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BIOLOGICAL MONITORING AT ST. PAUL ISLAND, ALASKA IN 2010 WITH ADDITIONAL OBSERVATIONS AT OTTER AND WALRUS ISLANDS

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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.

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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).

The specific monitoring goals in 2010 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 2010 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.

In addition, 2010 marked the last of three years of field work for the seabird colony-based component of the Bering Sea Integrated Ecosystem Research Program (BSIERP), a collaborative project examining the response of seabirds breeding on the Pribilof Islands to potential changes in food availability due to climate change. This work is summarized in separate reports to the North Pacific Research Board but is closely tied to data collected by the refuge annual monitoring program.

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 2010 consisted of Greg Thomson (11 June to 5 September) and Matt Henschen (26 May to August 23). John Warzybok (May 26 to 24 August) served as the lead refuge representative for the BSIERP project on St. Paul Island, assisted by Caitlin Kroeger (1 July to 24 August). John Warzybok and Heather Renner also assisted with the refuge monitoring work during the early part of the season.

Other BSIERP collaborators working on the island consisted of the telemetry crew associated with UC Santa Cruz: Rachael Orben (24 June to 26 August), Kerrith McKay (24 June to 26 August), and Dan Cushing (2 to 16 August).

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 1 June and continuing until 1 September. A boat-based population count of red-legged kittiwakes along the entire west coast of the island was made in mid July. With the help of the BSIERP crew, diet samples were collected from least auklets with noose carpets and mist nets, and red-faced cormorant chicks during chick banding procedures (when sixty-two chicks were banded). Black-legged kittiwake and thick-billed murre diet samples were also collected from as part of the BSIERP project. Two trips were made to Otter Island ($57^{o}02'$ N, $170^{o}24'$ W), approximately 7.5 km south of St. Paul, to record minimum productivity of nesting kittiwakes on plots delineated there last year. A visit was also made to Walrus Island ($57^{o}11'$ N, $169^{o}56'$ W), approximately 10.5 km east of St. Paul, to survey wildlife. In addition to the seabird work described above, the monitoring crew compiled a species account of all birds and marine mammals seen in 2010. The Refuge ship M/V Tiglax visited St. Paul and gave logistical support on 16 and 17 July.

Over the past two 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 2010, 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 year, 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 and test some potential changes to fledging age conventions. In the meantime, we present in this report:

- Reproductive success and chronology data from 2010 for kittiwakes and murres summarized using the database, with fledging ages adjusted to account for uncertainty periods around hatch and fledge events ("new" fledge age = fledge age from previous protocols minus 4 days; "new" fledge age if still present at last check = minus two days from above fledge age).

- All other data from 2010 summarized by hand as in past years following methods outlined in the St. Paul Island protocols.

- All data from 1975-2009 unchanged (as presented in 2009 report [McClintock et al. 2010]).

INTERESTING OBSERVATIONS

- Black-legged and red-legged kittiwakes exhibited higher breeding success than during the last few years on St. Paul.

- At least four immature red-faced cormorants banded as chicks at Tsamana colony were resighted on St. Paul in 2010. Last year resighted cormorants were observed where they had been banded; this year, banded birds were seen on cliffs adjacent to Marunich and North.

- Autopsies on four black-legged kittiwake chicks and two red phalarope juveniles show these birds had starved to death.

ACKNOWLEDGMENTS

Great appreciation is extended to Heather Renner and Vernon Byrd for not firing Greg Thomson! John Warzybok and Caitlin Kroeger (USFWS), in addition to their regular BSIERP duties, helped us with various projects including cormorant banding, the Otter Island surveys, vehicle maintenance, and coordination of field work between various crews. Rolf Ream, Rod Towel, and Juan Leon Guerrero of National Marine Fisheries Service provided helpful assistance including accommodations at Staff Quarters. Sean Haggerty and Stephan Lorenz of the Tanadgusix Corporation Island Tours directed us to some of the rare birds they observed on the island this year. Terry Spraker, a pathologist with Colorado State University in Fort Collins, Colorado, did autopsies on several bird carcasses we retrieved. Thanks 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.

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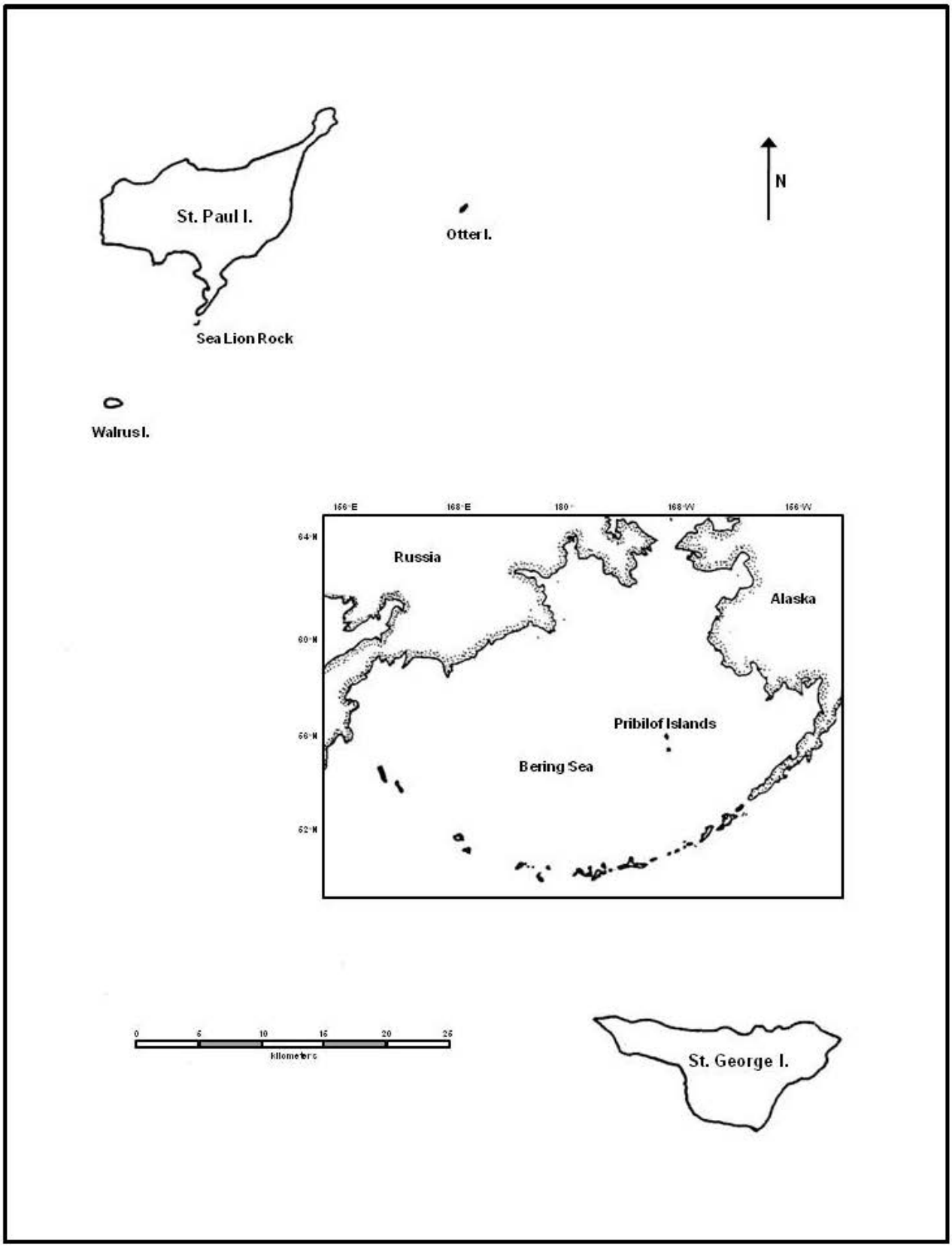

Figure 1. Map of the Pribilof Islands, Alaska.

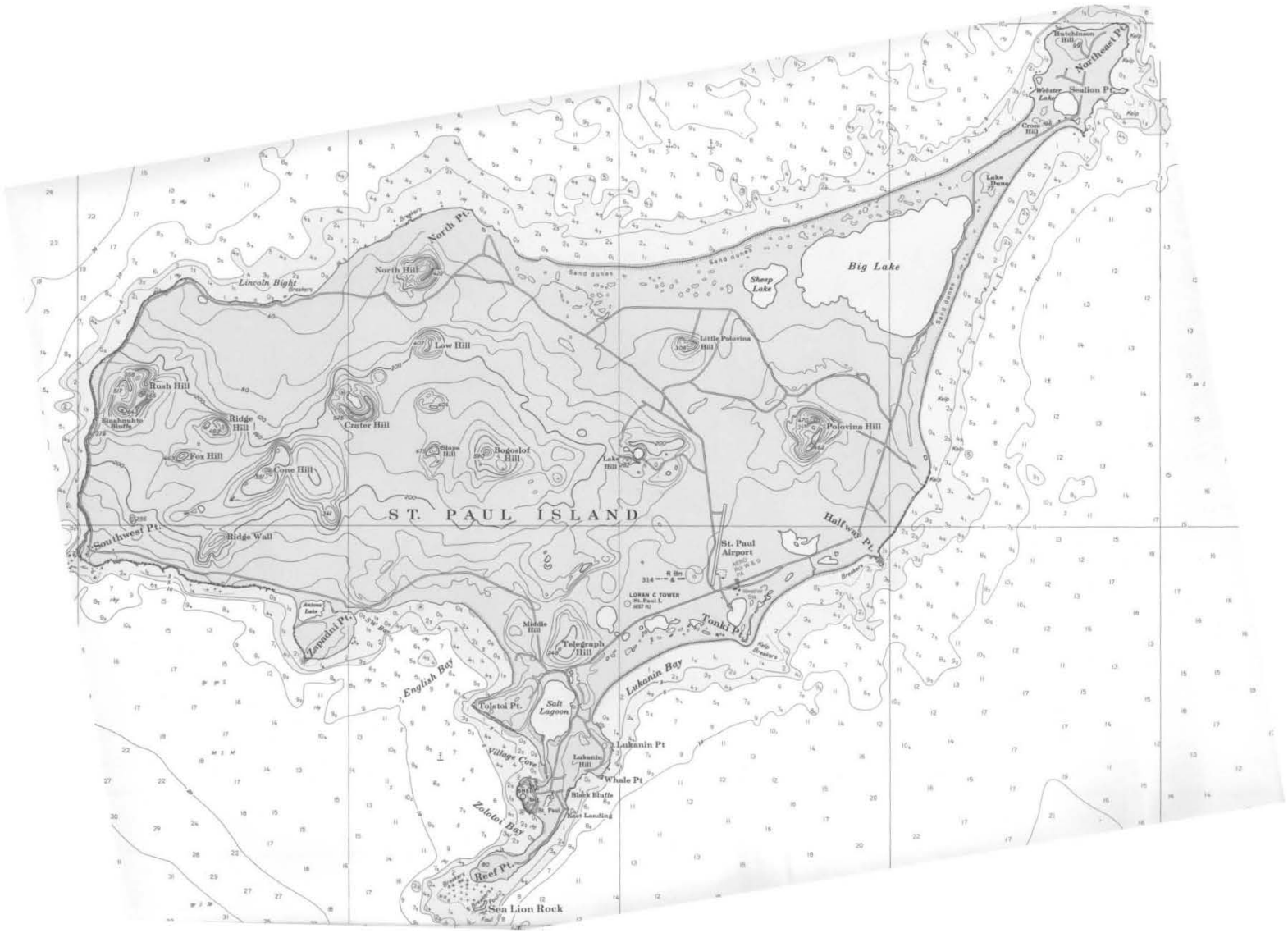

Figure 2. Map of St. Paul Island, Alaska.

FIGURES AND TABLES

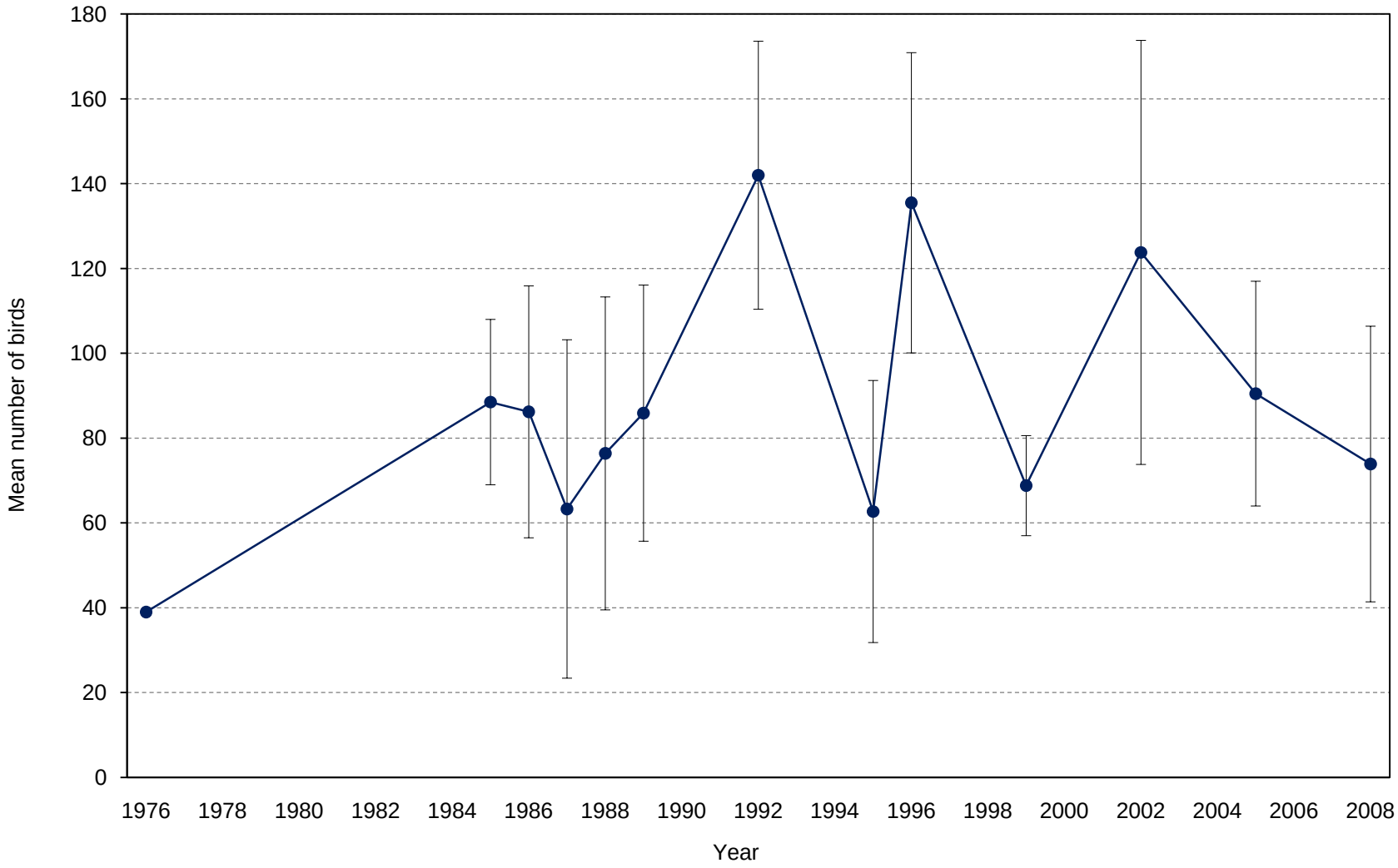

Figure 3. Mean numbers of northern fulmars counted on index plots at St. Paul Island, Alaska. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 1. Numbers of northern fulmars counted on index plots at St. Paul Island, Alaska. 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
1	39	95	63	133	116	74	120	37	99	84	68	83	119
2	-	95	105	72	123	52	159	97	176	69	129	60	64
3	-	104	129	75	27	124	100	54	94	63	84	68	37
4	-	60	61	34	73	89	136	-	175	58	117	81	59
5	-	-	73	43	42	69	191	-	138	57	211	88	50
6	-	-	-	23	57	62	146	-	131	82	134	114	47
7	-	-	-	-	97	79	-	-	-	-	-	143	115
8	-	-	-	-	-	138	-	-	-	-	-	87	100
Mean	39	89	86	63	76	86	142	63	136	69	124	91	74
n	1	4	5	6	7	8	6	3	6	6	6	8	8
SD	-	20	30	40	37	30	32	31	35	12	50	27	33
First count	19 Jul	xx[a]	xx	xx	xx	xx	xx	xx	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	-	xx	xx	xx	xx	xx	xx	xx	xx	1 Aug	31 Jul	31 Jul

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

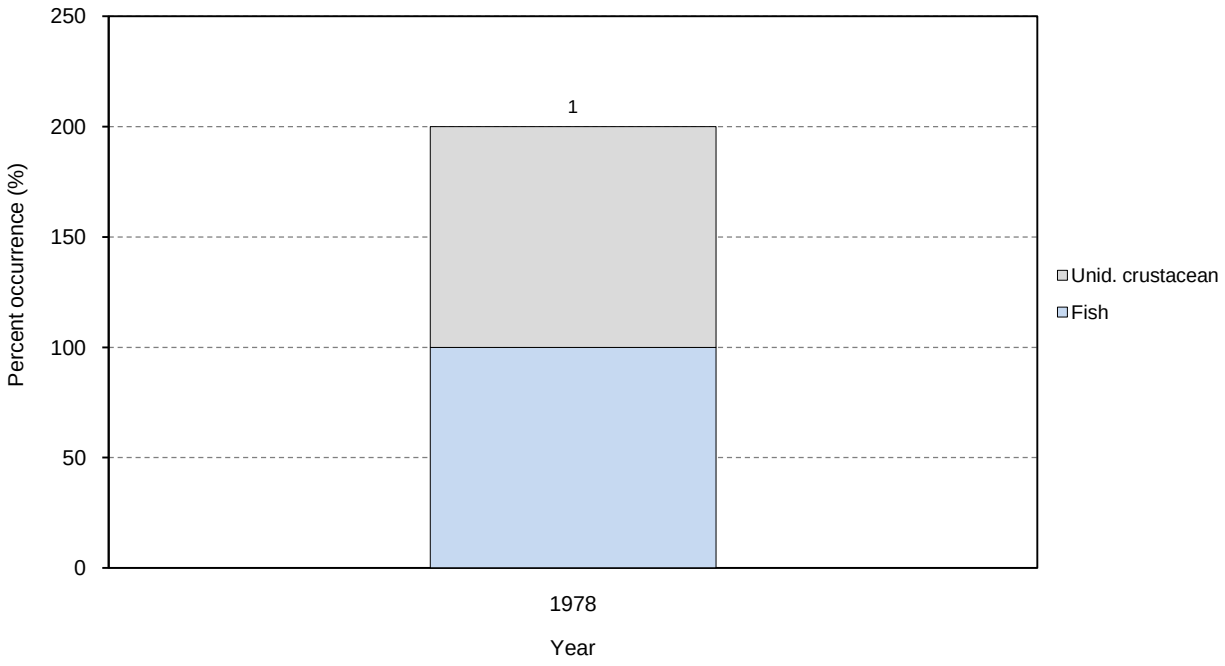

Figure 4. Frequency of occurrence of selected prey items in diets of northern fulmars at St. Paul Island, Alaska. Number above column indicates sample size. No samples were collected in years other than 1978.

Table 2. 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

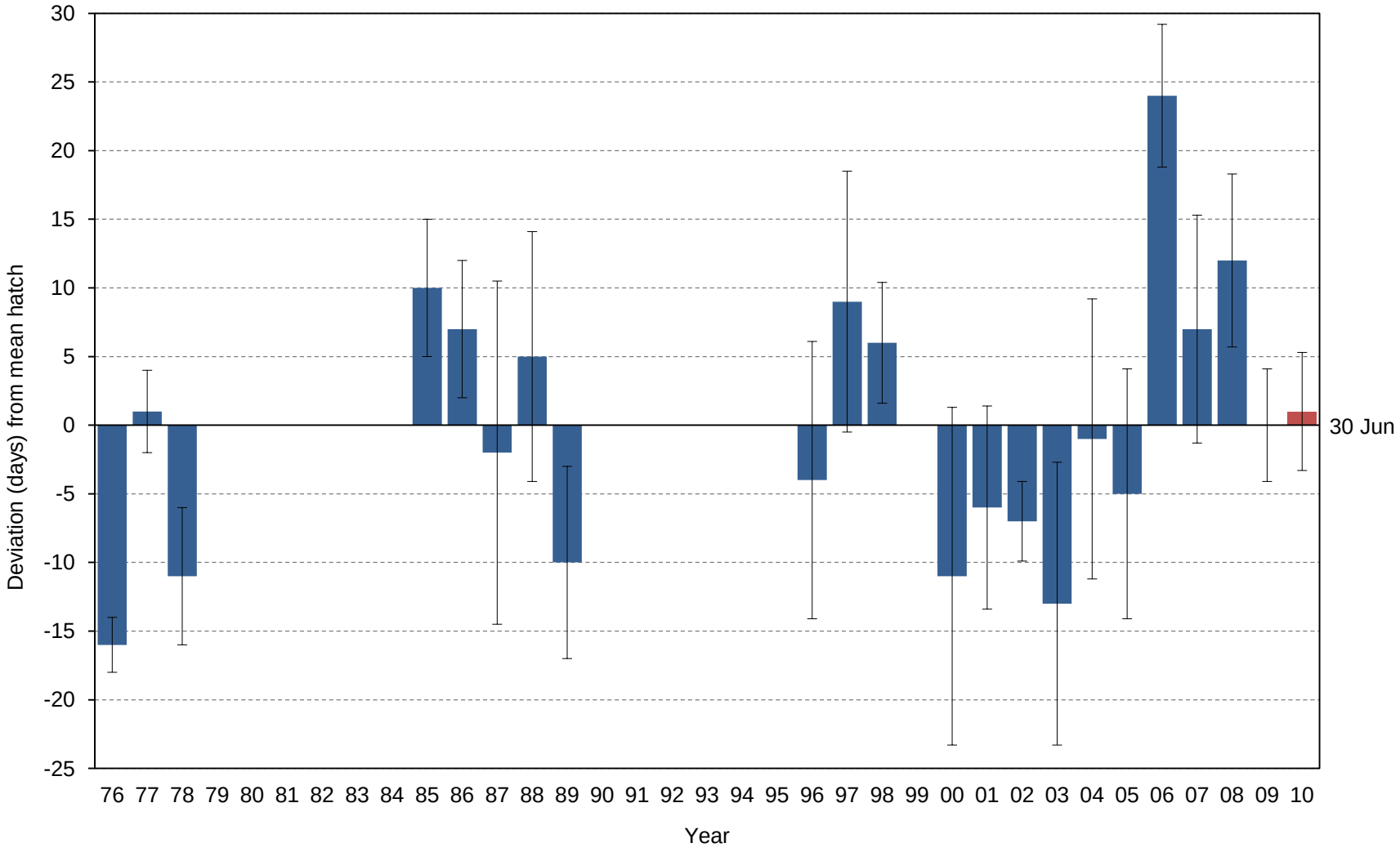

Figure 5. Yearly hatch date deviation (from the 1976-2009 average of 30 June) for red-faced cormorants at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 3. 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

[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 4. 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
156	-	-	-	*no*	*no*	*no*	*no*	*no*	*no*	-	-	-
157	-	-	-	*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	-	-		-	-	-	-	-	-	-	-	-
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191	-	-	-	-	-	-	-	-	-	-	1	6
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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 4 (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											
	99	00	01	02	03	04	05	06	07	08	09	10
156	*no*	-	-	-	1	-	-	-	-	-	-	-
157	*data*	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	-	-	-	-	-
173	-	-	-	1	-	4	2	-	-	-	-	-
174	-	-	-	-	2	3	5	-	-	-	-	-
175	-	1	-	-	-	7	9	-	2	-	-	3
176	-	-	2	8	-	4	5	-	-	-	1	-
177	-	-	-	-	-	1	2	-	1	-	-	-
178	-	-	-	-	-	6	6	-	-	-	11	-
179	-	-	-	-	-	5	7	-	1	-	-	5
180	-	-	-	-	-	1	3	-	4	-	-	2
181	-	3	-	-	-	9	2	-	-	-	-	1
182	-	-	1	-	1	-	2	-	3	-	10	9
183	-	-	-	-	-	-	1	-	4	2	-	-
184	-	-	-	-	1	1	4	-	2	-	1	2
185	-	1	-	-	-	3	-	-	2	1	-	-
186	-	-	-	-	-	-	4	-	1	1	-	6
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

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

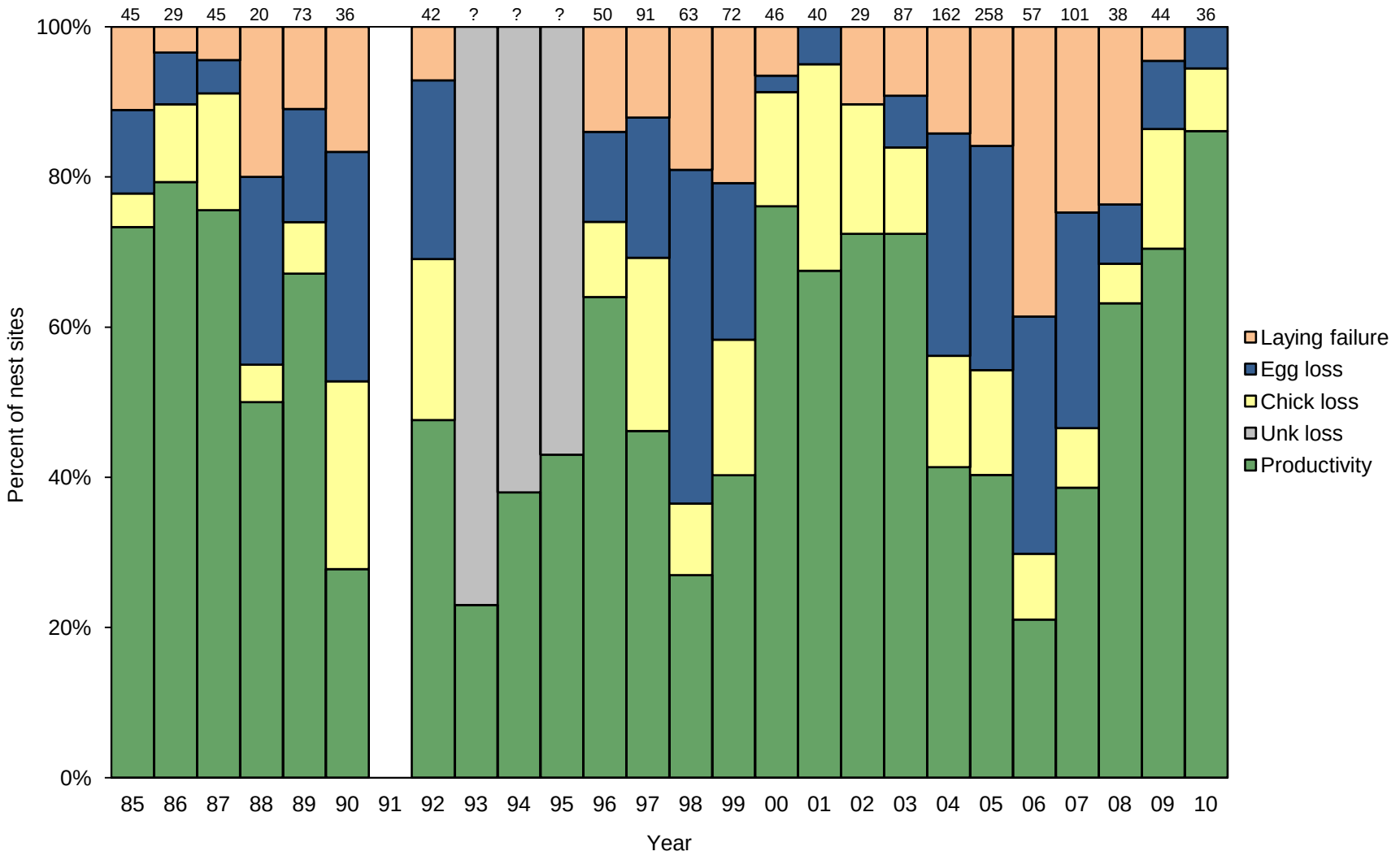

Figure 6. Reproductive performance of red-faced cormorants at St. Paul Island, Alaska. Laying failure=(A-B)/A; Egg loss=(B-D)/A; Chick loss=(D-F)/A; Productivity=F/A, where A=total nest sites; B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns indicate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

Table 5. 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 7).

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	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

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

Table 6. Reproductive performance of red-faced cormorants at St. Paul Island, Alaska in 2010. Measures of success are based on frequent monitoring of individual nests (as opposed to Boom or Bust methodology presented in Table 7).

Parameter	Plots			Total
	110	Tripod West	114	
Total nest starts (A)	11	9	16	36
Nest sites w/ eggs (B)	11	9	16	36
Total eggs (C)	41	30	51	122
Nest sites w/ chicks (D)	11	8	15	34
Total chicks (E)	36	21	43	100
Nest sites w/ chicks fledged (F)	11	8	12	31
Total chicks fledged (G)	32	19	30	81
Laying success (B/A)	-	-	-	1.00
Mean clutch size (C/B)	-	-	-	3.4
Nesting success (D/B)	-	-	-	0.94
Hatching success (E/C)	-	-	-	0.82
Chick success (G/E)	-	-	-	0.81
Egg success (G/C)	-	-	-	0.66
Fledging success (F/D)	-	-	-	0.91
Reproductive success (F/B)	-	-	-	0.86
Fledglings/nest start (G/A)	-	-	-	2.25
Productivity (F/A)	-	-	-	0.86

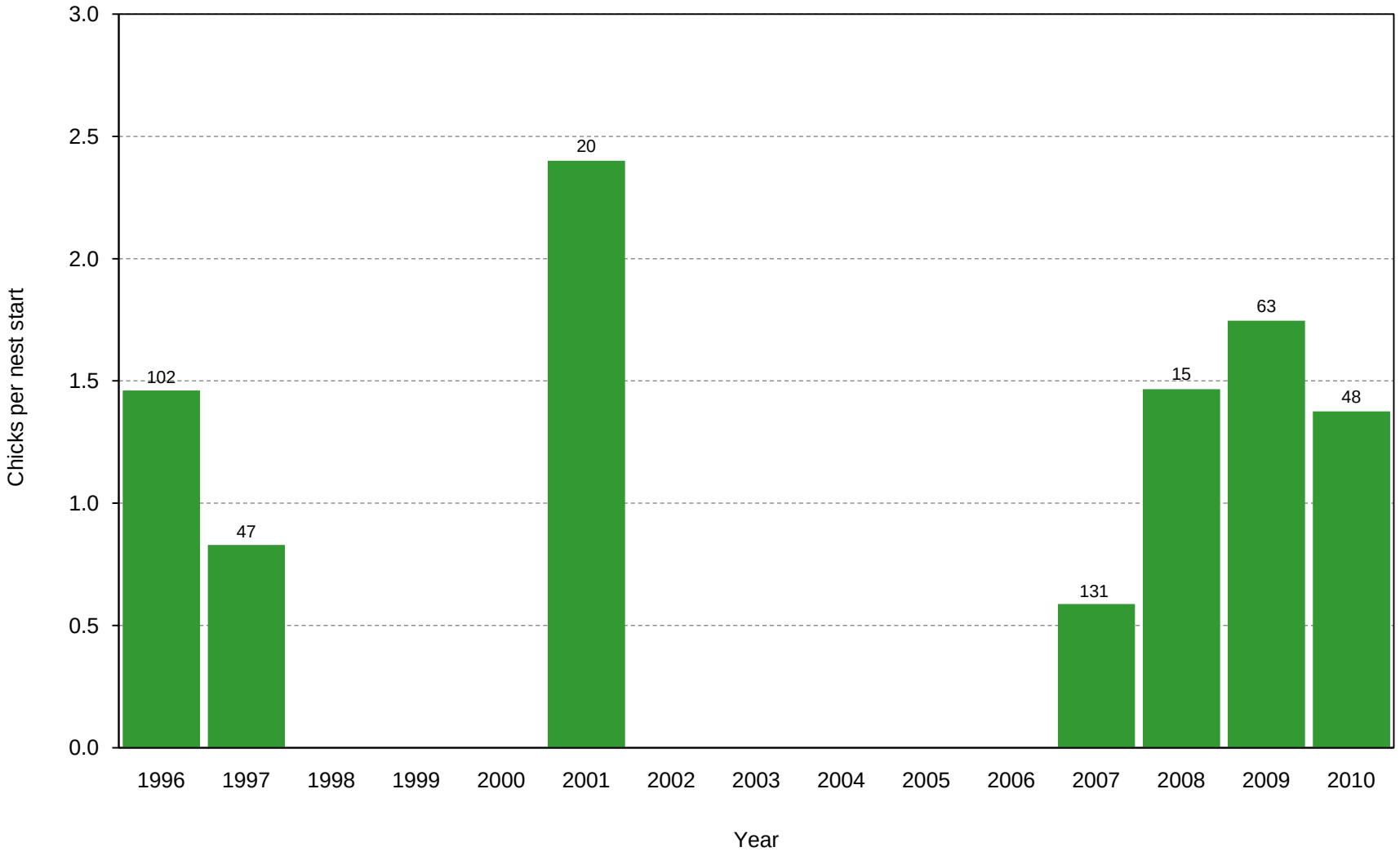

Figure 7. Reproductive performance of red-faced cormorants at St. Paul Island, Alaska, as determined by a Boom or Bust methodology. Success is measured by the number of chicks per nest start (E/A), where E=total chicks and A=total nest starts (including those without chicks). Numbers above columns indicate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

Table 7. 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 (A)	Nest sites w/ unk. contents	Nest sites w/ x chicks[a]: 0	1	2	3	4	5	Nest sites w/ chicks (D)	Total chicks (E)	Mean brood size (E/D)	Prop. nest sites w/ chicks (D/A)[b]	Chicks/ nest start (E/A)[b]	Date(s) of nest count	Date(s) of chick count
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

[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.

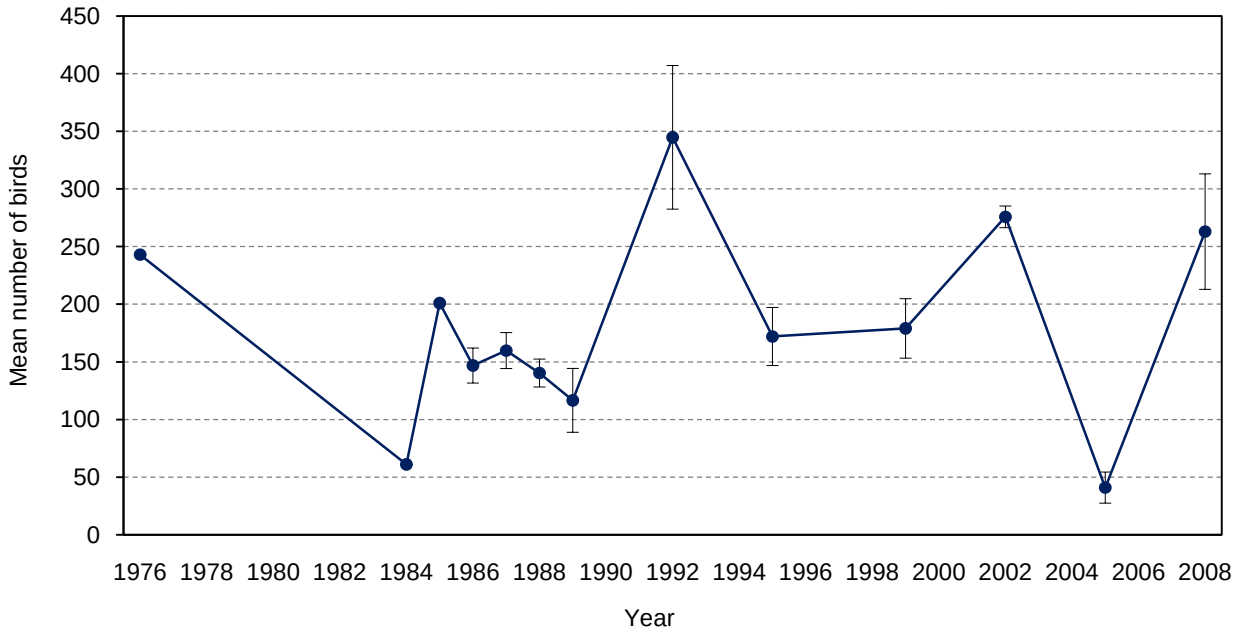

Figure 8. Mean numbers of red-faced cormorants counted on index plots at St. Paul Island, Alaska. Data from 1982 are excluded because not all plots were counted. Error bars represent standard deviation.

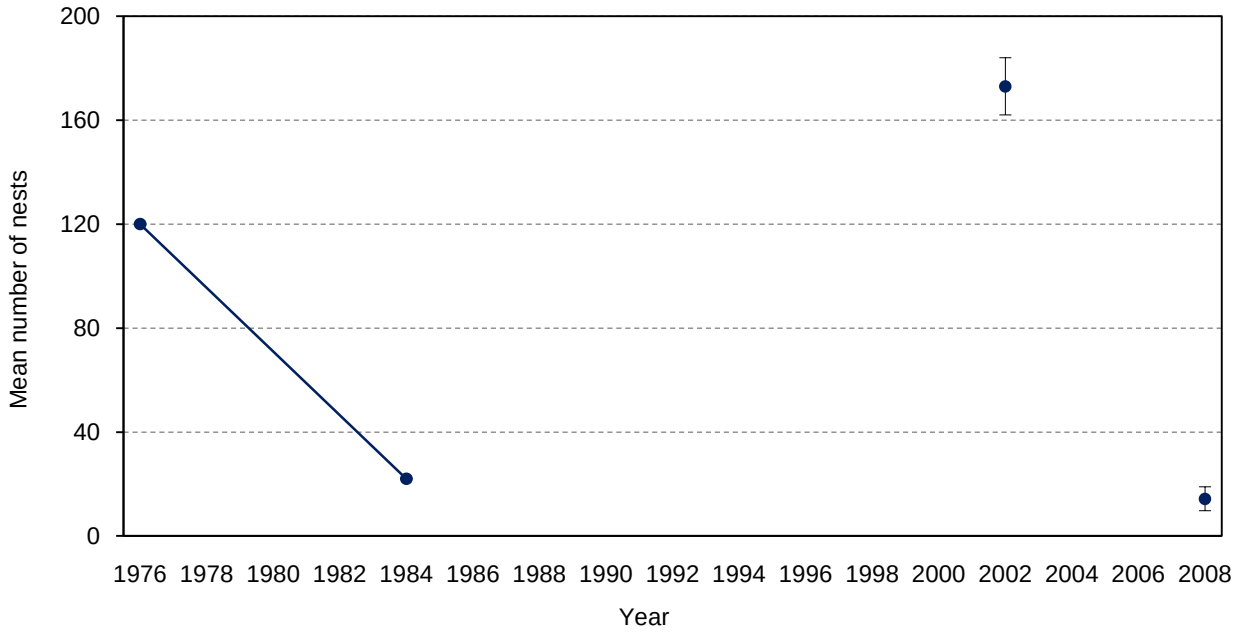

Figure 9. Mean numbers of red-faced cormorant nests counted on index plots at St. Paul Island, Alaska. Data from 1982 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 8. Numbers of red-faced cormorants counted on index plots at St. Paul Island, Alaska. 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
1	243	61	200	148	164	149	123	372	160	216	272	63	340
2	-	-	200	142	187	137	150	361	201	198	276	49	238
3	-	-	201	140	163	140	151	425	155	186	291	33	211
4	-	-	203	132	143	142	135	268	-	146	276	34	249
5	-	-	-	172	153	141	97	298	-	165	278	32	224
6	-	-	-	-	149	156	74	-	-	163	262	55	230
7	-	-	-	-	-	117	98	-	-	-	-	38	276
8	-	-	-	-	-	-	105	-	-	-	-	23	336
Mean	243	61	201	147	160	140	117	345	172	179	276	41	263
n	1	1	4	5	6	7	8	6	3	6	6	7	8
SD	-	-	1	15	16	12	28	62	25	26	9	14	50
First count	19 Jul	xx[a]	xx	xx	xx	xx	xx	xx	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	-	xx	xx	xx	xx	xx	xx	xx	xx	1 Aug	31 Jul	31 Jul

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

Table 9. Numbers of red-faced cormorant nests counted on index plots at St. Paul Island, Alaska. 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
1	120	22	xx[a]	xx	xx	xx	xx	xx	xx	xx	166	xx	xx
2	-	-	xx	xx	xx	xx	xx	xx	xx	xx	167	xx	xx
3	-	-	xx	xx	xx	xx	xx	xx	xx	xx	186	xx	xx
4	-	-	xx	xx	xx	xx	xx	xx	-	xx	-	xx	xx
5	-	-	-	xx	xx	xx	xx	xx	-	xx	-	xx	xx
6	-	-	-	-	xx	xx	xx	xx	-	xx	-	xx	xx
7	-	-	-	-	-	xx	xx	-	-	-	-	xx	xx
8	-	-	-	-	-	-	xx	-	-	-	-	xx	xx
Mean	120	22	xx	xx	xx	xx	xx	xx	xx	xx	173	xx	xx
Overall max.[b]	120	22	142	132	138	107	87	314	122	156	194	29	173
n	1	1	xx	xx	xx	xx	xx	xx	xx	xx	3	xx	xx
SD	-	-	xx	xx	xx	xx	xx	xx	xx	xx	11	xx	xx
First count	19 Jul	xx	xx	xx	xx	xx	xx	xx	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	-	xx	xx	xx	xx	xx	xx	xx	xx	23 Jul	xx	xx

[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 10. 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
Total new chicks banded	47	55	0	0	22	31	62
Cumulative chicks banded	47	102	102	102	124	155	217

Table 11. 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 2010
		2005	2006	2007	2008	2009	2010	
2004	47	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
2005	55	-	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0
2006	0	-	-	-	-	-	-	-
2007	0	-	-	-	-	-	-	-
2008	22	-	-	-	-	0 (1)	0 (0)	0
2009	31	-	-	-	-	-	0 (1)	0 (0.03)
2010	62	-	-	-	-	-	-	-
No. birds seen in current year (A)				0	0	0 (1)	0 (1)	-

Table 12. 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
Yellow	115	1018-01294	2008		-	-	-	-	(1)	0
Yellow	141	1018-01317	2009		-	-	-	-	-	(1)
			Total birds resighted[a]				0	0	0 (1)	0 (1)

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

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

Table 13 (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 12) 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	110	1018-01289	2008	Yellow	151	1018-01326	2009	Yellow	202	1018-01363	2010
Yellow	111	1018-01290	2008	Yellow	153	1018-01327	2009	Yellow	203	1018-01364	2010
Yellow	112	1018-01291	2008	Yellow	154	1018-01328	2009	Yellow	204	1018-01365	2010
Yellow	113	1018-01292	2008	Yellow	155	1018-01329	2009	Yellow	205	1018-01366	2010
Yellow	114	1018-01293	2008	Yellow	157	1018-01330	2009	Yellow	207	1018-01367	2010
Yellow	115	1018-01294	2008	Yellow	158	1018-01331	2009	Yellow	208	1018-01368	2010
Yellow	117	1018-01295	2008	Yellow	152	1018-01332	2009	Yellow	209	1018-01369	2010
Yellow	118	1018-01296	2008	Yellow	159	1018-01333	2009	Yellow	210	1018-01370	2010
Yellow	119	1018-01297	2008	Yellow	170	1018-01334	2009	Yellow	211	1018-01371	2010
Yellow	120	1018-01298	2008	Yellow	171	1018-01335	2009	-	-	1018-01372	2010
Yellow	121	1018-01299	2008	Yellow	172	1018-01336	2010	Yellow	212	1018-01373	2010
Yellow	122	1018-01300	2008	Yellow	173	1018-01337	2010	Yellow	213	1018-01374	2010
Yellow	123	1018-01301	2008	Yellow	174	1018-01338	2010	Yellow	214	1018-01375	2010
Yellow	124	1018-01302	2008	Yellow	175	1018-01339	2010	Yellow	215	1018-01376	2010
Yellow	125	1018-01303	2008	Yellow	177	1018-01340	2010	Yellow	217	1018-01377	2010
Yellow	127	1018-01304	2008	Yellow	178	1018-01341	2010	Yellow	218	1018-01379	2010
Yellow	128	1018-01305	2009	Yellow	179	1018-01342	2010	Yellow	219	1018-01378	2010
Yellow	129	1018-01306	2009	Yellow	180	1018-01343	2010	Yellow	220	1018-01380	2010
Yellow	130	1018-01307	2009	Yellow	181	1018-01344	2010	Yellow	221	1018-01381	2010
Yellow	131	1018-01308	2009	Yellow	182	1018-01345	2010	Yellow	222	1018-01382	2010
Yellow	132	1018-01309	2009	Yellow	183	1018-01346	2010	Yellow	223	1018-01383	2010
Yellow	133	1018-01310	2009	Yellow	184	1018-01347	2010	Yellow	224	1018-01385	2010
Yellow	134	1018-01311	2009	Yellow	185	1018-01348	2010	Yellow	225	1018-01384	2010
Yellow	135	1018-01312	2009	Yellow	187	1018-01349	2010	Yellow	227	1018-01386	2010
Yellow	137	1018-01313	2009	Yellow	188	1018-01350	2010	Yellow	228	1018-01387	2010
Yellow	138	1018-01314	2009	Yellow	189	1018-01352	2010	Yellow	229	1018-01388	2010
Yellow	139	1018-01315	2009	Yellow	190	1018-01353	2010	Yellow	230	1018-01389	2010
Yellow	140	1018-01316	2009	Yellow	191	1018-01351	2010	Yellow	231	1018-01390	2010
Yellow	141	1018-01317	2009	Yellow	192	1018-01354	2010	Yellow	232	1018-01391	2010
Yellow	142	1018-01318	2009	Yellow	193	1018-01356	2010	Yellow	233	1018-01392	2010
Yellow	143	1018-01319	2009	Yellow	194	1018-01355	2010	Yellow	234	1018-01393	2010
Yellow	144	1018-01320	2009	Yellow	195	1018-01357	2010	Yellow	235	1018-01394	2010
Yellow	145	1018-01321	2009	Yellow	197	1018-01358	2010	Yellow	237	1018-01395	2010
Yellow	147	1018-01322	2009	Yellow	198	1018-01359	2010	Yellow	238	1018-01396	2010
Yellow	148	1018-01323	2009	Yellow	199	1018-01360	2010	Yellow	239	1018-01397	2010
Yellow	149	1018-01324	2009	Yellow	200	1018-01361	2010				
Yellow	150	1018-01325	2009	Yellow	201	1018-01362	2010				

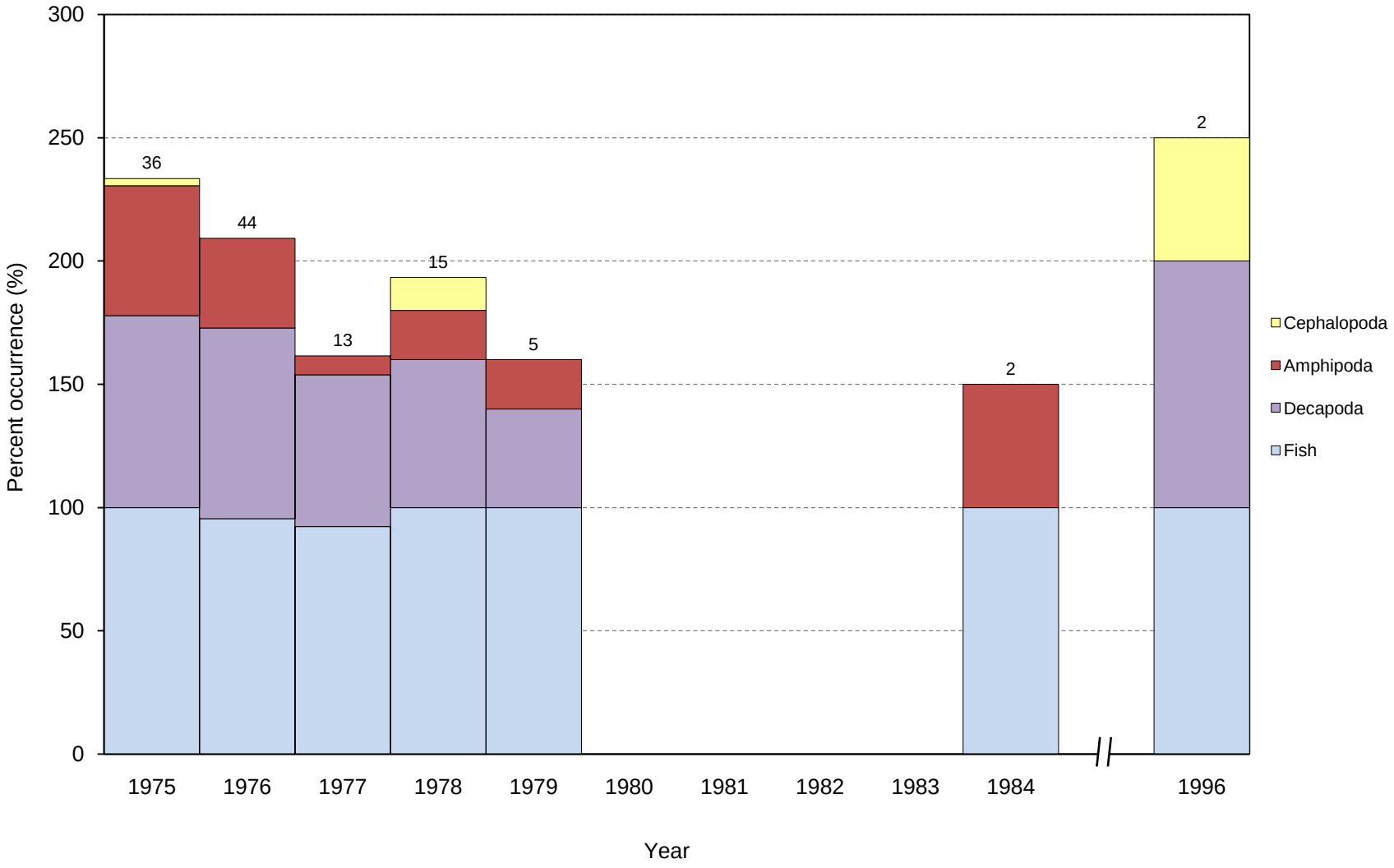

Figure 10. Frequency of occurrence of selected prey items in diets of red-faced cormorants at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1985-1995 or 1996-2008; samples were collected 2009-2010 but have not yet been summarized.

Table 14. 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 2009-2010 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

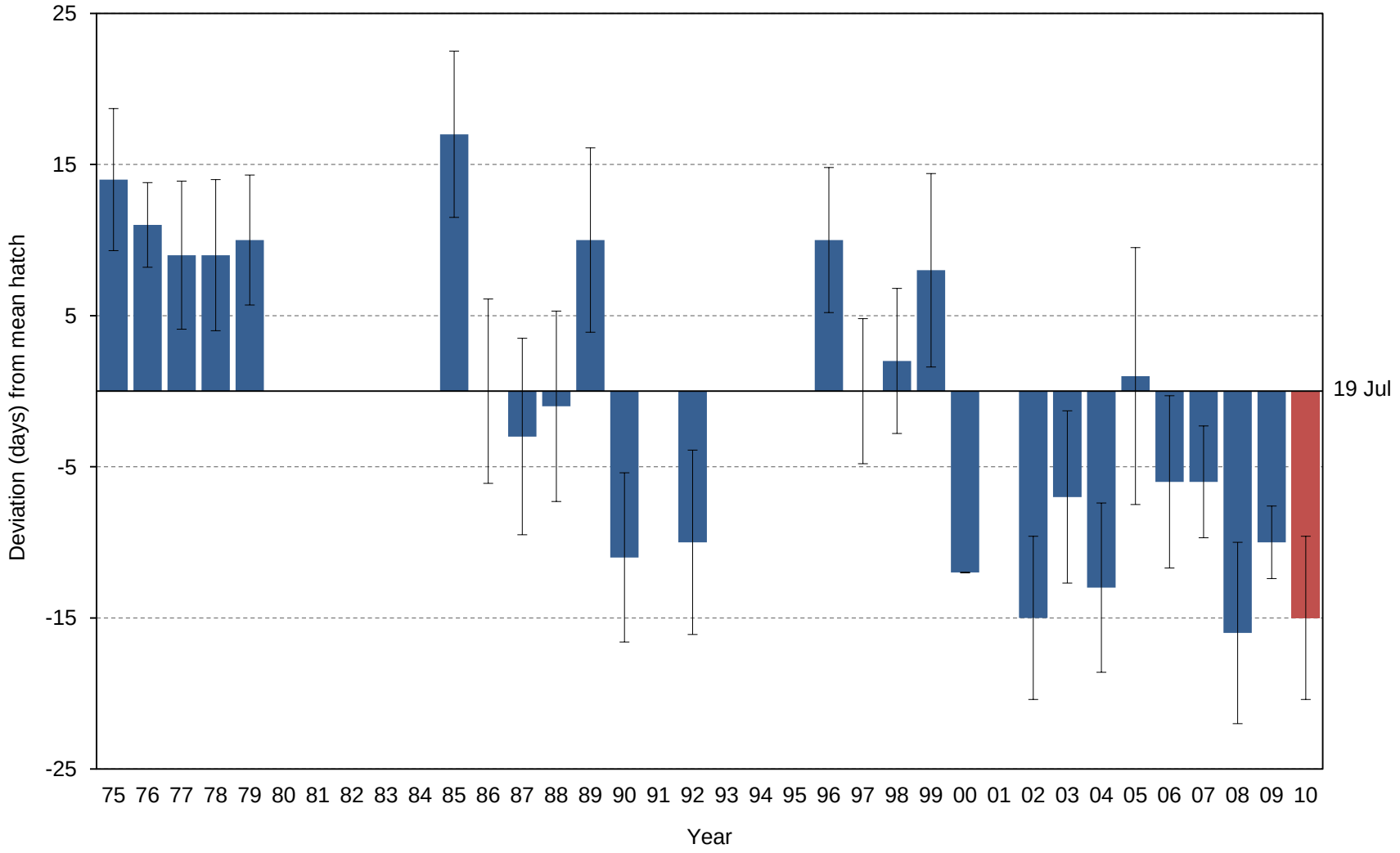

Figure 11. Yearly hatch date deviation (from the 1975-2009 average of 19 July) for black-legged kittiwakes at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 15. 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

[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 16. 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
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
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 16 (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																	
	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
169	*no data*	*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
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
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	-	-
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	-	-	-	37	133	199	31	236	86	210	201	273	52	127	204	173	24	207

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

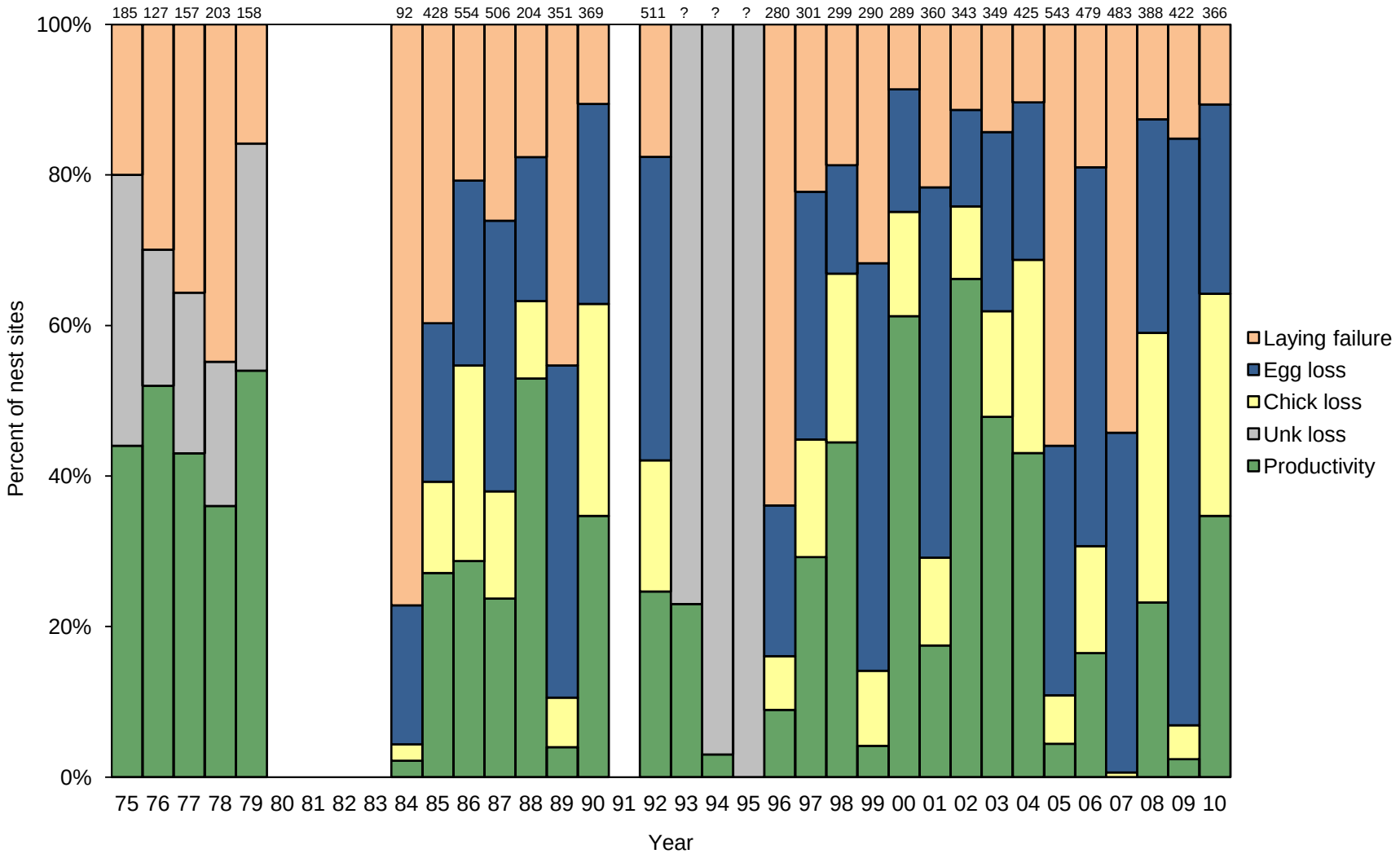

Figure 12. Reproductive performance of black-legged kittiwakes at St. Paul Island, Alaska. Laying failure=(A-B)/A; Egg loss=(B-D)/A; Chick loss=(D-F)/A; Productivity=F/A, where A=total nest sites; B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns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

Table 17. 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	-	0.60	1.3	0.65	-	-	-	0.69	0.45	-	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	222	63	63	0.78	1.5	0.37	0.51	0.28	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	221	3	3	0	0	0.46	1.0	0.01	0.01	0.00	0.01	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	358	557	29	36	10	10	0.85	1.6	0.08	0.06	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

[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 18. 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

[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 19. Reproductive performance of black-legged kittiwakes at St. Paul Island, Alaska in 2010.

Parameter	Plot													Total	SD[b]
	49	50/ 51[a]	53	54/ 55[a]	56	67/ 68[a]	69	87	89	90	90L	91	104		
Total nest starts (A)	30	29	17	38	25	36	29	19	20	22	22	45	34	366	-
Nest sites w/ eggs (B)	28	27	15	25	23	29	27	18	19	21	19	43	33	327	-
Total eggs (C)	50	49	25	44	42	49	40	33	35	38	35	78	63	581	-
Nest sites w/ chicks (D)	23	23	11	18	17	20	16	16	16	16	11	19	29	235	-
Total chicks (E)	24	24	12	25	21	25	17	21	22	23	13	24	40	291	-
Nest sites w/ chicks fledged (F)	13	21	8	14	13	7	8	10	6	4	6	8	9	127	-
Total chicks fledged (G)	13	21	8	14	13	7	8	10	6	4	6	8	9	127	-
Laying success (B/A)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.89	0.03
Mean clutch size (C/B)	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8	0.03
Nesting success (D/B)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.72	0.05
Hatching success (E/C)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.50	0.04
Chick success (G/E)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.44	0.06
Egg success (G/C)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22	0.03
Fledging success (F/D)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.54	0.06
Reproductive success (F/B)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.39	0.06
Fledglings/nest start (G/A)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.35	0.05
Productivity (F/A)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.35	0.05

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

Table 20. 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

[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.

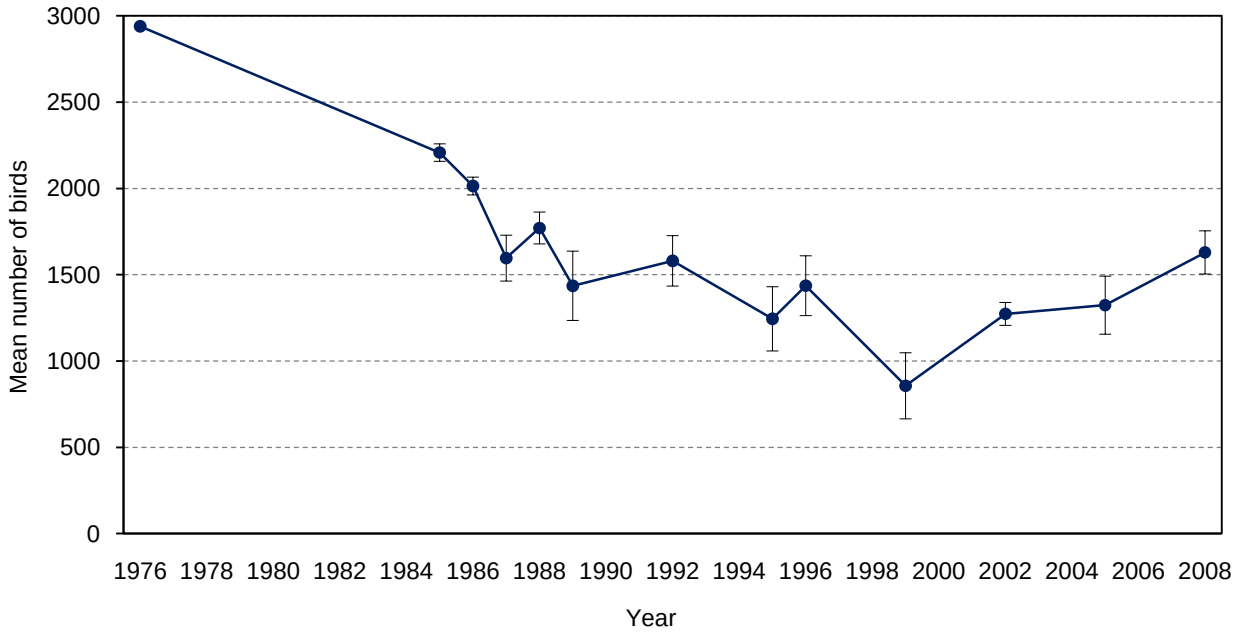

Figure 13. Mean numbers of black-legged kittiwakes counted on index plots at St. Paul Island, Alaska. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

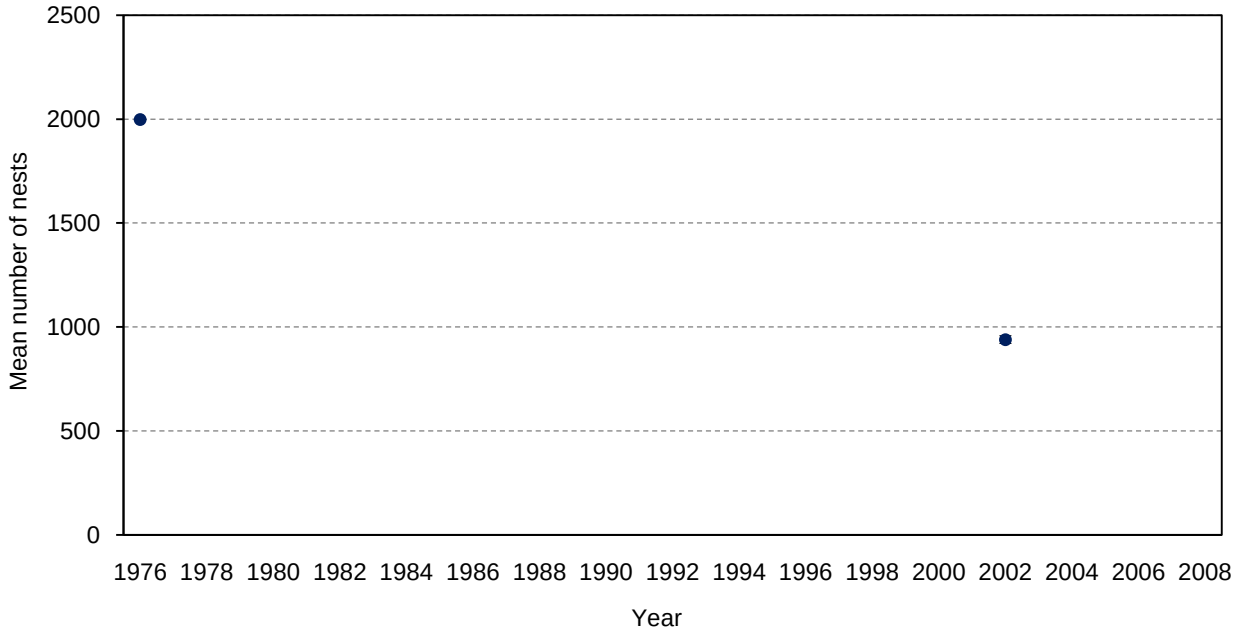

Figure 14. Mean numbers of black-legged kittiwake nests counted on index plots at St. Paul Island, Alaska. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 21. Numbers of black-legged kittiwakes counted on index plots at St. Paul Island, Alaska. 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
1	2939	2240	2003	1382	1714	1596	1630	1132	1195	635	1175	1266	1569
2	-	2238	2100	1636	1739	1708	1687	1142	1476	698	1226	1165	1606
3	-	2133	1971	1644	1758	1602	1521	1459	1592	831	1290	1140	1559
4	-	2219	2016	1559	1721	1244	1709	-	1382	803	1299	1353	1507
5	-	-	1979	1568	1666	1220	1314	-	1316	1069	1369	1164	1585
6	-	-	-	1787	1880	1226	1621	-	1657	1102	1278	1568	1572
7	-	-	-	-	1917	1329	-	-	-	-	-	1534	1749
8	-	-	-	-	-	1561	-	-	-	-	-	1398	1886
Mean	2939	2208	2014	1596	1771	1436	1580	1244	1436	856	1273	1324	1629
n	1	4	5	6	7	8	6	3	6	6	6	8	8
SD	-	51	52	133	92	201	146	186	173	191	66	168	125
First count	19 Jul	xx[a]	xx	xx	xx	xx	xx	xx	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	1 Aug	31 Jul	31 Jul

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

Table 22. Numbers of black-legged kittiwake nests counted on index plots at St. Paul Island, Alaska. 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
1	1998	xx[a]	xx	xx	xx	xx	xx	*no nest counts*	xx	xx	917	xx	xx
2	-	xx	xx	xx	xx	xx	xx		xx	xx	951	xx	-
3	-	xx	xx	xx	xx	xx	xx	-	xx	xx	948	xx	-
4	-	xx	xx	xx	xx	xx	xx	-	xx	xx	-	xx	-
5	-	-	xx	xx	xx	xx	xx	-	xx	xx	-	xx	-
6	-	-	-	xx	xx	xx	xx	-	xx	xx	-	xx	-
7	-	-	-	-	xx	xx	-	-	-	-	-	xx	-
8	-	-	-	-	-	xx	-	-	-	-	-	xx	-
Mean	1998	xx	xx	xx	xx	xx	xx	-	xx	xx	939	xx	xx
Overall max.[b]	1998	1569	1959	1521	1399	924	1303	-	940	851	987	441	1399
								-					
n	1	xx	xx	xx	xx	xx	xx	-	xx	xx	3	xx	xx
SD	-	xx	xx	xx	xx	xx	xx	-	xx	xx	19	xx	xx
First count	19 Jul	xx	xx	xx	xx	xx	xx	-	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	xx	xx	xx	xx	xx	xx	-	xx	xx	23 Jul	xx	xx

[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 23. 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
New color bands	7	7	78
New metal and colors	7	0	54
New colors on previous metal-banded bird[a]	0	7	24
New color bands replace old color bands[b]	0	0	0
Cum. color-banded birds	7	14	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 24. 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 2010
		2009	2010	
2008	7	5	3	0.43
2009	7	-	4	0.57
2010	78[a]	-	-	-[a]
Birds seen in current year (A)		5	7	-
Birds potentially alive from prior year (B)[b]		7	14	-
Apparent annual survival (A/B)[c]		0.71	0.50	-
Resighting effort[d]				
Total no. resight days		16	14	
Total no. resight hours		N/A[e]	46.0	

[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 25. 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
DG/O	GY	974-09358	2008	SW		3	0
DG/R	GY	974-09357	2008	SW		0	1
O/DB	R	974-09361	2008	SW		2	5
O/Y	R	974-09356	2008	SW		0	1
R/Y	O	974-09359	2008	SW		2	0
R/O	Y	974-09360	2008	SW		3	0
Y/GY	DG	974-09362	2008	SW		1	0
Yellow	A1	974-09368	2009	SW		-	6
Yellow	A4	974-09377	2009	SW		-	0
Yellow	A5	974-09366	2009	SW		-	0
Yellow	A9	974-09372	2009	SW		-	0
Yellow	A0	974-09378	2009	SW		-	5
Yellow	C1	794-86629	2009	TS		-	3
Yellow	C4	974-09385	2010	TS		-	-
Yellow	C5	794-86632	2009	TS		-	2
Yellow	C6	794-86641	2010	TS		-	-
Yellow	C7	794-86631	2010	TS		-	-
Yellow	C8	714-10325	2010	TS		-	-
Yellow	C9	714-10330	2010	TS		-	-
Yellow	C0	714-10306	2010	TS		-	-
Yellow	E1	794-86621	2010	TS		-	-
Yellow	E2	974-09386	2010	TS		-	-
Yellow	E3	714-10312	2010	TS		-	-
Yellow	E6	974-09332	2010	SW		-	-
Yellow	E8	974-09380	2010	TS		-	-
Yellow	E9	974-09363	2010	SW		-	-
Yellow	E0	714-10324	2010	TS		-	-
Yellow	F1	714-10369	2010	SW		-	-
Yellow	F2	714-10371	2010	SW		-	-
Yellow	F3	714-10373	2010	SW		-	-
Yellow	F4	714-10375	2010	SW		-	-
Yellow	F5	714-10380	2010	SW		-	-
Yellow	F6	974-09381	2010	TS		-	-
Yellow	F7	714-10381	2010	SW		-	-

Table 25 (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
Yellow	F8	974-09387	2010	TS		-	-
Yellow	F9	974-09384	2010	TS		-	-
Yellow	F0	974-09392	2010	TS		-	-
Yellow	H1	974-09399	2010	TS		-	-
Yellow	H2	974-09400	2010	TN		-	-
Yellow	H3	714-10301	2010	TS		-	-
Yellow	H4	714-10307	2010	TS		-	-
Yellow	H5	714-10303	2010	TS		-	-
Yellow	H7	974-09383	2010	TS		-	-
Yellow	H8	714-10305	2010	TS		-	-
Yellow	H9	714-10392	2010	TN		-	-
Yellow	J1	714-10346	2010	SW		-	-
Yellow	J2	714-10347	2010	SW		-	-
Yellow	J3	714-10348	2010	SW		-	-
Yellow	J4	714-10349	2010	SW		-	-
Yellow	J5	714-10350	2010	SW		-	-
Yellow	J6	714-10351	2010	SW		-	-
Yellow	J7	714-10352	2010	SW		-	-
Yellow	J8	714-10353	2010	TN		-	-
Yellow	J9	714-10354	2010	SW		-	-
Yellow	J0	714-10356	2010	SW		-	-
Yellow	K1	714-10355	2010	SW		-	-
Yellow	K2	714-10357	2010	SW		-	-
Yellow	K3	714-10358	2010	SW		-	-
Yellow	K4	714-10359	2010	SW		-	-
Yellow	K5	974-09367	2010	SW		-	-
Yellow	K6	714-10360	2010	SW		-	-
Yellow	K7	714-10363	2010	SW		-	-
Yellow	K8	714-10365	2010	SW		-	-
Yellow	K9	714-10368	2010	SW		-	-
Yellow	K0	714-10376	2010	SW		-	-
Yellow	L1	714-10367	2010	SW		-	-
Yellow	L2	714-10370	2010	SW		-	-
Yellow	L3	714-10372	2010	SW		-	-

Table 25 (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			Location	Resight history
	DB = dark blue	R = red	Y = yellow	SW = Southwest Pt.	0 = not resighted
	DG = dark green	W = white	GY = gray	TS = Tsamana	x = band no longer resightable
	O = orange			TN = Tsamana North	(dead, removed, etc.)

Color band		Metal band #	Year banded	Location banded	Notes	Year resighted	
Color or L leg	Band # or R leg					2009	2010
Yellow	L4	714-10378	2010	SW		-	-
Yellow	L5	714-10379	2010	SW		-	-
Yellow	L6	714-10382	2010	SW		-	-
Yellow	L7	0974-09382	2010	TS		-	-
Yellow	L8	0974-09388	2010	TS		-	-
Yellow	L9	0974-09393	2010	TS		-	-
Yellow	L0	0974-09397	2010	TS		-	-
Yellow	M1	0974-09390	2010	TS		-	-
Yellow	M2	794-86720	2010	TS		-	-
Yellow	M3	0974-09396	2010	TS		-	-
Yellow	M4	0974-09398	2010	TS		-	-
Yellow	M5	0974-09365	2010	SW		-	-
Yellow	M6	714-10391	2010	TN		-	-
Yellow	M7	714-10393	2010	TN		-	-
Yellow	N1	714-10361	2010	SW		-	-
Yellow	N2	714-10362	2010	SW		-	-
Yellow	N3	714-10364	2010	SW		-	-
Yellow	N4	714-10366	2010	SW		-	-
Yellow	N5	714-10374	2010	SW		-	-
Yellow	N6	714-10377	2010	SW		-	-
Yellow	N7	0974-09389	2010	TS		-	-
Yellow	N8	0974-09391	2010	TS		-	-
Yellow	N9	0974-09394	2010	TS		-	-
Yellow	N0	0974-09395	2010	TS		-	-
Yellow	L2	714-10370	2010	SW		-	-
Yellow	L3	714-10372	2010	SW		-	-
Yellow	L4	714-10378	2010	SW		-	-
Yellow	L5	714-10379	2010	SW		-	-
Yellow	L6	714-10382	2010	SW		-	-
				Total birds resighted		5	7

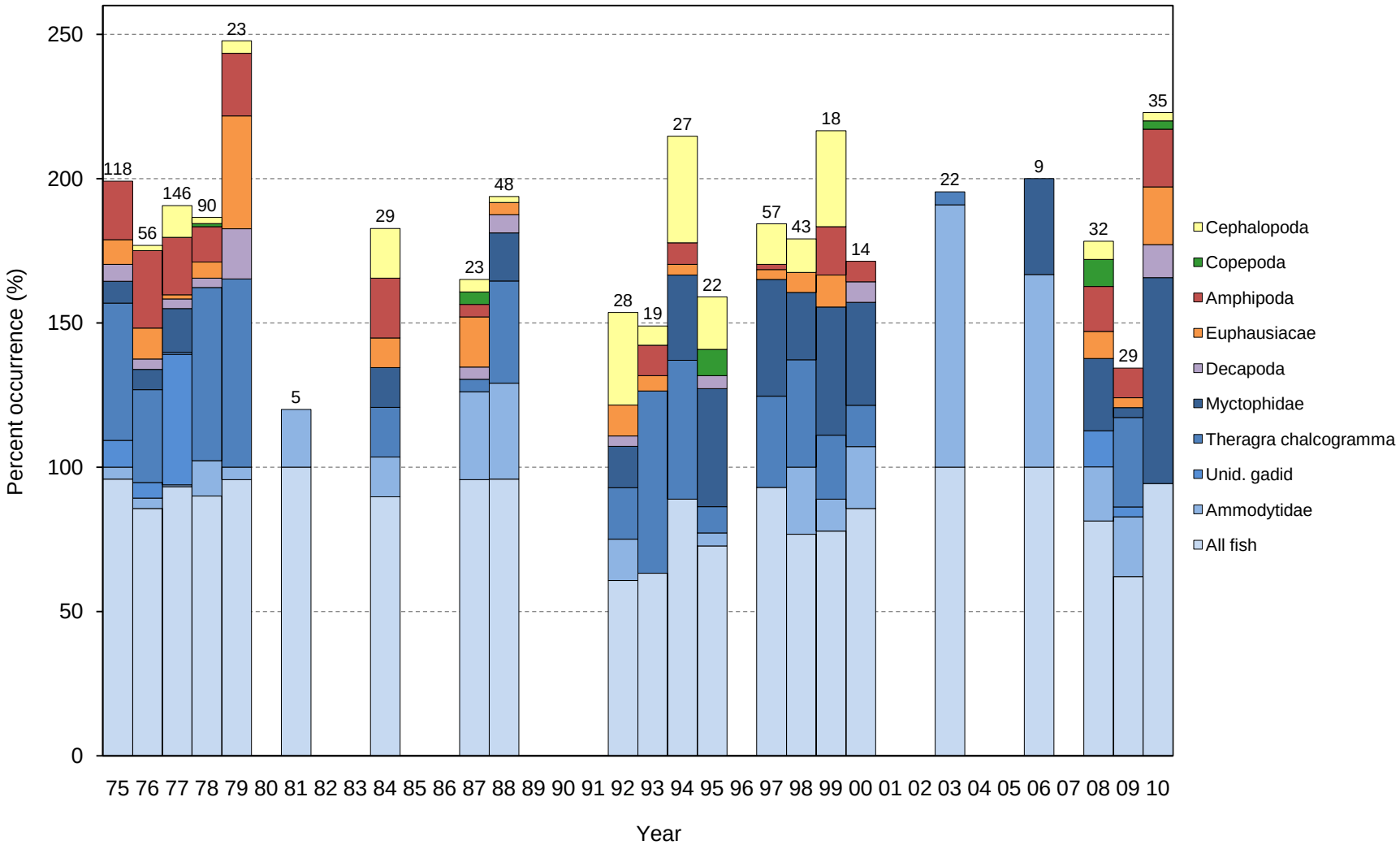

Figure 15. Frequency of occurrence of selected prey items in diets of black-legged kittiwakes at St. Paul Island, Alaska. Numbers above columns indicate sample sizes.

Table 26. 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.

	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	-	**-**	**-**	**-**	**-**	-	**-**	**-**
T. pacifica	4.2	-	-	-	21.7	-	-	-	-	-	-	-
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 26 (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.

	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	-	-	-	-	-	-	-	-	-	-	-	-
T. pacifica	-	-	-	-	-	-	-	-	-	-	-	-
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 26 (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.

	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
T. pacifica	-	-	-	-	-	-	-	-	-	3.1	-	5.7
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

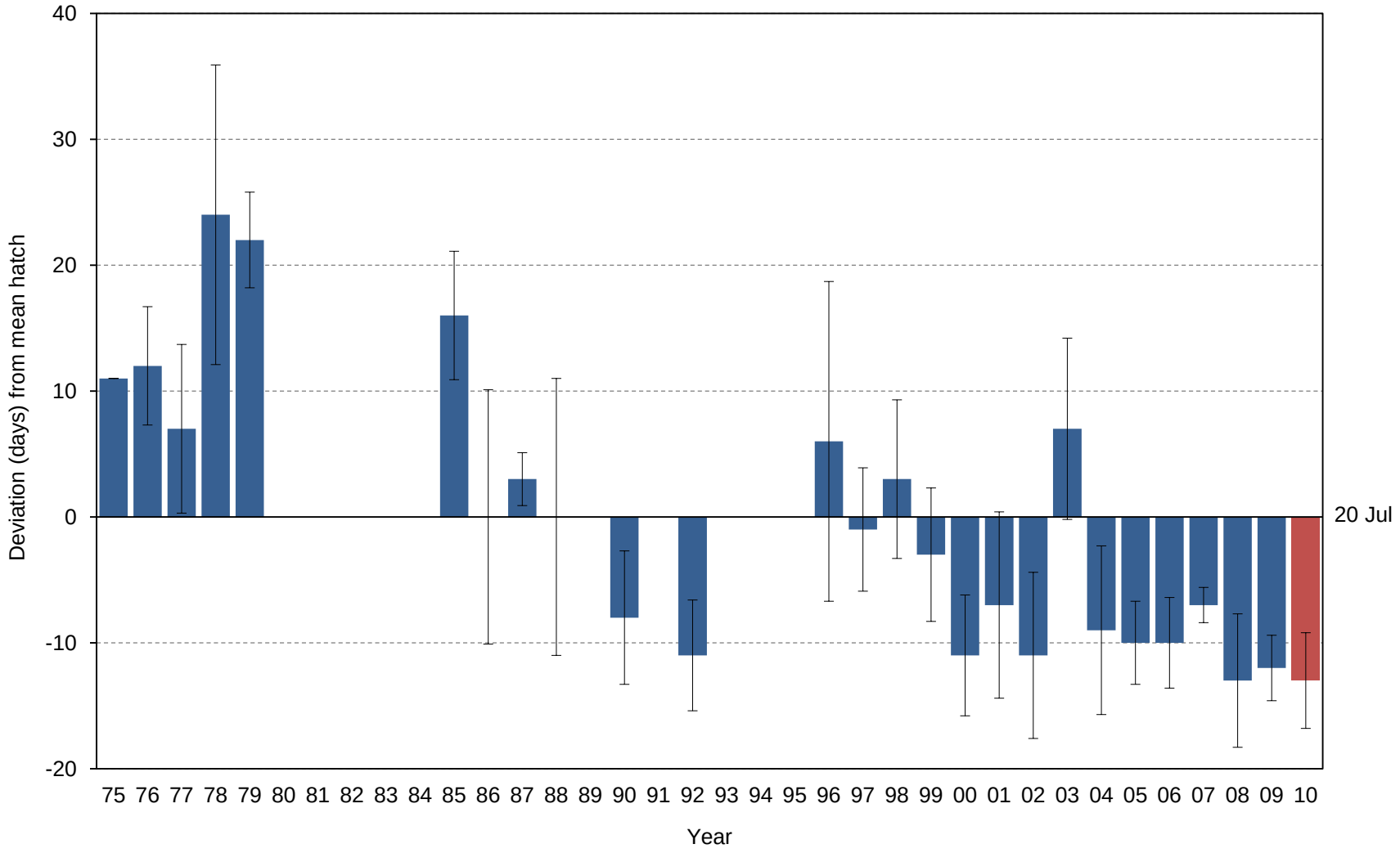

Figure 16. Yearly hatch date deviation (from the 1975-2009 average of 20 July) for red-legged kittiwakes at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 27. 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

[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 28. 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
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
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	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 28 (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																	
	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
169	*no data*	*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	-
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	-
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	-	-
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

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

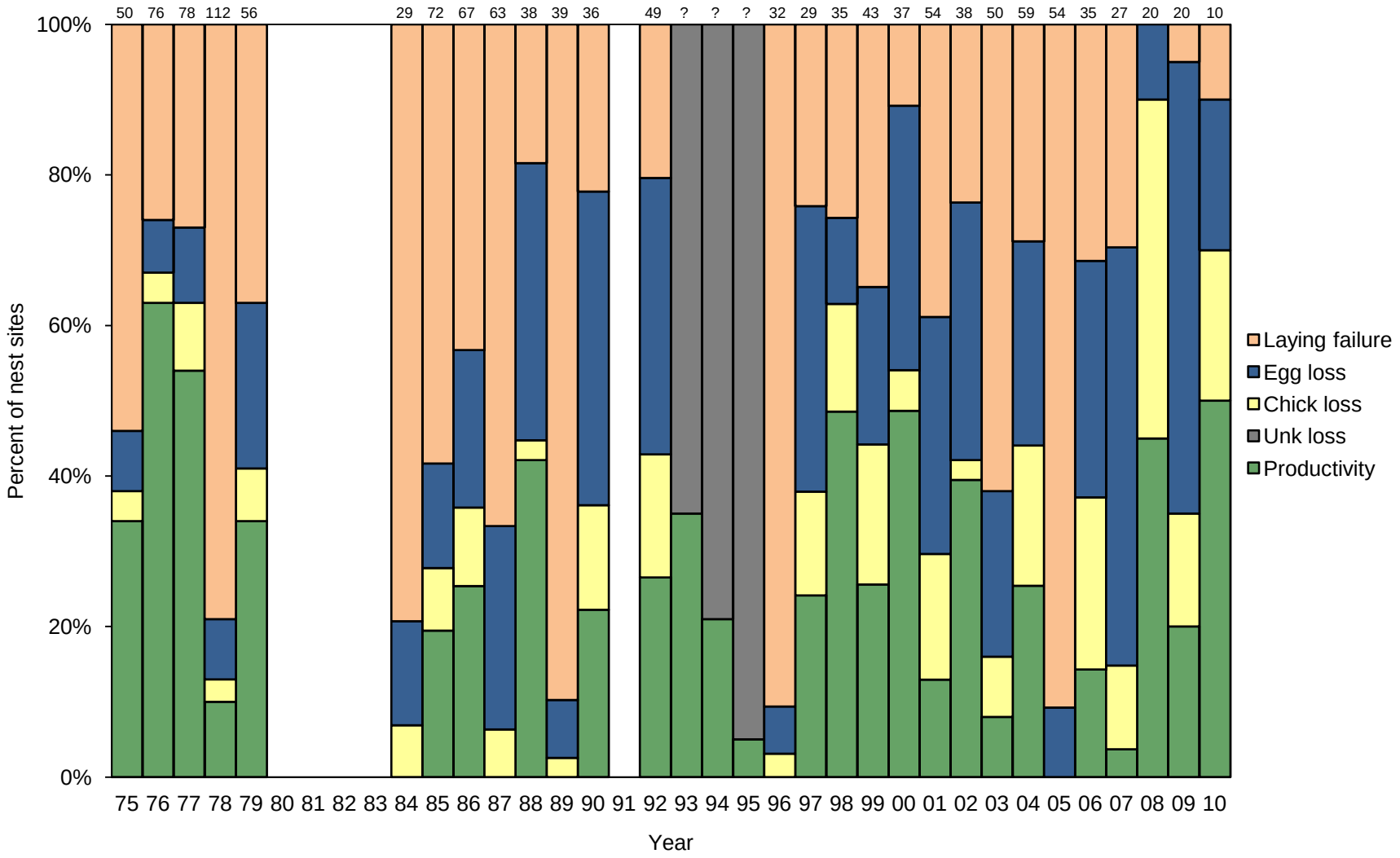

Figure 17. Reproductive performance of red-legged kittiwakes at St. Paul Island, Alaska. Laying failure=(A-B)/A; Egg loss=(B-D)/A; Chick loss=(D-F)/A; Productivity=F/A, where A=total nest sites; B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns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

Table 29. 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

[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 30. 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]

[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 31. Reproductive performance of red-legged kittiwakes at St. Paul Island, Alaska in 2010.

Parameter	Plot				Total	SD[a]
	53	56	61	87		
Total nest starts (A)	2	4	1	3	10	-
Nest sites w/ eggs (B)	2	3	1	3	9	-
Total eggs (C)	2	3	1	3	9	-
Nest sites w/ chicks (D)	1	2	1	3	7	-
Total chicks (E)	1	2	1	3	7	-
Nest sites w/ fledged chicks (F)	0	2	1	2	5	-
Total fledged chicks (G)	0	2	1	2	5	-
Laying success (B/A)	-	-	-	-	0.90	-
Mean clutch size (C/B)	-	-	-	-	1.0	-
Nesting success (D/B)	-	-	-	-	0.78	-
Hatching success (E/C)	-	-	-	-	0.78	-
Chick success (G/E)	-	-	-	-	0.71	-
Egg success (G/C)	-	-	-	-	0.56	-
Fledging success (F/D)	-	-	-	-	0.71	-
Reproductive success (F/B)	-	-	-	-	0.56	-
Fledglings/nest start (G/A)	-	-	-	-	0.50	-
Productivity (F/A)	-	-	-	-	0.50	-

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

Table 32. 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*	-	-	-	-	-		-	-

[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.

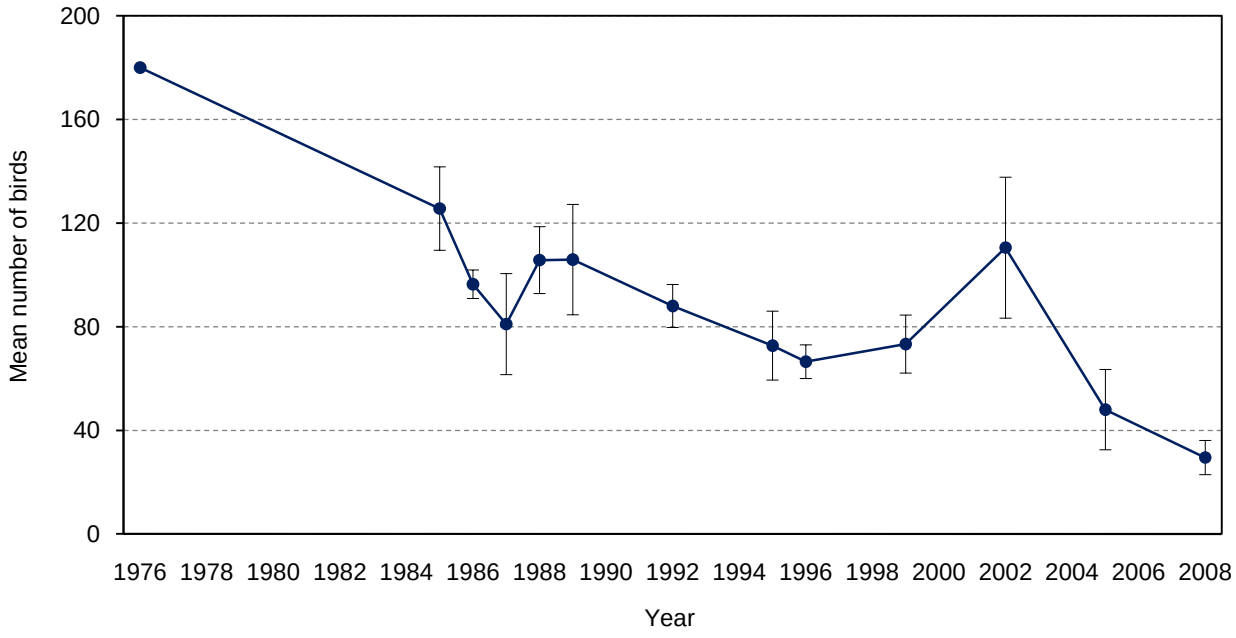

Figure 18. Mean numbers of red-legged kittiwakes counted on index plots at St. Paul Island, Alaska. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

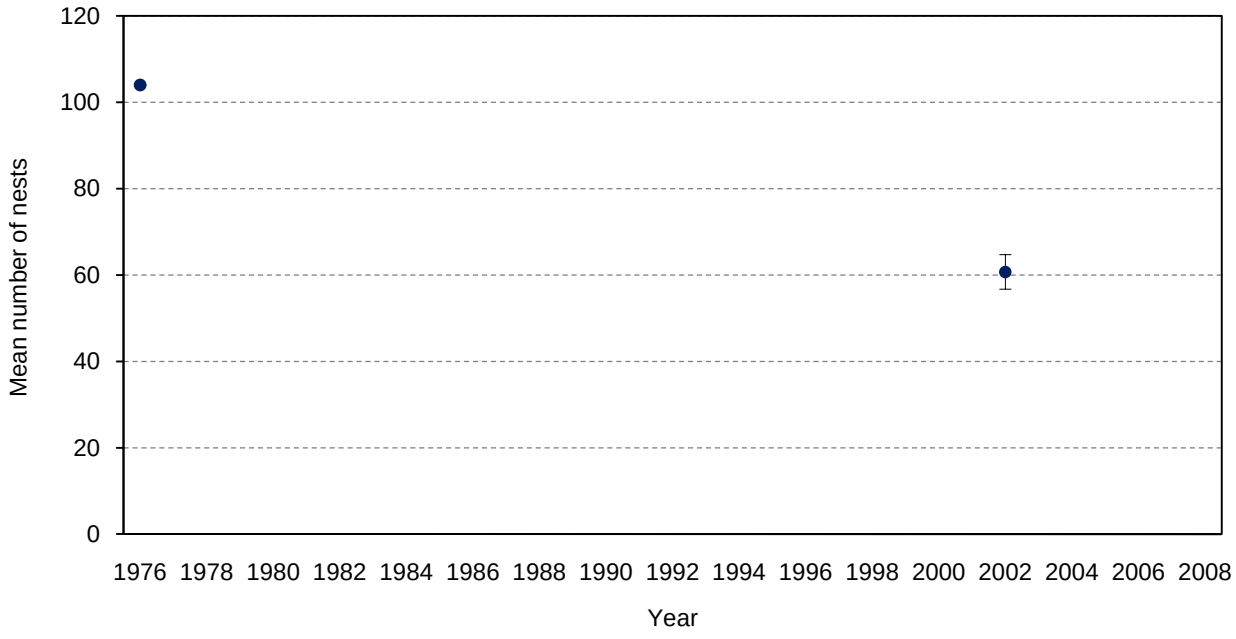

Figure 19. Mean numbers of red-legged kittiwake nests counted on index plots at St. Paul Island, Alaska. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 33. Numbers of red-legged kittiwakes counted on index plots at St. Paul Island, Alaska. 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
1	180	101	104	57	101	75	82	64	55	65	99	40	26
2	-	142	95	85	104	103	95	66	64	74	87	35	27
3	-	131	92	74	82	112	97	88	70	66	90	28	24
4	-	119	91	69	105	115	88	-	68	76	109	40	25
5	-	135	100	114	117	102	75	-	68	65	161	49	25
6	-	-	-	87	122	119	91	-	74	94	117	66	31
7	-	-	-	-	109	80	-	-	-	-	-	73	35
8	-	-	-	-	-	141	-	-	-	-	-	53	43
Mean	180	126	96	81	106	106	88	73	67	73	111	48	30
n	1	5	5	6	7	8	6	3	6	6	6	8	8
SD	-	16	6	20	13	21	8	13	7	11	27	16	7
First count	19 Jul	xx[a]	xx	xx	xx	xx	xx	xx	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	1 Aug	31 Jul	31 Jul

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

Table 34. Numbers of red-legged kittiwake nests counted on index plots at St. Paul Island, Alaska. 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
1	104	xx[a]	xx	xx	xx	xx	xx	*no nest counts*	xx	xx	65	xx	xx
2	-	xx	xx	xx	xx	xx	xx		xx	xx	57	xx	xx
3	-	xx	xx	xx	xx	xx	xx	-	xx	xx	60	xx	xx
4	-	xx	xx	xx	xx	xx	xx	-	xx	xx	-	xx	xx
5	-	xx	xx	xx	xx	xx	xx	-	xx	xx	-	xx	xx
6	-	-	-	xx	xx	xx	xx	-	xx	xx	-	xx	xx
7	-	-	-	-	xx	xx	-	-	-	-	-	xx	xx
8	-	-	-	-	-	xx	-	-	-	-	-	xx	xx
Mean	104	xx	xx	xx	xx	xx	xx	-	xx	xx	61	xx	xx
Overall max.[b]	104	104	101	83	79	57	75	-	51	103	74	3	30
n	1	xx	xx	xx	xx	xx	xx	-	xx	xx	3	xx	xx
SD	-	xx	xx	xx	xx	xx	xx	-	xx	xx	4	xx	xx
First count	19 Jul	xx	xx	xx	xx	xx	xx	-	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	xx	xx	xx	xx	xx	xx	-	xx	xx	23 Jul	xx	xx

[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.

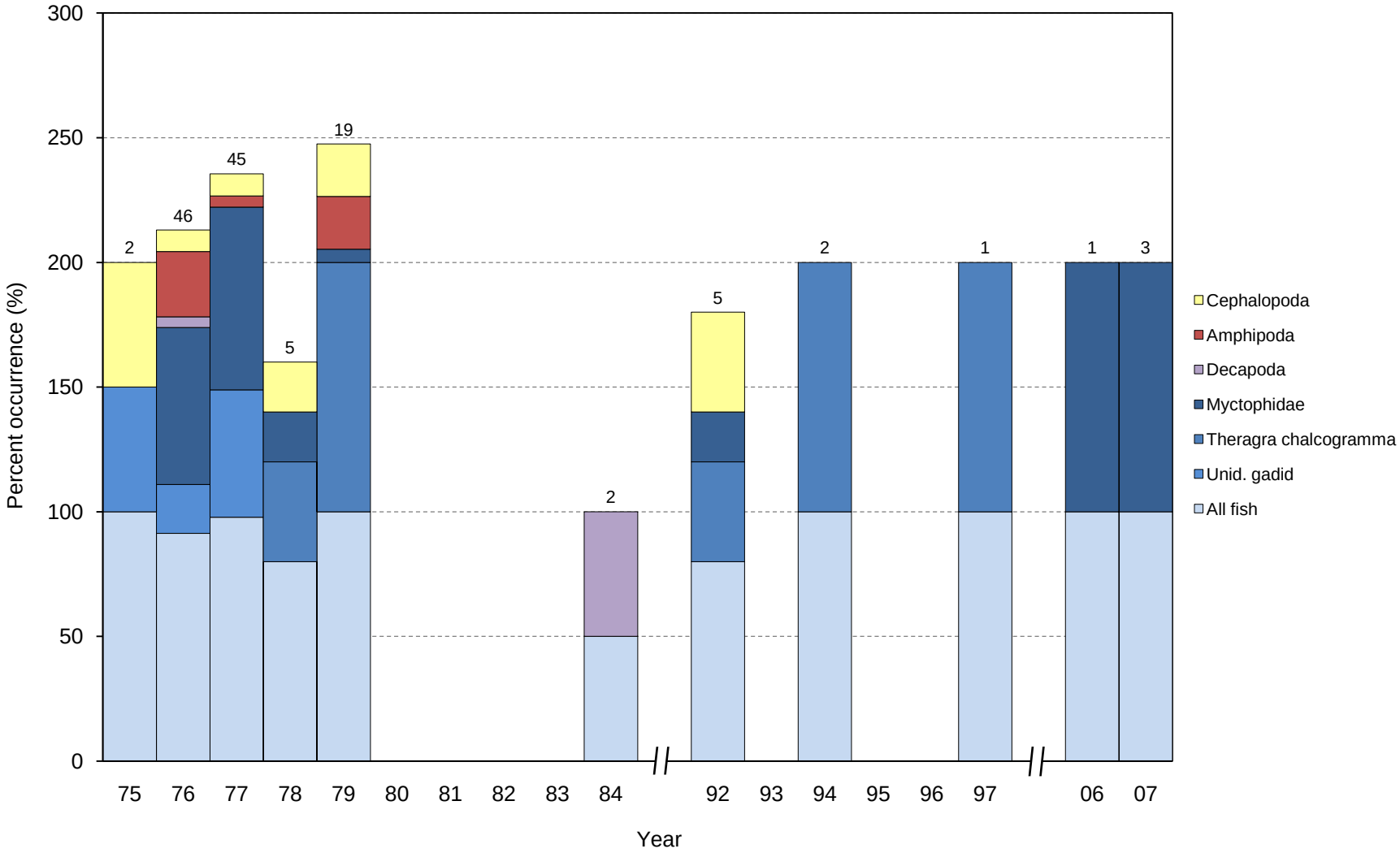

Figure 20. Frequency of occurrence of selected prey items in diets of red-legged kittiwakes at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1985-1991, 1998-2005, or after 2007.

Table 35. 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	-	-	-	-	-	-	-	-	-	-	-
T. 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	-

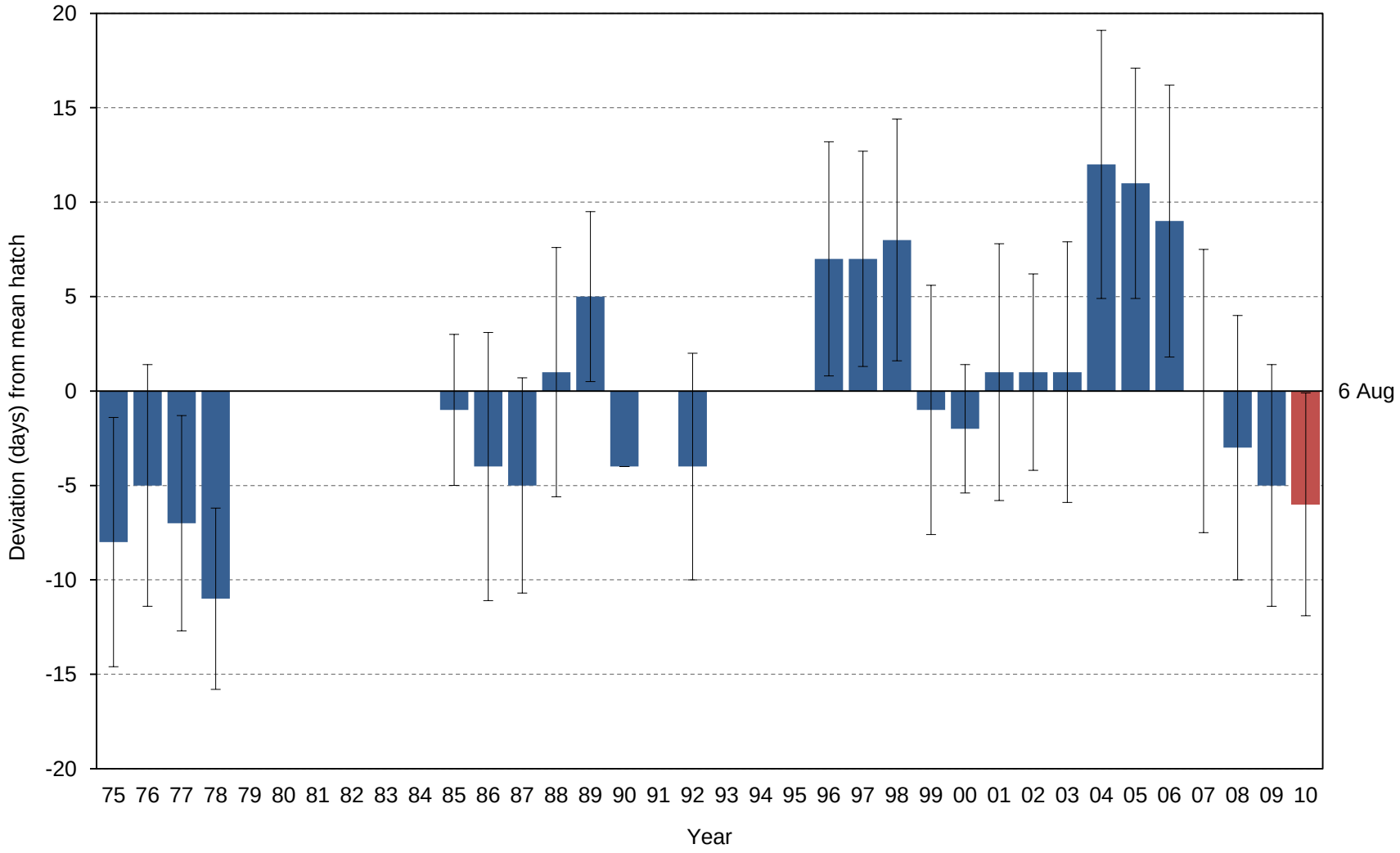

Figure 21. Yearly hatch date deviation (from the 1975-2009 mean of 5 August) for common murres at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 36. 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

[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 37. 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
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
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 37 (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																	
	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
193	*no data*	*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	-
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	-	-
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
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	-	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
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
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
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
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	-	-
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

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

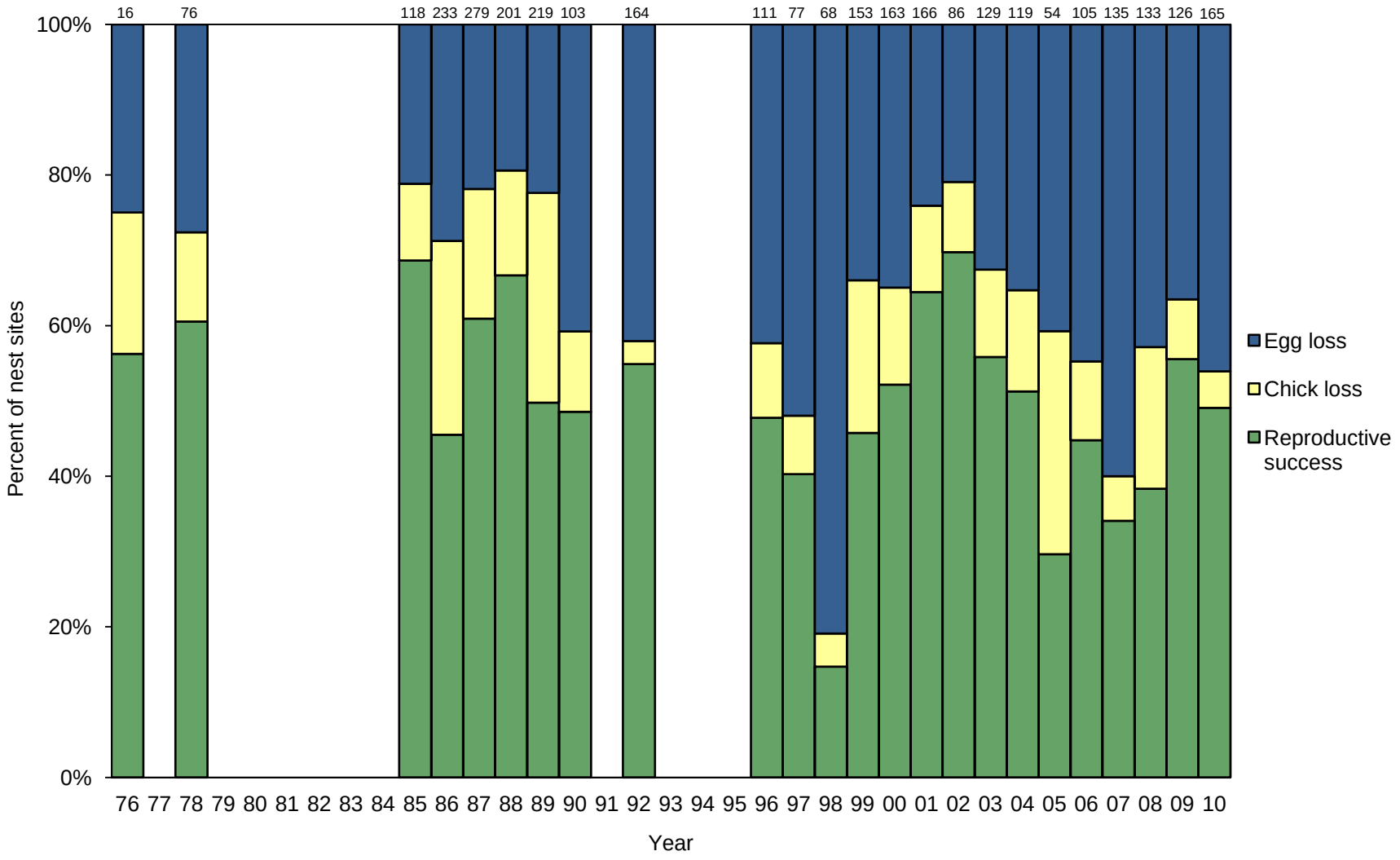

Figure 22. Reproductive performance of common murres at St. Paul Island, Alaska. Egg loss=(B-D)/B; Chick loss=(D-F)/B; Reproductive success=F/B, where B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns indicate sample sizes (B).

Table 38. 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

[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 39. 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

[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 40. Reproductive performance of common murres at St. Paul Island, Alaska in 2010.

Parameter	Plot								Total	SD[b]
	66	67/68[a]	81	85/86[a]	89	90L	104	114		
Nests w/ eggs (B)	31	8	23	23	10	26	21	23	165	-
Nests w/ chicks (D)	21	7	15	14	3	4	8	17	89	-
Nests w/ chicks fledged (F)	21	6	15	14	1	3	5	16	81	-
Nesting success (D/B)[c]	-	-	-	-	-	-	-	-	0.54	0.09
Fledging success (F/D)[d]	-	-	-	-	-	-	-	-	0.91	0.05
Reproductive success (F/B)	-	-	-	-	-	-	-	-	0.49	0.10

[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).

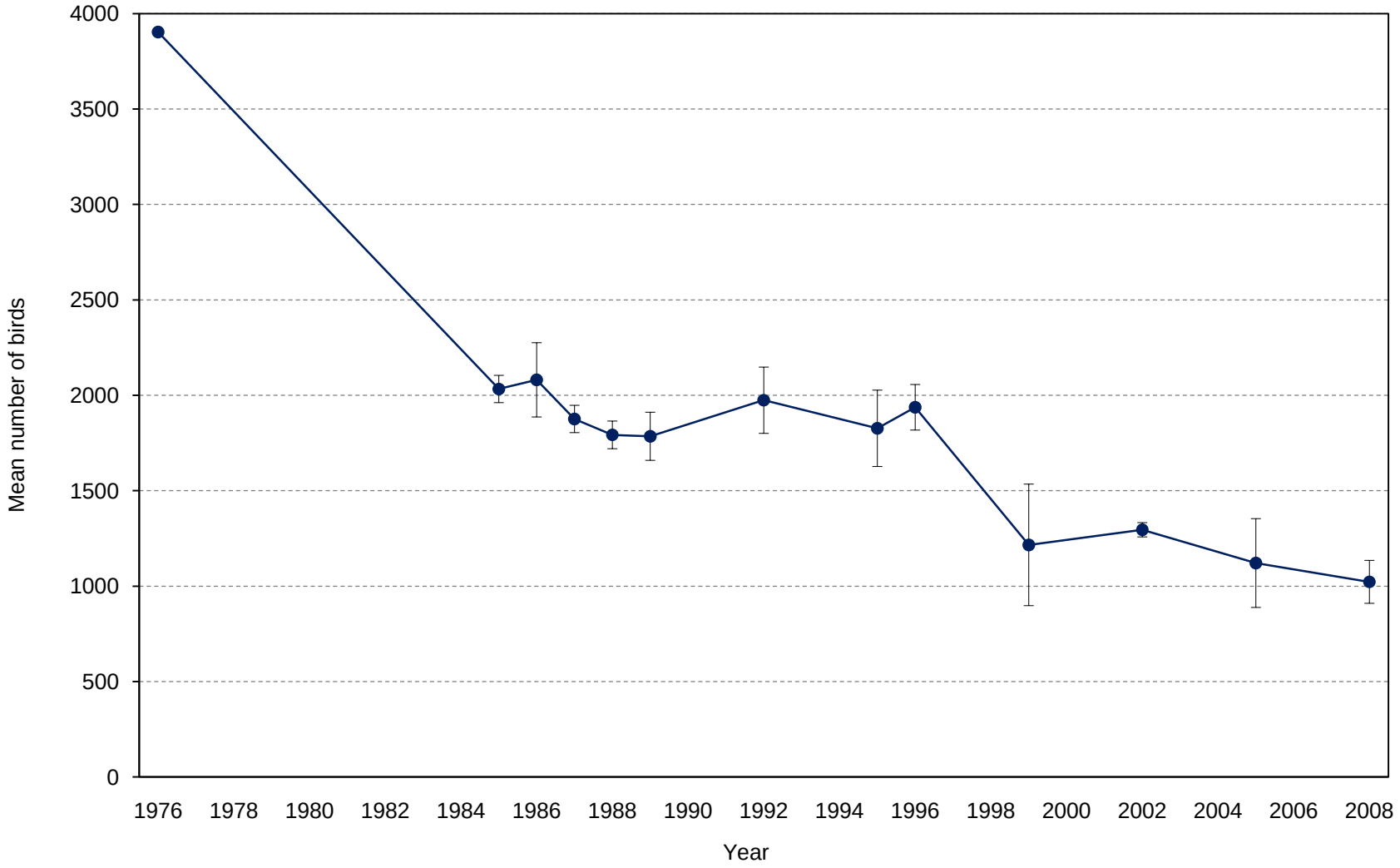

Figure 23. Mean numbers of common murres counted on index at St. Paul Island, Alaska. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 41. Numbers of common murres counted on index plots at St. Paul Island, Alaska. 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
1	3903	2071	1808	1798	1688	1847	1858	1681	1999	855	1252	673	993
2	-	2114	1956	1850	1772	1819	1996	1745	1790	1161	1305	924	868
3	-	1962	2178	1853	1742	1688	2092	2055	1843	884	1324	1059	876
4	-	1985	2174	1871	1775	1776	1709	-	1926	1358	1350	1313	980
5	-	-	2289	1873	1838	1576	2203	-	1936	1349	1268	1394	1052
6	-	-	-	2011	1913	1716	1987	-	2129	1691	1274	1190	1139
7	-	-	-	-	1820	1986	-	-	-	-	-	1162	1147
8	-	-	-	-	-	1874	-	-	-	-	-	1254	1126
Mean	3903	2033	2081	1876	1793	1785	1974	1827	1937	1216	1296	1121	1023
n	1	4	5	6	7	8	6	3	6	6	6	8	8
SD	-	72	195	72	73	126	174	200	119	318	37	233	113
First count	19 Jul	xx[a]	xx	xx	xx	xx	xx	xx	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	1 Aug	31 Jul	31 Jul

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

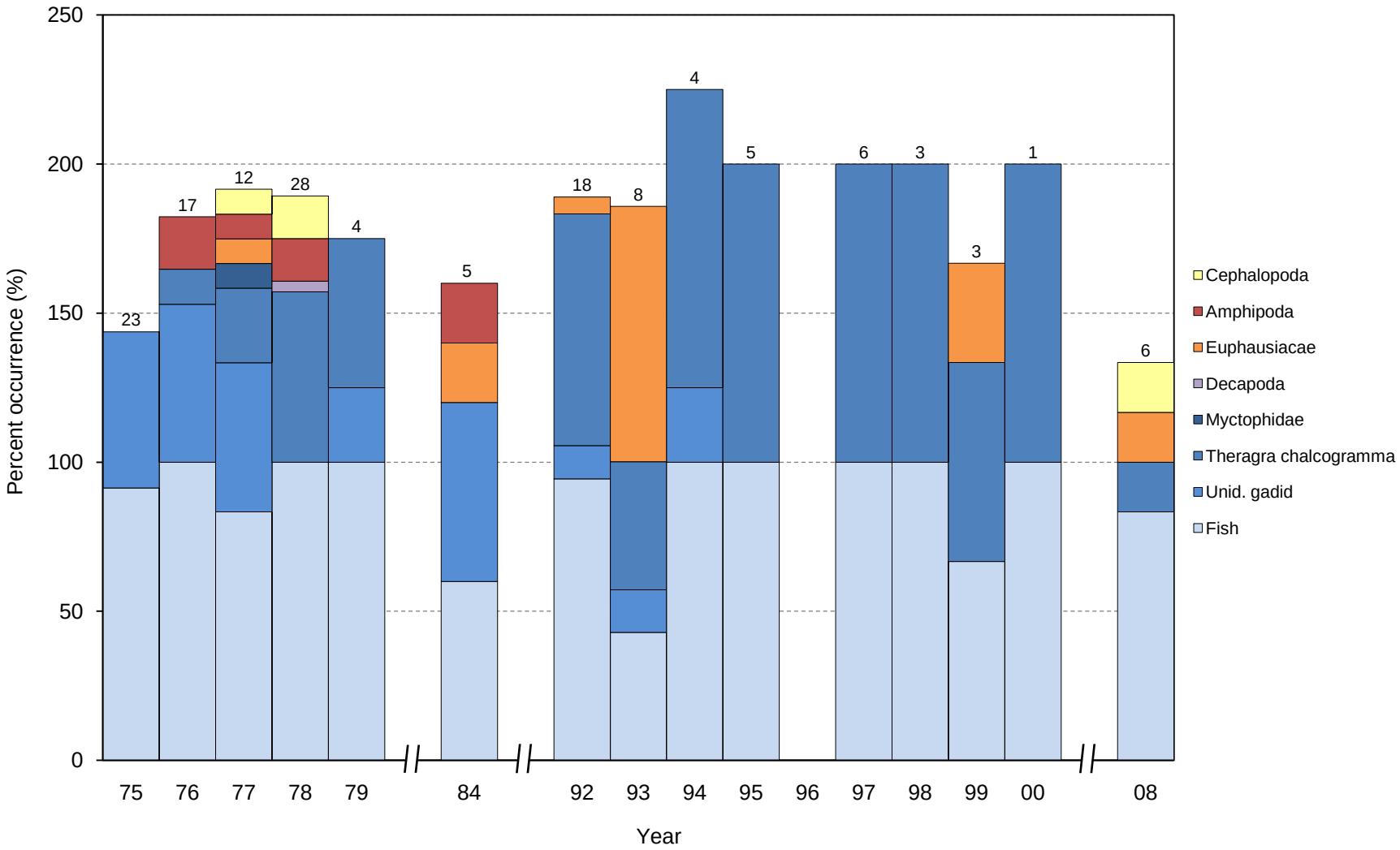

Figure 24. Frequency of occurrence of selected prey items in diets of common murres at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1980-1983, 1985-1991, 2001-2007, or 2009-2010.

Table 42. 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 2009-2010.

	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	-	-	-	-	-	-	-	-	-	-	-	-
T. pacifica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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

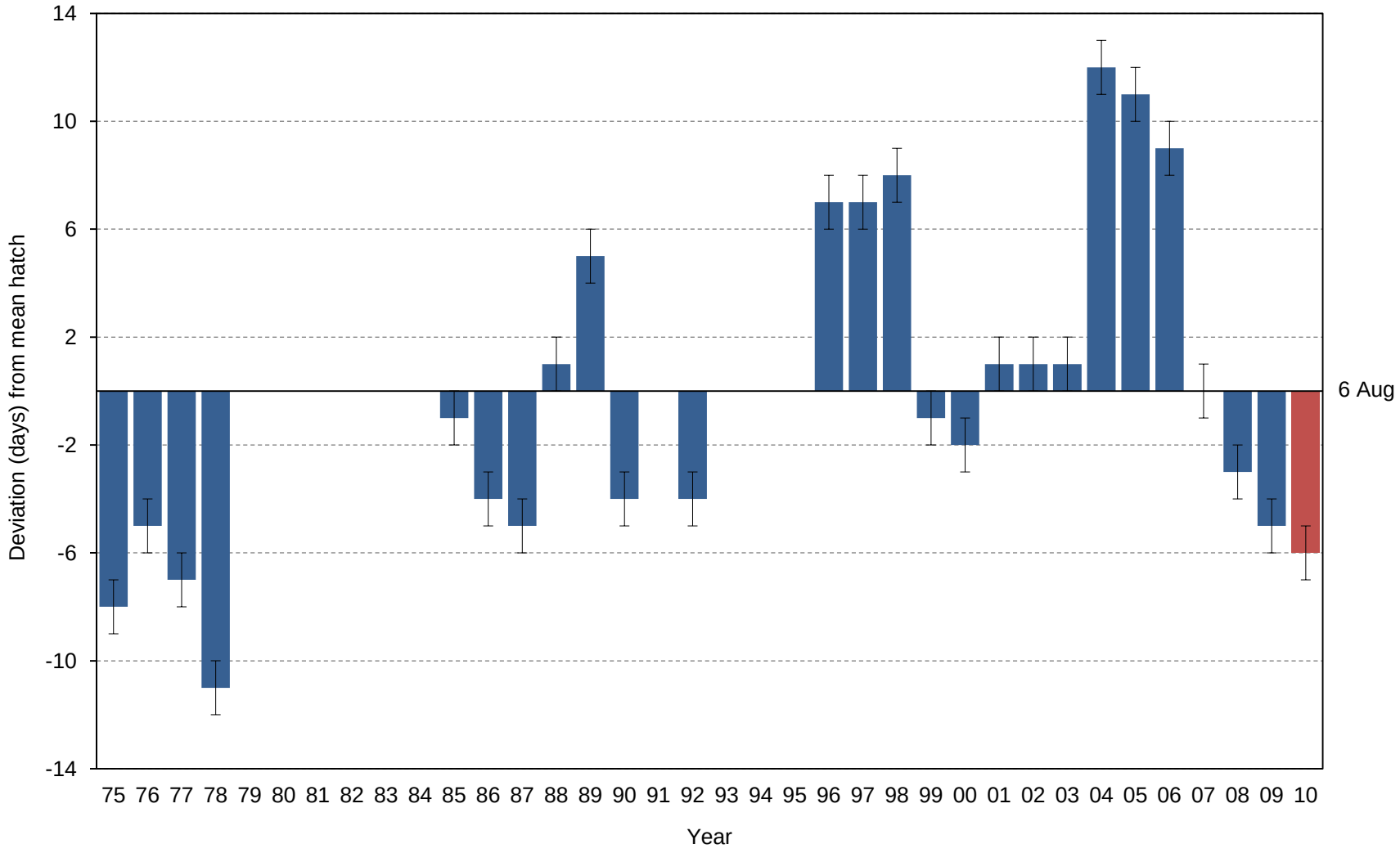

Figure 25. Yearly hatch date deviation (from the 1975-2009 mean of 6 August) for thick-billed murres at St. Paul Island, Alaska. Negative values indicate earlier than mean hatch date, positive values indicate later than mean hatch date. Error bars represent standard deviation around each year's mean hatch date; red highlights the current year.

Table 43. 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	31 Aug	5.9	183	17 Jul	18 Aug	9 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 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
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
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 44 (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																	
	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
193	*no data*	*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
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
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
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
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	9	14
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
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
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
219	-	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	7
220	-	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	3	11
221	-	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	1
222	-	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	7	6
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
225	-	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	-	-
226	-	-	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	1	-
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	-	-
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	-	-
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	-
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

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

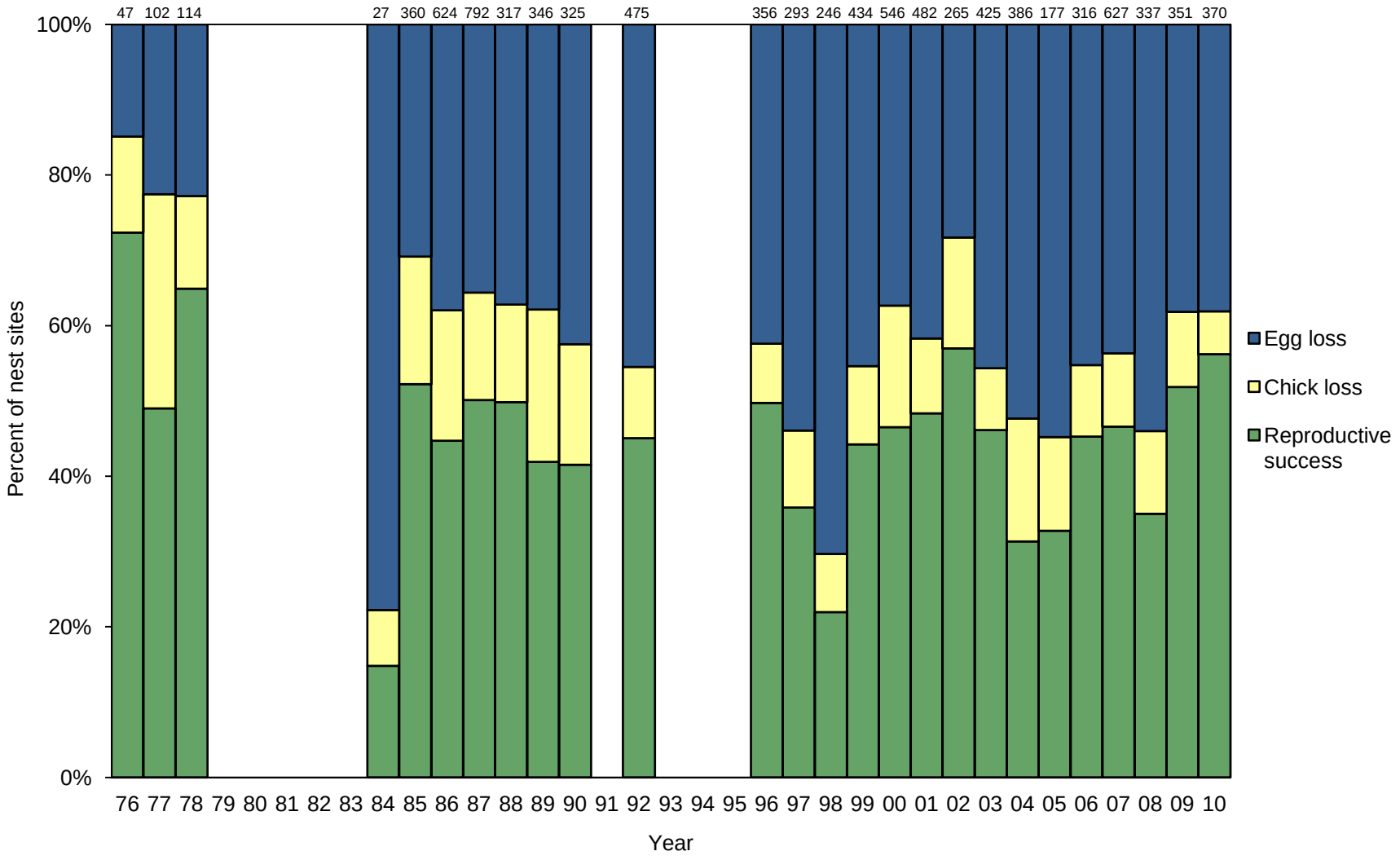

Figure 26. Reproductive performance of thick-billed murres at St. Paul Island, Alaska. Egg loss=(B-D)/B; Chick loss=(D-F)/B; Reproductive success=F/B, where B=nest sites with eggs; D=nest sites with chicks; F=nest sites with chicks fledged. Numbers above columns indicate sample sizes (B).

Table 45. 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

[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 46. 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

[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 thick-billed murres at St. Paul Island, Alaska in 2010.

Parameter	Plot													Total	SD[b]
	48	53	61	66	67	68	80/ 81[a]	84	85/ 86[a]	87/ 104[a]	89	90/ 90L[a]	114		
Nest sites w/ eggs (B)	33	19	31	24	31	26	28	26	39	32	28	30	23	370	-
Nest sites w/ chicks (D)	21	14	21	15	15	19	18	17	29	22	13	12	13	229	-
Nest sites w/ chicks fledged (F)	18	11	18	14	15	17	16	17	28	22	11	9	12	208	-
Nesting success (D/B)[c]	-	-	-	-	-	-	-	-	-	-	-	-	-	0.62	0.03
Fledging success (F/D)[d]	-	-	-	-	-	-	-	-	-	-	-	-	-	0.91	0.02
Reproductive success (F/B)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.56	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).

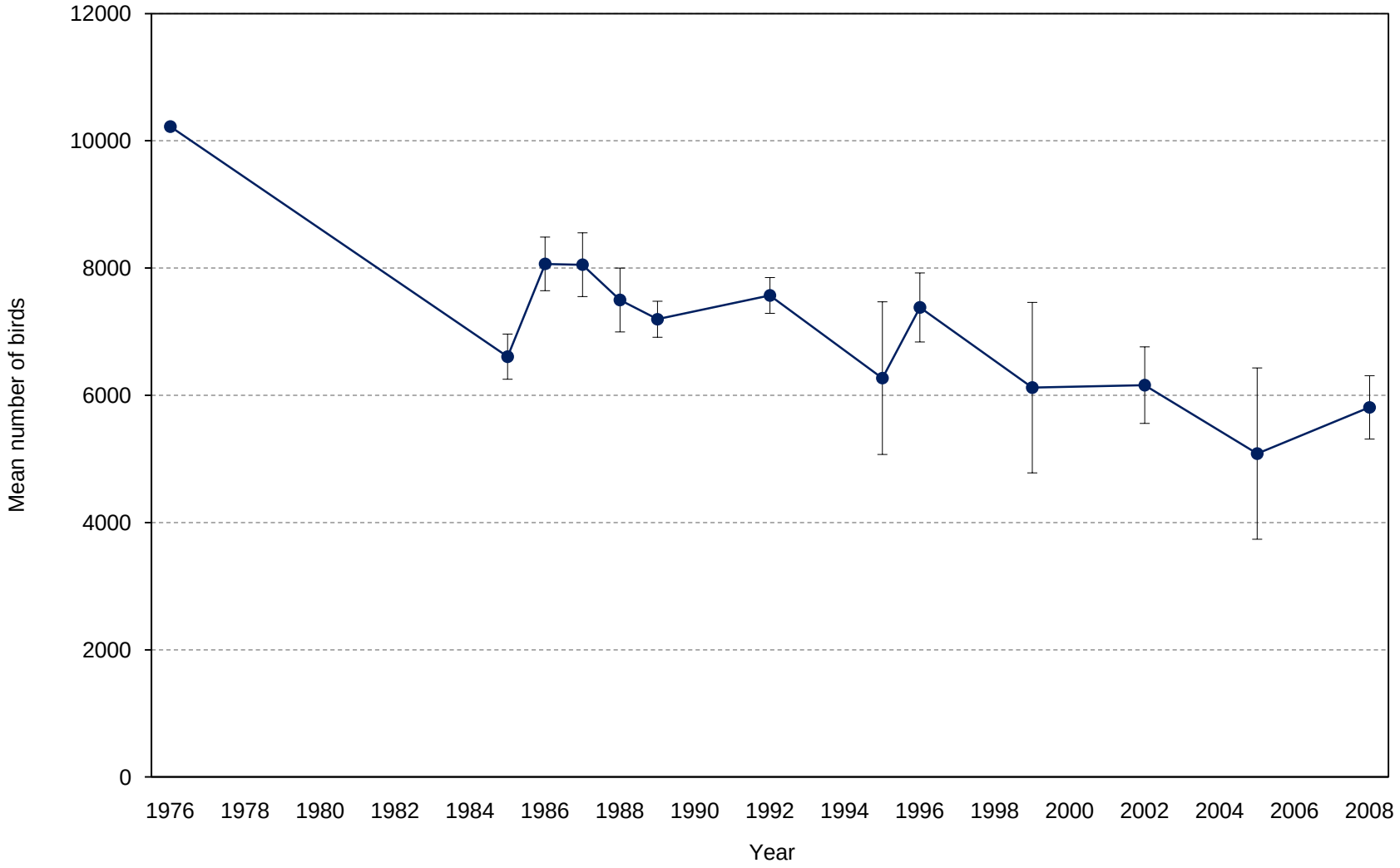

Figure 27. Mean numbers of thick-billed murres counted on index at St. Paul Island, Alaska. Data from 1982 and 1984 are excluded because not all plots were counted. Error bars represent standard deviation.

Table 48. Numbers of thick-billed murres counted on index plots at St. Paul Island, Alaska. 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
1	10223	6460	7473	7335	6877	6921	7129	5251	7121	4147	5165	2957	5662
2	-	6478	8295	8152	6966	6904	7511	5966	6513	5139	6109	4156	5451
3	-	6358	8499	7865	7813	6953	7381	7592	7561	5816	6109	3985	5075
4	-	7134	8271	7763	7080	7406	7776	-	7552	7084	7050	4714	6656
5	-	-	7789	8676	7755	7272	7854	-	7388	7750	6282	6223	5645
6	-	-	-	8525	8046	7002	7766	-	8149	6786	6243	6918	6359
7	-	-	-	-	7948	7560	-	-	-	-	-	6078	5784
8	-	-	-	-	-	7544	-	-	-	-	-	5639	5849
Mean	10223	6608	8065	8053	7498	7195	7570	6270	7381	6120	6160	5084	5810
n	1	4	5	6	7	8	6	3	6	6	6	8	8
SD	-	355	421	501	502	283	281	1200	543	1340	602	1346	498
First count	19 Jul	xx[a]	xx	xx	xx	xx	xx	xx	xx	xx	8 Jul	11 Jul	1 Jul
Last count	-	xx	xx	xx	xx	xx	xx	xx	xx	xx	1 Aug	31 Jul	31 Jul

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

Table 49. 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
New color bands	2	14	33
New metal and colors	2	12	29
New colors on previous metal-banded bird[a]	0	2	4
New color bands replace old color bands[b]	0	0	0
Cum. color-banded birds	2	16	49

[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 50. 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 2010
		2009	2010	
2008	2	2	2	1.00
2009	14	-	9	0.64
2010	33[a]	-	-	-[a]
Birds seen in current year (A)		2	11	-
Birds potentially alive from prior year (B)[b]		2	16	-
Apparent annual survival (A/B)[c]		1.00	0.69	-
Resighting effort[d]				
Total no. resight days		4	11	
Total no. resight hours		N/A[e]	18.9	

[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 51. 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
DG/O	DB	1186-04112	2008	ZD		2	3
DG/R	DB	1186-04122	2008	ZD		3	5
Yellow	A5	1186-04115	2009	ZD		-	6
Yellow	A6	1186-04202	2009	ZD		-	0
Yellow	A7	1186-04203	2009	ZD		-	0
Yellow	A9	895-12792	2009	ZD		-	2
Yellow	A0	1186-04118	2009	ZD		-	5
Yellow	C1	895-12791	2009	ZD		-	1
Yellow	E1	1186-04223	2009	Z84		-	1
Yellow	E2	1186-04224	2009	Z84		-	4
Yellow	E3	1186-04225	2009	Z84		-	0
Yellow	E4	1186-04226	2009	Z84		-	4
Yellow	E5	1186-04784	2010	PZD		-	-
Yellow	E7	1186-04786	2010	PZD		-	-
Yellow	E0	1186-04766	2010	TO		-	-
Yellow	F7	1186-04770	2010	ZD		-	-
Yellow	H2	1186-04768	2010	TO		-	-
Yellow	H4	1186-04767	2010	TO		-	-
Yellow	H5	1186-04783	2010	PZD		-	-
Yellow	H6	1186-04785	2010	PZD		-	-
Yellow	H0	1186-04769	2010	TO		-	-
Yellow	L6	1186-04247	2010	TO		-	-
Yellow	L7	1186-04248	2010	TO		-	-
Yellow	L8	1186-04249	2010	TO		-	-
Yellow	L9	1186-04250	2010	ZD		-	-
Yellow	M1	1186-04243	2010	TO		-	-
Yellow	M2	1186-04244	2010	TO		-	-
Yellow	M3	1186-04245	2010	TO		-	-
Yellow	M4	1186-04137	2010	PZD		-	-
Yellow	M5	1186-04246	2010	ZD		-	-
Yellow	M6	1186-04761	2010	ZD		-	-
Yellow	M7	1186-04764	2010	ZD		-	-
Yellow	M8	1186-04782	2010	PZD		-	-
Yellow	M9	1186-04781	2010	ZD		-	-

Table 51 (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
Yellow	M0	895-12797	2010	ZD		-	-
Yellow	N1	1186-04229	2010	TO		-	-
Yellow	N2	1186-04230	2010	TO		-	-
Yellow	N3	1186-04235	2010	TO		-	-
Yellow	N4	1186-04236	2010	TO		-	-
Yellow	N5	1186-04237	2010	TO		-	-
Yellow	N6	1186-04108	2010	PZD		-	-
Yellow	N7	1186-04116	2010	ZD		-	-
Yellow	N8	1186-04762	2010	ZD		-	-
Yellow	N9	1186-04765	2010	ZD		-	-
Yellow	N0	1186-04763	2010	ZD		-	-
Yellow	P1	1186-04231	2009	Z84		-	0
Yellow	P2	1186-04232	2009	Z84		-	1
Yellow	P3	1186-04233	2009	Z84		-	0
Yellow	P4	1186-04234	2009	Z84		-	1
			Total birds resighted				

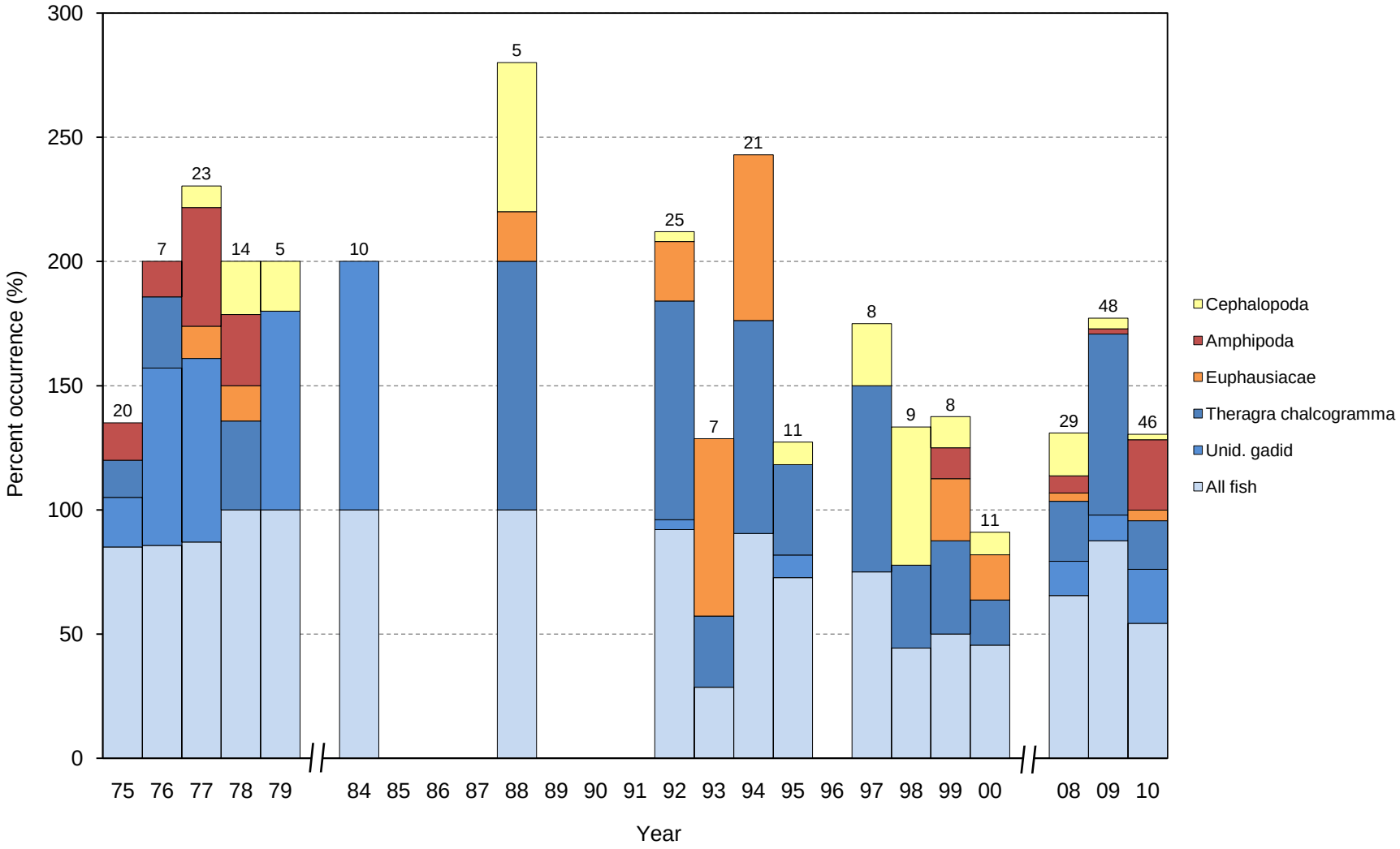

Figure 28. Frequency of occurrence of selected prey items in diets of thick-billed murres at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1980-1983 or 2001-2007.

Table 52. 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 or 2001-2007.

	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	-	-	-	-	-	-	-	-	-
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 52 (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 or 2001-2007.

	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
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

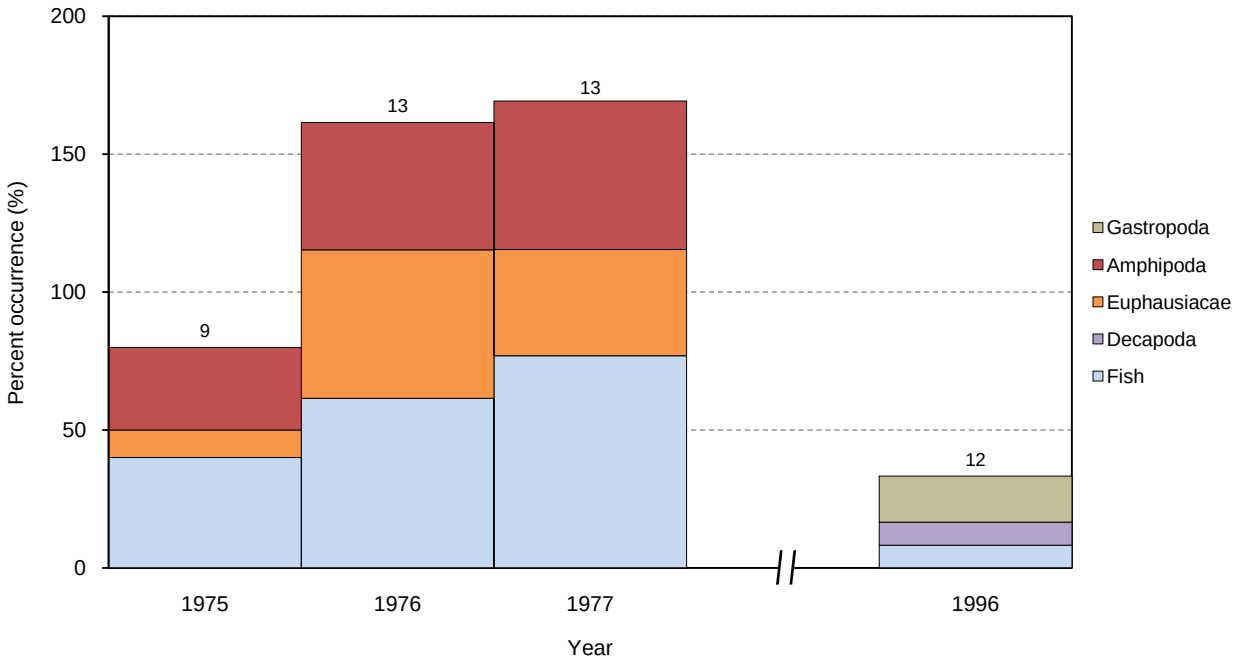

Figure 29. Frequency of occurrence of selected prey items in diets of parakeet auklets at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1978-1995 or after 1996.

Table 53. 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 54. 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 55. 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 54.

[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 a s 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 56. 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 56 (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; 2+ = resighted at least twice; y = resighted (# times unknown)
GY = gray; LB = light blue; R = red; Y = yellow; 1 = resighted once only; 0 = not resighted
DB = dark blue; LG = light green

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 56 (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; 2+ = resighted at least twice; y = resighted (# times unknown)
GY = gray; LB = light blue; R = red; Y = yellow; 1 = resighted once only; 0 = not resighted
DB = dark blue; LG = light green

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 56 (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; 2+ = resighted at least twice; y = resighted (# times unknown)
GY = gray; LB = light blue; R = red; Y = yellow; 1 = resighted once only; 0 = not resighted
DB = dark blue; LG = light green

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 56 (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

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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

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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 56 (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 56 (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 56 (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 56 (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.

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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 56 (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

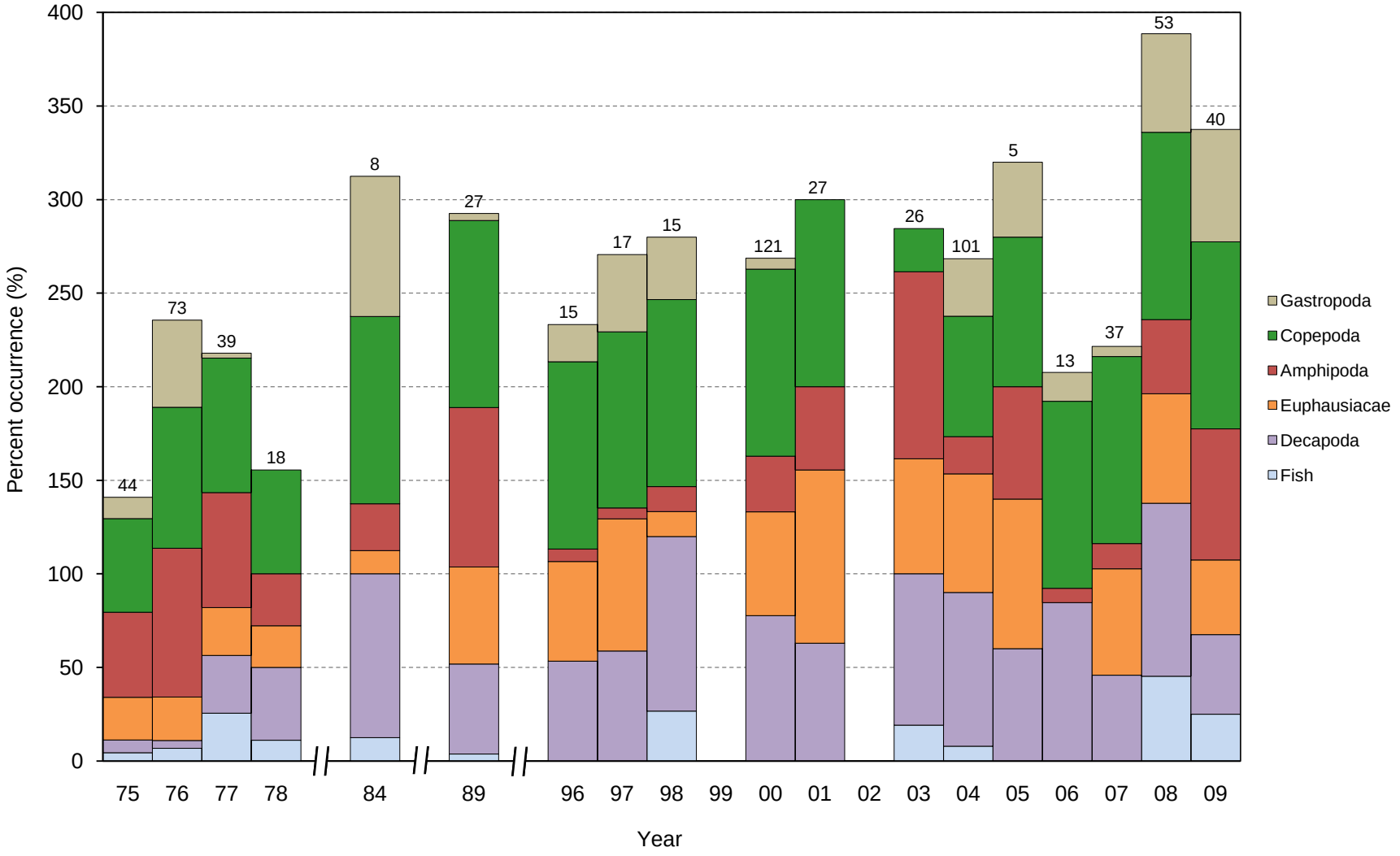

Figure 30. Frequency of occurrence of selected prey items in diets of least auklets at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected 1979-1983, 1985-1998, or 1990-1995; samples were collected in 2010 but have not yet been summarized.

Table 57. 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 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	-	-	-	-
T. pacifica	-	1.4	-	5.6	-	14.8	6.7	-	13.3	-
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 57 (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 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
T. pacifica	-	-	-	73.1	5.9	60.0	-	5.4	1.9	12.5
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.

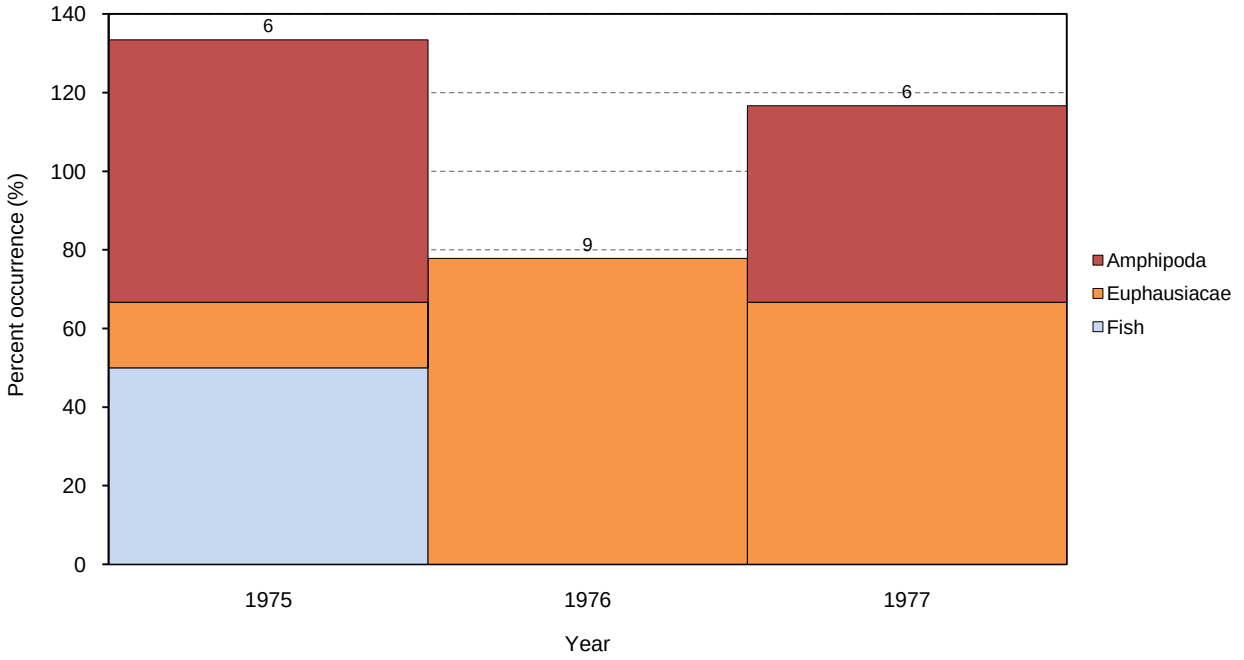

Figure 31. Frequency of occurrence of selected prey items in diets of crested auklets at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected after 1977.

Table 58. 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
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	-	-

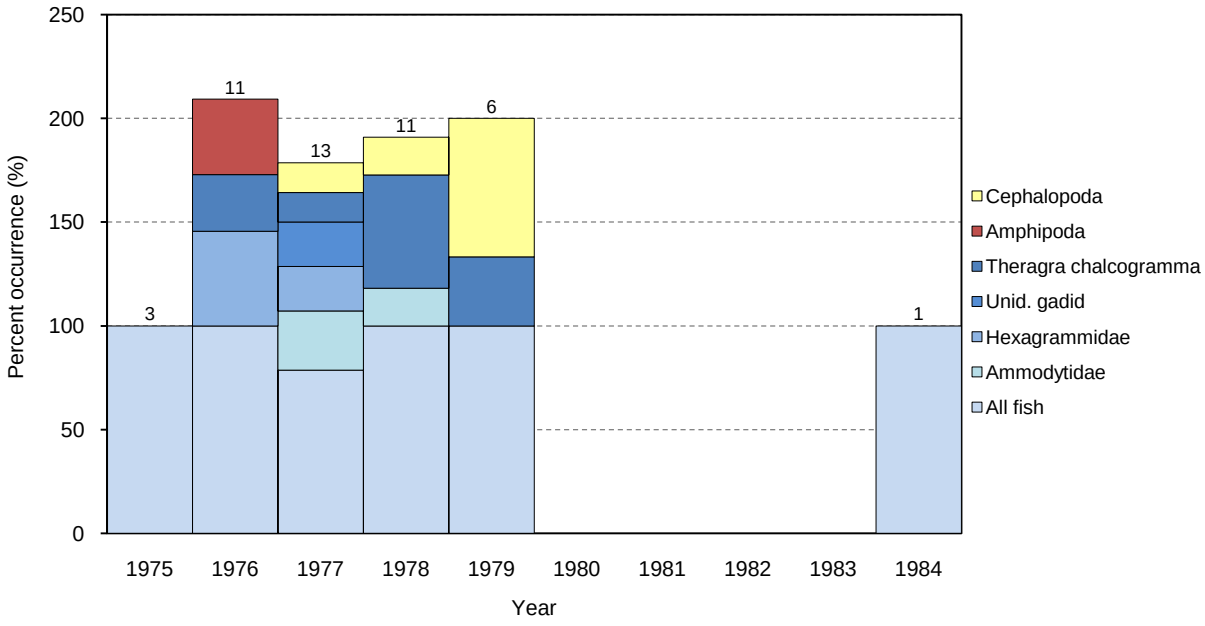

Figure 32. Frequency of occurrence of selected prey items in diets of horned puffins at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected after 1984.

Table 59. 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

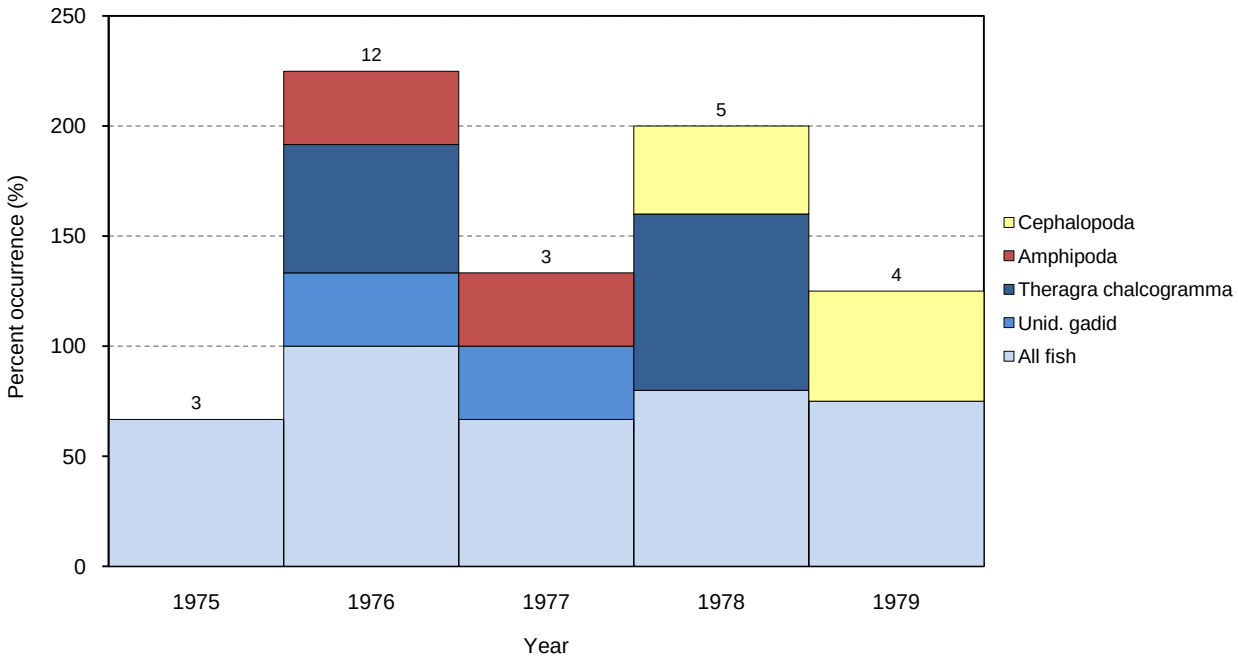

Figure 33. Frequency of occurrence of selected prey items in diets of tufted puffins at St. Paul Island, Alaska. Numbers above columns indicate sample sizes. No samples were collected after 1979.

Table 60. 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 61. 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
Rock sandpiper	6	*no counts*	*no counts*	1
Pacific wren	0	-	-	0
Lapland longspur	22	-	-	1
Snow bunting	0	-	-	0
Gray-crowned rosy finch	7	-	-	0
n	5	-	-	4
First survey	10 Jun	-	-	18 Jun
Last survey	30 Jun	-	-	30 Jun

Table 62. 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
Rock sandpiper	24	0	*no counts*	1
Pacific wren	0	0	-	0
Lapland longspur	7	0	-	1
Snow bunting	3	0	-	1
Gray-crowned rosy finch	69	1	-	12
n	5	2	-	4
First survey	14 Jun	11 Jun	-	18 Jun
Last survey	4 Jul	20 Jun	-	29 Jun

Table 63. Numbers of birds detected on beach transect surveys along Lukanin Beach, St. Paul Island, Alaska in 2010.

Species	Date				Mean	SD
	18 Jun	23 Jun	29 Jun	30 Jun		
Rock sandpiper	1	0	1	0	1	1
Pacific wren	0	0	0	0	0	0
Lapland longspur	5	0	0	0	1	3
Snow bunting	0	0	0	0	0	0
Gray-crowned rosy finch	0	0	0	0	0	0
Start time	0850	0900	0900	0800		
End time	0910	0915	0915	0815		

Table 64. Numbers of birds detected on beach transect surveys along Zapadni Beach, St. Paul Island, Alaska in 2010.

Species	Date				Mean	SD
	18 Jun	23 Jun	24 Jun	29 Jun		
Rock sandpiper	1	1	0	3	1	1
Pacific wren	0	0	0	0	0	0
Lapland longspur	4	1	0	0	1	2
Snow bunting	1	1	1	0	1	1
Gray-crowned rosy finch	12	12	10	13	12	1
Start time	0910	0915	0900	0915		
End time	0945	0945	0925	0945		

Annotated list of wildlife species observed at St. Paul Island, Alaska in 2010 (26 May-5 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

Cackling goose (*Branta hutchinsii*). Uncommon migrant. A flock of 16 birds was seen near Polovina wetlands on 26 May.

Mallard (*Anas platyrhynchos*). Uncommon migrant. Single birds were seen on Antone Lake on 31 May and 17 August.

Northern pintail (*Anas acuta*). Common breeder. This species was routinely seen on various lakes around the island. A male was observed on Anton Lake on 18 June. A male and female were seen on the road by the Quarry on 1 July. A female was observed on Anton Lake on 14 August. A nest containing six eggs was found near the quarry road on 27 June.

American green-winged teal (*Anas crecca carolinensis*). Uncommon possible breeder. A lone individual was seen at Anton Slew on 5 June.

Green-winged teal (*Anas crecca* unspecified subspecies). Common breeder. Birds were seen on Weather Station Lake on 5 June and 10 July and on Ice House Lake on 1 and 4 July. A female and six ducklings were observed on Anton Lake on 31 August.

Greater scaup (*Aythya marila*). Uncommon migrant. Two males and female were seen at Anton Slew on 5 June. A male and female were observed on Anton Lake on 18 June.

Lesser scaup (*Aythya affinis*). Uncommon migrant. A male and female were seen on a lake north of the Weather Station housing on 4 July.

Steller's eider (*Polysticta stelleri*). Rare migrant. Three birds were photographed in the harbor with a flock of harlequin ducks on the evening of 22 August.

King eider (*Somateria spectabilis*). Common migrant. A first-winter female was seen resting on a beach rock with two harlequin ducks, then swam out to sea, at Black Face Cliff on 18 June. A female bird was sighted offshore at Lincoln Bight on 29 June.

Harlequin duck (*Histrionicus histrionicus*). Abundant resident non-breeder. This species was seen daily in nearshore waters during the summer. Most of the flocks seen in June were composed of males in breeding plumage. By August most sightings consisted of immature males and females. A group of 76

birds were seen riding the current of the Salt Lagoon outlet behind Staff Quarters on 2 June. On 19 June, 24 birds were sighted in nearshore waters at Tsamana Cabin. East Lincoln Bight tidal bench was a favored roosting spot, with about 150 birds counted on 9 July and 90 birds counted on 13 July. Counts of flocks in nearshore waters on 19 June were 69 off Lincoln Bight and 45 on the east Lincoln Bight tidal bench, and on 13 August were 92 off Lincoln Bight, 75 on the east Lincoln Bight tidal bench, 107 between east Lincoln Bight and Slade's Arch, and 136 at Slade's Arch.

Long-tailed duck (*Clangula hyemalis*). Common breeder. A female was seen on Anton Lake on 18 June. A lone duckling was observed on a pond near Lokanin Point on 10 July, and eight ducklings were seen on Watson Lake on 14 August.

Bufflehead (*Bucephala albeola*). Uncommon migrant. One bird was observed at Marunich on 29 May. Two birds were seen on Anton Lake on 1 June. A female was sighted on Weather Station Lake on 4 July.

Red-breasted merganser (*Mergus serrator*). Uncommon migrant. One female was seen on Anton Lake on 5 June.

Northern fulmar (*Fulmarus glacialis*). Abundant breeder. This species nests on the cliff of Zapadni, Tolstoi and High Bluffs. Intermittent counts on Plot 53 ranged from 10 to 22 adults and up to seven chicks, with maximum counts occurring on 25 August. The first chick was seen on 13 July on plot 53. Light phase birds are significantly more common than the dark phase birds.

Short-tailed shearwater (*Puffinus tenuirostris*). Uncommon migrant. A single bird was seen only a few meters from shore at Southwest Point on 12 July.

Fork-tailed storm-petrel (*Oceandroma furcata*). Uncommon migrant. Four birds were seen south and southeast of St. Paul from the M/V Tiglax on 16 and 17 July.

Red-faced cormorant (*Phalacrocorax urile*). Abundant breeder. At Slade's Arch, there were 15 birds seen on 13 July and 23 adult and 15 immature birds counted on 13 August. The first chick was seen on June 21. On 30 August there were still chicks on the productivity plot, all aged between 49 to 67 days. An immature bird with a yellow leg band was seen at Slade's Arch (west of Marunich cabin) on 19 June and 9 July, and two birds with bands were sighted there on 1 September, although only one band number (141, banded last year) could be read.

Pelagic cormorant (*Phalacrocorax pelagicus*). Uncommon resident non-breeder. Two birds were sighted with several red-faced cormorants at Slade's Arch west of Marunich cabin on 19 June. A single bird was seen roosting at Tolstoi Point on 3 July.

Pacific golden-plover (*Pluvialis fulva*). Common migrant. This bird was first sighted on 30 July at Southwest Point. Along the four wheeler trail between Southwest Point and Rush Hill, over 20 birds were seen on 13 August and 10 birds were counted on 1 September. One bird was seen on the Zapadni Beach on 14 August.

Semipalmated plover (*Charadrius semipalmatus*). Common possible breeder. Single individuals were seen at Antone Slew on 5 June, above Ice House Pond on 27 June, on the road to Northeast Point on 7 July, and at Southwest Point on 9 July. This species has bred on St. Paul in previous years.

Grey-tailed tattler (*Tringa brevipes*). Common migrant. One bird was seen at Anton Lake on 29 July.

Wandering tattler (*Tringa incana*). Common migrant. The first bird was seen along Ridgewall on 2 June. From mid July to through August, we routinely saw this species at Anton Lake, including four individuals on 17 July and one on 14 August.

Wood sandpiper (*Tringa glareola*). Rare migrant. One bird was seen in Anton Slew on 20 August.

Whimbrel (*Numenius phaeopus*). Common migrant. Individual birds were seen at Zapadni Beach on 31 May and behind Staff Quarters, walking along the outlet to the boat harbor from Salt Lagoon, on 17 June.

Black-tailed godwit (*Limosa limosa*). Rare migrant. Ten birds were seen at Salt Lagoon on 5 June. One bird was seen flying up the Salt Lagoon outlet as we launched the skiff to retrieve the data logger on 28 August.

Bar-tailed godwit (*Limosa lapponica*). Uncommon migrant. Up to 13 birds were seen on the mud flats along the Salt Lagoon over a three-day period beginning 3 June.

Ruddy turnstone (*Arenaria interpres*). Common migrant. A single bird was seen 31 May, followed by a long period where no birds were observed until 8 July. In August, birds were routinely seen along the roads, four wheeler trails, and on beaches feeding in the kelp. A group of 28 birds was counted on Marunick Beach on 13 August.

Great knot (*Calidris tenuirostris*). Rare migrant. A lone immature bird was photographed at Marunick Beach on 13 August.

Western sandpiper (*Caladris mauri*). Uncommon migrant. Two birds were seen in the Zapadni Slew on 14 August. On 17 August, one bird was seen at Tsamana Lake and four at Marunick Lake.

Red-necked stint (*Calidris ruficollis*). Common migrant. One bird was seen at Marunick Pond on 21 August.

Least sandpiper (*Calidris minutilla*). Common resident non-breeder. One bird was seen in the Anton Lake slew on 8 July. This species has bred on St. Paul in the past.

Pectoral sandpiper (*Caladris melanotos*). Uncommon migrant. One bird was seen at Tsamana Lake on 17 August. At least two birds were sighted in the marsh behind the town school on 2 September.

Sharp-tailed sandpiper (*Calidris acuminata*). Uncommon migrant. A lone juvenile was seen in the Zapadni Slew with several juvenile rock sandpipers on 14 August. This species was seen again in Zapadni Slew on 21 August. At least a dozen birds were observed in the marsh behind the town school on 3 September.

Pribilof rock sandpiper (*Caladris ptilocnemis ptilocnemis*). Abundant breeder. This species is the most common shorebird on the island. They were observed daily throughout the island. Two dozen birds were counted at Marunick Beach on 13 August and again on 18 August.

Ruff (*Philomachus pugnax*). Uncommon migrant. One bird was seen at Marunick Lake on 21 August.

Long-billed dowitcher (*Limnodromus scolopaceus*). Rare migrant. There were seven birds seen at Webster Lake on 7 and 8 July.

Red-necked phalarope (*Phalaropus lobatus*). Common breeder. Often observed at Webster Lake, Saucer Pond and the Polovina Wetlands.

Red phalarope (*Phalaropus fulicarius*). Common breeder. From Northeast Point on 8 July, flocks containing thousands of birds were observed flying north and then turning to the west as they rounded Northeast Point. Thousands of birds were also observed at sea on 16 and 17 July from the M/V Tiglax. One bird in white winter plumage was seen on 3 July on Webster Lake. Four birds were seen on Tsamana Lake on 9 July. On 25 July, two young-of-the-year females were found dead near Webster Lake. An examination by pathologist Dr. Terry Spraker revealed both were emaciated, with no food in the proventriculus and ventriculus and breast muscles that were severely atrophied (see Table 68). Suspected cause of death was malnutrition. One of the birds had a small degree of discoloration to the anterior aspects of the lungs.

Black-legged kittiwake (*Rissa tridactyla*). Abundant breeder. The first egg was seen at Tolstoi on 1 June. The first chick was seen on 22 June. There were numerous two-egg clutches this year, similar to what was observed in 2009. However, hatch success this year was better than 2009 (Table 17). Kittiwake flocks are routinely seen on Tsamana Lake, including over 50 on 9 July and 25 on 13 August, and at Weather Station Lake, where over 200 birds were noted on 10 July. We counted 53 on the east end Lincoln Bight reef and 39 on Marunick Beach on 13 August. Over 500 birds were counted on Clam Lagoon on 17 August. A fledgling, perhaps on his first flight, was observed catching up drafts near the cliffs and awkwardly trying to land on ledges at Zapadni on 12 August.

Red-legged kittiwake (*Rissa brevirostris*). Abundant breeder. This species is less common than the black-legged kittiwake on St. Paul. By skiff we counted 760 red-legged kittiwakes from Tsamana to Southwest Point on 17 July. Over 100 birds were counted on Clam Lagoon on 17 August. The first egg recorded was on 3 June. The first chick was seen on 2 July. We were unable to find as many nests to monitor for productivity as in previous years. In 2006, the crew monitored 34 nests, compared to just nine in 2010. High Bluff plots 49, 53, 55, 56, and 61 accounted for 24 red-legged nests in 2006 but had only nine nests in 2010. Zapadni plots 87, 88, and 89R had eight red-legged nests in 2006 but only 3 in 2010. This year at plot 53, a nest site that had been a red-legged kittiwake site since at least 2006 was occupied by a black-legged kittiwake.

Glaucous-winged gull (*Larus glaucescens*). Abundant resident non-breeder. This is the most common gull on the island. Flocks were often found on Salt Lagoon, Zapadni Beach, North Beach, and roosting on the sand spit on Big Lake. We counted eight birds on Weather Station Lake on 10 July, 64 on Zapadni Beach on 1 August, and 68, including 23 subadults, on Zapadni Beach on 14 August.

Arctic tern (*Sterna paradisaea*). Rare migrant. An immature bird was seen at Anton Lake on 1 and 2 August.

Long-tailed jaeger (*Stercorarius longicaudus*). Uncommon migrant. Single individuals were seen flying over Zapadni Beach on 31 May, floating on Antone Lake on 19 July, and flying over Ridgewall on 11 August.

Common murre (*Uria aalge*). Abundant breeder. An unattended egg of unknown murre species was seen on Plot 90L on 14 June, and the first confirmed common murre egg was sighted on 17 June. The

first chick hatched on 21 July. Fewer common murres laid eggs in 2010 compared to recent years: in 2009 plot 90L had 43 common murres with eggs, where as in 2010 the same area contained only 27 birds with eggs. At plot 89 the upper ledge of common murres lost all their eggs when two northern fulmars began roosting there and most of the murres abandoned the site when the fulmars were present. As a result there were four unattended eggs on 5 July and by 12 August only one common murre was still incubating an egg there.

Thick-billed murre (*Uria lomvia*). Abundant breeder. This species is more abundant than the common murre on St. Paul. The first egg was seen on plot 89 on 15 June. The first chick was seen on 20 July. For a second year in a row, a rock fall destroyed several nest sites on plot 53. First fledglings at sea were observed from Southwest Point on 13 August.

Pigeon guillemot (*Cepphus columba*). Common migrant. One bird was seen south of Tolstoi on 3 June while the crew was deploying data loggers. Two birds were seen enroute to Otter Island on 25 June.

Ancient murrelet (*Synthliboramphus antiquus*). Common migrant. Two birds were seen enroute to Otter Island on 25 June.

Parakeet auklet (*Aethia psittacula*). Abundant breeder. This species is found in abundance on all the cliffs of the island.

Least auklet (*Aethia pusilla*). Abundant breeder. This seabird is the most abundant auklet on St. Paul. It breeds on various boulder beaches including East Landing, Tolstoi, Zapadni, Antone Lake seawall, and on the east end of Lincoln Bight (N57^{o}12".26" W170^{o}20'34.5"). A fledgling was observed on 1 August floating in Antone Lake.

Crested auklet (*Aethia cristatella*). Abundant breeder. This species was observed daily and was most often seen at Zapadni and Tolstoi, where they breed. Throughout the summer we saw several flocks of 15 to 30 birds fly along these cliffs when monitoring productivity plots at Zapadni and Tolstoi. On 22 June there were flocks of more than 100 birds circling the cliffs at Tolstoi.

Horned puffin (*Fratercula corniculata*). Abundant breeder. This seabird was observed daily on all the major seabird colony cliffs of St. Paul.

Tufted puffin (*Fratercula cirrhata*). Abundant breeder. Though less abundant than *F. corniculata*, this species was observed daily at most major seabird colony cliffs of St. Paul.

Common raven (*Corvus corax*). Common resident non-breeder. Single individuals were observed on 29 May off Tolstoi, at the crab pots on 4 July, and on the road by the Quarry on 8 July. An usually large bird was seen flying at Southwest Point on 14 August. Beginning 21 August, one bird was seen regularly along Zapadni and Ridgewall until field crews departed.

Bank swallow (*Riparia riparia*). Uncommon migrant. One bird was seen along High Bluffs on 28 May.

Cliff swallow (*Petrochelidon pyrrhonota*). Accidental migrant. One bird was seen along Ridgewall on 27 May and four birds were observed along Tolstoi cliffs on 29 May.

Pacific wren (*Troglodytes pacificus*; formerly winter wren *Troglodytes troglodytes*). Common breeder. This species is not abundant on St. Paul. One to two birds have been seen routinely on the trail to the

Zapadni plots at the end of the Anton Lake seawall over the past five years. This year the first bird was seen on 5 June at Zapadni plot 104. Individual birds were heard at plot 80 on 1 July and at Tolstoi plot 90 on 3 and 10 July.

Northern wheatear (*Oenanthe oenanthe*). Uncommon migrant. One bird was noted at Big Lake on 23 August.

Northern mockingbird (*Mimus polyglottos*). Accidental migrant. A lone bird was sighted at Hutch Hill on 14 August and photographed on 15 August.

Eastern yellow wagtail (*Motacilla tschutschensis*). Irregular migrant. One bird was observed and photographed at Tourist Point on 2 June.

Yellow-rumped "Myrtle" warbler (*Dendroica coronata*). Casual migrant. One female was seen and photographed on 29 May on Tolstoi.

Lapland longspur (*Calcarius lapponicus*). Abundant breeder. This species migrates to the island to nest for the summer. It is abundant throughout the island.

Snow bunting (*Plectrophenax nivalis*). Common breeder. This species is a year-round resident of St. Paul, although less abundant than the gray crown-crowned rosy-finch and Lapland longspur. We began seeing juvenile birds in July: over 2 dozen juveniles were flying along the Anton Lake access road 20 July.

Gray-crowned rosy-finch (*Leucosticte tephrocotis*). Abundant breeder. This species is a year-round resident of St. Paul and is abundant throughout the island. A nest was observed at plot 56 on High Bluffs that contained three partially feathered chicks on 2 July and appeared to be fledged by 9 July.

Hoary redpoll (*Carduelis hornemanni*). Uncommon migrant. Single individuals were seen in the crab pots on 21 June and near Anton Slough on 10 July.

MAMMALS

Northern fur seal (*Callorhinus ursinus*). Abundant breeder. Two individuals were seen in the Tattler Cove area of Salt Lagoon on 22 June. About 75 animals were hauled out at Southwest Point on 4 July. We counted seven adults and two pups dead on the sandy Zapadni Beach on 1 August. One male was seen atop Zapadni cliffs on 5 and 12 July and another was at the Tolstoi Tripod on 21 August.

Harbor seal (*Phoca vitulina*). Common resident non-breeder. Three animals were seen in the boat harbor on 17 June. Offshore along the coast adjacent to North Hill, nine seals were counted from the east end of Lincoln Bight to the Marunich Cabin. One individual was in the Tattler Cove area of Salt Lagoon on 22 June.

Steller's sea lion (*Eumetopias jubatus*). Common resident non-breeder. Single individuals were seen hauled out lying among the fur seals at Zapadni Point on 23 June, 1 July and 5 July. One animal was sighted eating a fish in nearshore waters below Tolstoi on 3 July. Three animals were observed hauled out at Southwest Point on 4 July.

Orca (*Orcinus orca*). Uncommon migrant. A pod of five to six individuals was seen and photographed off Zapadni Point on 2 June. Another pod containing at least five individuals was sighted along High Bluffs during the Tiglax cruise on 17 July.

Gray whale (*Eschrichtius robustus*). Casual migrant. Individuals were observed between 29 May and 10 June from Zapadni and Ridge Wall areas south of the island, with a maximum count of six whales seen at any one time.

Arctic fox (*Alopex lagapus*). Abundant breeder. Active fox dens were located on Tolstoi below plots 110 and 114. At least four small pups were seen below plot 110 on 7 July. At Zapadni the den at the WWII hut and adjacent areas had several pups, and at the end of the Anton Lake seawall. On 30 June a fox was seen from plot 110 carrying a parakeet auklet to a den on the Tolstoi Beach, and later in the day a fox was observed taking a kittiwake chick to the same den. On 10 July a fox was seen carrying a kittiwake chick below plot 90 at Tolstoi.

Reindeer (*Rangifer tarandus*). Abundant breeder. A herd estimated at 200 individuals was first seen on 14 June near quarry road. Late in the evening on 29 June, a herd of about the same size was sighted crossing the road near Ridgewall. One wounded individual was observed near Ridge Wall on 21 July. Another herd was seen north of Rush Hill on 25 July. Trampled vegetation and other signs of the herd presence were often observed along Zapadni, Ridge Wall and along High Bluffs ATV trail throughout August.

Table 65. 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
Bean goose	X	X	-	-	-	-	-	-
Greater white-fronted goose	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
Cackling goose	-	X	X	X	-	X	-	-
Tundra swan	X	-	-	X	-	-	X	-
Gadwall	-	-	X	-	-	-	-	-
Eurasian wigeon	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
Eurasian green-winged teal (*A. c. crecca*)	B	B	-	-	X	X	-	-
American green-winged teal (*A. c. carolinensis*)	B	B	-	-	-	X	-	X
Green-winged teal (unspecified subsp.)	-	-	B	X	-	B	X	B
Canvasback	-	-	X	-	-	-	-	-
Common pochard	-	-	-	X	X	-	-	-
Ring-necked duck	-	-	X	-	-	-	X	-
Tufted duck	X	X	-	X	-	X	X	-
Greater scaup	X	X	-	-	X	X	X	X
Lesser scaup	-	-	-	-	-	X	-	X
Steller's eider	-	(X)	-	X	X	-	-	X
King eider	X	X	X	X	X	X	X	X
Harlequin duck	X	X	X	X	X	X	X	X
White-winged scoter	X	X	-	-	-	X	-	-
American scoter (formerly black scoter)	X	X	-	-	-	X	-	-
Long-tailed duck	B	B	B	X/B?	X/B?	B	X/B?	B
Bufflehead	X	X	-	X	-	X	X	X
Common goldeneye	X	X	-	-	-	X	X	-
Smew	-	-	-	X	X	-	-	-
Common merganser	-	(X)	-	X	X	X	-	-
Red-breasted merganser	X	X	-	-	X	X	X	X
Pacific loon	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	-
Black-footed albatross	X	-	-	-	-	-	-	-
Laysan albatross	-	-	-	-	-	X	-	-
Northern fulmar	B	B	B	B	B	B	B	B
Mottled petrel	X	-	-	-	-	-	-	-
Sooty shearwater	-	-	-	-	X	-	-	-
Short-tailed shearwater	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
Pelagic cormorant	X	X	X	-	-	X	X	X
Bald eagle	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	-	-	-	-	-	-
American golden-plover	X	-	-	-	-	-	-	-

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

Table 65 (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
Pacific golden-plover	X	X	-	X	X	X	X	X
Lesser sand-plover (Mongolian plover)	X	X	X	-	-	-	X	-
Semipalmated plover	B	B	-	X/B?	X/B?	B	B	P
Terek sandpiper	X	-	-	-	-	-	-	-
Common sandpiper	X	X	-	-	-	X	-	-
Gray-tailed tattler	X	X	X	X	X	X	X	X
Wandering tattler	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	-	-	-
Wood sandpiper	X	X	-	-	-	-	X	-
Whimbrel	X	X	X	X	-	X	X	X
Bristle-thighed curlew	X	X	X	-	-	X	X	X
Far-eastern curlew	-	-	-	-	X	-	-	-
Black-tailed godwit	-	-	-	-		-	X	X
Bar-tailed godwit	X	X	-	-	X	X	X	X
Ruddy turnstone	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
Red-necked stint	X	X	-	X	X	X	X	X
Little stint	X	-	-	-	X	-	-	-
Temmick's stint	-	-	-	-	-	-	X	-
Long-toed stint	X	-	-	-	-	-	-	-
Least sandpiper	P	B	-	X/B?	X/B?	B	X/B?	X
Baird's sandpiper	X	X	-	-	-	-	-	-
Pectoral sandpiper	X	X	-	X	-	X	X	X
Sharp-tailed sandpiper	X	X	-	-	X	X	X	X
Pribilof rock sandpiper (*C. p. ptilocnemis*)	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
Long-billed dowitcher	X	X	-	-	-	-	X	X
Short-billed dowitcher	X	X	-	-	-	X	-	-
Jack snipe	-	X	-	-	-	-	-	-
Wilson's snipe	-	X	-	-	-	X	-	-
Common snipe	X	X	-	-	-	-	X	-
Red-necked phalarope	X	B	B	X	X	X	X	B
Red phalarope	X	X	-	X	X	P	X	X
Black-legged kittiwake	B	B	B	B	B	B	B	B
Red-legged kittiwake	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	-	-
Slaty-backed gull	X	X	-	X	X	X	X	-
Glaucous-winged gull	X	X	-	X	X	X	X	X
Glaucous gull	X	X	-	-	X	X	X	-
Aleutian tern	X	-	-	-	-	-	-	-
Common tern	-	X	-	-	-	-	X	-

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

Table 65 (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
Arctic tern	X	X	-	-	-	X	X	X
Pomarine jaeger	X	X	-	X	X	X	X	-
Parasitic jaeger	X	X	-	X	X	X	X	-
Long-tailed jaeger	X	X	-	-	X	X	X	X
Dovekie	-	-	-	-	-	X	Walrus I.	-
Common murre	B	B	B	B	B	B	B	B
Thick-billed murre	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
Parakeet auklet	B	B	B	B	B	B	B	B
Least auklet	B	B	B	B	B	B	B	B
Whiskered auklet	-	-	-	-	X	-	-	-
Crested auklet	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
Tufted puffin	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	-
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
Sky lark	-	(X)	-	-	-	-	-	-
Purple martin	X	-	-	-	-	-	-	-
Tree swallow	X	X	-	-	-	X	-	-
Bank swallow	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 wren(formerly winter wren)	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 flycatcher (Siberian flycatcher)	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)	-	-	-	-	-	-
Varied thrush	-	(X)	-	-	-	-	-	-

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

Table 65 (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
Northern mockingbird	-	-	-	-	-	-	-	X
Eastern yellow wagtail	X	X	-	-	-	X	X	X
Gray wagtail	-	-	-	-	-	X	-	-
White wagtail (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	-	-
Dark-eyed junco	-	X	-	-	-	X	-	-
Lapland longspur	B	B	B	B	B	B	B	B
Rustic bunting	X	-	-	-	-	-	X	-
Snow bunting	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
Common rosefinch	-	-	-	-	-	X	X	-
Red crossbill	X	X	-	-	-	-	-	-
White-winged crossbill	X	-	-	-	-	-	-	-
Common redpoll	B	B	-	-	-	X	X	-
Hoary redpoll	X	B	-	X	-	X	X	X
Pine siskin	X	-	-	-	-	-	X	-
Hawfinch	X	-	-	-	-	-	-	-
Sea otter	NR[b]	NR	NR	X	-	-	-	-
Harbor seal	NR	NR	NR	X	X	-	X	X
Northern fur seal	NR	NR	NR	B	B	B	B	B
Steller's sea lion	NR	NR	NR	-	X	X	X	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
Reindeer	NR	NR	NR	-	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

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

Table 66. 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. No data were collected in 2010.

Family	Species	Common name	xx[a]	xx	2001	2009
Apiaceae (Umbelliferae)	*Conioselinum chinense*	Hemlock parsley	xx	xx	15 Jul	1 Aug
	Angelica lucida	Wild celery	xx	xx	xx	16 Jul
	Ligustocum scotisum	Lovage	xx	xx	27 Jul	-
Asteraceae (Compositae)	*Taraxacum officinale*	Common dandelion	xx	xx	xx	11 Jul
	Taraxacum ceratophorum	Horned dandelion	xx	xx	xx	26 Jun
	Achillea borealis	Northern yarrow	xx	xx	13 Jul	16 Jul
	Senecio pseudo-arnica	Beach sunflower	xx	xx	16 Jul	29 Jul
	Artemesia titesii	Northern wormwood	xx	xx	13 Jul	25 Jul
	Arnica unalaschensis	Unalaska arnica	xx	xx	xx	1 Aug
	Chyrsanthemum arcticum	Arctic daisy	xx	xx	16 Jul	24 Jul
	Aster sibiricus	Siberian aster	xx	xx	2 Aug	24 Jul
	Petasites hyperboreus	Sweet coltsfoot	xx	xx	31 May	26 May
Boraginaceae	*Eritrichium chamissonis*	Arctic forget-me-not	xx	xx	2 Aug	-
	Mertensia maritima	Beach bluebells	xx	xx	xx	6 Jul
Brassicaceae (Cruciferae)	*Draba borealis*	Arctic whitlow-grass	xx	xx	xx	16 Jun
	Draba lactea	Arctic draba	xx	xx	xx	6 Jul
	Draba hyperborea	Northern draba	xx	xx	xx	-
	Cochlearia officionalis oblongifolia	Scurvy grass	xx	xx	xx	9 Jun
	Cardamine pratensis angustfolia	Cuckoo flower	xx	xx	13 Jul	3 Jul
	Barbarea orthoceras	Wintercress	xx	xx	xx	16 Jul
Campanulaceae	*Campanula lasiocarpa*	Mountain harebell	xx	xx	2 Aug	26 Jul
Caryophyllaceae	*Silene acaulis*	Moss campion	xx	xx	xx	26 Jul
	Minuartia arctica	Arctic sandwort	xx	xx	xx	-
	Cerastium beeringianum var. *grandifolium*	Bering Sea chickweed	xx	xx	xx	27 Jul
	Cerastium beeringianum	Mouse-eared chickweed	xx	xx	xx	3 Jul
	Unid. *Cerastium* sp.	Unid. chickweed	xx	xx	14 Jun	-
	Honckenya peploides	Beach greens	xx	xx	xx	-
Cornus	*Cornus suecica*	Dogwood	xx	xx	xx	26 Jul
Fabaceae (Leguminosae)	*Lathyrus maritimus*	Beach pea	xx	xx	17 Jun	-
	Lupinus nootkatensis	Nootka lupine	xx	xx	31 May	-
Fumariaceae	*Corydalis pauciflora*	Few-flowered corydalis	xx	xx	14 Jun	9 Jun
Gentianaceae	*Gentiana algida*	Whitish gentian	xx	xx	2 Aug	1 Aug
Geraniaceae	*Geranium erianthum*	Wild geranium	xx	xx	xx	26 Jul
Papaveraceae	*Papaver alaskanum*	Alaska poppy	xx	xx	7 Jun	-
	Papaver macounii	Macoun's poppy	xx	xx	xx	-
Plumbaginaceae	*Armeria maritia*	Thrift	xx	xx	19 Jun	1 Aug

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

Table 66 (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. No data were collected in 2010.

Family	Species	Common name	xx[a]	xx	2001	2009
Polemoniaceae	*Polemonium acutiflorum*	Tall Jacob's ladder	xx	xx	17 Jun	11 Jul
Polygonaceae	*Polygonum bistora plumosum*	Pink plumes	xx	xx	xx	-
Portulacaceae	*Claytonia sarmentosa*	Alaska spring beauty	xx	xx	7 Jun	22 Jun
Primulaceae	*Primula tschuktschorum* var. *arctica*	Chukchi primrose	xx	xx	23 May	26 May
	Androsace tschuktschorum. lehmanniana	Rock jasmine	xx	xx	xx	-
	Trientalis europaea arctica	Northern starflower	xx	xx	26 Jun	26 Jul
Pyrolaceae	*Pyrola minor*	Lesser wintergreen	xx	xx	xx	1 Aug
Ranunculaceae	*Ranunculus sulphureus*	Sulphur buttercup	xx	xx	xx	26 May
	Ranunculus pygmaeeus	Pigmy buttercup	xx	xx	xx	21 Aug
	Unid. *Ranunculus* sp.	Unid. buttercup	-	-	6 Jun	-
	Aconitum delphinifolium chamissonianum	Big monkshood	xx	xx	xx	-
	Aconitum delphinifolium paradoxum	Little monkshood	xx	xx	xx	-
	Unid. *Aconitum* sp.	Unid. monkshood	xx	xx	7 Jul	-
Rosaceae	*Potentilla villosa*	Cinquefoil	xx	xx	xx	10 Jun
	Potentilla hyperarctica	High Arctic cinquefoil	xx	xx	xx	16 Jul
	Unid. *Potentilla* sp.	Cinquefoil sp.	xx	xx	7 Jun	-
	Rubus arcticus	Nagoonberry	xx	xx	xx	1 Aug
	Geum rossii	Ross' avens	xx	xx	xx	16 Jul
Salicaceae	*Salix arctica*	Arctic willow	xx	xx	xx	-
	Salix reticulata orbicularis	Netleaf willow	xx	xx	xx	-
Saxifragaceae	*Saxifraga punctata nelsoniana*	Brook saxifrage	xx	xx	xx	16 Jul
	Saxifraga serpyllifolia	Thyme-leaved saxifrage	xx	xx	2 Aug	14 Jul
	Saxifraga hirculus	Bog saxifraga	xx	xx	xx	14 Jul
	Saxifraga hieracifolia	Rusty saxifrage	xx	xx	xx	11 Jul
Scrophulariaceae	*Pedicularis lanata*	Woolly lousewort	xx	xx	17 Jun	10 Jun
	Lagotis glauca	Weasel snout	xx	xx	26 Jun	22 Jun
	Pedicularis verticillata	Whorled lousewort	xx	xx	xx	6 Jul
	Pedicularis langsdorffi Langsdorffi	Alaska violet	xx	xx	xx	6 Jul
	Pedicularis sudetica Pacifica	Fern-leaf lousewort	xx	xx	xx	6 Jul
	Veronica stelleri	Steller's speedwell	xx	xx	xx	8 Aug
Valerianaceae	*Valeriana capitata*	Capitate valerian	xx	xx	30 Jun	26 Jul
Violaceae	*Viola langsdorffii*	Alaska violet	xx	xx	10 Jun	27 Jun

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

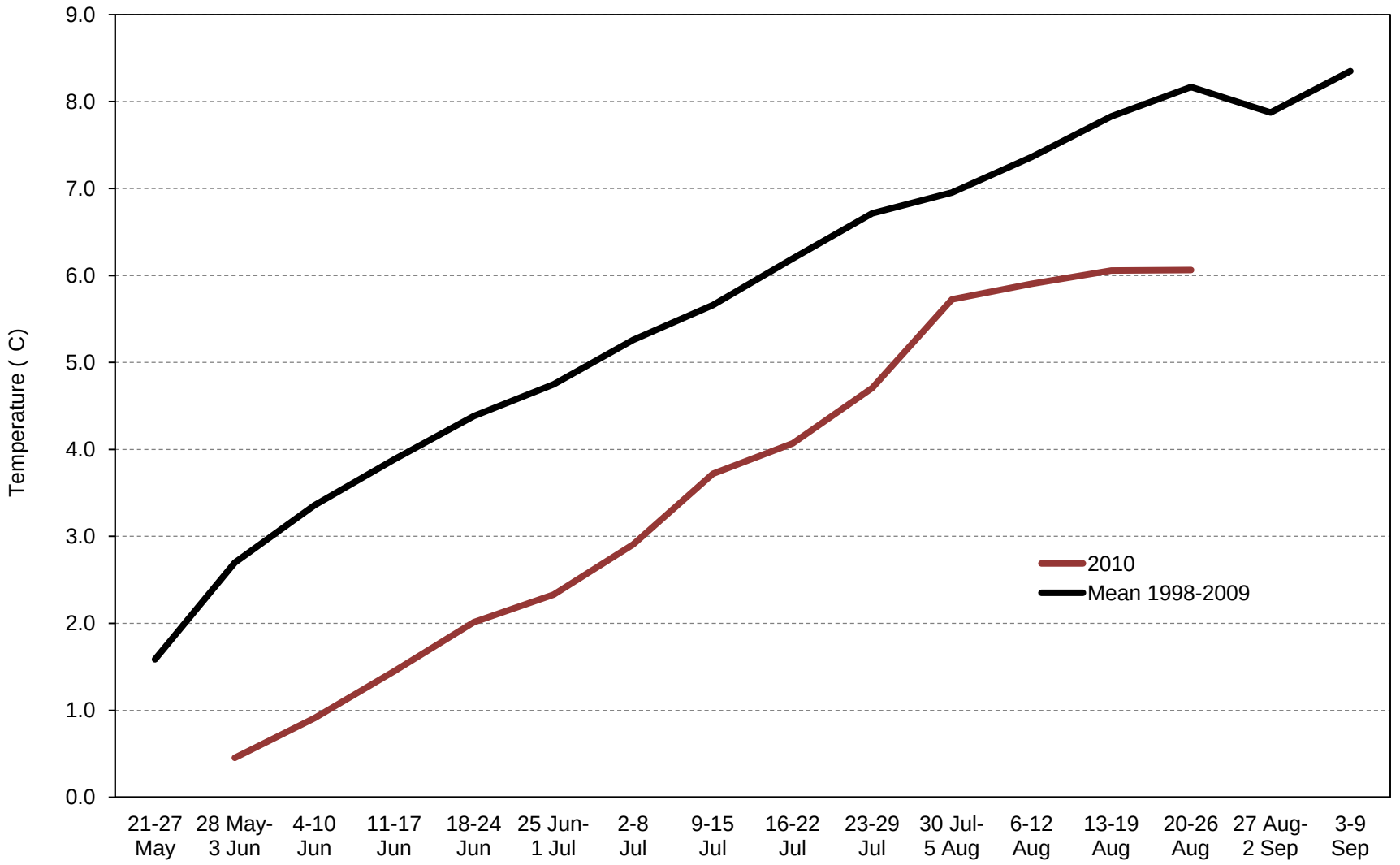

Figure 34. Mean weekly sea surface temperatures (°C) at English Bay, St. Paul Island, Alaska.

Table 67. 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
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
11-17 Jun	4.0	-	-	3.9	4.9	5.9	-	-	-	3.9	2.0	2.6	1.4
18-24 Jun	4.4	-	4.8	4.7	5.3	6.2	-	-	-	4.2	2.5	3.1	2.0
25 Jun-1 Jul	4.8	-	5.3	4.8	5.6	6.6	-	-	-	4.2	3.2	3.5	2.3
2-8 Jul	5.4	-	5.1	5.4	6.2	7.0	-	-	-	5.2	3.7	4.0	2.9
9-15 Jul	5.9	-	5.4	5.8	6.8	6.9	-	-	-	5.9	4.0	4.6	3.7
16-22 Jul	6.4	-	6.7	6.4	7.2	7.3	-	-	-	5.8	4.5	5.3	4.1
23-29 Jul	6.7	-	7.2	6.7	7.4	7.8	-	-	-	7.0	5.1	5.8	4.7
30 Jul-5 Aug	7.2	-	6.6	6.9	8.2	8.7	-	-	-	6.5	5.5	6.2	5.7
6-12 Aug	7.8	-	7.2	7.6	8.5	8.9	-	-	-	6.7	5.6	6.7	5.9
13-19 Aug	8.1	-	8.3	7.9	8.9	8.4	-	-	-	7.3	6.3	7.4	6.1
20-26 Aug	8.2	-	8.2	8.1	8.8	8.6	-	-	-	8.0	6.8	8.6	6.1
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 68. 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.

OTTER ISLAND

Refuge personnel Greg Thomson, Matt Henschen and John Warzybok went to Otter Island on 25 June to count kittiwake adults, nests, and chicks to measure reproductive success on a series of plots established in 2007. The plots were counted again on 16 July when Thomson, Henschen and Heather Renner returned to the island aboard the M/V Tiglax. Kittiwake plot count results are presented in the following tables. On 25 June, the crew also made incidental counts of marine mammals, totaling 86 harbor seals, three sea lions and 200 fur seals.

On 16 July, Rolf Ream, Mike Williams, Juan Guerrero, and Dave Withrow from the National Oceanic and Atmospheric Administration (NOAA) landed on the island and conducted marine mammal counts that are not presented here. Refuge personnel did not land on the island during either visit.

Table 69. Reproductive performance of black-legged and red-legged kittiwakes at Otter Island, Alaska in 2010, as determined by a Boom or Bust methodology. Measures of success are based on a count of nests conducted early in the nesting period and a count of large chicks conducted late in the nesting period.

Parameter	Black-legged kittiwakes	Red-legged kittiwakes
Total plots monitored	9	9
Total nest starts (A)	254	73
Nest sites w/ chicks (D)	31	8
Total chicks (E)	32	8
Prop. nest sites w/ chicks (D/A)[a]	0.12	0.11
Chicks/nest start (E/A)[a]	0.13	0.11
Date of nest count	25 Jun	25 Jun
Date of chick count	16 Jul	16 Jul

[a]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.

Table 70. Numbers of black-legged kittiwake adults, nests, and chicks counted on plots at Otter Island, Alaska.

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 71. Numbers of red-legged kittiwake adults, nests, and chicks counted on plots at Otter Island, Alaska.

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

Refuge personnel Heather Renner, Matt Henschen and Greg Thomson went to Walrus Island aboard M/V Tiglax on 16 July. Birds and marine mammals were counted in a circumnavigation survey by inflatable skiff. Rolf Ream, Mike Williams, Dave Withrow and Juan Guerrero from the National Oceanic and Atmospheric Administration (NOAA) landed on the island and conducted marine mammal counts that are not presented here. They also took photos of murre rock from land that could be compared to previous photos.

Table 72. Numbers of birds and marine mammals counted during circumnavigation surveys at Walrus Island, Alaska. Data do not include land-based counts.

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 73 . Land-based counts of common murres on Murre Rock, Walrus Island, Alaska.

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

Figure 35. Murre Rock at Walrus Island, Alaska on 28 July 2009.

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 Color or L leg	Band # or R leg	Metal band #	Year banded	Location banded	Color band Color or L leg	Band # or R leg	Metal band #	Year banded	Location banded
DG/R	DG	1186-04045	2008	Tolstoi E	Y/Y	Y	1186-04081	2009	Unknown
DG/R	Y	1186-04053	2008	Tolstoi M/N	GY/Y	DB	1186-04058	2008	Tolstoi E
DG/O	R	1186-04060	2008	Ridgewall	Yellow	A1	1186-04082	2009	Unknown
DG/W	Y	1186-04012	2008	Zap. Beach	Yellow	A2	1186-04083	2009	Unknown
DG/Y	DB	1186-04015	2008	Zap. Beach	Yellow	A3	1186-04084	2009	Unknown
R/DB	DG	1186-04134	2008	SW Point	Yellow	A4	1186-04085	2009	Unknown
R/DB	R	1186-04048	2008	Tolstoi E	Yellow	A8	1186-04119	2009	Zapadni 87
R/DB	W	1186-04018	2008	Zap. Beach	Yellow	C2	1186-04211	2009	Ridgewall
R/DB	Y	1186-04046	2008	Tolstoi M/N	Yellow	C3	1186-04212	2009	Ridgewall
R/DG	DB	1186-04043	2008	Tolstoi E	Yellow	C4	1186-04213	2009	Ridgewall
R/DG	DG	1186-04088	2009	Unknown	Yellow	C5	1186-04214	2009	Ridgewall
R/DG	R	1186-04101	2009	Unknown	Yellow	C6	1186-04215	2009	Ridgewall
R/R	DB	1186-04089	2009	Unknown	Yellow	C7	1186-04216	2009	Ridgewall
R/R	R	1186-04080	2009	Unknown	Yellow	C8	1186-04218	2009	Ridgewall
R/R	Y	1186-04100	2009	Unknown	Yellow	C9	1186-04220	2009	Ridgewall
R/O	DG	1186-04021	2008	Zap. Beach	Yellow	C0	1186-04221	2009	Tourist Pt.
R/O	R	1186-04044	2008	Tolstoi E	Yellow	E9	1186-04210	2009	Ridgewall
R/W	DB	1186-04011	2008	Zap. Beach	Yellow	F1	895-12795	2009	Zapadni
R/W	DG	1186-04103	2009	Unknown	Yellow	H1	1186-04184	2009	Ridgewall
R/W	R	1186-04097	2009	Unknown	Yellow	H3	1186-04217	2009	Ridgewall
R/W	Y	1186-04014	2008	Zap. Beach	Yellow	H8	1186-04222	2009	Ridgewall
R/Y	DB	1186-04013	2008	Zap. Beach	Yellow	H9	1186-04138	2009	Zapadni Pt.
R/Y	DG	1186-04132	2008	SW Point	Yellow	J1	1186-04105	2009	Zapadni
O/DB	R	1186-04120	2008	Zapadni 87	Yellow	J2	1186-04109	2009	Unknown
O/DG	DG	1186-04063	2008	Ridgewall	Yellow	J3	1186-04110	2009	Unknown
O/DG	R	1186-04059	2008	Ridgewall	Yellow	J4	1186-04061	2009	Ridgewall
O/DG	W	1186-04017	2008	Zap. Beach	Yellow	J4	1186-04144	2009	Unknown
O/DG	Y	1186-04050	2008	Tolstoi M/N	Yellow	J5	1186-04139	2009	Unknown
O/R	DG	1186-04052	2008	Tolstoi M/N	Yellow	J6	1186-04143	2009	Unknown
O/R	DG	1186-04019	2008	Zap. Beach	Yellow	J8	1186-04146	2009	Unknown
O/R	Y	1186-04041	2008	Tolstoi E	Yellow	J9	1186-04148	2009	Unknown
W/R	R	1186-04099	2009	Unknown	Yellow	J0	1186-04149	2009	Unknown
Y/DB	DG	1186-04016	2008	Zap. Beach	Yellow	K1	1186-04150	2009	Unknown
Y/DB	R	1186-04042	2008	Tolstoi E	Yellow	K2	1186-04151	2009	Unknown
Y/DB	O	1186-04133	2008	SW Point	Yellow	K3	1186-04152	2009	Unknown
Y/DG	R	1186-04121	2008	Zapadni 87	Yellow	K4	1186-04153	2009	Unknown
Y/R	DB	1186-04131	2008	SW Point	Yellow	K5	1186-04057	2009	Tolstoi E
Y/R	DG	1186-04051	2008	Tolstoi M/N	Yellow	K6	1186-04154	2009	Unknown
Y/R	W	1186-04102	2009	Unknown	Yellow	K7	1186-04155	2009	Unknown
Y/R	O	1186-04056	2008	Tolstoi E	Yellow	K8	1186-04156	2009	Unknown
Y/R	Y	1186-04047	2008	Tolstoi M/N	Yellow	K9	1186-04158	2009	Unknown
Y/R	Y	1186-04098	2009	Unknown	Yellow	K0	1186-04159	2009	Unknown
Y/O	DB	1186-04125	2008	Ridgewall	Yellow	L1	1186-04160	2009	Unknown
Y/O	W	1186-04020	2008	Zap. Beach	Yellow	L2	1186-04166	2009	Unknown
Y/W	O	1186-04054	2008	Tolstoi M/N	Yellow	L3	1186-04171	2009	Unknown
Y/Y	DB	1186-04090	2009	Unknown	Yellow	L4	1186-04172	2009	Unknown
Y/Y	DG	1186-04087	2009	Unknown	Yellow	L5	1186-04182	2009	Unknown