Leguminosae)	*Lupinus nootkatensis*	Nootka lupine	31 May	30 May	7 Jun	-	-	29 May
Fumariaceae	*Corydalis pauciflora*	Few-flowered corydalis	14 Jun	13 Jun	12 Jun	9 Jun	-	13 Jun

Table 99 (continued). First flowering dates of plants identified on St. Paul Island, Alaska. Data represent the day a fully-opened flower was first observed on the island each year. Dates may be poor indicators of actual phenology because observations of initial flowering events for uncommon or inconspicuous plants may be missed or depend on timing of field crew activities. Identifications are made by field personnel on-island and have not been confirmed by other authorities. Data may potentially exist before 2000 and 2002-2006 but have not yet been summarized.

Family	Species	Common name	2001	2007	2008	2009	2010	2011
Gentianaceae	*Gentiana algida*	Whitish gentian	2 Aug	7 Aug	12 Aug	1 Aug	*no data*	11 Aug
	Gentiana glauca	Glaucous gentian	-	7 Aug	-	-	-	-
Geraniaceae	*Geranium erianthum*	Wild geranium	-	26 Jul	12 Aug	26 Jul	-	10 Jul
Lilacaea	*Fritillaries camschatcensis*	Chocolate lily	-	-	25 Jul	-	-	23 Jul
	Lloydia serotina	Alp lily	-	29 Jul	-	-	-	-
	Streptopus amplexifolius	Twisted stalk	-	-	1 Aug	-	-	23 Jul
Onagracaea	*Epilobium anagallidifolium*	Alpine willow herb	-	-	-	-	-	14 Aug
	Epilobium hornemannii ssp. Behrringianum	Bering willow herb	-	26 Jul	-	-	-	20 Aug
Papaveraceae	*Papaver alaskanum*	Alaska poppy	7 Jun	15 Jun	21 Jun	-	-	17 Jun
	Papaver macounii	Macoun's poppy	-	-	-	-	-	-
Plumbaginaceae	*Armeria maritia*	Thrift	19 Jun	14 Jul	27 Jun	1 Aug	-	22 Jun
Polemoniaceae	*Polemonium acutiflorum*	Tall Jacob's ladder	17 Jun	5 Aug	3 Jul	11 Jul	-	17 Jun
	Polemonium boreale macranthum	Bluebells	-	20 Jun	-	-	-	-
Polygonaceae	*Polygonum bistora plumosum*	Pink plumes	-	5 Aug	-	-	-	-
	Polygounum vivaparium	Alpine bistort	-	-	-	-	-	17 Jul
	Oxyria digyna	Mountain sorrel	-	23 Jun	-	-	-	-
Portulacaceae	*Claytonia sarmentosa*	Alaska spring beauty	7 Jun	22 Jun	16 Jun	22 Jun	-	9 Jun
Primulaceae	*Androsace tschuktschorum. lehmanniana*	Rock jasmine	-	18 Jun	8 Jun	-	-	11 Jun
	Primula tschuktschorum var. *arctica*	Chukchi primrose	23 May	6 Jun	4 Jun	26 May	-	28 May
	Trientalis europaea arctica	Northern starflower	26 Jun	20 Jul	24 Jul	26 Jul	-	10 Jul
Pyrolaceae	*Pyrola minor*	Lesser wintergreen	-	5 Aug	-	1 Aug	-	-
Ranunculaceae	*Aconitum delphinifolium chamissonianum*	Big monkshood	-	15 Jul	20 Jul	-	-	18 Jul
	Aconitum delphinifolium paradoxum	Little monkshood	-	15 Jul	-	-	-	13 Jul
	Unid. *Aconitum* sp.	Unid. monkshood	7 Jul	-	-	-	-	-
	Ranunculus eschscholtzii	Subalpine buttercup	-	24 Jun	-		-	-
	Ranunculus pygmaeeus	Pigmy buttercup	-	-	-	21 Aug	-	-
	Ranunculus repans	Creeping spearwort	-	-	-	-	-	14 Aug
	Ranunculus sulphureus	Sulphur buttercup	-	2 Jun	2 Jun	26 May	-	9 Jun
	Unid. *Ranunculus* sp.	Unid. buttercup	6 Jun	-	-	-	-	-
Rosaceae	*Geum rossii*	Ross' avens	-	3 Jul	12 Jul	16 Jul	-	-
	Potentilla egedii	Beach cinquefoil	-	-	-	-	-	11 Aug
	Potentilla hyperarctica	High Arctic cinquefoil	-	29 Jun	-	16 Jul	-	-
	Potentilla uniflora	One-flowered cinquefoil	-	23 Jun	22 Jun	-	-	19 Jun
	Potentilla villosa	Cinquefoil	-	20 Jun	2 Jul	10 Jun	-	18 Jun
	Unid. *Potentilla* sp.	Cinquefoil sp.	7 Jun	-	-	-	-	-
	Rubus arcticus	Nagoonberry	-	1 Jul	22 Aug	1 Aug	-	14 Aug
	Rubus chamaemorus	Cloudberry	-	2 Jul	14 Jul		-	7 Jul
	Sibbaldia procumbens	Sibbaldia	-	5 Aug	-		-	-
Salicaceae	*Salix arctica*	Arctic willow	-	16 Jun	-	-	-	18 Jun
	Salix reticulata orbicularis	Netleaf willow	-	23 Jun	-	-	-	22 Jun

Table 99 (continued). First flowering dates of plants identified on St. Paul Island, Alaska. Data represent the day a fully-opened flower was first observed on the island each year. Dates may be poor indicators of actual phenology because observations of initial flowering events for uncommon or inconspicuous plants may be missed or depend on timing of field crew activities. Identifications are made by field personnel on-island and have not been confirmed by other authorities. Data may potentially exist before 2000 and 2002-2006 but have not yet been summarized.

Family	Species	Common name	2001	2007	2008	2009	2010	2011
Saxifragaceae	*Chrysosplenium wrightii*	Bering Sea water carpet	-	3 Jun	-	-	*no data*	11 Jun
	Saxifraga bracteata	Bracted saxifrage	-	27 Jun	15 Jul	-	-	-
	Saxifraga bronchialis	Yellow-spotted saxifrage	-	19 Jul	-	-	-	-
	Saxifraga hieracifolia	Rusty saxifrage	-	22 Jul	-	11 Jul	-	13 Jul
	Saxifraga hirculus	Bog saxifraga	-	-	-	14 Jul	-	-
	Saxifraga oppositifolia	Purple mountain saxifraga	-	3 Jun	-	-	-	-
	Saxifraga punctate nelsoniana	Brook saxifraga	-	6 Jul	22 Jun	16 Jul	-	22 Jun
	Saxifraga serpyllifolia	Thyme-leaved saxifrage	2 Aug	18 Jul	2 Aug	14 Jul	-	10 Jul
	Saxifraga unalaschensis	Unalaska saxifrage	-	29 Jun	-	-	-	-
Scrophulariaceae	*Lagotis glauca*	Weasel snout	26 Jun	26 Jun	30 Jun	22 Jun	-	22 Jun
	Pedicularis lanata	Woolly lousewort	17 Jun	1 Jun	22 Jun	10 Jun	-	19 Jun
	Pedicularis langsdorffi Langsdorffi	Arctic lousewort	-	29 Jun	6 Jul	6 Jul	-	22 Jun
	Pedicularis sudetica Pacifica	Fern-leaf lousewort	-	9 Jul	1 Jul	6 Jul	-	29 Jun
	Pedicularis verticillata	Whorled lousewort	-	29 Jun	-	6 Jul	-	28 Jun
	Veronica serpyllifolia	Thyme-leaf speedwell	-	-	-	-	-	20 Aug
	Veronica stelleri	Steller's speedwell	-	26 Jul	16 Aug	8 Aug	-	-
Valerianaceae	*Valeriana capitata*	Capitate valerian	30 Jun	-	16 Jun	26 Jul	-	19 Jun
Violaceae	*Viola langsdorffii*	Alaska violet	10 Jun	23 Jun	28 Jun	27 Jun	-	28 Jun

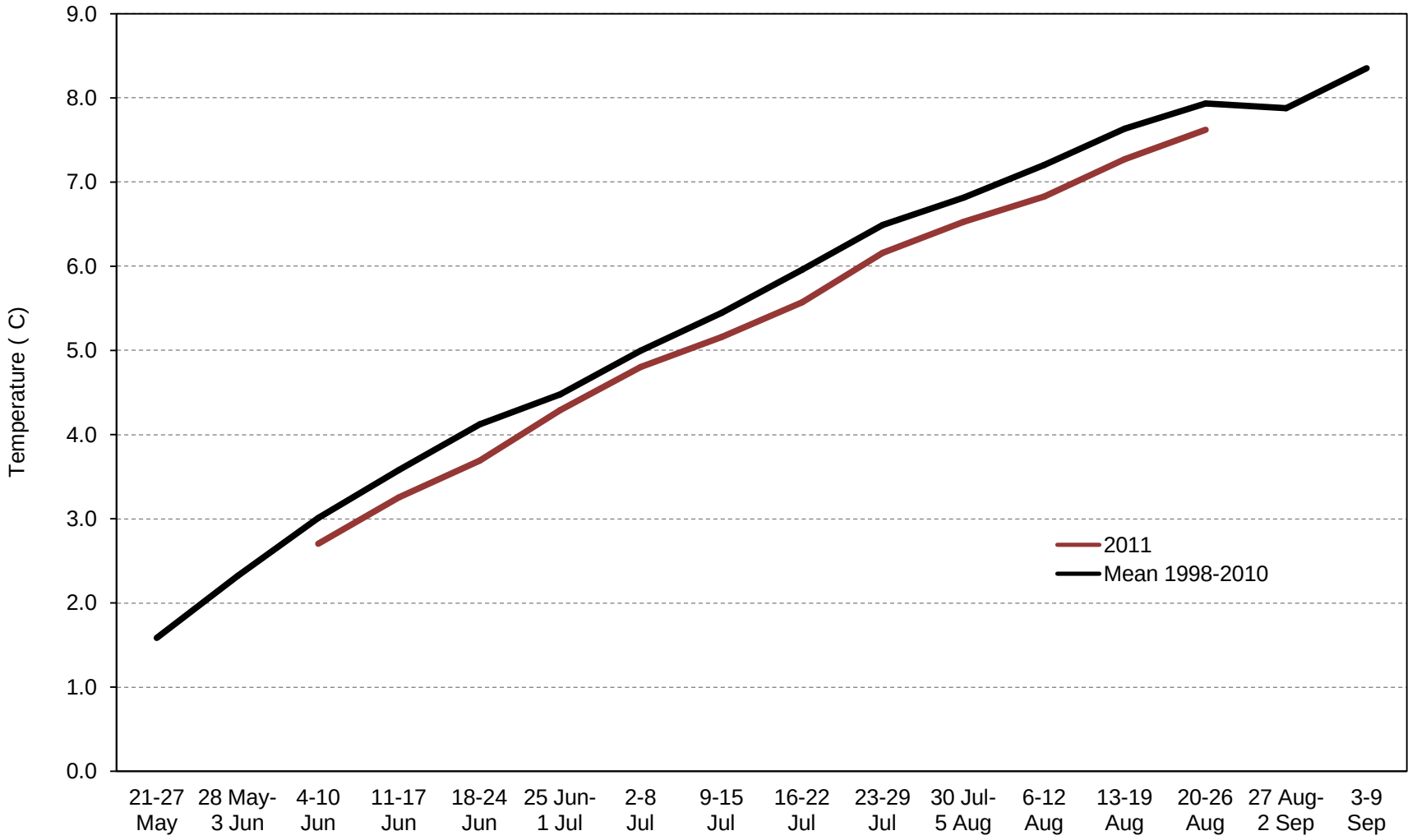


Figure 34. Mean weekly sea surface temperatures (°C) at English Bay, St. Paul Island, Alaska.

Table 100. Mean weekly sea surface temperatures (°C) at English Bay, St. Paul Island, Alaska.

Week	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
21-27 May	-	*no data*	-	-	-	-	*no data*	*no data*	*no data*	1.4	-	1.8	-	-
28 May-3 Jun	-	-	-	2.8	-	5.5	-	-	-	2.5	1.3	1.5	0.5	-
4-10 Jun	3.7	-	-	3.4	-	6.0	-	-	-	3.5	1.6	1.9	0.9	2.7
11-17 Jun	4.0	-	-	3.9	4.9	5.9	-	-	-	3.9	2.0	2.6	1.4	3.3
18-24 Jun	4.4	-	4.8	4.7	5.3	6.2	-	-	-	4.2	2.5	3.1	2.0	3.7
25 Jun-1 Jul	4.8	-	5.3	4.8	5.6	6.6	-	-	-	4.2	3.2	3.5	2.3	4.3
2-8 Jul	5.4	-	5.1	5.4	6.2	7.0	-	-	-	5.2	3.7	4.0	2.9	4.8
9-15 Jul	5.9	-	5.4	5.8	6.8	6.9	-	-	-	5.9	4.0	4.6	3.7	5.2
16-22 Jul	6.4	-	6.7	6.4	7.2	7.3	-	-	-	5.8	4.5	5.3	4.1	5.6
23-29 Jul	6.7	-	7.2	6.7	7.4	7.8	-	-	-	7.0	5.1	5.8	4.7	6.2
30 Jul-5 Aug	7.2	-	6.6	6.9	8.2	8.7	-	-	-	6.5	5.5	6.2	5.7	6.5
6-12 Aug	7.8	-	7.2	7.6	8.5	8.9	-	-	-	6.7	5.6	6.7	5.9	6.8
13-19 Aug	8.1	-	8.3	7.9	8.9	8.4	-	-	-	7.3	6.3	7.4	6.1	7.3
20-26 Aug	8.2	-	8.2	8.1	8.8	8.6	-	-	-	8.0	6.8	8.6	6.1	7.6
27 Aug-2 Sep	-	-	7.1	8.3	-	9.0	-	-	-	7.7	7.2	-	-	-
3-9 Sep	-	-	-	8.5	-	9.0	-	-	-	8.0	7.9	-	-	-

Table 101. Results of seabird necropsies at St. Paul Island, Alaska in 2010. All necropsies were performed by Dr. Terry Spraker from Colorado State University, Fort Collins, Colorado.

ID	Date	Results
10SB-1	6 Jul 2010	Black-legged kittiwake chick, Nest #2, Southwest Point, fair condition, food in ventriculus that appears to be seaweed or some type of grass, yoke sac approximately 1cc diameter and collapsed. Stomach contents collected and tissues were collected for histopathology.
10SB-2	12 Jul 2010	Black-legged kittiwake chick, below nest #13, Southwest Point, fair condition, unknown nest site, yoke sac approximately 1cc diameter and collapsed. Ventriculus empty and tissues were collected for histopathology.
10SB-3	12 Jul 2010	Black-legged kittiwake chick, nest #15, Southwest Point, fair condition, No food in ventriculus. Small amount of yoke sac found. Chick severely autolytic. Tissues were not collected for histopathology.
10SB-4	15 Jul 2010	Black-legged kittiwake chick, nest #2, Northwest Point, fair condition, Small amount of food is present in ventriculus. Small amount of yoke sac found. Chick severely autolytic. Tissues were collected for histopathology.
10SB-5	25 Jul 2010	Two young of the year female red phalaropes were found near Webster Lake. Both were emaciated, had no food in the proventriculus and ventriculus. The breast muscles were severely atrophied. Suspected cause of death was malnutrition. One of the birds did have a small degree of discoloration to the anterior aspects of the lungs. Tissues were saved from both birds but were placed in one jar.
10SB-6	27 Jul 2010	Adult black-legged kittiwake, this bird was found alive on the road near the weather station. There was a large dried laceration of the skin and massive tearing of the pectoral muscles of the left side of the breast. This tearing extended down to the bone. The bird was euthanized. The torn pectoral muscles were dried and the bone was exposed. The remaining pectoral muscles were markedly atrophied. Green staining was present around the vent. The esophagus and crop was not torn. Lungs, heart, brain, and kidneys were within normal limits. The ovary was immature and the bird was estimated to be immature. Diagnosis: Skin and pectoral muscles, severe sharp trauma, with extensive tearing. Comments: This lesion may have been caused by the bird impaling herself into somewhat a sharp object on a tower. Where the bird was found there are multiple towers of all sizes and shapes. Photos were taken.

Table 102. Number of common and thick-billed murre eggs collected for the Seabird Tissue Archival and Monitoring Project (STAMP) at St. Paul Island, Alaska.

Species	Year		
	2009	2010	2011
Common murres	1	12	9
Thick-billed murres	12	15	15

OTTER ISLAND

Table 103. Numbers of black-legged kittiwake adults, nests, and chicks counted on plots at Otter Island, Alaska. No surveys were conducted in 2011.

Plot	2007[a]						2008[a]			2009[a]						2010[a]					
	6 Jul			27 Jul			8 Aug			14 Jun			25 Jul			25 Jun			16 Jul		
	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks
1	20	7	0	12	4	0	15	5	0	11	9	0	1	0	0	9	9	0	5	3	0
2	111	56	0	87	21	0	100	70	18	123	104	0	37	10	3	110	98	1	76	57	13
3	11	5	0	11	0	0	4	4	0	12	9	0	3	2	0	7	6	0	13	12	2
4	69	20	0	47	1	0	54	30	11	57	41	0	22	17	5	51	33	0	59	27	3
5	43	7	0	34	7	2	37	17	7	49	37	0	17	11	3	53	38	0	33	18	3
6	28	12	0	38	4	0	41	18	4	20	12	0	12	7	1	47	26	0	27	24	3
7	39	11	0	40	2	1	39	15	2	44	19	0	6	2	1	29	18	0	31	17	3
8	32	7	0	35	3	1	25	10	4	12	3	0	5	2	1	27	20	0	24	15	2
9	39	15	0	46	3	0	41	19	9	35	31	0	17	2	0	35	6	0	27	16	3
Total	392	140	0	350	45	4	356	188	55	363	265	0	120	53	14	368	254	1	295	189	32

[a]Mean hatch dates on St. Paul were 13 Jul in 2007, 2 Jul in 2008, 9 Jul in 2009 and 4 Jul in 2010.

Table 104. Numbers of red-legged kittiwake adults, nests, and chicks counted on plots at Otter Island, Alaska. No surveys were conducted in 2011.

Plot	2007[a]						2008[a]			2009[a]						2010[a]					
	6 Jul			27 Jul			8 Aug			14 Jun			25 Jul			25 Jun			16 Jul		
	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks	Adults	Nests	Chicks
1	2	1	0	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	24	13	0	28	6	0	22	17	12	7	4	0	7	3	3	15	12	0	15	14	0
3	2	1	0	2	0	0	6	6	4	5	1	0	1	1	0	6	6	0	11	8	1
4	14	8	0	15	6	4	13	8	6	5	5	0	13	10	6	23	14	0	24	13	0
5	9	6	0	17	8	4	16	3	3	5	5	0	7	7	4	10	6	0	12	7	0
6	14	5	0	21	8	3	21	7	5	13	6	0	9	5	0	41	6	0	11	8	2
7	23	7	0	33	6	2	18	10	8	8	3	0	11	5	3	13	8	0	12	4	0
8	31	15	1	52	15	10	46	12	6	37	31	0	26	9	4	43	20	0	44	16	4
9	13	5	0	15	4	1	7	0	0	8	5	0	1	1	1	6	1	0	8	2	1
Total	132	61	1	186	54	25	149	63	44	88	60	0	75	41	21	157	73	0	137	72	8

[a]Mean hatch dates on St. Paul were 13 Jul in 2007, 2 Jul in 2008, 9 Jul in 2009 and 7 Jul in 2010.

WALRUS ISLAND

Table 105. Numbers of birds and marine mammals counted during circumnavigation surveys at Walrus Island, Alaska. Data do not include land-based counts. No surveys were conducted in 2011.

Species	2008			2009			2010		
	West	East	Total	West	East	Total	West	East	Total
Pelagic cormorant	13	0	13	2	0	2	0	0	0
Red-faced cormorant	10	7	17	20	7	27	4	1	5
nests	0	3	3	0	0	0	1	0	1
chicks	0	2	2	-	-	-	0	0	0
Black-legged kittiwake	57	54	111	131	164	295	89	112	201
nests	41	51	92	33	41	74	56	89	145
chicks	11	14	25	-	-	-	0	0	0
Red-legged kittiwake	0	0	0	0	0	0	0	0	0
nests	0	0	0	0	0	0	0	0	0
chicks	0	0	0	-	-	-	0	0	0
Common murre	320	53	373	224	8	232	120	6	126
Thick-billed murre	22	10	32	0	38	38	138	69	207
Unid. murre spp.	0	0	0	154	89	243	29	0	29
Steller's sea lion (adults)	44	44	88	101	70	171	104	28	132
bulls[a]	4	3	7	-	-	-	-	-	-
pups	20	6	26	0	0	0	0	0	0
Harbor seal	1	0	1	0	0	0	1	0	1
Northern fur seal (adults)	0	0	0	0	0	0	0	0	0
pups	0	0	0	0	0	0	0	0	0
Survey date	8 Aug			28 Jul			16 Jul		

[a]Bulls are included in adult sea lion total.

Table 106. Land-based counts of common murres on Murre Rock, Walrus Island, Alaska. No surveys were conducted in 2011.

	1987	1997	2006	2008	2009	2010
No. birds	1200	880	465	540	591	530

Appendix A. Discrepancies in historic dataset of red-faced cormorant breeding chronology at St. Paul Island, Alaska.

Year	Details
1976	Mean hatch date reported comes from original data (Hunt et al. 1981), which differ from that reported in later refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010).
1978	Mean hatch date reported comes from original data (Hunt et al. 1981), which differ from that reported in later refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010).
1986	Mean hatch date reported comes from original data (Byrd 1986), which differ from that reported in later refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010).
1987	Mean hatch date reported comes from recalculation of raw data, which differ from that reported in earlier refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010), likely a Julian date calculation error.
1989	Standard deviation reported comes from recalculation of raw data, which differ from that reported in earlier refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010), likely a mathematical or transcription error.
1996	Mean hatch date and sample size come from recalculation of raw data, which differ from that reported in earlier refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010), likely a Julian date calculation, mathematical or transcription error.
1998	Mean hatch date reported comes from recalculation of raw data, which differ from that reported in earlier refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010), likely a Julian date calculation error.
2001	Standard deviation reported comes from recalculation of raw data, which differ from that reported in earlier refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010), likely a mathematical or transcription error.
2004	Mean hatch date, standard deviation, and sample size come from recalculation of raw data, which differ from that reported in earlier refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010), likely a Julian date calculation, mathematical or transcription error.
2006	Mean hatch date, standard deviation, and sample size come from recalculation of raw data, which differ from that reported in earlier refuge reports (Thomson and Sapora 2007, Thomson and Spitler 2008, McClintock et al. 2010), likely a Julian date calculation, mathematical or transcription error.
2008	Standard deviation reported comes from recalculation of raw data, which differ from that reported in earlier refuge reports (Thomson and Spitler 2008, McClintock et al. 2010), likely a mathematical or transcription error.
2009	Standard deviation reported comes from recalculation of raw data, which differ from that reported in earlier refuge reports (McClintock et al. 2010), likely a mathematical or transcription error.
2010	All data reported comes from recalculation of raw data.

Appendix B. Details of historic dataset of black-legged kittiwake reproductive performance (1975-1995) at St. Paul Island, Alaska.

Year	Details
1975	Values reported here come from more recent Hunt et al. 1981 (which differ from values in Hunt et al. 1977, 1978) Mean clutch size (C/B) based on smaller-than-reported sample size Hatching success (E/C) value is midpoint of range (0.60-0.82) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.41-0.64) presented in original source (Hunt et al. 1981) Reproductive success (F/B) calculated from known-clutch-size nests only Productivity (F/A) assumed to be same as fledglings/nest start (G/A) because no nests fledged >1 chick (Climo 1993)
1976	Values reported here come from more recent Hunt et al. 1981 (which differ from values in Hunt et al. 1977, 1978) Mean clutch size (C/B) based on smaller-than-reported sample size Hatching success (E/C) value is midpoint of range (0.72-0.88) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.57-0.69) presented in original source (Hunt et al. 1981) Reproductive success (F/B) calculated from known-clutch-size nests only
1977	Values reported here come from more recent Hunt et al. 1981 (which differ from values in Hunt et al. 1978) Mean clutch size (C/B) based on smaller-than-reported sample size Hatching success (E/C) value is midpoint of range (0.59-0.85) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.52-0.74) presented in original source (Hunt et al. 1981) Reproductive success (F/B) calculated from known-clutch-size nests only
1978	Mean clutch size (C/B) based on smaller-than-reported sample size Hatching success (E/C) value is midpoint of range (0.74-0.84) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.58-0.66) presented in original source (Hunt et al. 1981) Reproductive success (F/B) calculated from known-clutch-size nests only
1979	Total nest sites (A) estimated from ratio of known-clutch nests/total nests 1975-1978 (Hunt et al. 1981) Mean clutch size (C/B) based on smaller-than-reported sample size Hatching success (E/C) value is midpoint of range (0.73-0.88) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.50-0.60) presented in original source (Hunt et al. 1981) Reproductive success (F/B) calculated from known-clutch-size nests only
1980	No data collected
1981	No data collected
1982	No data collected
1983	No data collected
1984	Original data presented as a range including nests of unknown fate and multiple ways of calculating success parameters (Johnson and Baker 1985) Values reported here were recalculated (B. Drummond, March 2010) from original report values but using only known-fate nests and not including chicks seen only at end of season
1985	Values reported in successive reports vary; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1986	Values reported in successive reports vary; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1987	No known data problems
1988	No known data problems
1989	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1990	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1991	No data collected
1992	No known data problems
1993	Data based on short-term observations
1994	Data based on short-term observations
1995	Data based on short-term observations

Appendix C. Details of historic dataset of red-legged kittiwake reproductive performance (1975-1995) at St. Paul Island, Alaska.

Year	Details
1975	Values reported here come from more recent Hunt et al. 1981 (which differ from values in Hunt et al. 1977, 1978) Hatching success (E/C) value is midpoint of range (0.78-0.91) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.81-0.94) presented in original source (Hunt et al. 1981)
1976	Values reported here come from more recent Hunt et al. 1981 (which differ from values in Hunt et al. 1977, 1978) Hatching success (E/C) value is midpoint of range (0.88-0.93) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.92-0.98) presented in original source (Hunt et al. 1981)
1977	Values reported here come from more recent Hunt et al. 1981 (which differ from values in Hunt et al. 1978) Hatching success (E/C) value is midpoint of range (0.82-0.91) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.81-0.89) presented in original source (Hunt et al. 1981)
1978	Hatching success (E/C) value is midpoint of range (0.54-0.71) presented in original source (Hunt et al. 1981) Chick success (G/E) value is a midpoint of range (0.65-0.85) presented in original source (Hunt et al. 1981)
1979	Hatching success (E/C) value is midpoint of range (0.63-0.71) presented in original source (Hunt et al. 1981) Chick success (G/E) value is midpoint of range (0.76-0.81) presented in original source (Hunt et al. 1981) Reproductive success (F/B) calculated from known-clutch-size nests only
1980	No data collected
1981	No data collected
1982	No data collected
1983	No data collected
1984	Original data presented as a range including nests of unknown fate and multiple ways of calculating success parameters (Johnson and Baker 1985) Values reported here were recalculated (B. Drummond, March 2010) from original report values but using only known-fate nests and not including chicks seen only at end of season
1985	Values reported in successive reports vary; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1986	No known data problems
1987	Values reported in successive reports vary; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1988	No known data problems
1989	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1990	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1991	No data collected
1992	No known data problems
1993	Data based on short-term observations
1994	Data based on short-term observations
1995	Data based on short-term observations

Appendix D. Details of historic dataset of common murre reproductive performance (1975-1990) at St. Paul Island, Alaska.

Year	Details
1975	No data to use (all nests monitored were high-disturbance sites; Hunt et al. 1981)
1976	Values reported include only minimal-disturbance sites (Hunt et al. 1981)
1977	No data to use (all nests monitored were high-disturbance sites; Hunt et al. 1981)
1978	Values reported include only minimal-disturbance sites (Hunt et al. 1981)
1979	No data collected
1980	No data collected
1981	No data collected
1982	No data collected
1983	No data collected
1984	No data collected
1985	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1986	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1987	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1988	No known data problems
1989	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1990	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)

Appendix E. Details of historic dataset of thick-billed murre reproductive performance (1975-1987).

Year	Details
1975	No data to use (all nests monitored were high-disturbance sites; Hunt et al. 1981)
1976	Values reported include only minimal-disturbance sites (Hunt et al. 1981)
1977	Values reported include only minimal-disturbance sites (Hunt et al. 1981) Values reported here come from more recent Hunt et al. 1981 (which differ from values in Hunt et al. 1978) Nesting success (D/B) value is midpoint of range (0.66-0.84) presented in original source (Hunt et al. 1981) Fledging success (F/B) value is midpoint of range (0.42-0.84) presented in original source (Hunt et al. 1981) Reproductive success (F/B) value is midpoint of range (0.35-0.62) presented in original source (Hunt et al. 1981)
1978	Nesting success (D/B) value is midpoint of range (0.74-0.79) presented in original source (Hunt et al. 1981) Fledging success (F/B) value is midpoint of range (0.0.77-0.91) presented in original source (Hunt et al. 1981) Reproductive success (F/B) value is midpoint of range (0.61-0.68) presented in original source (Hunt et al. 1981)
1979	No data collected
1980	No data collected
1981	No data collected
1982	No data collected
1983	No data collected
1984	Original data presented as a range including nests of unknown fate and multiple ways of calculating success parameters (Johnson and Baker 1985) Values reported here were recalculated (B. Drummond, March 2010) from original report values but using only known-fate nests and not including chicks seen only at end of season
1985	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1986	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1987	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1988	No known data problems
1989	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)
1990	Values reported in successive reports vary for unknown reasons; values reported here come from most recent reliable island reports (Climo 1993, Thomson and Sapora 2007, Thomson and Spitler 2008)

Appendix F. Adult black-legged kittiwakes banded with alphanumeric color bands or three color band combinations outside of survival plots at St. Paul Island, Alaska. Birds were banded as part of the BSIERP project (2008-2010) and are not included in any resight efforts for survival data; this list simply provides a record of these individuals. Color codes are recorded as color and # of band for birds banded with alphanumeric color bands, and as colors (in code) of bands on left (L) and right (R) legs for birds banded with three band combinations.

color combo codes: DG = dark green O = orange

Color band		Metal band #	Year banded	Location banded
Color or L leg	Band # or R leg			
DG/O	R	0974-09376	2008	Ridgewall Beach
Yellow	A2	0974-09369	2009	Ridgewall Beach
Yellow	A3	0974-09374	2009	Ridgewall Beach
Yellow	C3	714-10309	2009	Tsamana South
Yellow	E4	714-10390	2010	Tsamana South
Yellow	E5	714-10314	2010	Tsamana South

Appendix G. Adult common murres banded with alphanumeric color bands or four color band combinations outside of survival plots at St. Paul Island, Alaska. Birds were banded as part of the BSIERP project (2008-2010) and are not included in any resight efforts for survival data; this list simply provides a record of these individuals. Color codes are recorded as color and # of band for birds banded with alphanumeric color bands, and as colors (in code) of bands on left (L) and right (R) legs for birds banded with four band combinations.

color combo codes: DB = dark blue DG = dark green R = red O = orange W = white Y = yellow GY = gray

Color band		Metal band #	Year banded	Location banded	Color band		Metal band #	Year banded	Location banded
Color or L leg	Band # or R leg				Color or L leg	Band # or R leg			
DB/DB/W	O	1186-04094	2009	Ridgewall	W/DB/DB	O	1186-04034	2008	Tolstoi
DB/GY/R	O	1186-04163	2009	Tolstoi	W/DG/DG	O	1186-04168	2009	Ridgewall
DB/W/R	O	1186-04024	2008	Tolstoi	W/R/W	O	1186-04174	2009	Ridgewall
DB/W/Y	O	1186-04040	2008	Tolstoi	W/W/W	O	1186-04028	2008	Tolstoi
DG/DB/DB	O	1186-04025	2008	Tolstoi	W/GY/DG	O	1186-04167	2009	Ridgewall
DG/O/W	O	1186-04093	2009	Ridgewall	W/GY/R	O	1186-04038	2008	Tolstoi
DG/W/Y	O	1186-04181	2009	Zapadni	Y/R/R	O	1186-04095	2009	Tolstoi
DG/GY/DB	O	1186-04030	2008	Tolstoi	Y/R/W	O	1186-04175	2009	Ridgewall
DG/GY/O	O	1186-04033	2008	Tolstoi	Y/O/Y	O	1186-04162	2009	Tolstoi
R/DG/O	O	1186-04173	2009	Ridgewall	Y/W/DG	O	1186-04066	2009	Tolstoi
R/DG/GY	O	1186-04178	2009	Zapadni	Y/GY/DB	O	1186-04176	2009	Zapadni
R/R/W	O	1186-04036	2008	Tolstoi	Y/GY/O	O	1186-04026	2008	Tolstoi
R/O/DG	O	1186-04104	2009	Tolstoi	GY/DG/DB	O	1186-04096	2009	Tolstoi
R/GY/O	O	1186-04177	2009	Zapadni	GY/DG/W	O	1186-04031	2008	Tolstoi
R/GY/W	O	1186-04039	2008	Tolstoi	GY/DG/Y	O	1186-04180	2009	Zapadni
O/DB/O	O	1186-04092	2009	Ridgewall	GY/R/DB	O	1186-04035	2008	Tolstoi
O/DB/W	O	1186-04029	2008	Tolstoi	GY/R/DG	O	1186-04179	2009	Zapadni
O/R/W	O	1186-04169	2009	Ridgewall	GY/W/DG	O	1186-04027	2008	Tolstoi
O/W/DG	O	1186-04164	2009	Tolstoi	GY/W/O	O	1186-04032	2008	Tolstoi
O/Y/O	O	1186-04037	2008	Tolstoi	GY/Y/DG	O	1186-04091	2009	Tolstoi
O/GY/Y	O	1186-04165	2009	Tolstoi					

Appendix H. Adult thick-billed murres banded with alphanumeric color bands or three color band combinations outside of survival plots at St. Paul Island, Alaska. Birds were banded as part of the BSIERP project (2008-2010) and are not included in any resight efforts for survival data; this list simply provides a record of these individuals. Color codes are recorded as color and # of band for birds banded with alphanumeric color bands, and as colors (in code) of bands on left (L) and right (R) legs for birds banded with four band combinations.

color combo codes: DB = dark blue, DG = dark green, R = red, O = orange, W = white, Y = yellow

Color band		Metal	Year	Location	Color band		Metal	Year	Location
Color or L leg	Band # or R leg	band #	banded	banded	Color or L leg	Band # or R leg	band #	banded	banded
DG/R	DG	1186-04045	2008	Tolstoi E	Y/Y	DG	1186-04087	2009	Unknown
DG/R	Y	1186-04053	2008	Tolstoi M/N	Y/Y	Y	1186-04081	2009	Unknown
DG/O	R	1186-04060	2008	Ridgewall	GY/Y	DB	1186-04058	2008	Tolstoi E
DG/W	Y	1186-04012	2008	Zap. Beach	Yellow	A1	1186-04082	2009	Unknown
DG/Y	DB	1186-04015	2008	Zap. Beach	Yellow	A2	1186-04083	2009	Unknown
R/DB	DG	1186-04134	2008	SW Point	Yellow	A3	1186-04084	2009	Unknown
R/DB	R	1186-04048	2008	Tolstoi E	Yellow	A4	1186-04085	2009	Unknown
R/DB	W	1186-04018	2008	Zap. Beach	Yellow	A8	1186-04119	2009	Zapadni 87
R/DB	Y	1186-04046	2008	Tolstoi M/N	Yellow	C2	1186-04211	2009	Ridgewall
R/DG	DB	1186-04043	2008	Tolstoi E	Yellow	C3	1186-04212	2009	Ridgewall
R/DG	DG	1186-04088	2009	Unknown	Yellow	C4	1186-04213	2009	Ridgewall
R/DG	R	1186-04101	2009	Unknown	Yellow	C5	1186-04214	2009	Ridgewall
R/R	DB	1186-04089	2009	Unknown	Yellow	C6	1186-04215	2009	Ridgewall
R/R	R	1186-04080	2009	Unknown	Yellow	C7	1186-04216	2009	Ridgewall
R/R	Y	1186-04100	2009	Unknown	Yellow	C8	1186-04218	2009	Ridgewall
R/O	DG	1186-04021	2008	Zap. Beach	Yellow	C9	1186-04220	2009	Ridgewall
R/O	R	1186-04044	2008	Tolstoi E	Yellow	C0	1186-04221	2009	Tourist Pt.
R/W	DB	1186-04011	2008	Zap. Beach	Yellow	E9	1186-04210	2009	Ridgewall
R/W	DG	1186-04103	2009	Unknown	Yellow	F1	895-12795	2009	Zapadni
R/W	R	1186-04097	2009	Unknown	Yellow	H1	1186-04184	2009	Ridgewall
R/W	Y	1186-04014	2008	Zap. Beach	Yellow	H3	1186-04217	2009	Ridgewall
R/Y	DB	1186-04013	2008	Zap. Beach	Yellow	H8	1186-04222	2009	Ridgewall
R/Y	DG	1186-04132	2008	SW Point	Yellow	H9	1186-04138	2009	Zapadni Pt.
O/DB	R	1186-04120	2008	Zapadni 87	Yellow	J1	1186-04105	2009	Zapadni
O/DG	DG	1186-04063	2008	Ridgewall	Yellow	J4	1186-04061	2009	Ridgewall
O/DG	R	1186-04059	2008	Ridgewall	Yellow	J5	1186-04139	2009	Unknown
O/DG	W	1186-04017	2008	Zap. Beach	Yellow	J6	1186-04143	2009	Unknown
O/DG	Y	1186-04050	2008	Tolstoi M/N	Yellow	J8	1186-04146	2009	Unknown
O/R	DG	1186-04052	2008	Tolstoi M/N	Yellow	J9	1186-04148	2009	Unknown
O/R	DG	1186-04019	2008	Zap. Beach	Yellow	J0	1186-04149	2009	Unknown
O/R	Y	1186-04041	2008	Tolstoi E	Yellow	K1	1186-04150	2009	Unknown
W/R	R	1186-04099	2009	Unknown	Yellow	K2	1186-04151	2009	Unknown
Y/DB	DG	1186-04016	2008	Zap. Beach	Yellow	K3	1186-04152	2009	Unknown
Y/DB	R	1186-04042	2008	Tolstoi E	Yellow	K4	1186-04153	2009	Unknown
Y/DB	O	1186-04133	2008	SW Point	Yellow	K5	1186-04057	2009	Tolstoi E
Y/DG	R	1186-04121	2008	Zapadni 87	Yellow	K6	1186-04154	2009	Unknown
Y/R	DB	1186-04131	2008	SW Point	Yellow	K7	1186-04155	2009	Unknown
Y/R	DG	1186-04051	2008	Tolstoi M/N	Yellow	K8	1186-04156	2009	Unknown
Y/R	W	1186-04102	2009	Unknown	Yellow	K9	1186-04158	2009	Unknown
Y/R	O	1186-04056	2008	Tolstoi E	Yellow	K0	1186-04159	2009	Unknown
Y/R	Y	1186-04047	2008	Tolstoi M/N	Yellow	L1	1186-04160	2009	Unknown
Y/R	Y	1186-04098	2009	Unknown	Yellow	L2	1186-04166	2009	Unknown
Y/O	DB	1186-04125	2008	Ridgewall	Yellow	L3	1186-04171	2009	Unknown
Y/O	W	1186-04020	2008	Zap. Beach	Yellow	L4	1186-04172	2009	Unknown
Y/W	O	1186-04054	2008	Tolstoi M/N	Yellow	L5	1186-04182	2009	Unknown
Y/Y	DB	1186-04090	2009	Unknown					