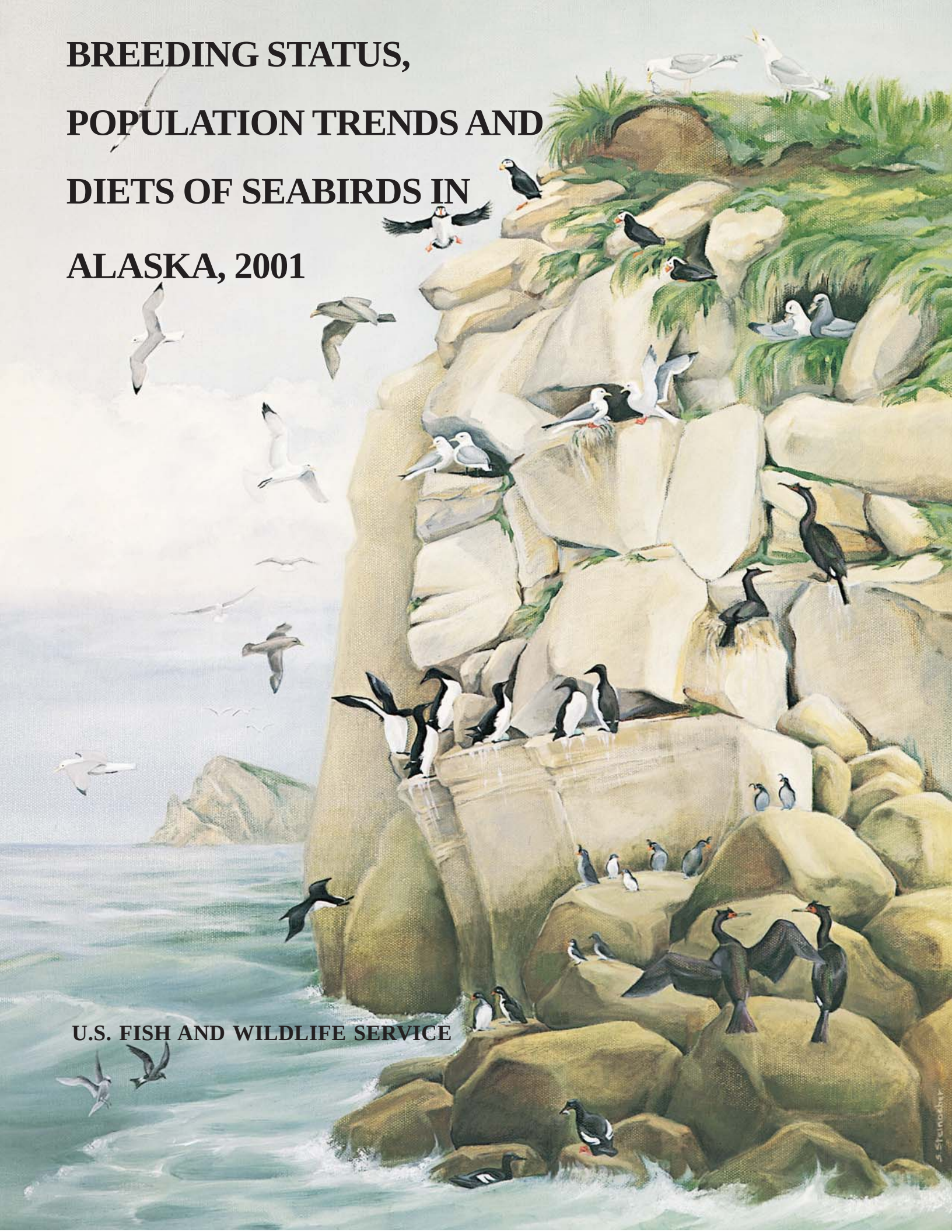
# BREEDING STATUS, POPULATION TRENDS AND DIETS OF SEABIRDS IN ALASKA, 2001




U.S. FISH AND WILDLIFE SERVICE

**AMNWR 03/05**

# BREEDING STATUS, POPULATION TRENDS AND DIETS OF SEABIRDS IN ALASKA, 2001

Compiled By:

Donald E. Dragoo, G. Vernon Byrd, and David B. Irons[a]

Key words: *Aethia*, Alaska, Aleutian Islands, ancient murrelet, Bering Sea, black-legged kittiwake, *Cepphus*, *Cerorhinca*, Chukchi Sea, common murre, crested auklet, diet, double-crested cormorant, fork-tailed storm-petrel, *Fratercula*, *Fulmarus*, glaucous-winged gull, Gulf of Alaska, hatching chronology, horned puffin, *Larus*, Leach's storm-petrel, least auklet, long-term monitoring, northern fulmar, *Oceanodroma*, parakeet auklet, pelagic cormorant, *Phalacrocorax*, pigeon guillemot, population trends, Prince William Sound, productivity, red-faced cormorant, red-legged kittiwake, rhinoceros auklet, *Rissa*, seabirds, *Synthliboramphus*, thick-billed murre, tufted puffin, *Uria*, whiskered auklet.

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

August 2003

---

Cite as: Dragoo, D. E., G. V. Byrd, and D. B. Irons. 2003. Breeding status, population trends and diets of seabirds in Alaska, 2001. U.S. Fish and Wildl. Serv. Report AMNWR 03/05.

[a]Dragoo (don_dragoo@fws.gov) and Byrd (vernon_byrd@fws.gov) at Alaska Maritime NWR, Homer; Irons (david_irons@fws.gov) at U. S. Fish and Wildlife Service, Migratory Bird Management, 1011 East Tudor Road, Anchorage, Alaska USA 99503

## EXECUTIVE SUMMARY

Data are being collected annually for selected species of marine birds at breeding colonies on the far-flung Alaska Maritime National Wildlife Refuge (NWR) and at other areas in Alaska to monitor the condition of the marine ecosystem and to evaluate the conservation status of species under the trust of the Fish and Wildlife Service. The strategy for colony monitoring includes estimating timing of nesting events, rates of reproductive success (e.g., chicks per nest), population trends and diet composition of representative species of various foraging guilds (e.g., offshore diving fish-feeders, offshore surface-feeding fish-feeders, diving plankton-feeders) at geographically-dispersed breeding sites. This information enables managers to better understand ecosystem processes and respond appropriately to resource issues. It also provides a basis for researchers to test hypotheses about ecosystem change. The value of the marine bird monitoring program is enhanced by having sufficiently long time-series to describe patterns for these long-lived species.

In summer 2001 data were gathered on storm-petrels, cormorants, gulls, kittiwakes, murres, guillemots, murrelets, auklets, and/or puffins at ten annual monitoring sites on the Alaska Maritime NWR, one annual monitoring site on the Togiak NWR and one site on the Becharof NWR. In addition, data were gathered at six other locations which are visited intermittently or are currently part of a research or monitoring program off refuges (e.g., Exxon Valdez Trustee Council-sponsored research in Prince William Sound).

In 2001, we recorded only four cases of later than normal hatching (storm-petrels at St. Lazaria Island and puffins at Buldir Island). Most species were within normal bounds or were earlier than average. Surface plankton feeders (storm-petrels) were later than normal in half of the cases (species x site). Timing of nesting of diving plankton feeders (auklets) was normal in all but one case. Fish feeders (cormorants, gulls, kittiwakes, murres, murrelets, puffins) were earlier than normal in 14 of 28 cases, about normal in 12 cases and later than normal in only two cases.

Plankton feeders (storm-petrels and auklets) had average or below average rates of reproductive success in all but two cases. Storm-petrels exhibited above average success at Aiktak Island in 2001. For surface fish feeders, gulls had above average, average and below average rates of success at one site each, all in different geographic regions. The productivity of kittiwakes also varied among regions. At Chukchi and Bering Sea locations kittiwakes generally had average or below average success. In the Gulf of Alaska, success was above average in all three cases. Monitored species of diving fish feeders (cormorants, murres, murrelets, rhinoceros auklets and puffins) had average or above average rates of productivity at most sites in Alaska in 2001. Below average success was recorded in only eight of 38 cases (species x sites), all but one in the Bering Sea.

Storm-petrel populations appeared to be increasing in three cases and stable at the remaining site. Trends for fish feeders (fulmars, cormorants, gulls, kittiwakes, murres, guillemots, rhinoceros auklets, puffins) exhibited upward and level trends in equal numbers (23 each) of cases (species x site). Declines were seen in 32 of 78 cases. No geographic patterns were apparent with regard to population trends of fish eating seabirds. Diving plankton feeders showed mixed results. Least auklets declined at Kasatochi Island while crested auklets appeared to increase at that colony.

## TABLE OF CONTENTS

**TABLE OF CONTENTS** (continued)

**TABLE OF CONTENTS** (continued)

**TABLE OF CONTENTS** (continued)

## LIST OF TABLES

**LIST OF TABLES** (continued)

## LIST OF FIGURES

**LIST OF FIGURES** (continued)

**LIST OF FIGURES** (continued)

## INTRODUCTION

This report is the sixth in a series of annual reports summarizing the results of seabird monitoring surveys at breeding colonies on the Alaska Maritime National Wildlife Refuge (NWR) and elsewhere in Alaska (see Byrd and Dragoo 1997, Byrd et al. 1998, Byrd et al. 1999, Dragoo et al. 2000 and Dragoo et al. 2001 for compilations of previous years' data). This report series is patterned after the publications of the Joint Nature Conservation Committee in Britain (e.g., Mavor et al. 2002). Like in Britain, the seabird monitoring program in Alaska is designed to keep track of selected species of marine birds that indicate changes in the marine environment. Furthermore, the U. S. Fish and Wildlife Service has the responsibility to conserve seabirds, and monitoring data are used to identify conservation problems. The objective is to provide long-term, time-series data from which biologically-significant changes may be detected and from which hypotheses about causes of changes may be tested.

The Alaska Maritime NWR was established specifically "To conserve marine bird populations and habitats in their natural diversity and the marine resources upon which they rely" and to "provide for an international program for research on marine resources" (Alaska National Interests Land Conservation Act of 1982). The monitoring program is an integral part of the management of this refuge, by providing data that can be used to define "normal" variability in demographic parameters and identify patterns that fall outside norms and thereby constitute conservation issues. Although approximately 80% of the seabird nesting colonies in Alaska occur on the Alaska Maritime NWR, marine bird nesting colonies occur on other public lands (national and state refuges) and on private lands as well.

The strategy for colony monitoring includes estimating timing of nesting events, reproductive success, population trends, and prey used by representative species of various foraging guilds (e.g., murres are offshore diving fish-feeders, kittiwakes are offshore surface-feeding fish-feeders, auklets are diving plankton-feeders, etc.) at geographically dispersed breeding sites along the entire coastline of Alaska. A total of 10 sites on Alaska Maritime NWR (Fig. 1), located roughly 300-500 km apart, are scheduled for annual surveys, and at least some data were available from all of these in 2001. Furthermore, data are recorded annually at a site on Togiak NWR. In addition, colonies near the annual sites are identified for less frequent surveys to "calibrate" the information at the annual sites. Data provided from other research projects (e.g., those associated with evaluating the impacts of oil spills on marine birds) also supplement the monitoring database.

In this report, we summarize information from 2001 for each species; i.e., tables with estimates of average hatch dates and reproductive success, and maps with symbols indicating the relative timing of hatching and success at various sites. In addition, historical patterns of hatching chronology and productivity are illustrated for many sites (those where we have adequate information). Population trend information is included for sites where at least five data points have been gathered. Seabird diet data from several locations are presented as well.

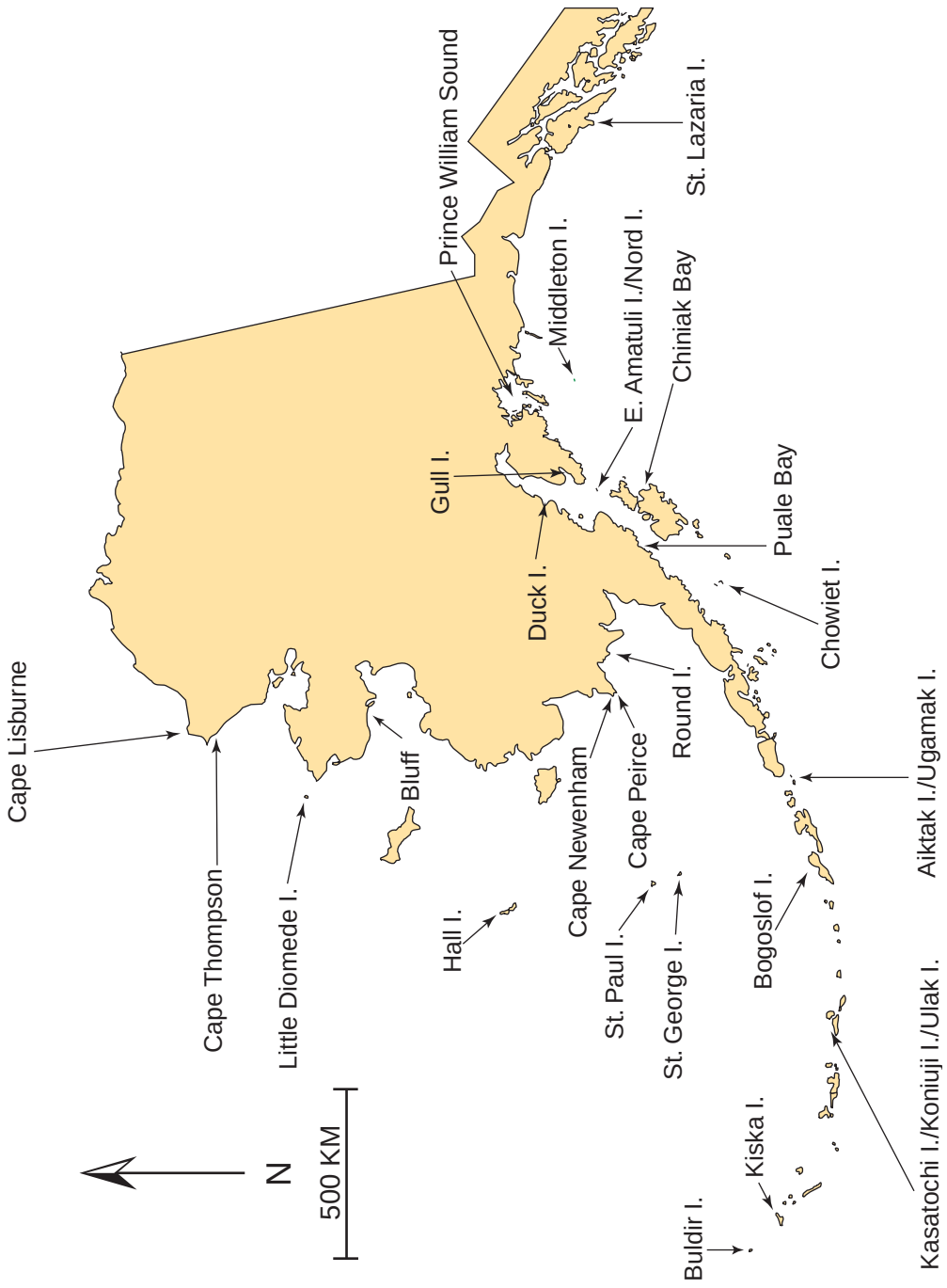



Figure 1. Map of Alaska showing the locations of seabird monitoring sites summarized in this report.

## METHODS

Data collection methods generally followed protocols specified in "Standard Operating Procedures for Population Inventories" (USFWS 1997*a*, *b*, *c*). Timing of nesting events and productivity usually were based on periodic checks of samples of nests (frequently in plots) throughout the breeding season, but a few estimates of productivity were based on single visits to colonies late in the breeding season (as noted in tables). Hatch dates commonly were used to describe nesting chronology. Productivity typically was expressed as chicks fledged per egg, but occasionally other variables were used (e.g., chicks hatched per egg, chicks fledged per nest site) (Table 1). Population surveys were conducted for ledge-nesting species at times of the day and breeding season when variability in attendance was reduced. Most burrow-nester counts were made early in the season before vegetation obscured burrow entrances. Deviations from standard methods are indicated in reports from individual sites which are appropriately referenced.

Table 1. Productivity parameters used in this report.

| Species | Productivity Value |
|---|---|
| Storm-petrels | Chicks Fledged/Egg (Total chicks fledged/Total eggs laid) |
| Cormorants | Chicks Fledged/Nest (Total chicks fledged/Total nests) |
| Glaucous-winged Gull | Hatching Success (Total chicks/Total eggs) |
| Kittiwakes | Chicks Fledged/Nest (Total chicks fledged/Total nests) |
| Murres | Chicks Fledged/Nest Site (Total chicks fledged/Total sites where egg was laid) |
| Ancient Murrelets | Hatching Success (Total chicks/Total eggs) |
| Auklets (except RHAU) | Chicks Fledged/Nest Site (Total chicks fledged/Total sites where egg was laid) |
| Rhinoceros Auklet | Chicks Fledged/Egg (Total chicks fledged/Total eggs) |
| Puffins | Chicks Fledged/Egg (Total chicks fledged/Total eggs) |

This report summarizes monitoring data for 2001, and compares 2001 results with previous years. For sites with at least two years of data prior to 2001, site averages were used for comparisons. Otherwise, prior estimates for nearby sites were utilized for comparisons. For chronology, we considered dates within 3 days of the long-term average "normal"; larger deviations represented relatively early or late dates. For productivity, we defined significant deviations from "normal" as 20% or greater from the site or regional average. We used the phrase "slightly" above or below average to indicate smaller differences. We described overall population trends with exponential regression models.

Diets of seabirds were reported as percent occurrence of prey types in either the nestling or adult diets. Nestling diet data are generally from chick regurgitations or observations of bill loads of fish brought to the chicks and adult diet data are from regurgitations or stomach samples. Data are reported in stacked bar graphs to facilitate having several years of data on one graph. The complete stacked bar indicates the cumulative percent occurrence of prey types in the samples and can add up to several hundred percent. The cumulative percent occurrence provides information on the average number of prey types per sample. For example, a cumulative percent occurrence of 400% for least auklets indicates that on average each bird consumed four different prey types during one foraging trip and a cumulative percent occurrence of 100% for black-legged kittiwakes indicates that on average each bird consumed one prey type during one foraging trip.

## RESULTS

### Northern Fulmar (*Fulmarus glacialis*)

Breeding Chronology.–No data for 2001.

Productivity.–No data for 2001.

Populations.–Although the 2001 count of this species at Chowiet Island was the lowest ever, there was no discernible trend evident at this colony (Fig. 2).

Diet.–No data.

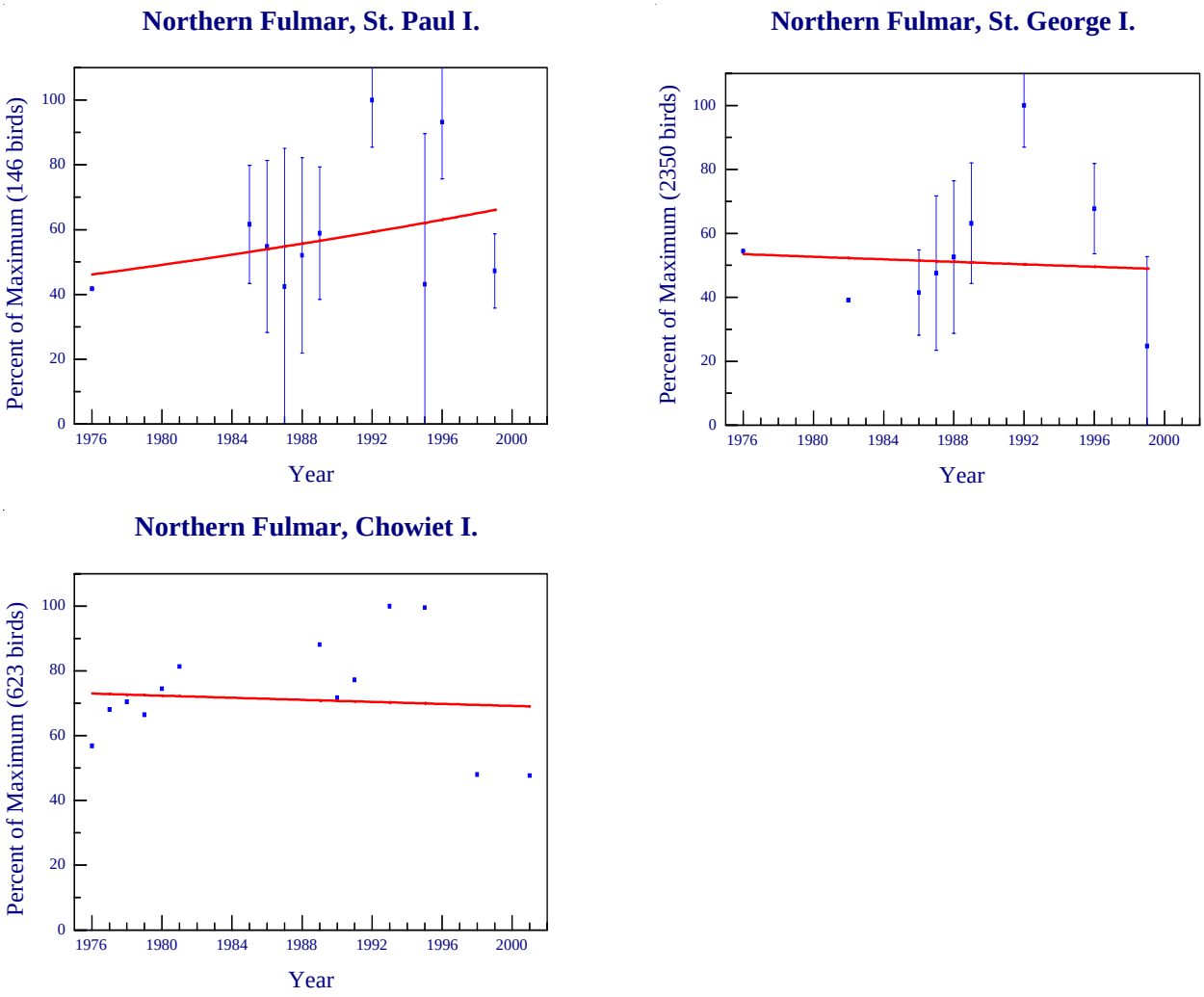



Figure 2. Trends in populations of northern fulmars at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

**Fork-tailed Storm-Petrel (*Oceanodroma furcata)***

Breeding Chronology.–The mean hatching date for fork-tailed storm-petrels was about average at Aiktak Island and later than normal at St. Lazaria Island in 2001 (Table 2, Fig. 3).

Table 2. Hatching chronology of fork-tailed storm-petrels at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Aiktak I. | 17 Jul (32)[a] | 14 Jul (32) | 16 Jul[b] (4)[a] | Sztukowski and Oleszczuk 2001 |
| St.Lazaria I. | 4 Aug (28) | 1 Aug (28) | 19 Jul[b] (6) | L. Slater Unpubl. Data |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity.–In 2001, productivity of fork-tailed storm-petrels ranged from 89% at Aiktak Island to 50% at Ulak Island (Table 3, Fig. 4). Compared to previous years, this species had approximately average success at three of four sites and higher than average productivity at the fourth (Table 3, Fig. 3).

Table 3. Reproductive performance of fork-tailed storm-petrels at Alaskan sites monitored in 2001.

| Site | Chicks Fledged[a]/egg | No. of Plots | No. of Eggs | Reference |
|---|---|---|---|---|
| Buldir I. | 0.76 | 4 | 41 | Moore et al. 2001 |
| Ulak I. | 0.50 | N/A[b] | 60 | Syria 2001 |
| Aiktak I. | 0.89 | 4 | 45 | Sztukowski and Oleszczuk 2001 |
| St.Lazaria I. | 0.58 | 8 | 119 | L. Slater Unpubl. Data |

[a]Fledged chick defined as being still alive at last check in August or September.
[b]Not applicable or not reported.

Populations.–Fork-tailed and Leach's storm-petrel burrows were combined for population monitoring purposes. In 2001, counts of burrow entrances were made in monitoring plots at four sites. It appeared that populations were increasing at Aiktak, E. Amatuli and St. Lazaria islands but no trend was evident at Buldir Island (Fig. 5).

Diet.–Myctophids dominated the diets of fork-tailed storm petrels at both Buldir and St. Lazaria islands. Fork-tailed storm-petrels on Buldir ate a more diverse diet including amphipods and squid (Fig. 6).

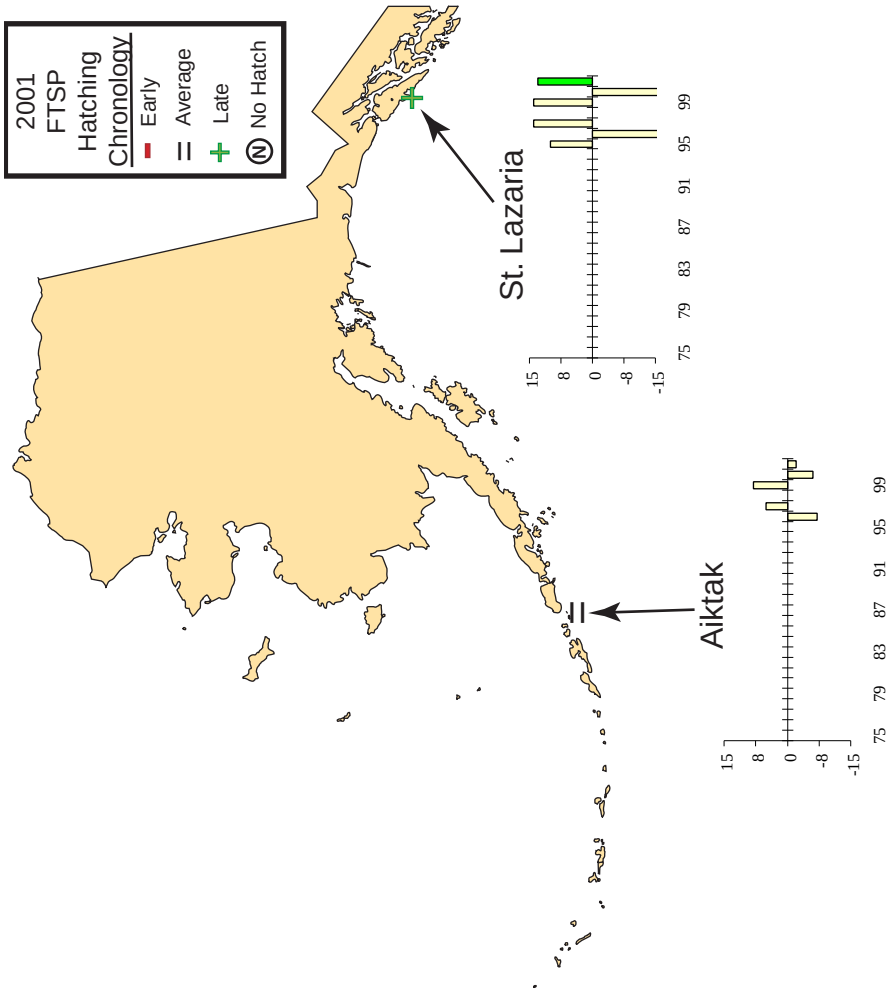



Figure 3. Hatching chronology of fork-tailed storm-petrels at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

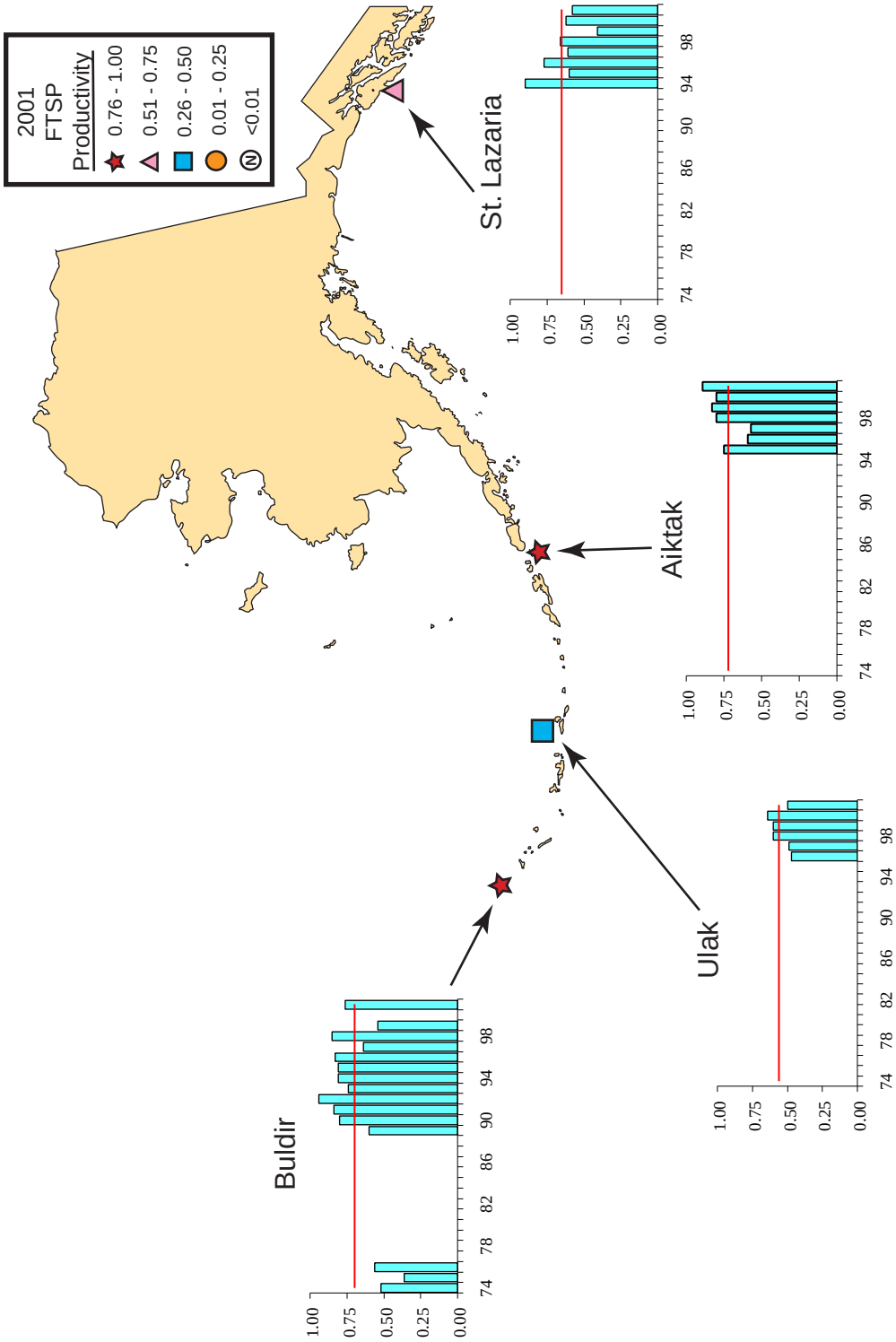



Figure 4. Productivity of fork-tailed storm-petrels (chicks fledged/egg) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

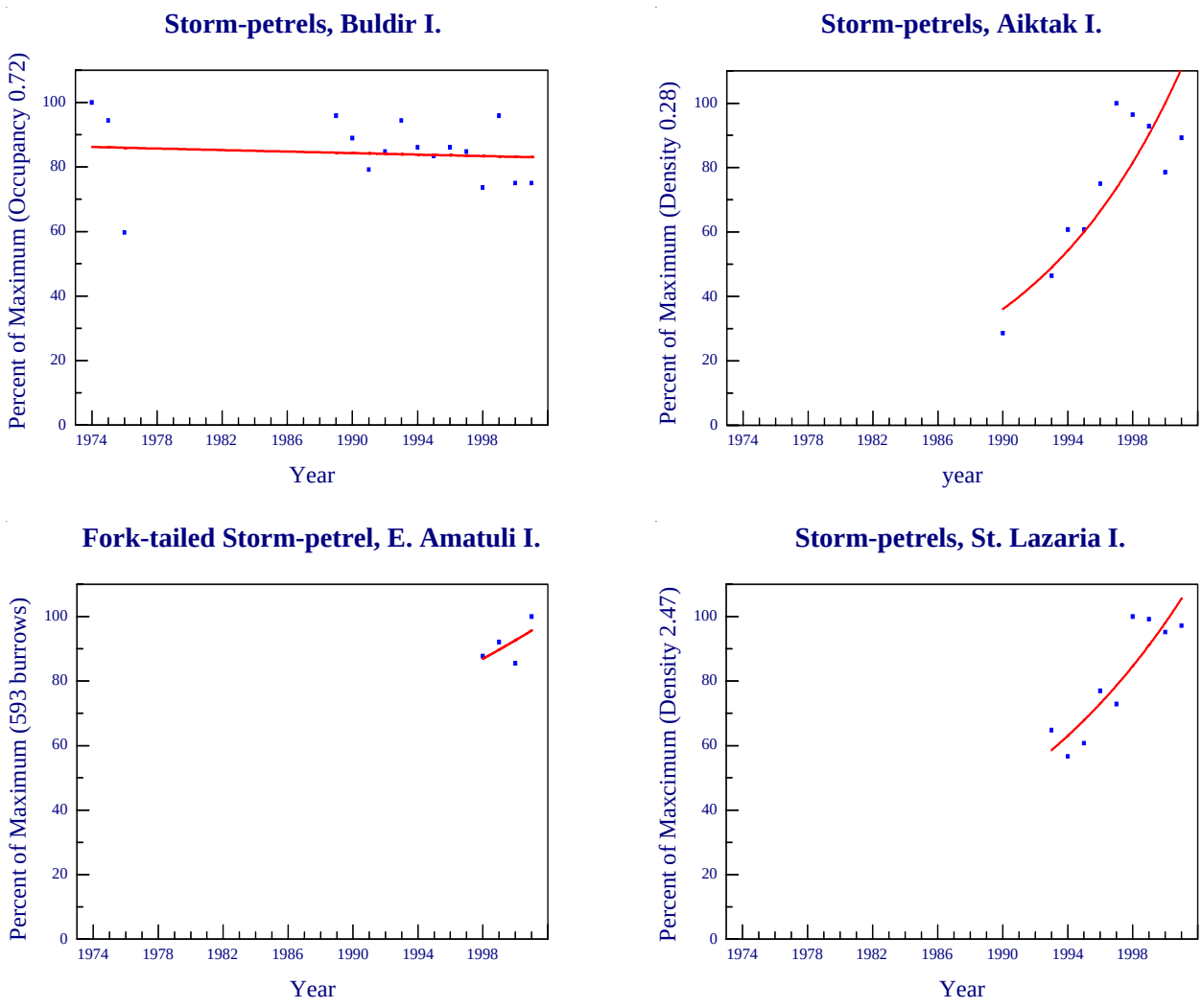



Figure 5. Trends in populations of storm-petrels at Alaskan sites.

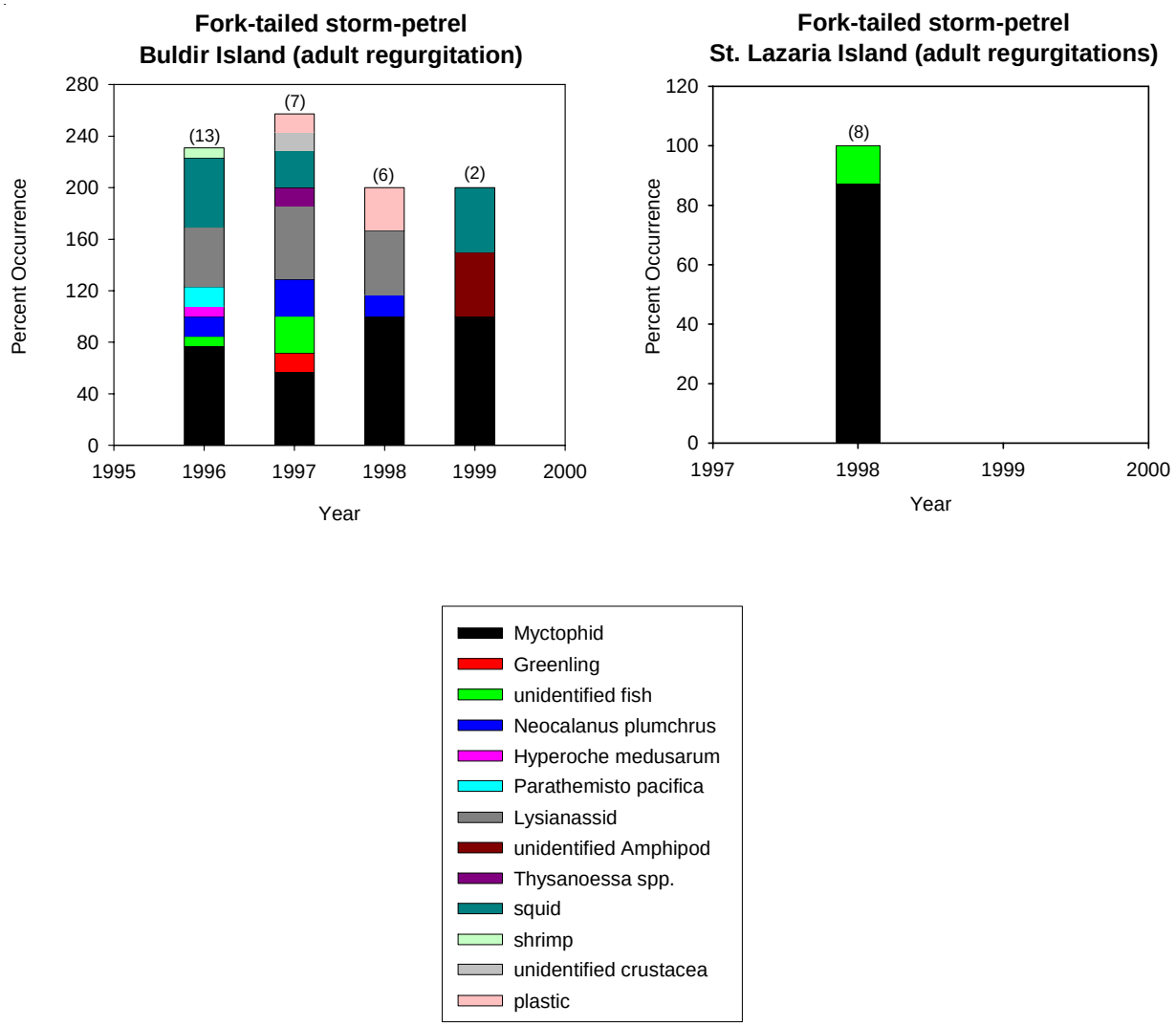



Figure 6. Diets of fork-tailed storm-petrels at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

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

Breeding Chronology.–The mean hatching date for Leach's storm-petrels was about average at Aiktak Island and later than the long-term average at St. Lazaria Island in 2001 (Table 4, Fig. 7).

Table 4. Hatching chronology of Leach's storm-petrels at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Aiktak I. | 27 Jul (22)[a] | 30 Jul (22) | 31 Jul[b] (4)[a] | Sztukowski and Oleszczuk 2001 |
| St.Lazaria I. | 4 Aug (10) | 6 Aug (10) | 1 Aug[b] (6) | L. Slater Unpubl. Data |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity.–In 2001, productivity of Leach's storm-petrels ranged from 88% at Aiktak Island to 52% at St. Lazaria Island (Table 5, Fig. 8). Compared to previous years, this species had better than average success at Aiktak Island, approximately average productivity at Buldir Island and below average success at St. Lazaria Island.

Table 5. Reproductive performance of Leach's storm-petrels at Alaskan sites monitored in 2001.

| Site | Chicks Fledged[a]/egg | No. of Plots | No. of Eggs | Reference |
|---|---|---|---|---|
| Buldir I. | 0.67 | 4 | 54 | Moore et al. 2001 |
| Aiktak I. | 0.88 | 6 | 84 | Sztukowski and Oleszczuk 2001 |
| St.Lazaria I. | 0.52 | 8 | 94 | L. Slater Unpubl. Data |

[a]Fledged chick defined as being still alive at last check in August or September.

Populations.–Fork-tailed and Leach's storm-petrel burrows were combined for population monitoring purposes. In 2001, counts of burrow entrances were made in monitoring plots at four sites. It appeared that populations were increasing at Aiktak, E. Amatuli and St. Lazaria islands but no trend was evident at Buldir Island (Fig. 5).

Diet.–The Leach's storm-petrels from Buldir and St. Lazaria islands ate mostly myctophids. At Buldir Island, Leach's storm-petrels ate a more diverse diet secondarily relying on a variety of amphipods and euphausiids (Fig. 9).

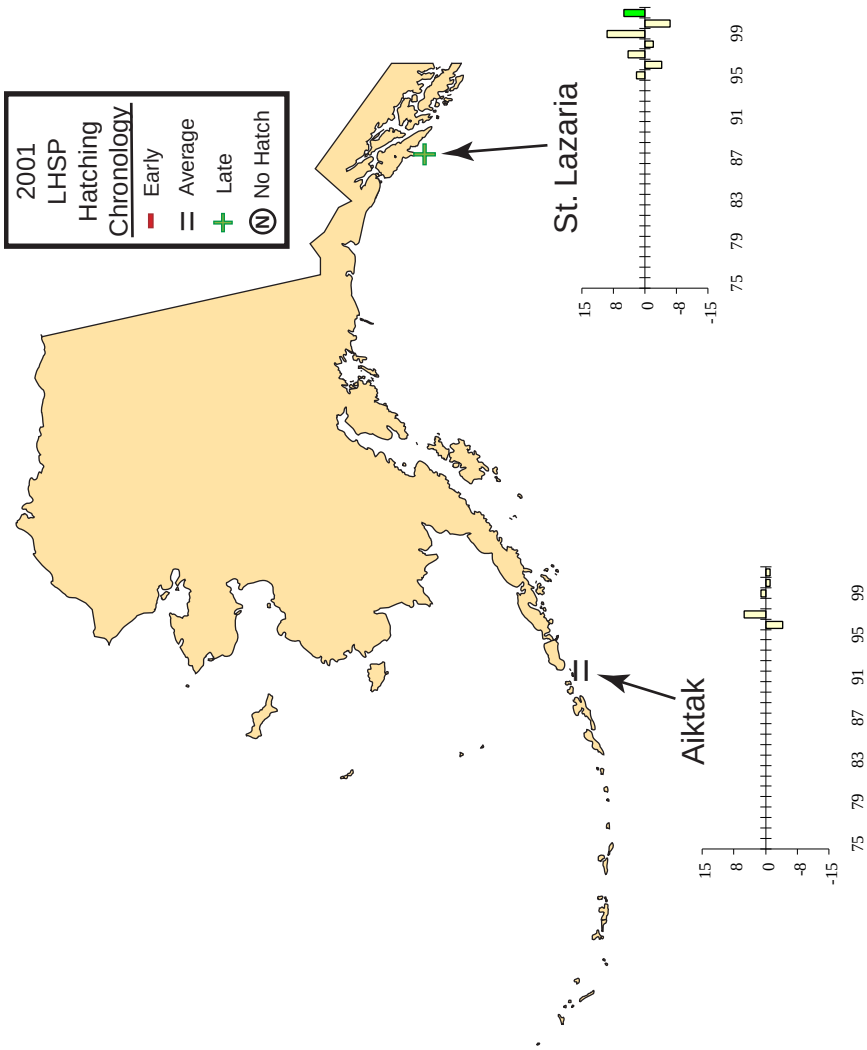



Figure 7. Hatching chronology of Leach's storm-petrels at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

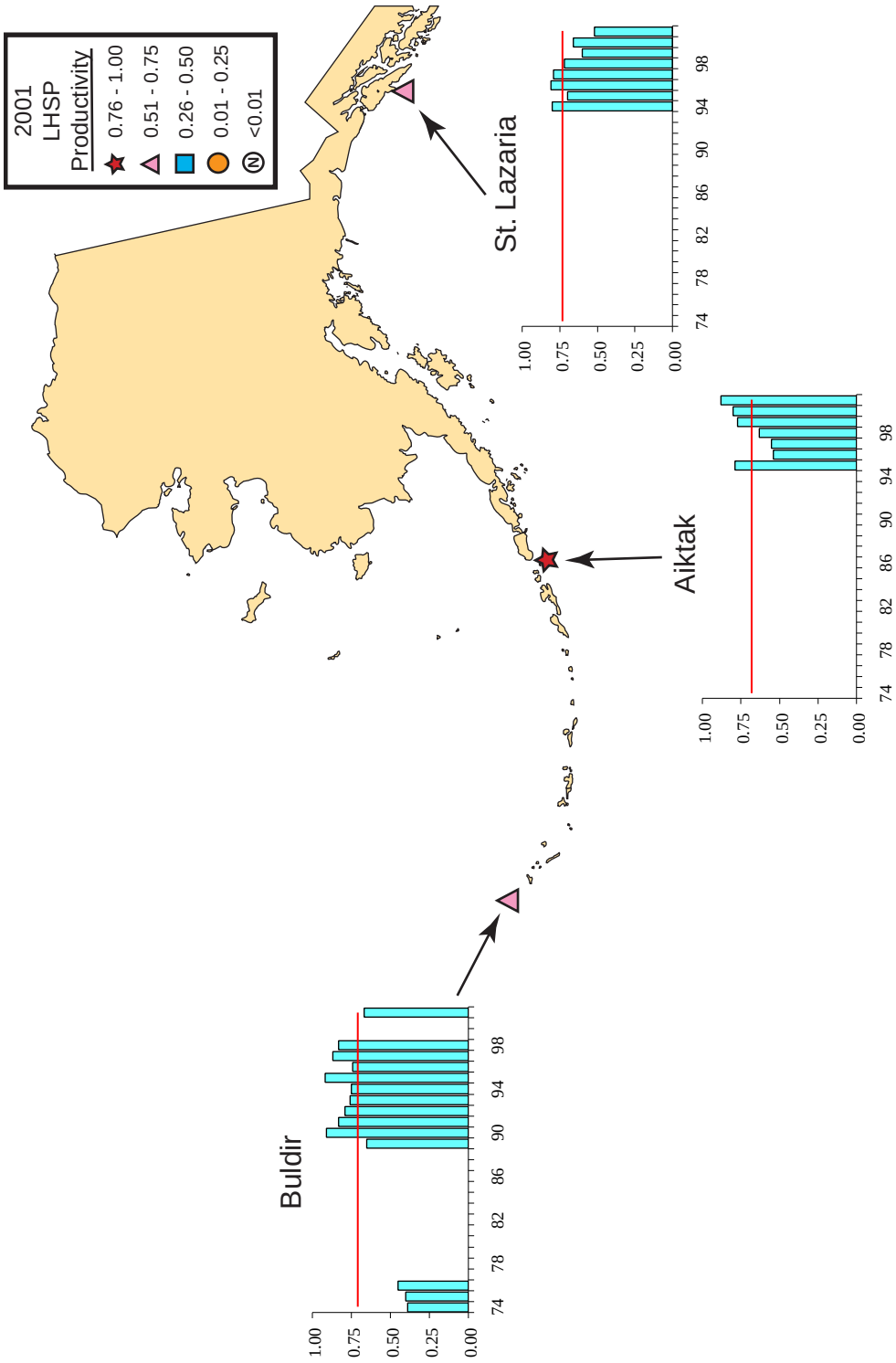



Figure 8. Productivity of Leach's storm-petrels (chicks fledged/egg) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

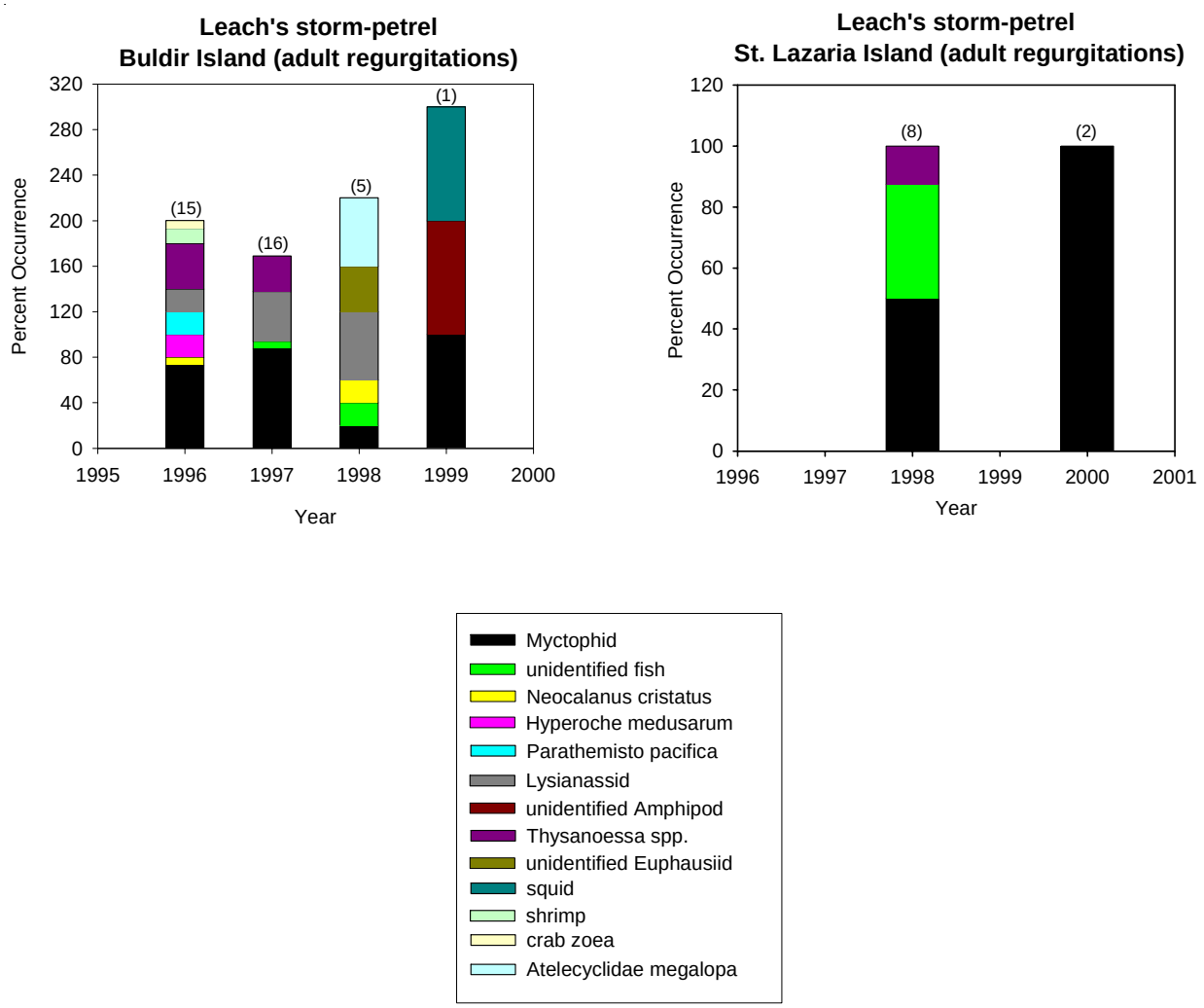



Figure 9. Diets of Leach's storm-petrels at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Double-crested Cormorant (*Phalacrocorax auritus)***

Breeding Chronology.–Double-crested cormorant eggs hatched on August first on average at Puale Bay in 2001 (Table 6).

Table 6. Hatching chronology of double-crested cormorants at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Puale B. | — | 1 Aug (4)[a] | N/A[b] | Doster and Savage 2002 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Not applicable or not reported.

Productivity.–In 2001, double-crested cormorants averaged nearly two chicks per nest at Puale Bay (Table 7). There is little prior information for this species at this site.

Table 7. Reproductive performance of double-crested cormorants at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/Nest | No. of Nests | Reference |
|---|---|---|---|
| Puale B. | 1.90 | 7 | Doster and Savage 2002 |

Populations.–This species was counted at Puale Bay in 2001. There are few prior data from this area except in one sub-colony where nests were counted in 1992. In that subarea the number of double-crested cormorant nests remained about the same in 2001 as in the previous count.

Diet.–No data.

**Red-faced Cormorant (*Phalacrocorax urile*)**

Breeding Chronology .–Red-faced cormorant eggs hatched on 18 July on average at Puale Bay in 2001 (Table 8).

Table 8. Hatching chronology of red-faced cormorants at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Puale B. | — | 18 Jul (95)[a] | N/A[b] | Doster and Savage 2002 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Not applicable or not reported.

Productivity .–In 2001, productivity of red-faced cormorants ranged from 0.60 chicks fledged per nest at St. George Island to 2.50 chicks fledged at Ulak Island (Table 9). Productivity was average or higher (substantially higher in some cases) at all sites where this species was monitored in 2001 with the exception of St. George Island, where success was relatively low (Fig. 10).

Table 9. Reproductive performance of red-faced cormorants at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/Nest | No. of Plots | No. of Nests | Reference |
|---|---|---|---|---|
| St. Paul I. | 1.68 | 3 | 60 | Snorek 2001 |
| St. George I. | 0.60 | 2 | 43 | Papish 2001 |
| Ulak I. | 2.50[b] | N/A[a] | 6 | Syria 2001 |
| Kasatochi I. | 1.30 | N/A | 21 | Syria 2001 |
| Aiktak I. | 1.48 | N/A | 21 | Sztukowski and Oleszczuk 2001 |
| Puale B. | 1.70 | N/A | 109 | Doster and Savage 2002 |
| Chiniak B. | 0.86 | N/A | 14 | D. Irons Unpubl. Data |

[a]Not applicable or not reported.
[b]Value obtained from onetime visit to colony.

Populations .–Red-faced cormorants were differentiated from other cormorants at only two colonies in 2001. Numbers were down for this species at both the Semidi Islands and Chiniak Bay (Fig. 11). See the section covering pelagic cormorants for a discussion of general cormorant population trends at colonies where the species are not differentiated.

Diet .–No data.

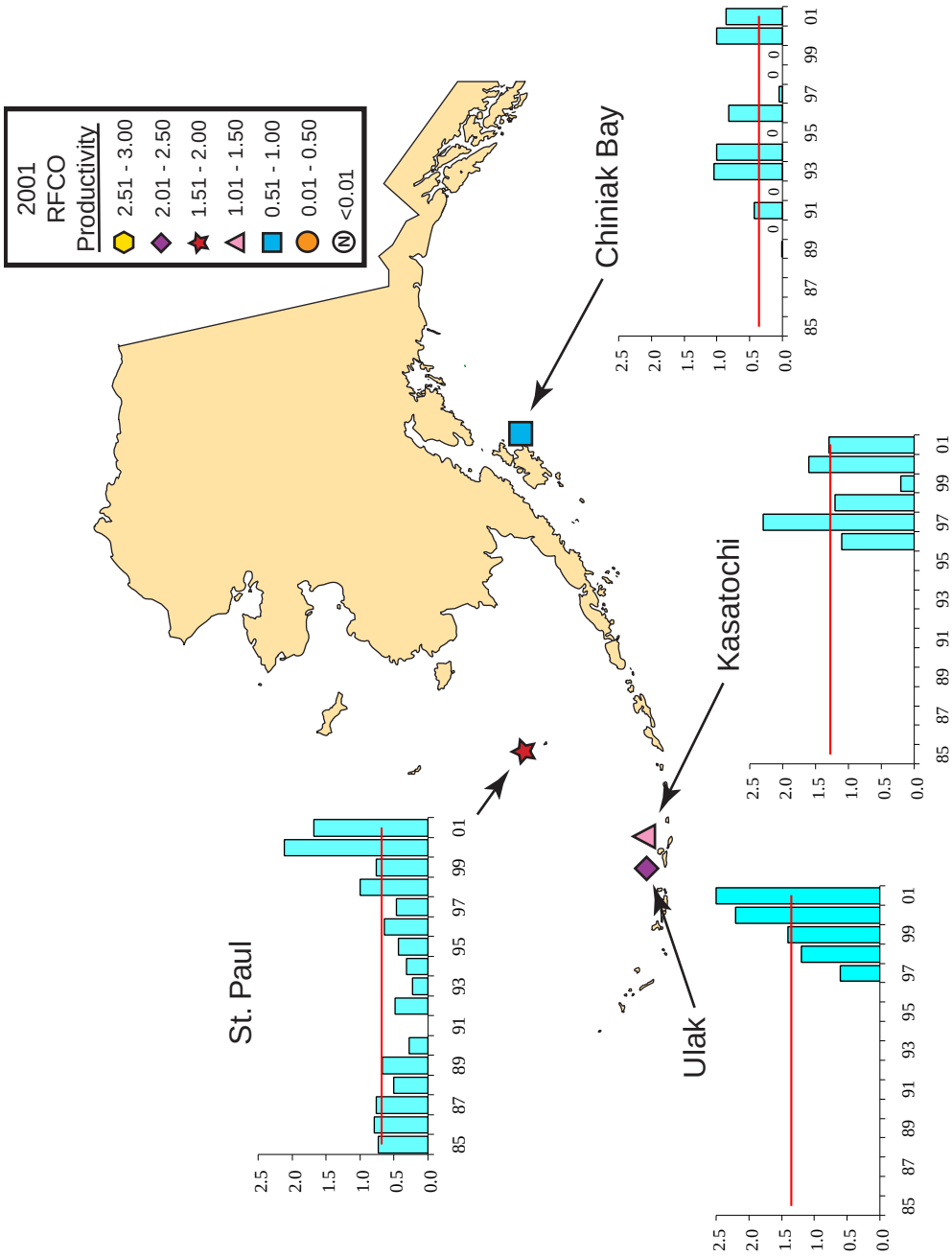



Figure 10. Productivity of red-faced cormorants (chicks fledged/nest) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

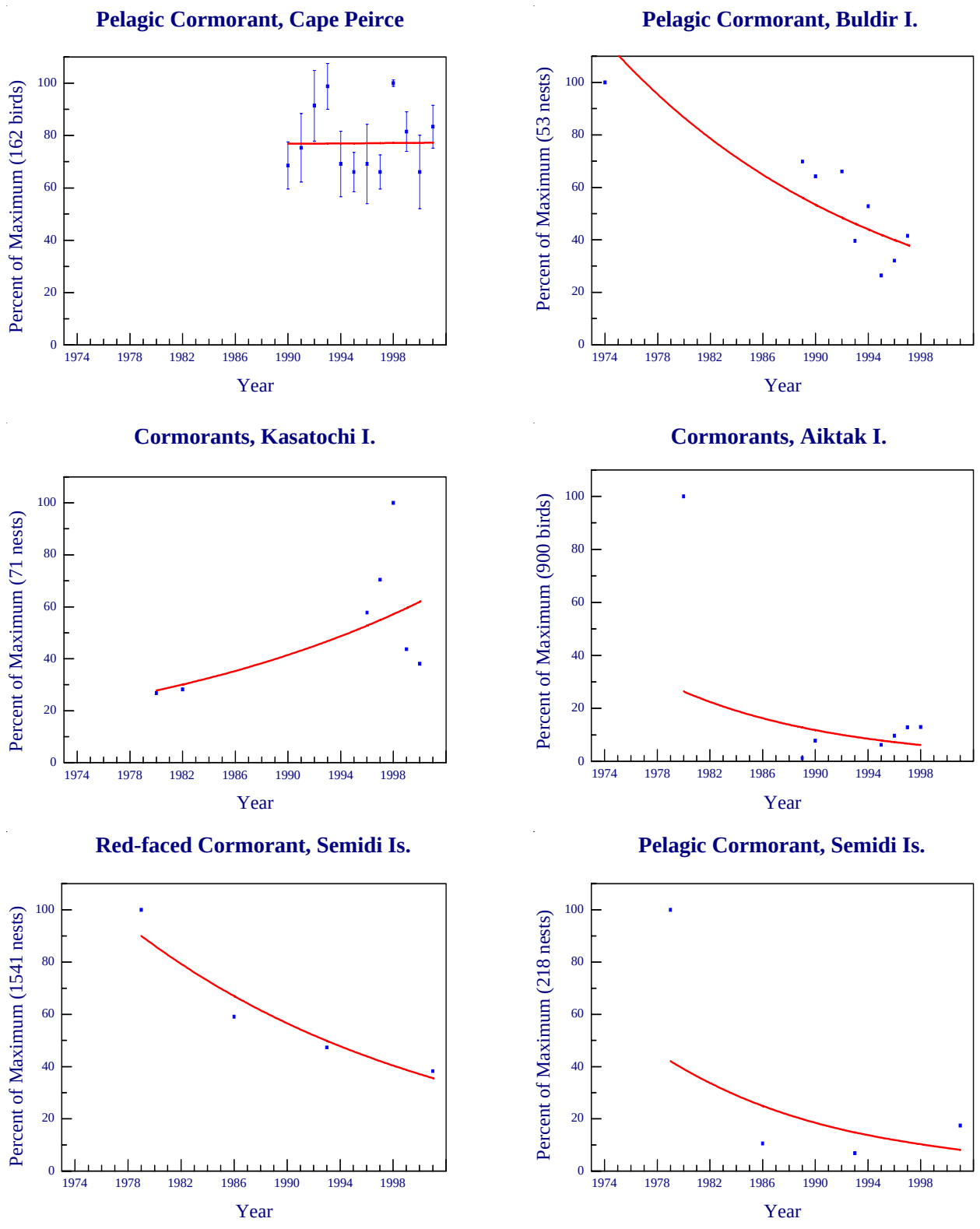



Figure 11. Trends in populations of cormorants at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

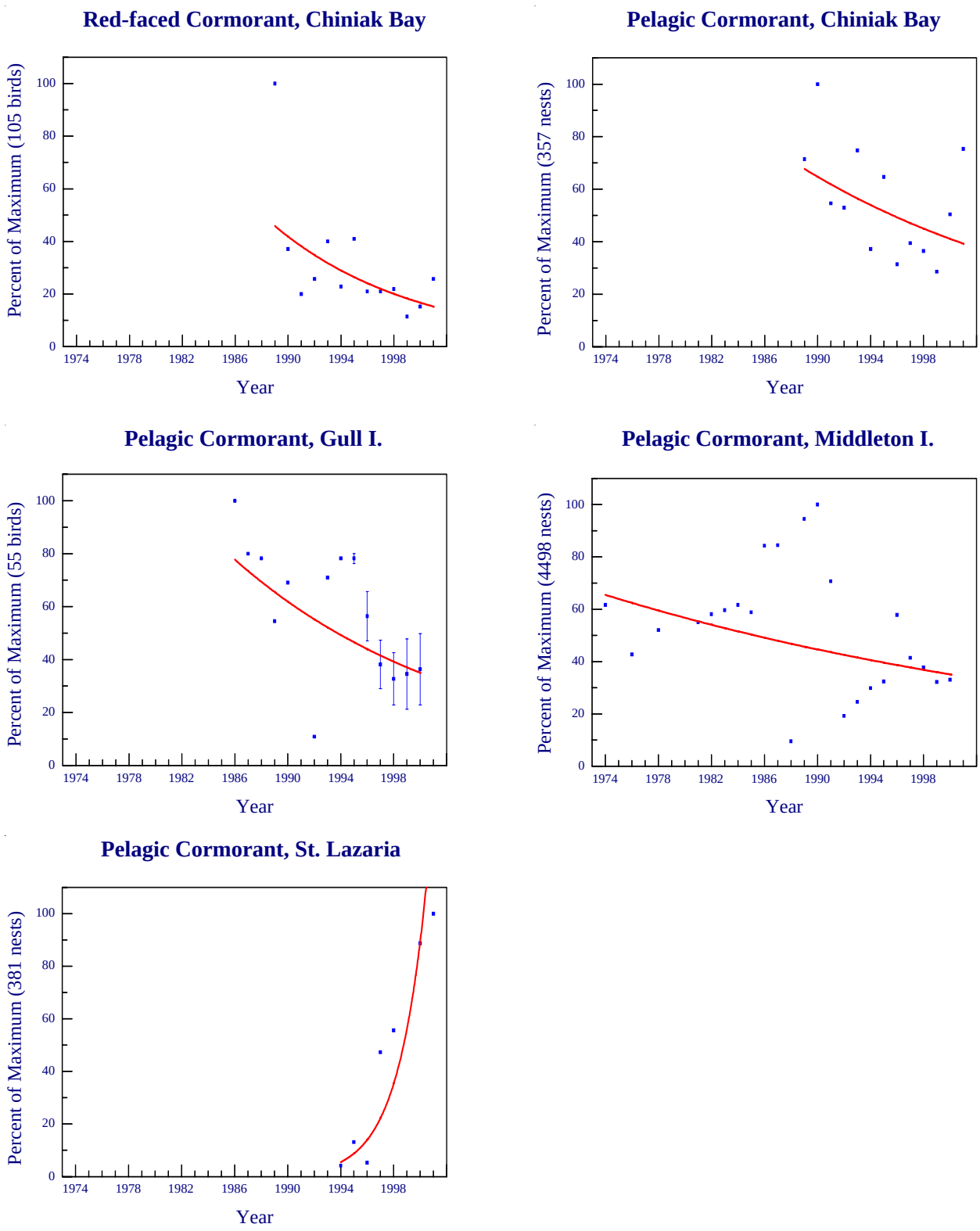



Figure 11 (continued). Trends in populations of cormorants at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

**Pelagic Cormorant (*Phalacrocorax pelagicus*)**

Breeding Chronology .–Hatching dates for pelagic cormorants were about average at Cape Peirce in 2001 (Table 10).

Table 10. Hatching chronology of pelagic cormorants at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Cape Peirce | — | 20 Jun (N/A[a])[b] | 20 Jun[c] (9)[b] | MacDonald 2002 |

[a]Not applicable or not reported.
[b]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[c]Mean of annual means.

Productivity .–Pelagic cormorant productivity was average or above at most sites monitored in 2001 (Table 11, Fig. 12). Success was below average at Kasatochi Island.

Table 11. Reproductive performance of pelagic cormorants at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/Nest | No. of Plots | No. of Nests | Reference |
|---|---|---|---|---|
| Cape Peirce | 1.19 | 12 | 58 | MacDonald 2002 |
| Round I. | 1.70 | 2 | 28 | Cody 2001 |
| Buldir I. | 1.03 | N/A[a] | 64 | Moore et al. 2001 |
| Ulak I. | 3.50 | N/A | 8 | Sryia 2001 |
| Kasatochi I. | 0.90 | N/A | 13 | Syria 2001 |
| Aiktak I. | 1.50 | N/A | 14 | Sztukowski and Oleszczuk 2001 |
| Chiniak B. | 0.93 | N/A | 269 | D. Irons Unpubl. Data |
| St. Lazaria I. | 1.36 | 11 | 381 | L. Slater Unpubl. Data |

[a]Not applicable or not reported.

Populations .–Cormorants are known to shift nesting locations between years, so it is difficult to confidently interpret changes in counts. Nevertheless, numbers of pelagic cormorants or nests (the index that has been used at some sites) have declined at sites in the western Gulf of Alaska (Semidi Islands and Chiniak Bay), were relatively stable at Cape Peirce and have increased at St. Lazaria Island (Fig. 11).

Diet .–No data.

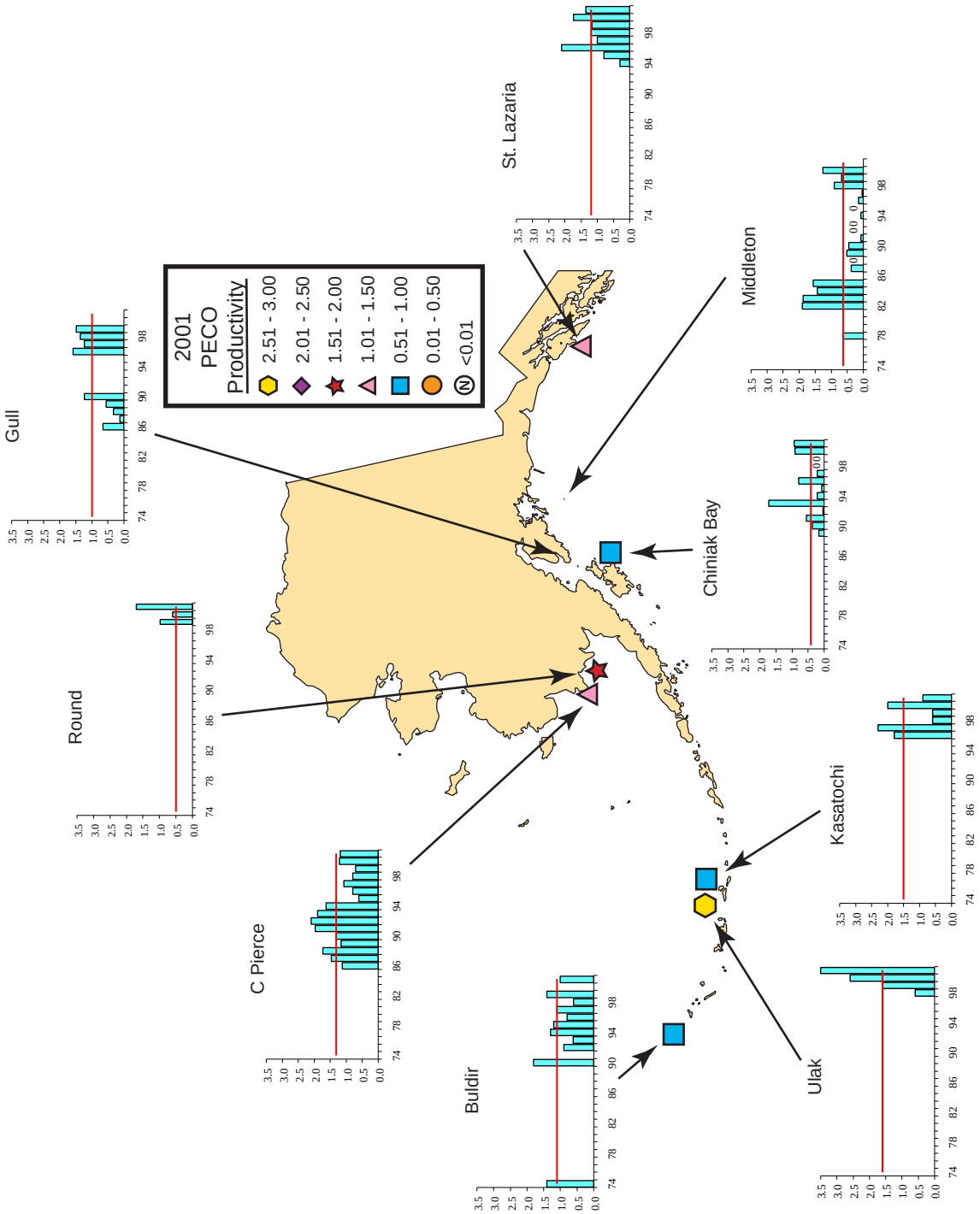



Figure 12. Productivity of pelagic cormorants (chicks fledged/nest) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

**Glaucous-winged Gull *(Larus glaucescens*)**

Breeding Chronology .–Mean hatch dates for gulls occurred in early July at Aiktak and St. Lazaria islands in 2001 (Table 12, Fig. 13), relatively early for both sites.

Table 12. Hatching chronology of glaucous-winged gulls at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Aiktak I. | 2 Jul (38)[a] | 2 Jul (38)[a] | 10 Jul[b] (6)[a] | Sztukowski and Oleszczuk 2001 |
| St. Lazaria I. | 29 Jun (33) | 1 Jul (33) | 6 Jul[b] (3) | L. Slater Unpubl. Data |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity .–Hatching success in 2001 ranged from 85 % at Aiktak Island to 14% at Buldir Island (Table 13, Fig. 14). Success at Buldir Island was low, whereas that at Aiktak Island was about average, and St. Lazaria Island hatching success was above average.

Table 13. Reproductive performance of glaucous-winged gulls at Alaskan sites monitored in 2001.

| Site | Hatching Success[a] | No. of Plots | No. of Nests | Reference |
|---|---|---|---|---|
| Buldir I. | 0.14 | N/A[b] | 34 | Moore et al. 2001 |
| Aiktak I. | 0.85 | 2 | 40 | Sztukowski and Oleszczuk 2001 |
| St.Lazaria I. | 0.79 | 3 | 41 | L. Slater Unpubl. Data |

[a]Total chicks/Total eggs.
[b]Not applicable or not reported.

Populations .–Gulls were counted in plots at four sites in 2001 (Fig. 15). The trends tended to be negative at Buldir and St. Lazaria islands, as well as Puale Bay. No trend was evident at Aiktak Island.

Diet .–Pacific herring occurred most frequently in the diets of glaucous-winged gulls from Aiktak Island in the eastern Aleutians (Fig. 16). Glaucous-winged gulls on Buldir predominantly ate a range of avian species with lesser amounts of sea urchins, marine algae and unidentified fish. Most of the unidentified fish were large and possibly Atka mackerel or Pacific cod.

The diets of glaucous-winged gulls in Prince William Sound varied by site (Fig. 17). Glaucous-winged gulls at Shoup Bay ate predominately offal followed by salmon eggs and intertidal invertebrates. Eleanor Island glaucous-winged gulls almost exclusively fed their chicks salmonids and capelin while the adults ate a more diverse diet.

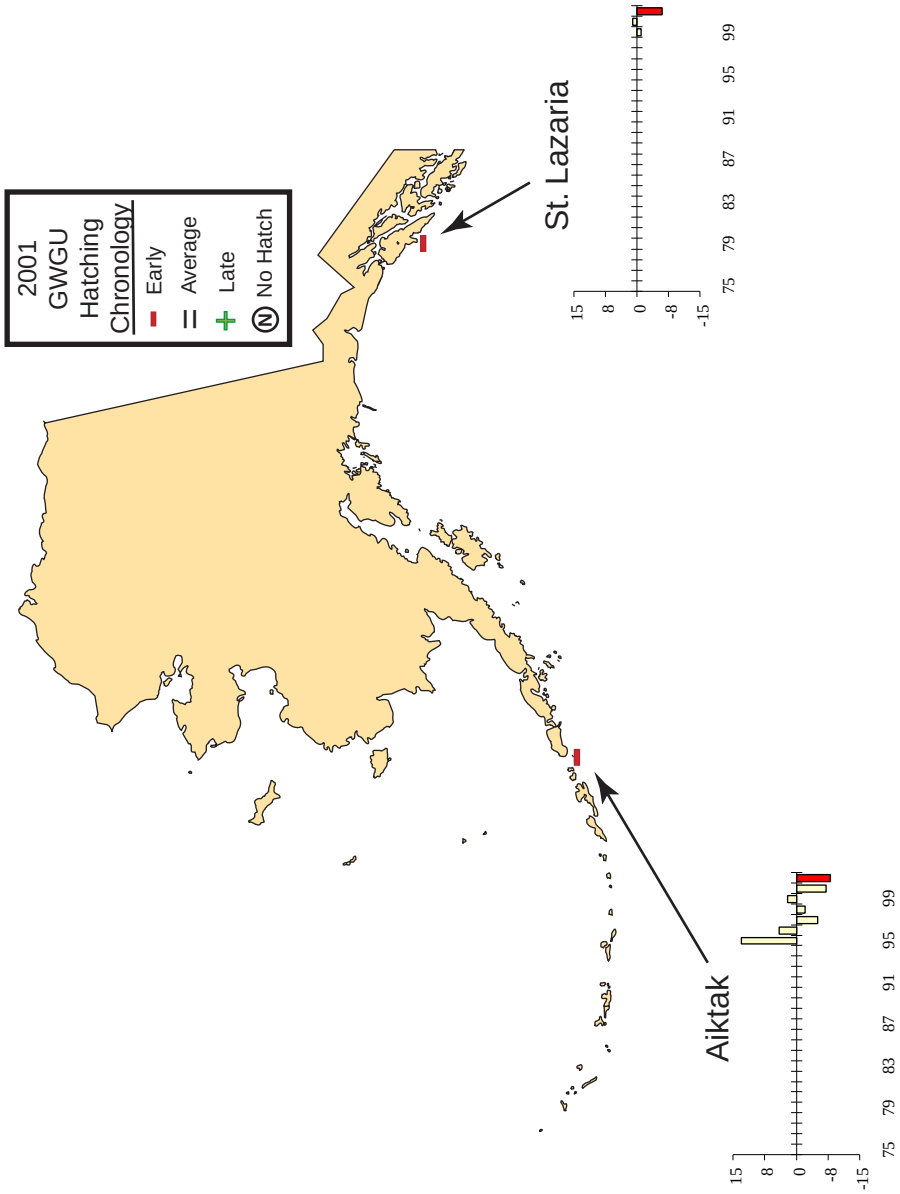



Figure 13. Hatching chronology of glaucous-winged gulls at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

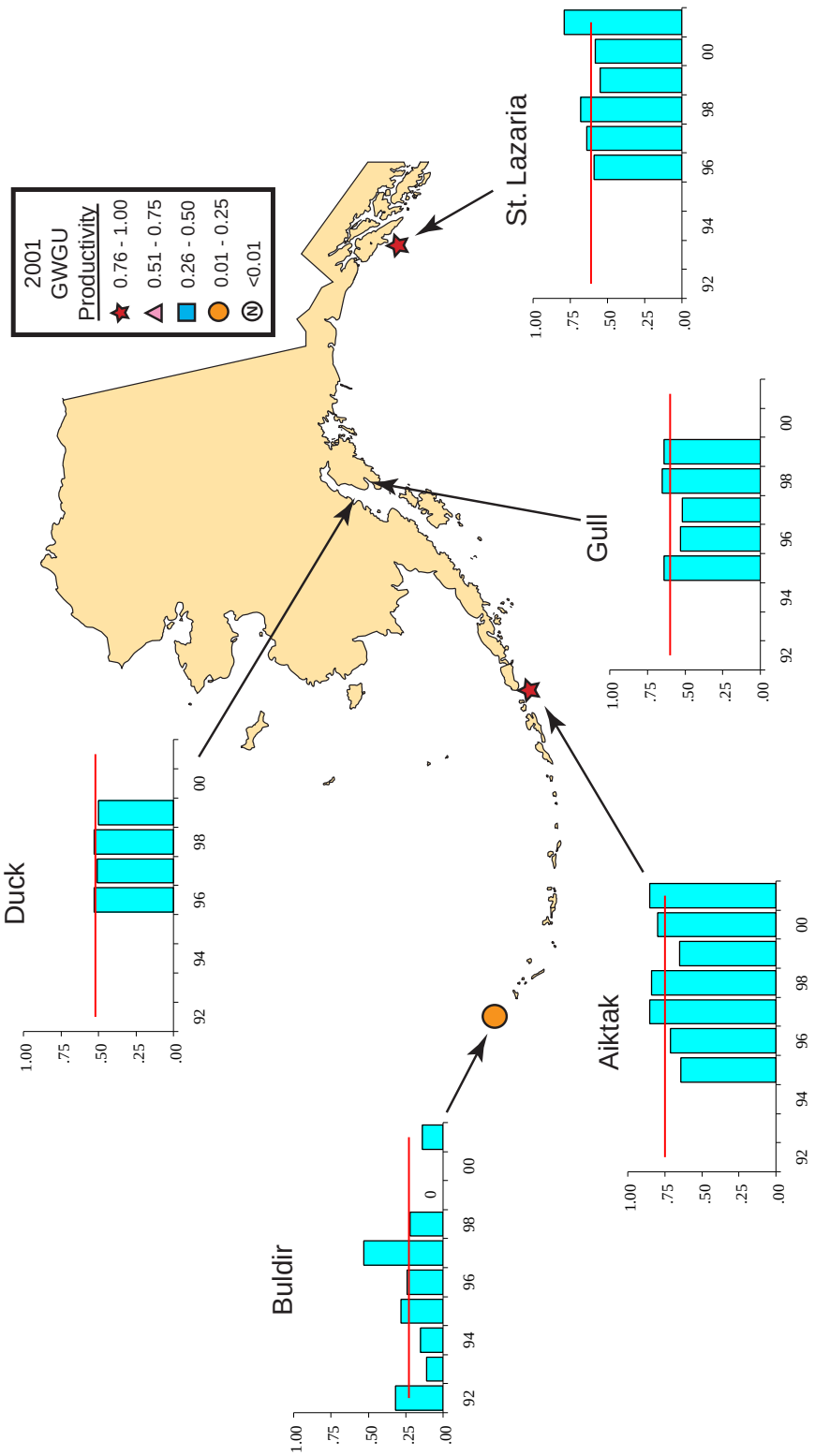



Figure 14. Productivity of glaucous-winged gulls (hatching success) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

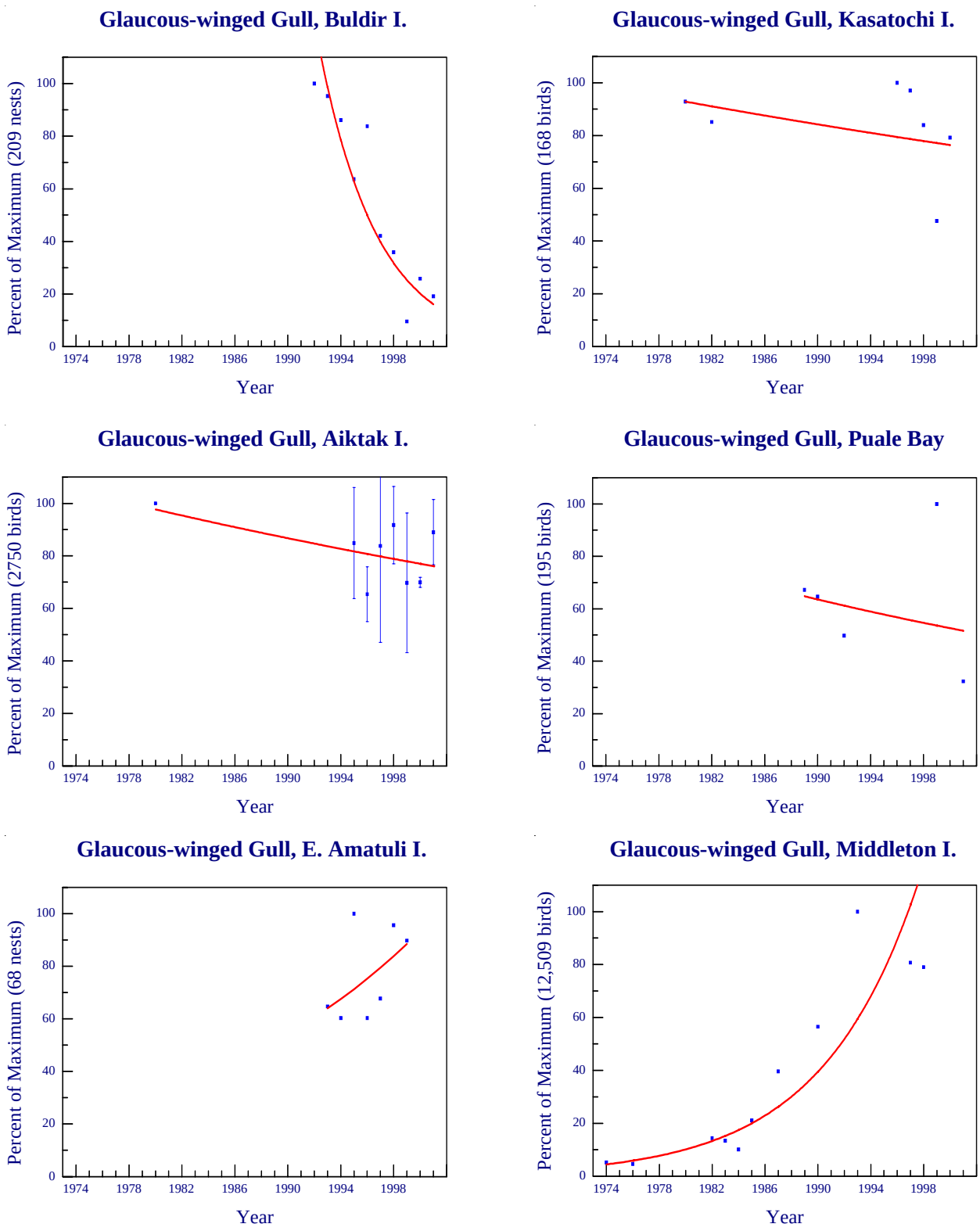



Figure 15. Trends in populations of glaucous-winged gulls at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

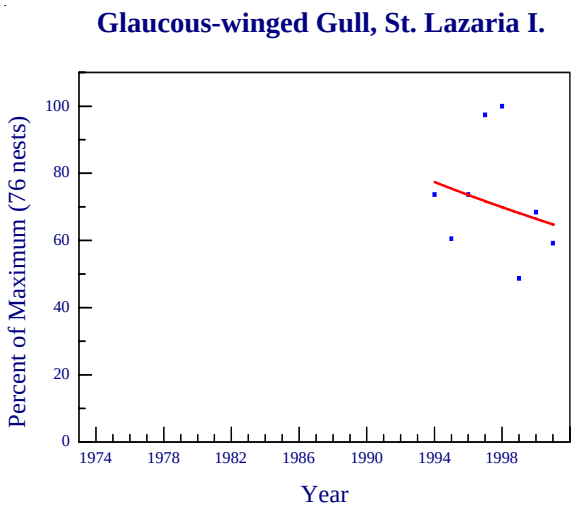



Figure 15 (continued). Trends in populations of glaucous-winged gulls at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

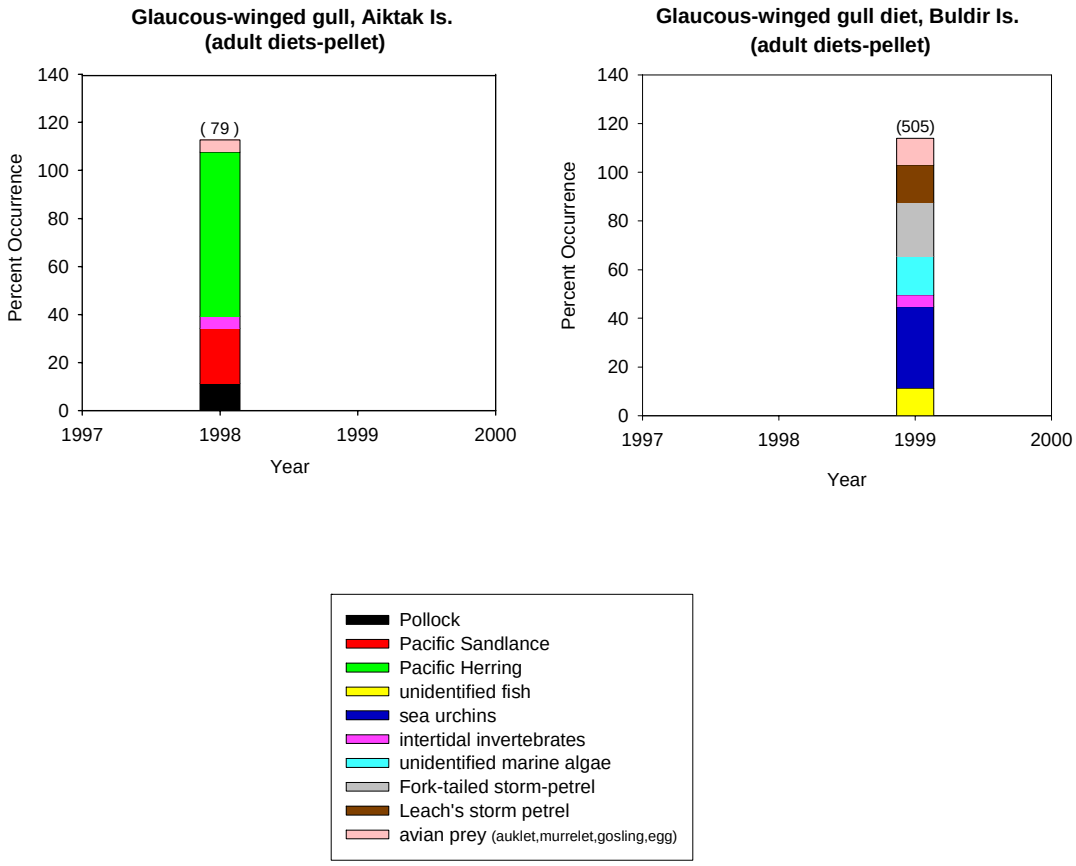



Figure 16. Diets of glaucous-winged gulls at Bering Sea sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

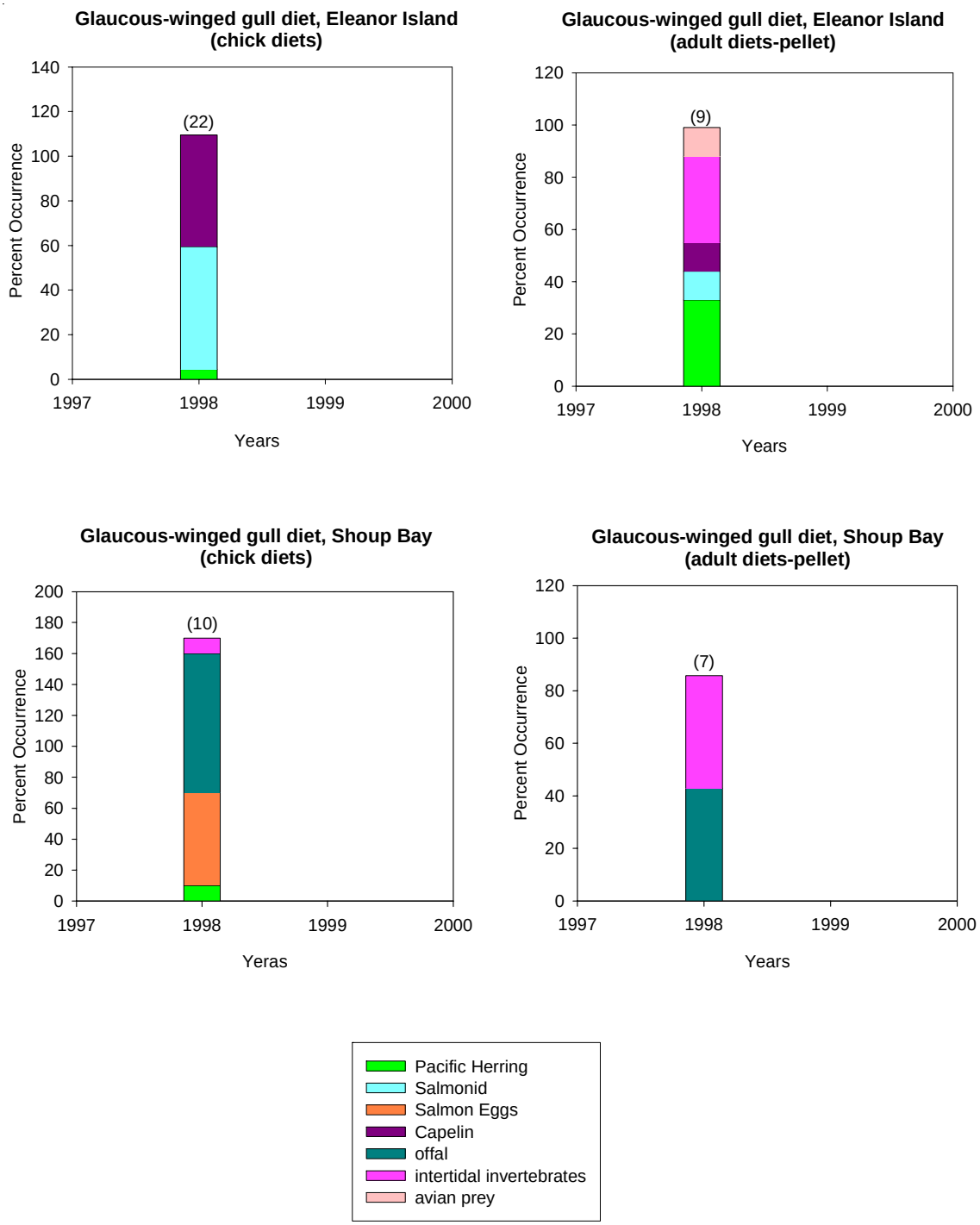



Figure 17. Diets of glaucous-winged gulls at Gulf of Alaska sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Black-legged Kittiwake (*Rissa tridactyla*)**

Breeding Chronology .–In 2001, nesting was relatively early at three of the four monitored sites, and approximately average at Cape Peirce (Table 14, Fig. 18). None hatched at Bluff in 2001**.**

Table 14. Hatching chronology of black-legged kittiwakes at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| St. Paul I. | — | 11 Jul (N/A[a])[b] | 21 Jul[c] (17)[b] | Snorek 2001 |
| St. George I. | — | 9 Jul (15) | 20 Jul[c] (16) | Papish 2001 |
| Cape Peirce | — | 10 Jul (N/A) | 11 Jul[c] (12) | MacDonald 2002 |
| Buldir I. | 26 Jun (17) | 23 Jun (17) | 7 Jul[c] (13) | Moore et al. 2001 |

[a]Not applicable or not reported.
[b]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[c]Mean of annual means.

Productivity .–Productivity of black-legged kittiwakes in 2001 ranged from complete failures at several colonies to 0.73 chicks fledged per nest at E. Amatuli Island (Table 15). Productivity was below average at all but one of the northern and western sites monitored this year and above average at all monitored colonies in the Gulf of Alaska (Fig. 19).

Table 15. Reproductive performance of black-legged kittiwakes at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/ Nest[a] | No. of Plots | No. of Nests | Reference |
|---|---|---|---|---|
| C. Lisburne | 0.00[c] | N/A[b] | 185 | D. Roseneau Unpubl. Data |
| Bluff | 0.00[c] | 5 | 78 | Murphy 2001 |
| St. Paul I. | 0.18 | 14 | 360 | Snorek 2001 |
| St. George I. | 0.06 | 5 | 95 | Papish 2001 |
| Cape Peirce | 0.00 | 11 | 243 | MacDonald 2002 |
| Round I. | 0.00 | 2 | 54 | Cody 2001 |
| Buldir I. | 0.01 | 5 | 178 | Moore et al. 2001 |
| Kiska I. | <0.01 | N/A | 481 | J. Williams Unpubl. Data |
| Koniuji I. | 0.26[c] | 10 | 755 | Syria 2001 |
| Bogoslof I. | 0.59[c] | N/A | 245 | G. V. Byrd Unpubl. Data |
| Chiniak B. | 0.59[c] | N/A | 13,068 | D. B. Irons Unpubl. Data |
| E. Amatuli I. | 0.73 | 10 | 401 | A. Kettle, Unpubl. Data |
| Pr. Will. Snd. | 0.41[c] | N/A | 25,254 | D. B. Irons Unpubl. Data |

[a]Total chicks fledged/Total nests.
[b]Not applicable or not reported.
[c]Short visit

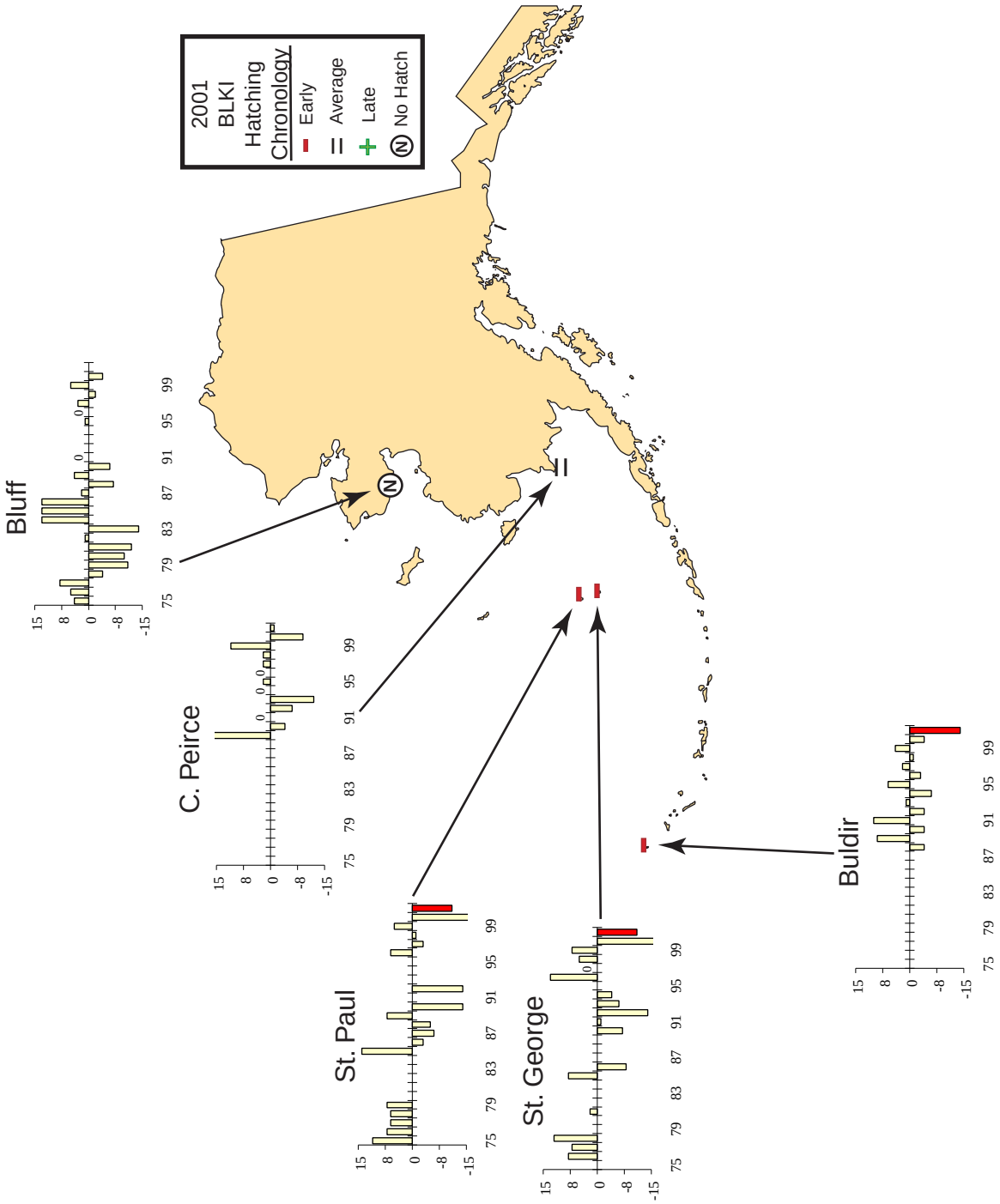



Figure 18. Hatching chronology of black-legged kittiwakes at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

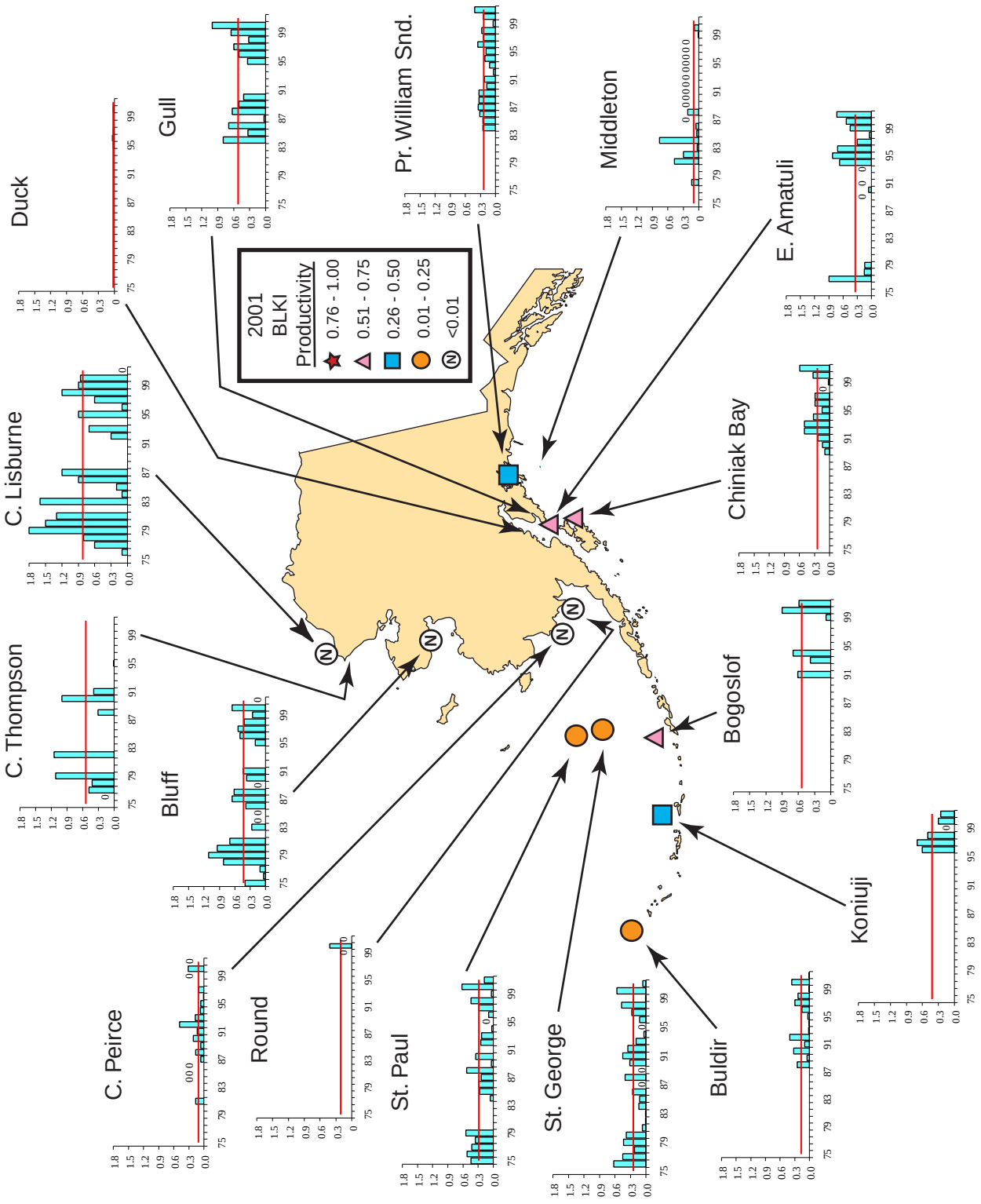



Figure 19. Productivity of black-legged kittiwakes (chicks fledged/nest) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

Populations .–Kittiwake counts in 2001 indicated a positive trend at two Gulf of Alaska colonies and no apperent trend at two northern sites (Fig. 20). Populations at Cape Peirce, Koniuji and Chowiet islands, and Chiniak Bay showed negative trends.

Diet .–Diets of black-legged kittiwakes of the Aleutian Islands, Bering Sea and Chukchi Sea lacked the capelin and herring seen in the Gulf of Alaska diets (note that legends contain different prey types for the two areas). Instead, there was a greater occurrence of pollock, greenling, myctophids and euphausiids in the Aleutians, and Bering and Chukchi seas (Fig. 21). Pollock and sandlance occurred in significant amounts in the diets of Pribilof Island black-legged kittiwakes but did not occur in the diets of western Aleutian black-legged kittiwakes.

Gulf of Alaska black-legged kittiwakes relied most heavily upon sandlance and capelin. Black-legged kittiwakes in northern Prince William Sound (Shoup Bay) fed mostly on Pacific herring and sandlance (Fig. 22).

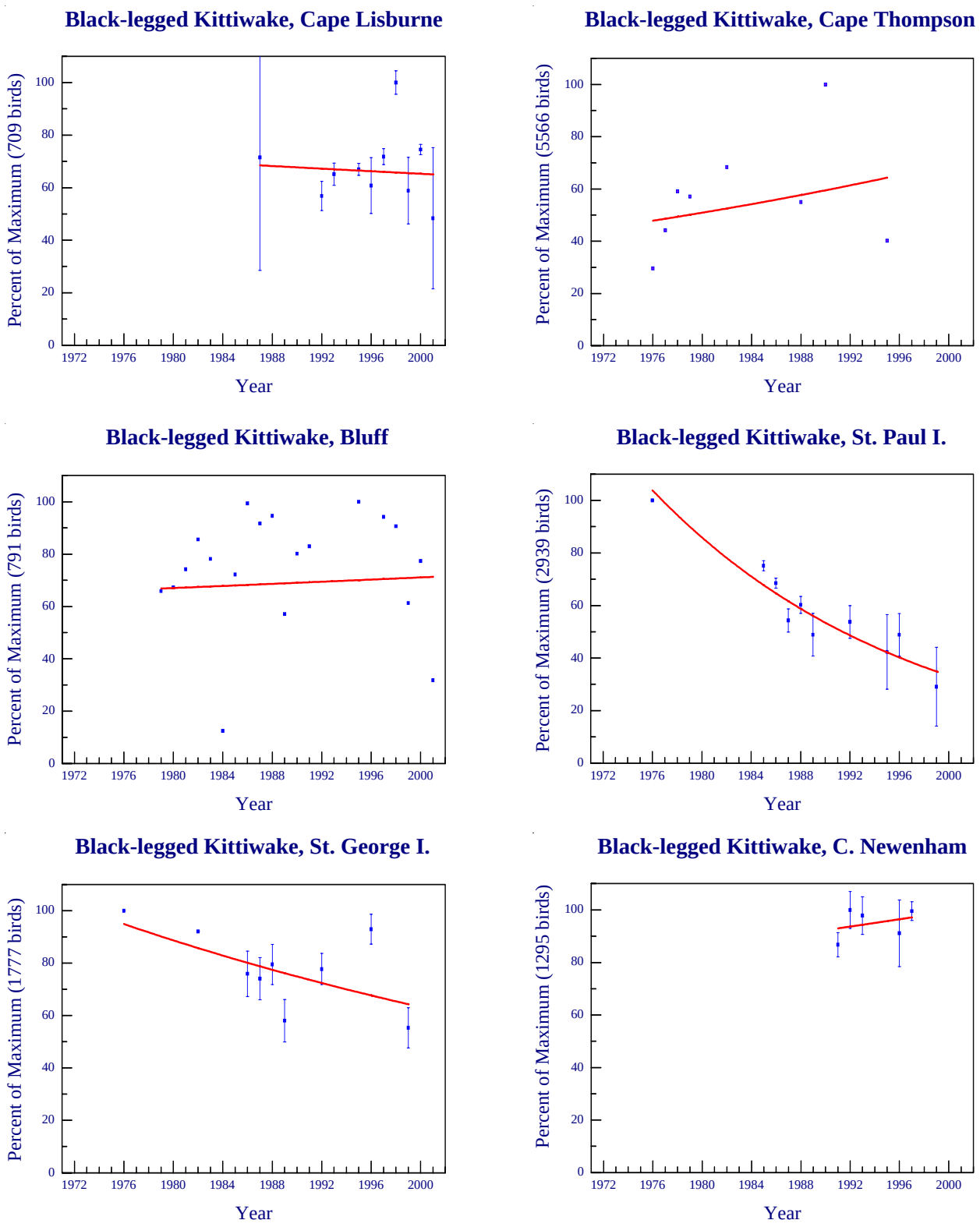



Figure 20. Trends in populations of black-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

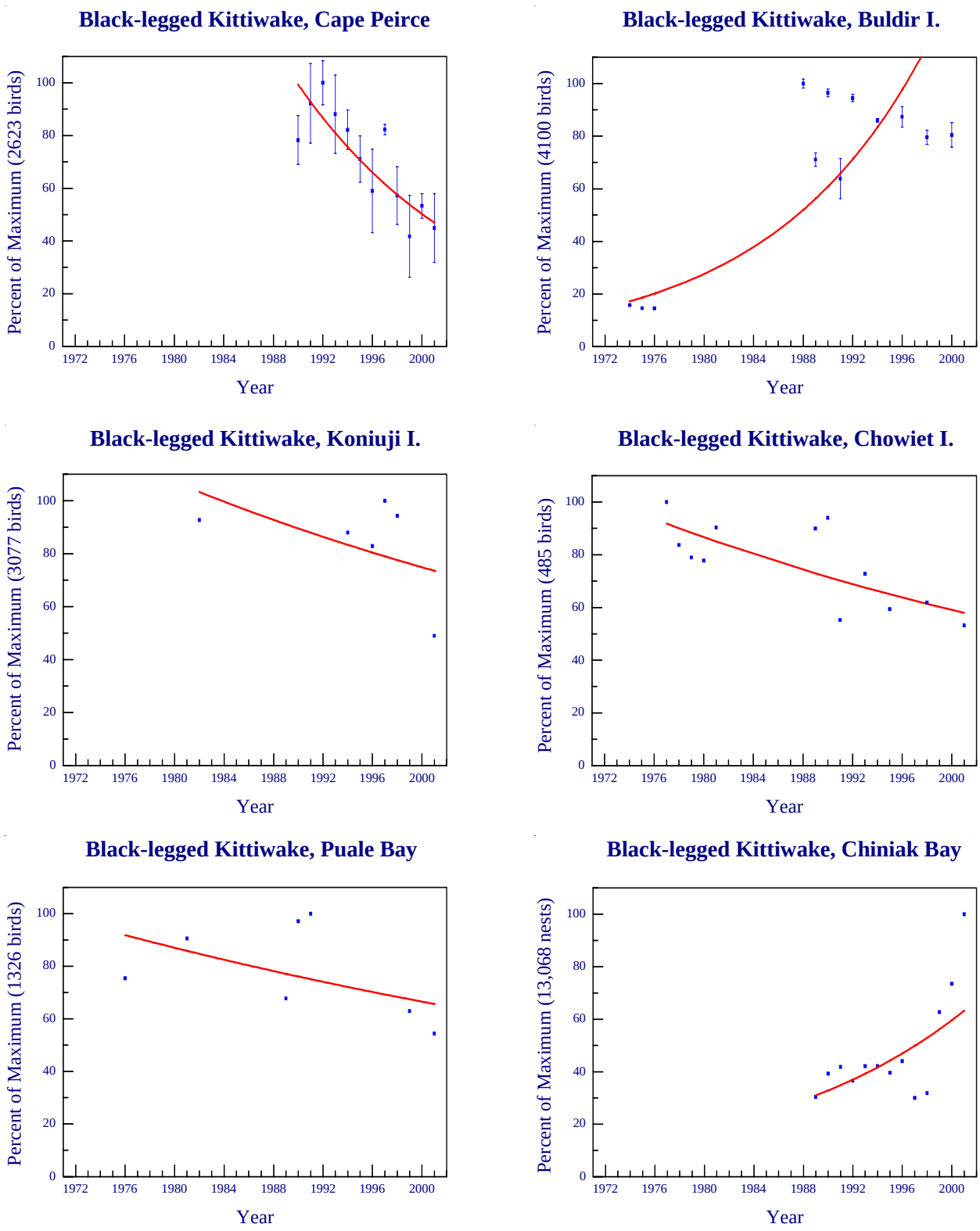



Figure 20 (continued). Trends in populations of black-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

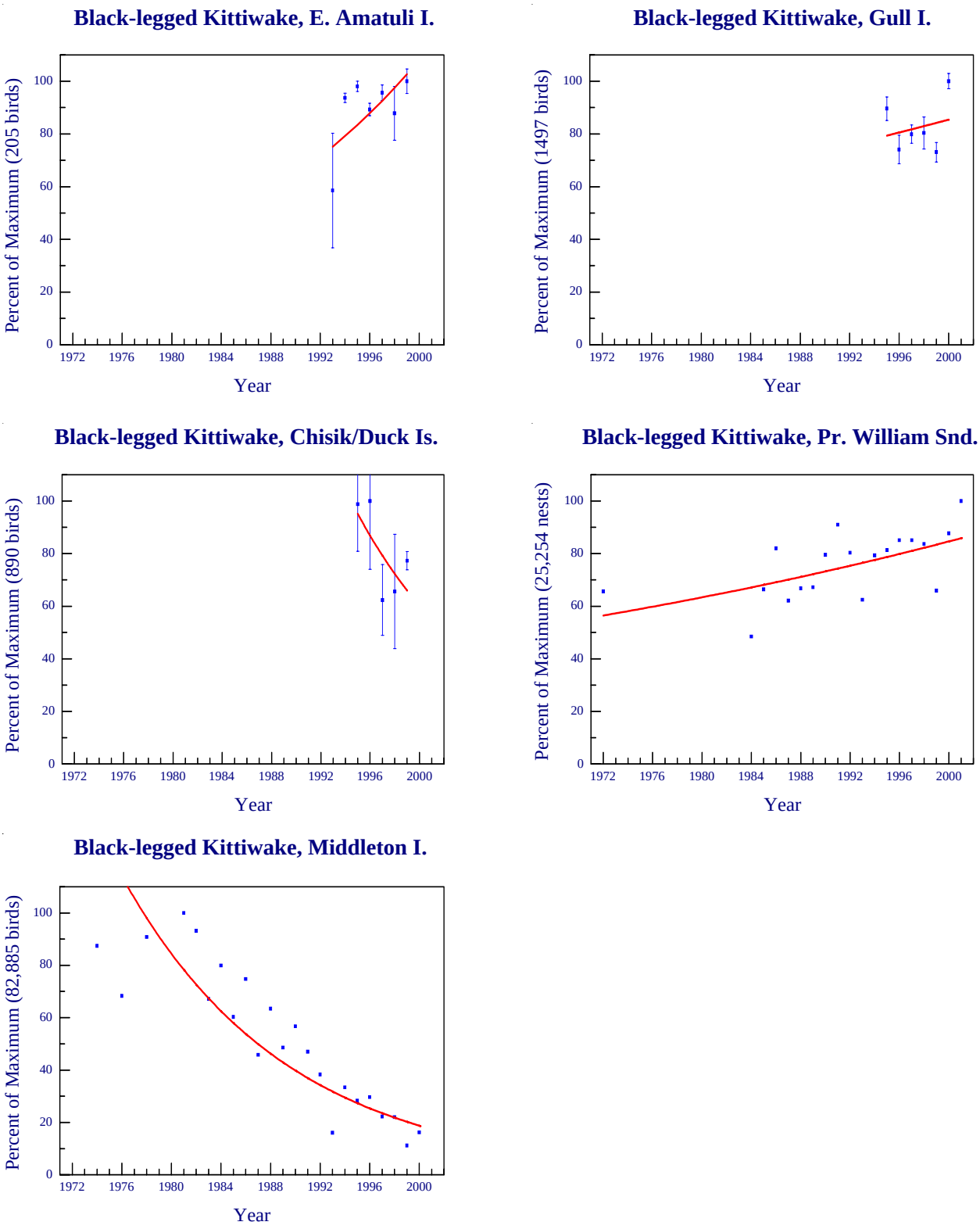



Figure 20 (continued). Trends in populations of black-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

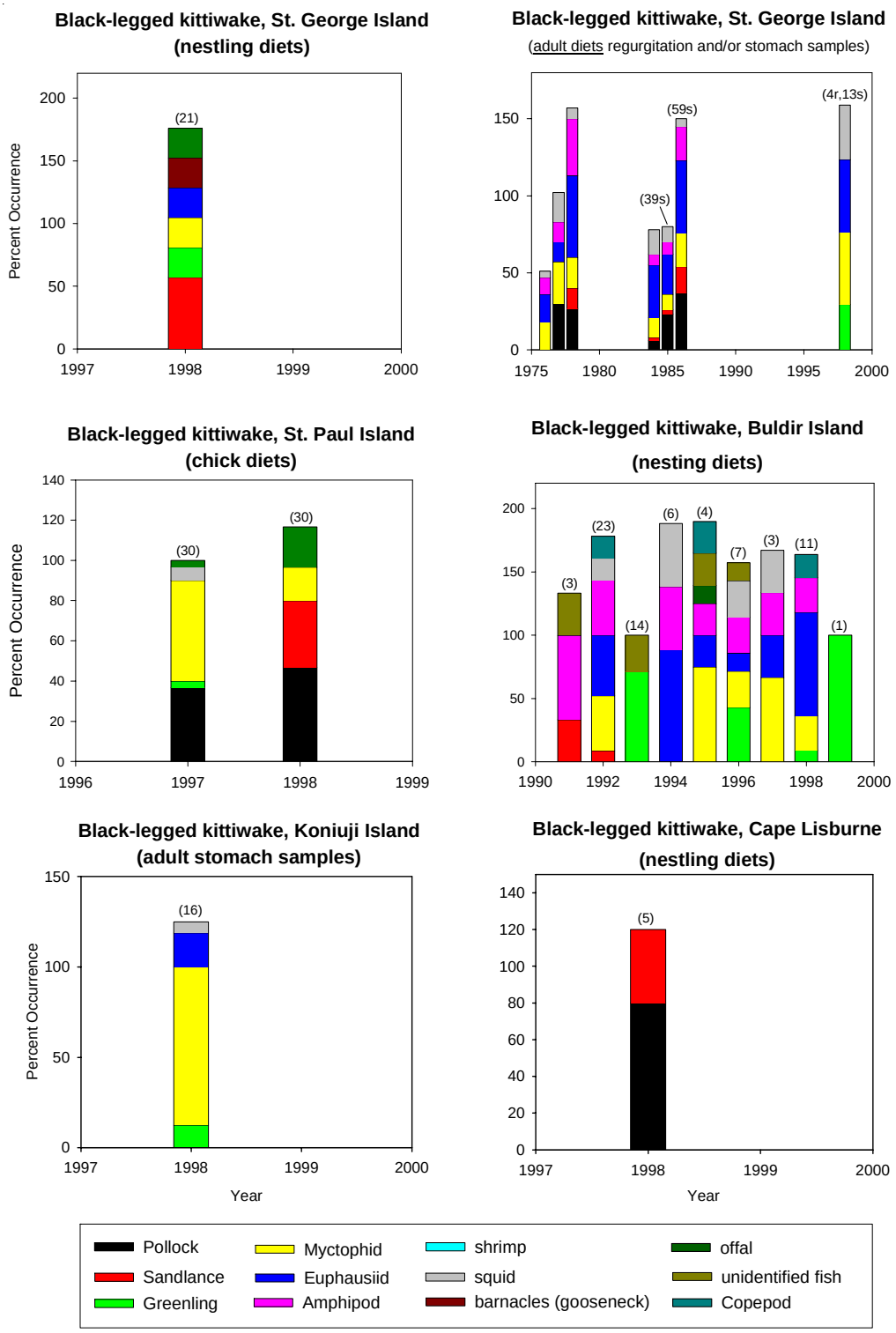



Figure 21. Diets of black-legged kittiwakes at Chukchi Sea and Bering Sea sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

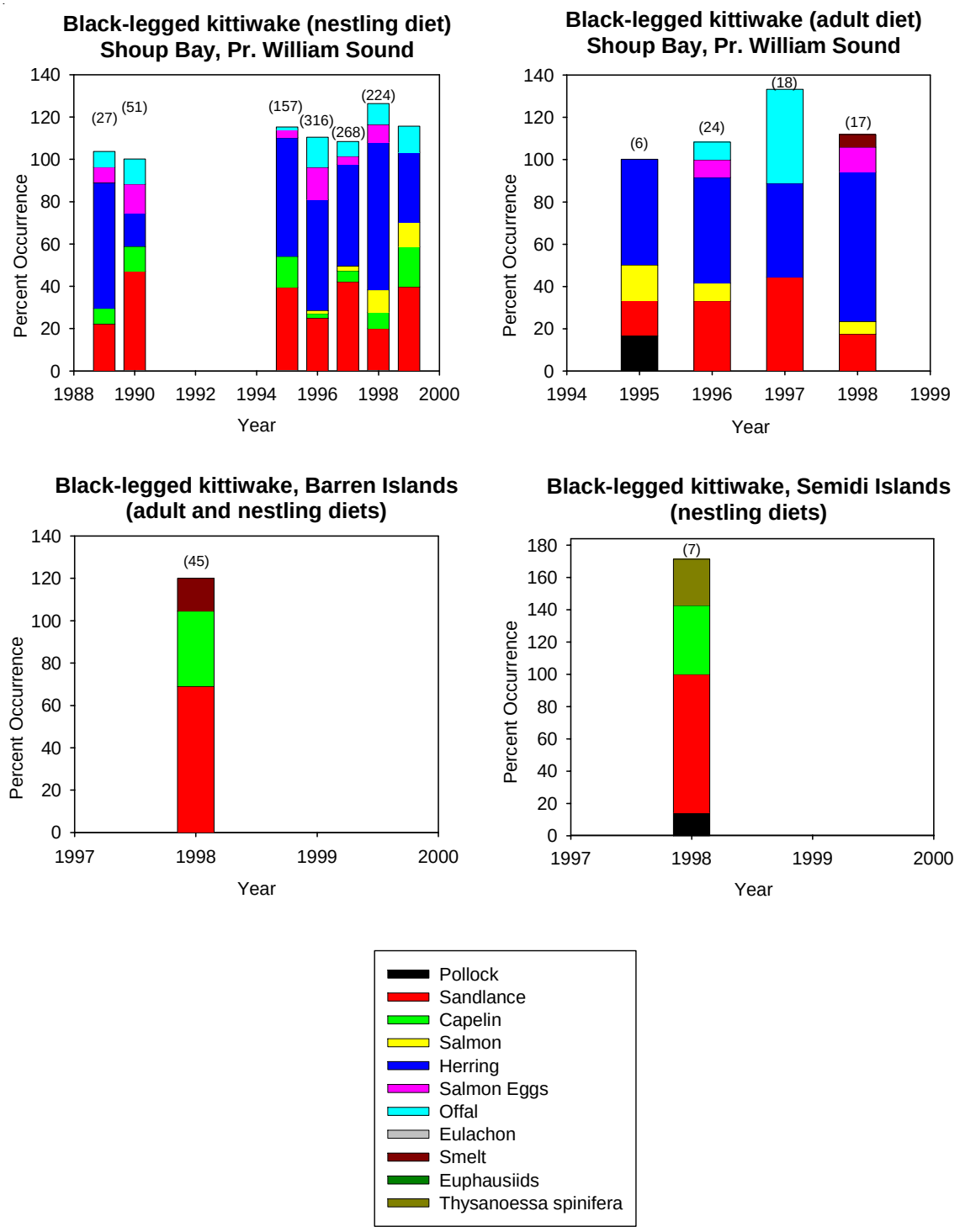



Figure 22. Diets of black-legged kittiwakes at Gulf of Alaska sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Red-legged Kittiwake (*Rissa brevirostris*)**

Breeding Chronology .–Hatch dates at all three monitored sites were earlier than normal in 2001 (Table 16, Fig. 23).

Table 16. Hatching chronology of red-legged kittiwakes at Alaskan sites monitored in 2001.

| Site | Mean | Long-term Average | Reference |
|---|---|---|---|
| St. Paul I. | 13 Jul (13)[a] | 25 Jul[b] (15)[a] | Snorek 2001 |
| St. George I. | 9 Jul (107) | 19 Jul[b] (19) | Papish 2001 |
| Buldir I. | 4 Jul (14) | 11 Jul[b] (13) | Moore et al. 2001 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity .–In 2001, red-legged kittiwakes experienced total failure at Buldir Island (Table 17, Fig. 24). Estimated productivity also was below average at the other three moniotored sites.

Table 17. Reproductive performance of red-legged kittiwakes at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/ Nest[a] | No. of Plots | No. of Nests | Reference |
|---|---|---|---|---|
| St. Paul I. | 0.13 | 3 | 54 | Snorek 2001 |
| St. George I. | 0.21 | 11 | 343 | Papish 2001 |
| Buldir I. | 0.00 | N/A[b] | 60 | Moore et al. 2001 |
| Bogoslof I. | 0.31 | N/A | 48 | G. V. Byrd Unpubl. Data |

[a]Total chicks fledged/Total nests.
[b]Not applicable or not reported.

Populations .–The only red-legged kittiwake colony that was counted in 2001 was the recently pioneered site at Koniuji Island. The 2001 count indicates that this colony may be declining after reaching a high of 40 individuals in 1998 (Fig. 25).

Diet .–Myctophids dominated the diets of red-legged kittiwakes (Fig. 26). Squid, amphipods, and euphausiids were of secondary importance at St. George and Buldir islands. Pollock and sandlance occurred only in minor amounts in red-legged kittiwake diets.

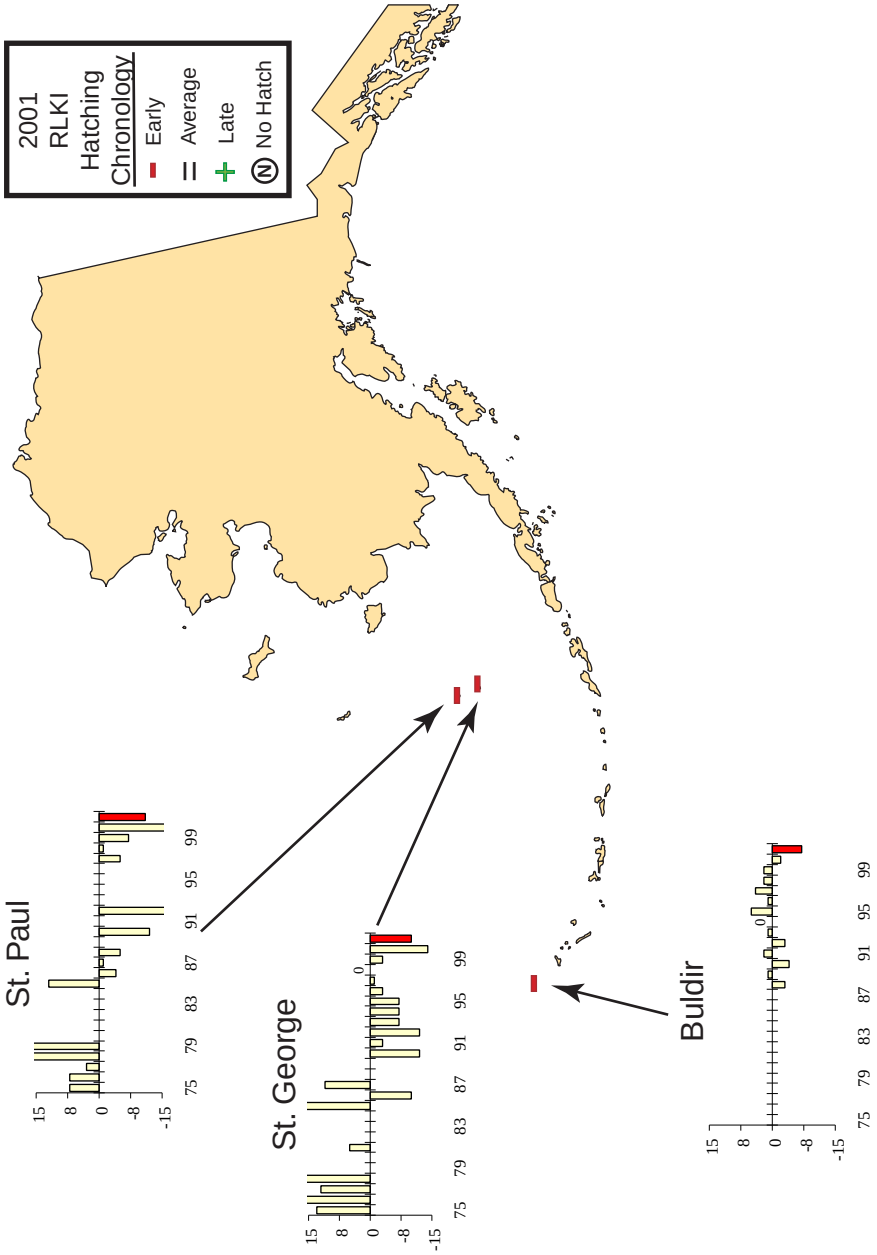



Figure 23. Hatching chronology of red-legged kittiwakes at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

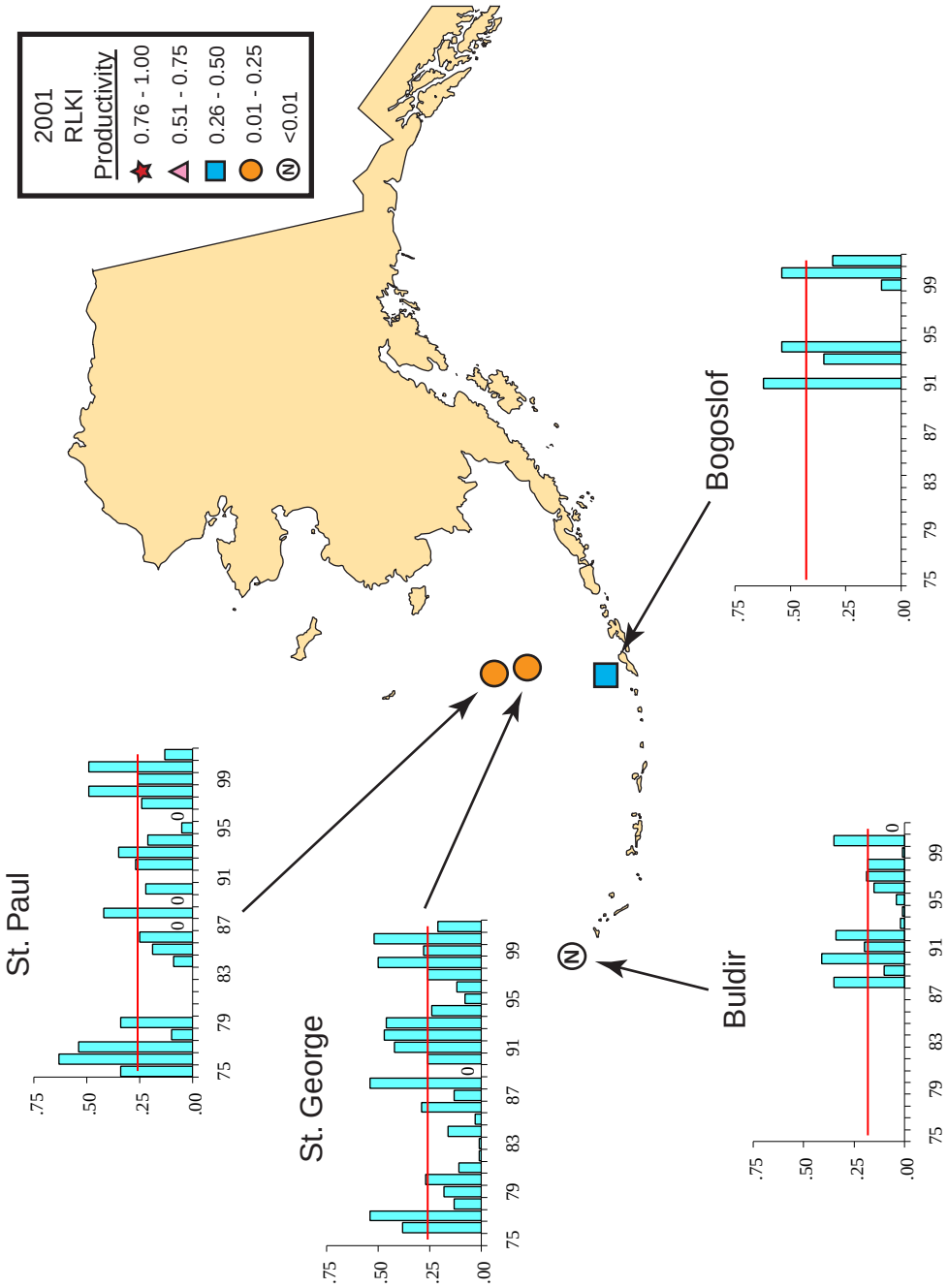



Figure 24. Productivity of red-legged kittiwakes (chicks fledged/nest) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

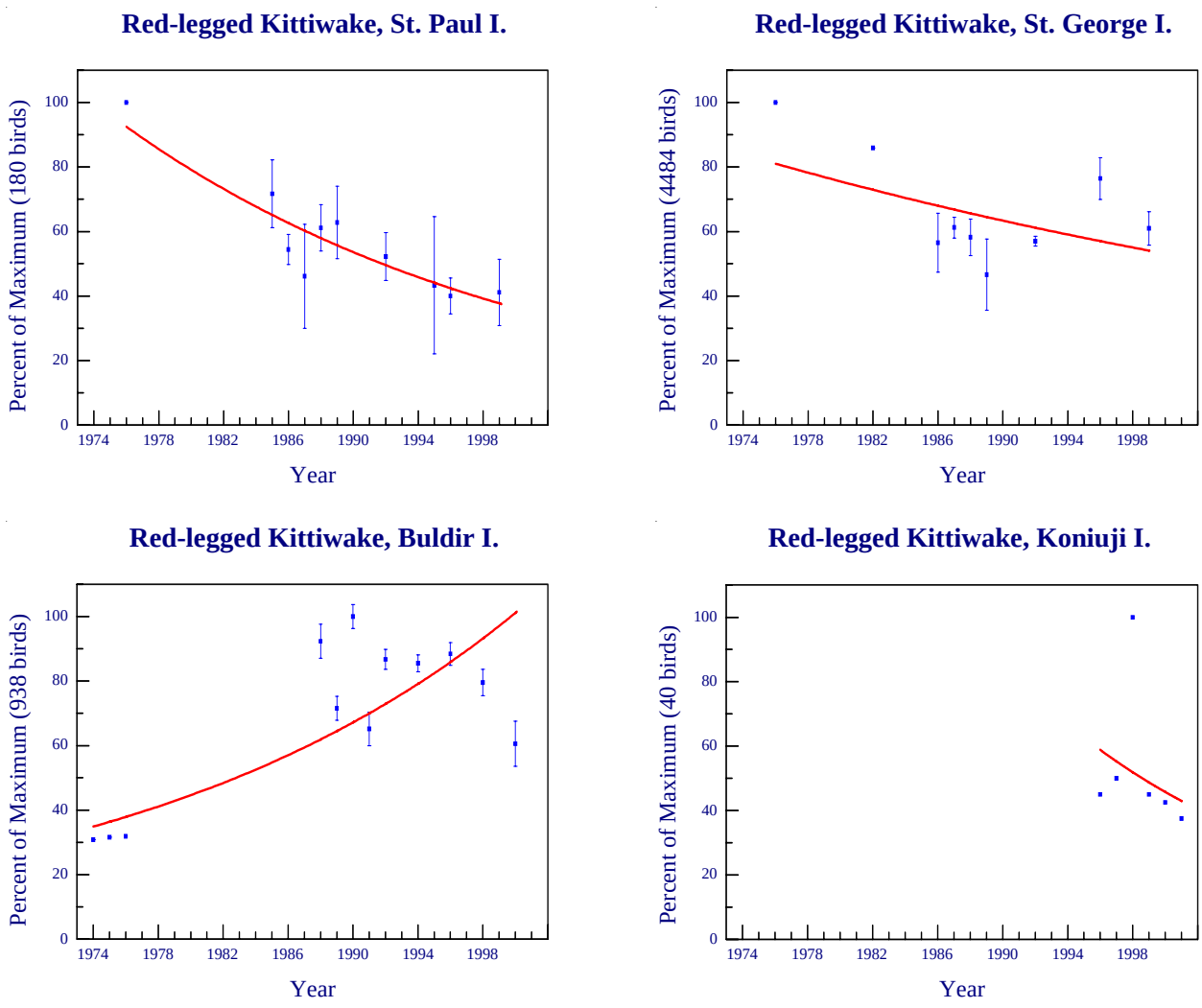



Figure 25. Trends in populations of red-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

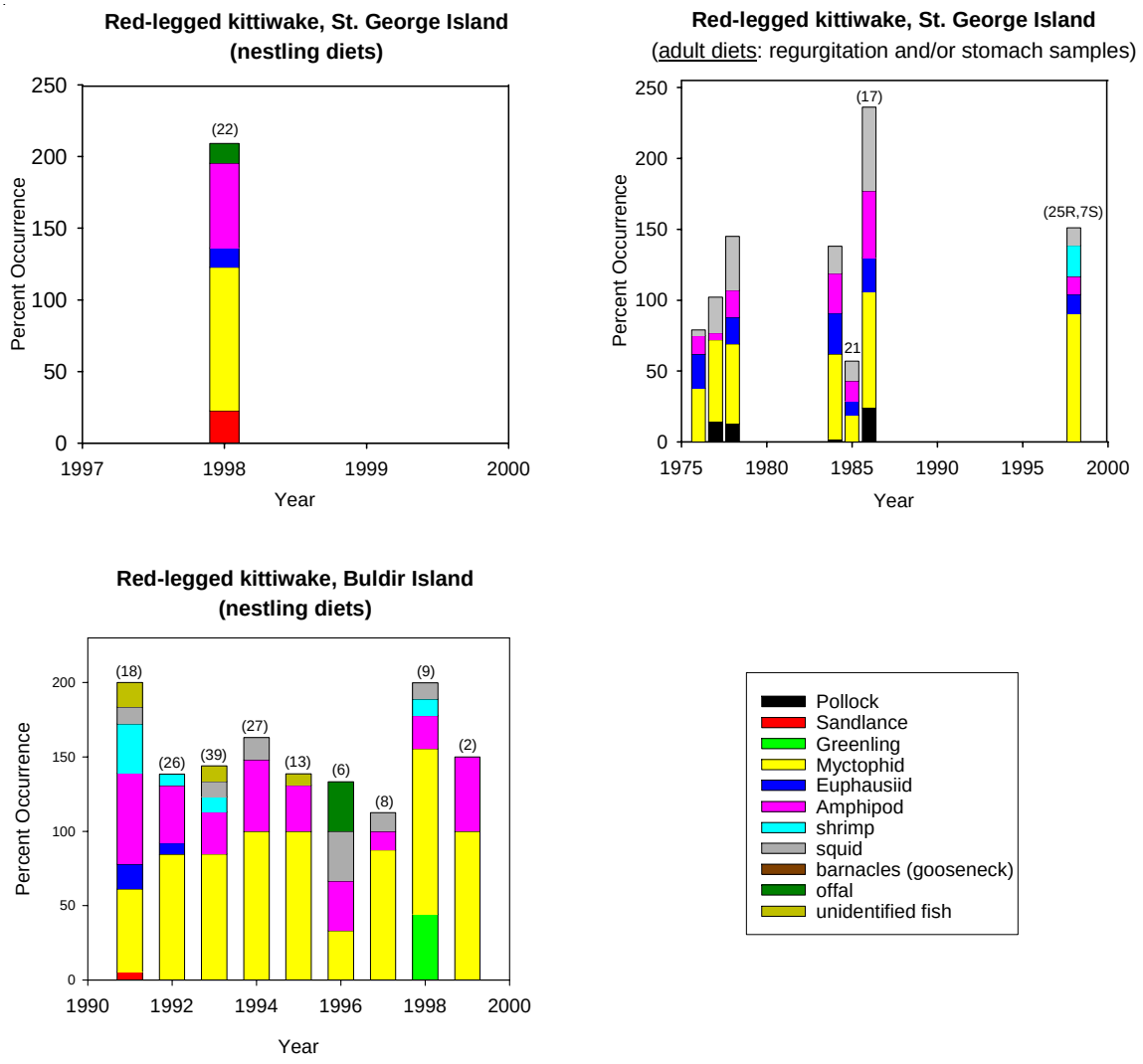



Figure 26. Diets of red-legged kittiwakes at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Common Murre (*Uria aalge*)**

Breeding Chronology .–Timing of common murre nesting events in 2001 was earlier than average at half of the sites monitored and early at the remainder (Table 18, Fig. 27).

Table 18. Hatching chronology of common murres at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Bluff | 20 Jul (N/A[a])[b] | — | 27 Jul[d] (24)[b] | Murphy 2001 |
| St. Paul I. | — | 1 Aug (109) | 4 Aug[c] (16) | Snorek 2001 |
| St. George I. | — | 3 Aug (75) | 4 Aug[c] (17) | Papish 2001 |
| Cape Peirce | — | 24 Jul (N/A[1]) | 22 Jul[c] (12) | MacDonald 2002 |
| Buldir I. | 13 Jul (3) | 12 Jul (3) | 21 Jul[c] (4) | Moore et al. 2001 |
| Aiktak I. | 8 Aug (69) | 9 Aug (69) | 12 Aug[c] (4) | Sztukowski and Oleszczuk 2001 |
| Puale B. | — | 8 Aug (521) | 1 Sep[c] (4) | Doster and Savege 2002 |
| St. Lazaria I. | 6 Aug (42) | 7 Aug (42) | 15 Aug[c] (7) | L. Slater Unpubl. Data |

[a]Not applicable or not reported.
[b]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[c]Mean of annual means.
[d]Median of annual medians.

Productivity .–Common murre productivity was average or above average at most sites monitored in 2001 (Table 19, Fig. 28). A notable exception being Kasatochi Island where no murres laid eggs and no chicks were produced for the fourth consecutive year. Productivity also was below average at Cape Peirce and Round Island.

Table 19. Reproductive performance of common murres at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/ Nest Site[a] | No. of Plots | No. of Nest Sites | Reference |
|---|---|---|---|---|
| St. Paul I. | 0.64 | 6 | 166 | Snorek 2001 |
| St. George I. | 0.54 | 5 | 134 | Papish 2001 |
| Cape Peirce | 0.25 | 7 | 163 | MacDonald 2002 |
| Round I. | 0.02 | 2 | 50 | Cody 2001 |
| Buldir I. | 0.43 | N/A[b] | 7 | Moore et al. 2001 |
| Kasatochi I. | 0.00 | N/A | 0 | Syria 2001 |
| Aiktak I. | 0.51 | 7 | 127 | Sztukowski and Oleszczuk 2001 |
| Puale B. | 0.76 | 17 | 701 | Doster and Savage 2002 |
| St. Lazaria I. | 0.76 | 4 | 66 | L. Slater Unpubl. Data |

[a]Since murres do not build nests, nest sites were defined as sites where eggs were laid.
[b]Not applicable or not reported.

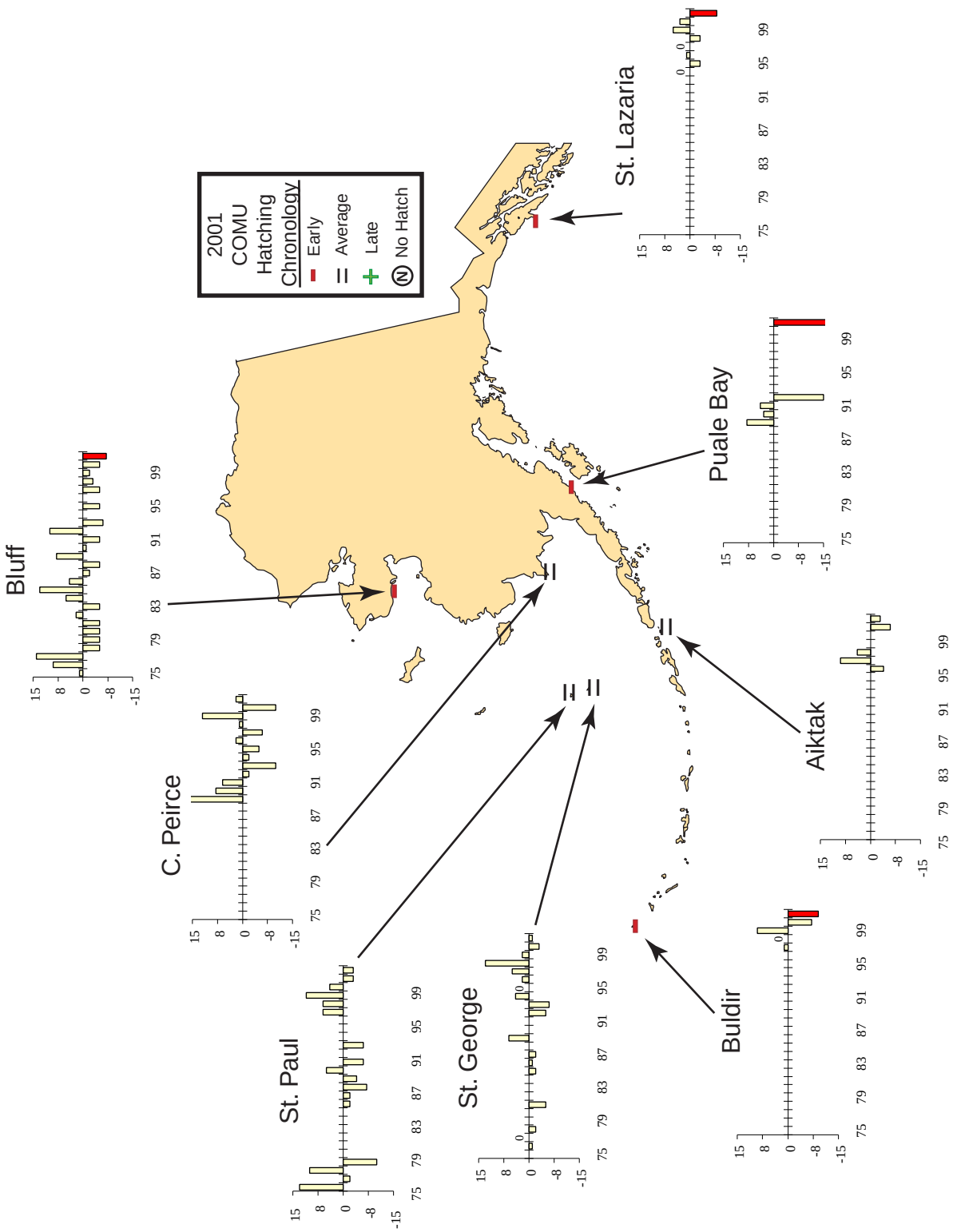



Figure 27 Hatching chronology of common murres at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

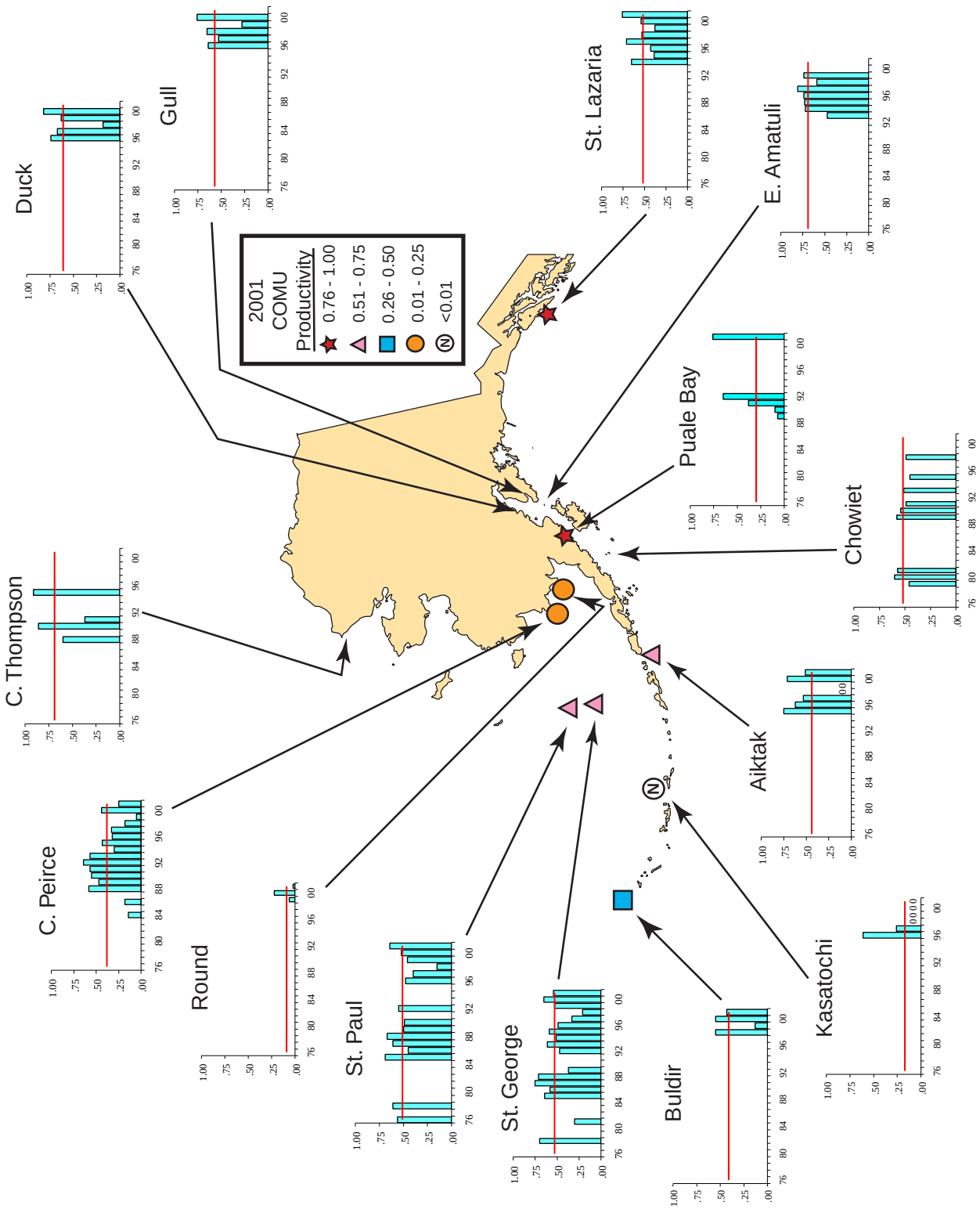



Figure 28. Productivity of common murres (chicks fledged/nest site) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

Populations .–At sites where counts of murres are made from the water, it is difficult to accurately assign every individual to a species. As a result, common and thick-billed murres often are combined at these colonies for population trend analysis. Common murre numbers appeared to be stable at Bluff, but declining at Cape Peirce (Fig. 29).

Diet .–Common murre diets exhibited significant geographic variability (Fig. 30). St. George Island common murres ate euphausiids and pollock with lesser amounts of squid. Common murres from Buldir and Koniuji islands ate predominantly squid with lesser amounts of pollock and herring. Common murres at Chowiet and Aiktak islands ate mostly sandlance and pollock.

Barren Islands common murres fed their chicks almost exclusively capelin. Note that the Barren Islands data were from a large number of bill load observations while the other locations had smaller numbers of adult stomach samples. The prey items brought to chicks may differ from the prey adults select for themselves.

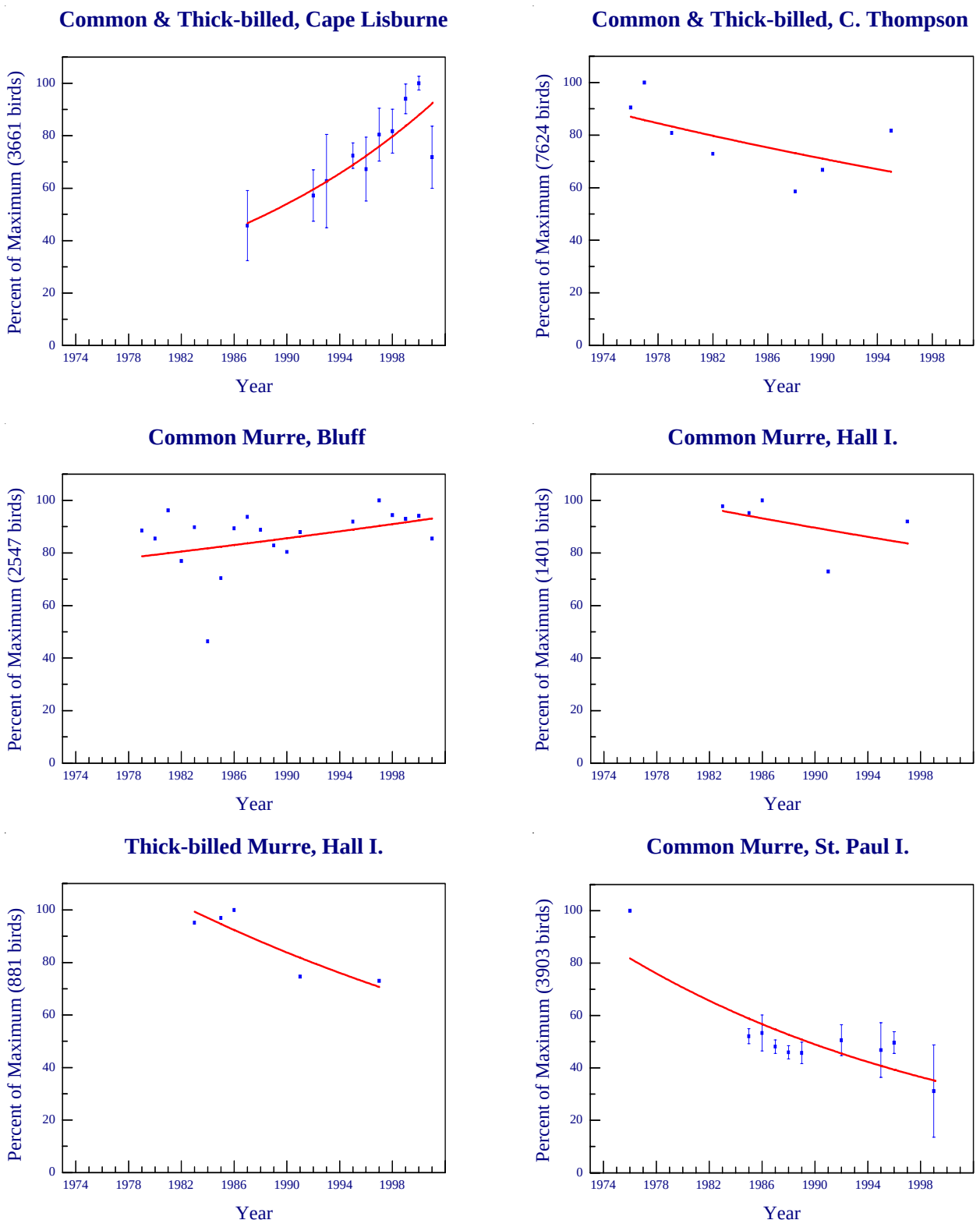



Figure 29. Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

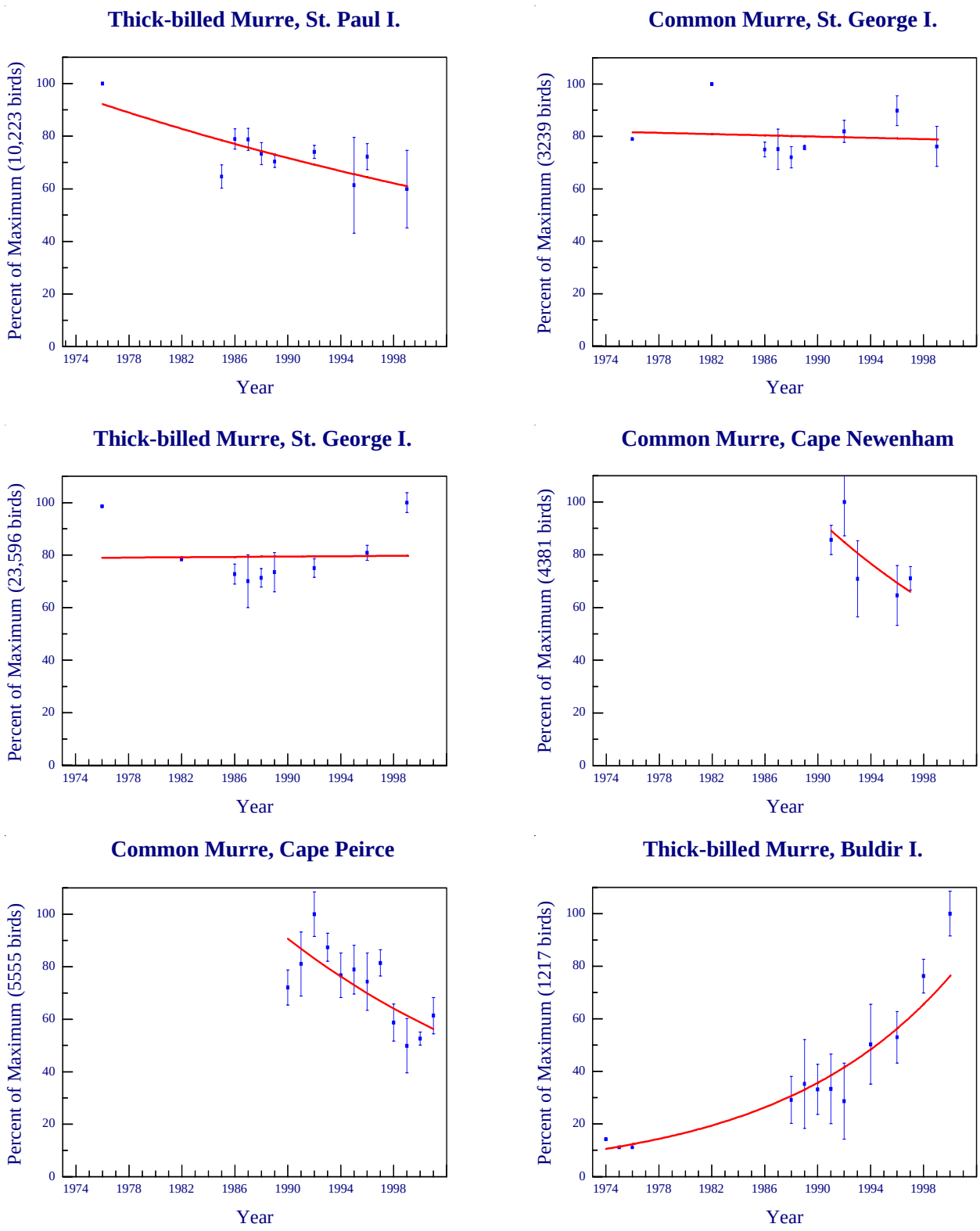



Figure 29 (continued). Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

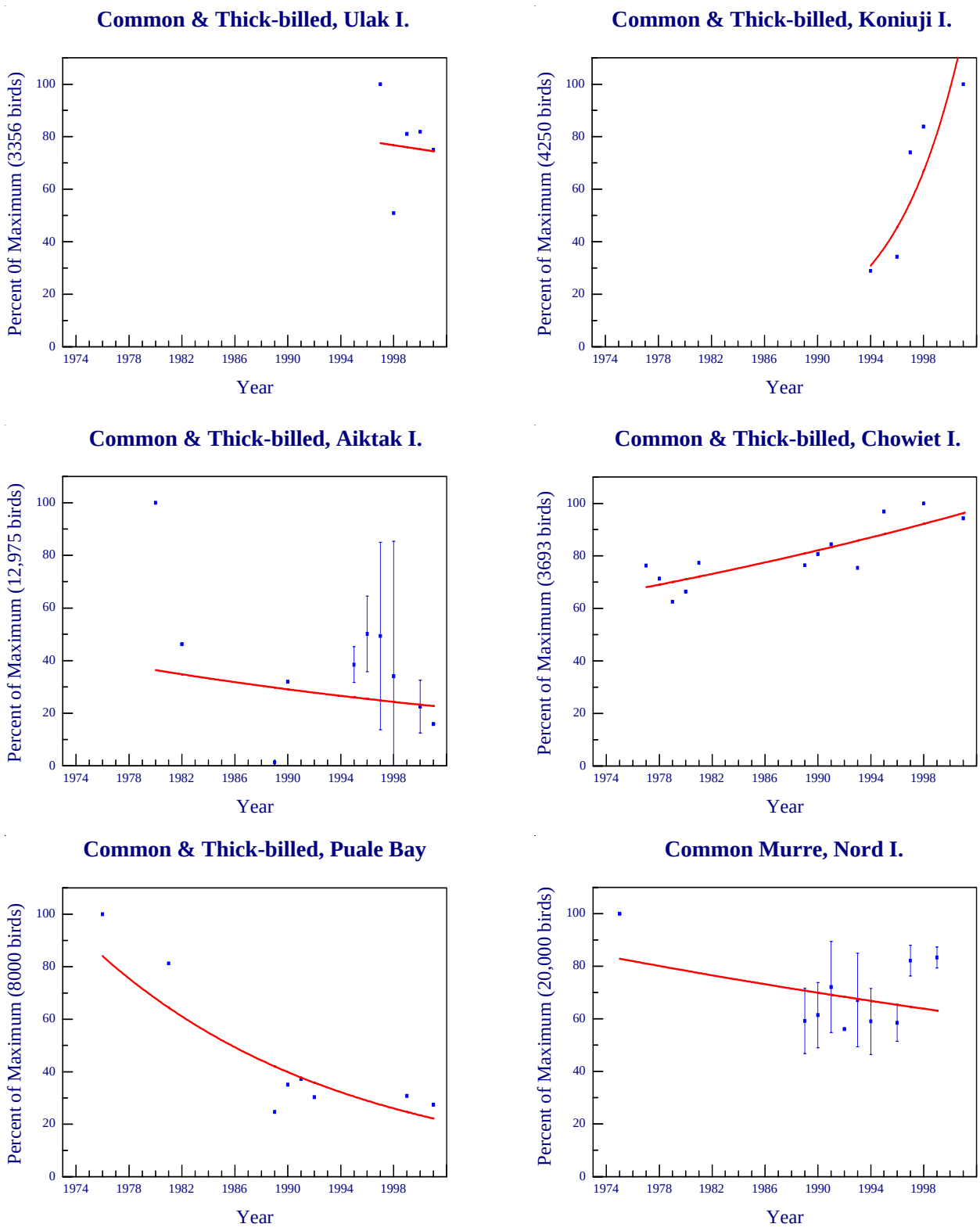



Figure 29 (continued). Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

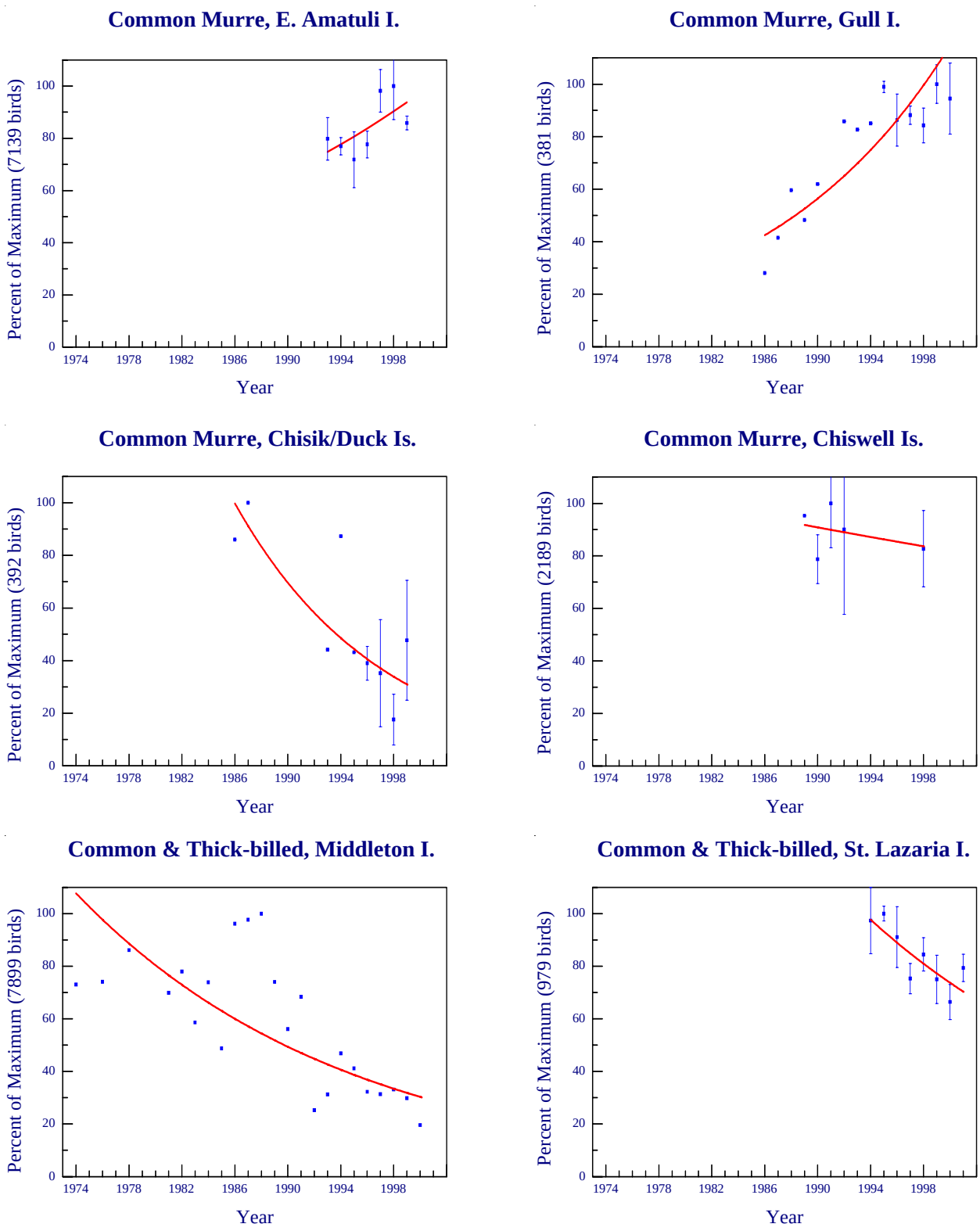



Figure 29 (continued). Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

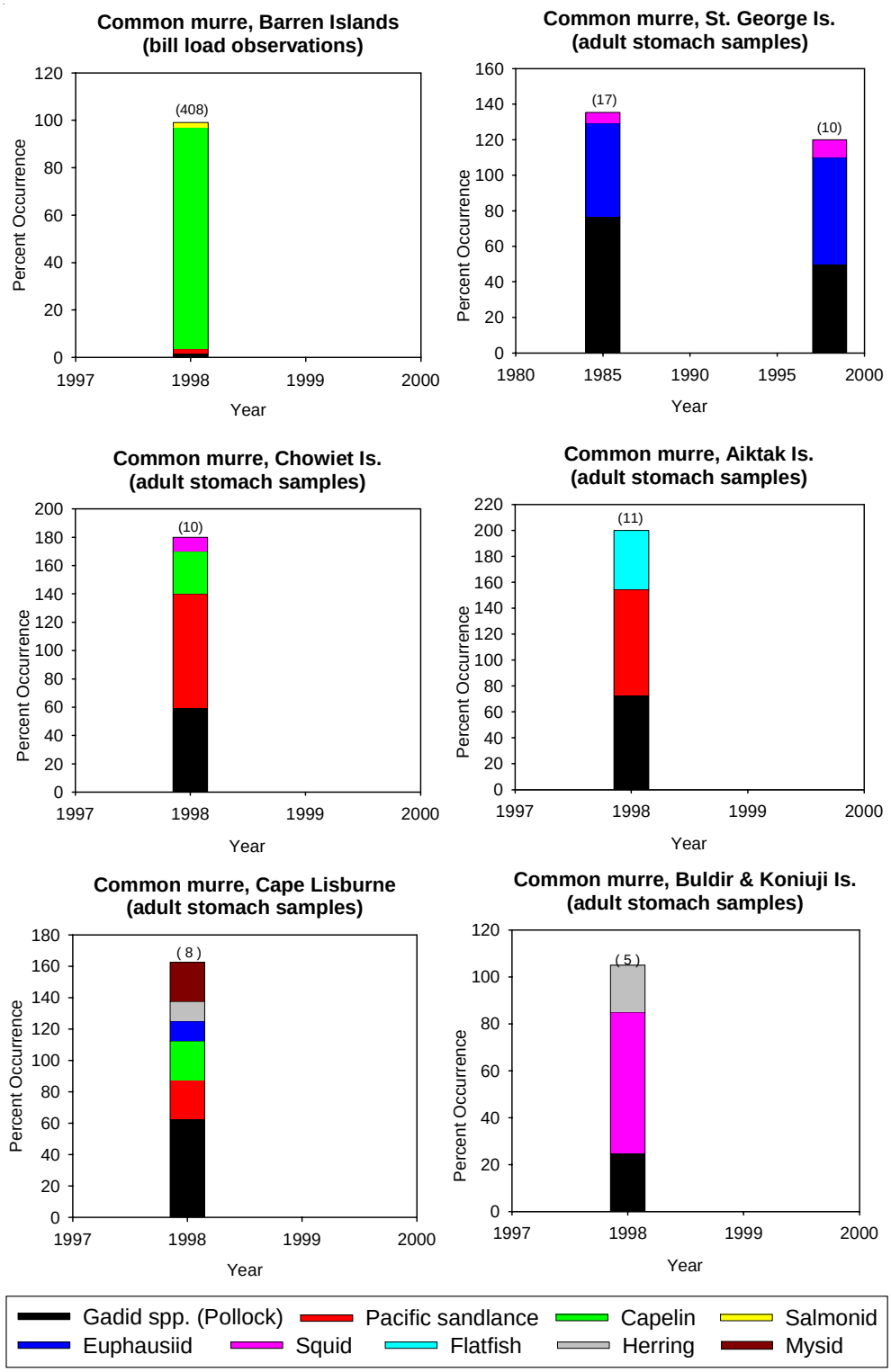



Figure 30. Diets of common murres at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Thick-billed Murre (*Uria lomvia*)**

Breeding Chronology .–In 2001, thick-billed murre chicks hatched on about average dates at all monitored Bering Sea and Aleutian Island sites and were early at Gulf of Alaska locations (Table 20, Fig. 31).

Table 20. Hatching chronology of thick-billed murres at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| St. Paul I. | — | 7 Aug (269)[a] | 4 Aug[b] (17)[a] | Snorek 2001 |
| St. George I | — | 30 Jul (218) | 30 Jul[b] (19) | Papish 2001 |
| Buldir I. | 13 Jul (59) | 15 Jul (59) | 16 Jul[b] (13) | Moore et al. 2001 |
| Aiktak I. | 8 Aug (81) | 7 Aug (81) | 7 Aug[b] (4) | Sztukowski and Oleszczuk 2001 |
| Puale B. | — | 7 Aug (21) | 28 Aug[b] (4) | Doster and Savage 2002 |
| St. Lazaria I. | 4 Aug (35) | 4 Aug (35) | 12 Aug[b] (7) | L. Slater Unpubl. Data |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity .–Rates of success in 2001 were average or above at most monitored colonies (Table 21, Fig. 32). Thick-billed murres laid no eggs and failed to produce any young, for the fourth year in a row, at Kasatochi Island. Productivity also was below average at Buldir Island in 2001.

Table 21. Reproductive performance of thick-billed murres at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/ Nest Site[a] | No. of Plots | No. of Nest Sites | Reference |
|---|---|---|---|---|
| St. Paul I. | 0.48 | 17 | 482 | Snorek 2001 |
| St. George I. | 0.53 | 14 | 382 | Papish 2001 |
| Buldir I. | 0.52 | 6 | 181 | Moore et al. 2001 |
| Kasatochi I. | 0.00 | N/A[b] | 0 | Syria 2001 |
| Aiktak I. | 0.58 | 6 | 121 | Sztukowski and Oleszczuk 2001 |
| Puale B. | 0.81 | 5 | 26 | Doster and Savage 2002 |
| St. Lazaria I. | 0.59 | 4 | 59 | L. Slater Unpubl. Data |

[a]Since murres do not build nests, nest sites were defined as sites where eggs were laid.
[b]Not applicable or not reported.

Populations .–No data for 2001. See Figure 29 for prior years' data.

Diet .–Cape Lisburne thick-billed murre diets consisted mainly of flatfish, sculpin and walleye pollock (Fig. 33). Thick-billed murre diets at St. George Island consisted entirely of pollock, euphausiids and squid. The frequency at which these prey groups occurred varied widely among years. At Buldir Island, thick-billed murres ate almost exclusively squid with some myctophids. Thick-billed murre diets at Aiktak Island emphasized pollock and sandlance.

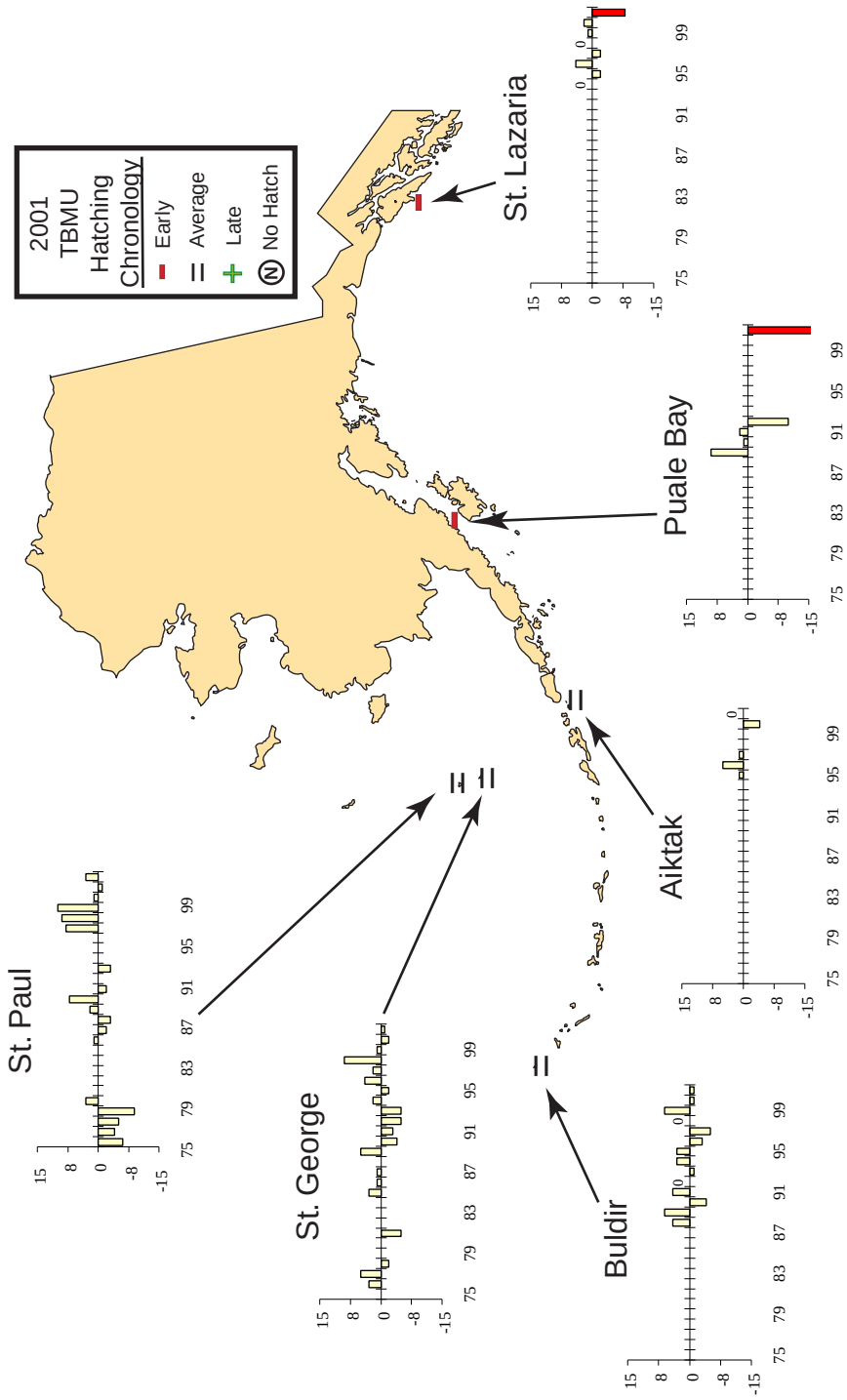



Figure 31. Hatching chronology of thick-billed murre at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

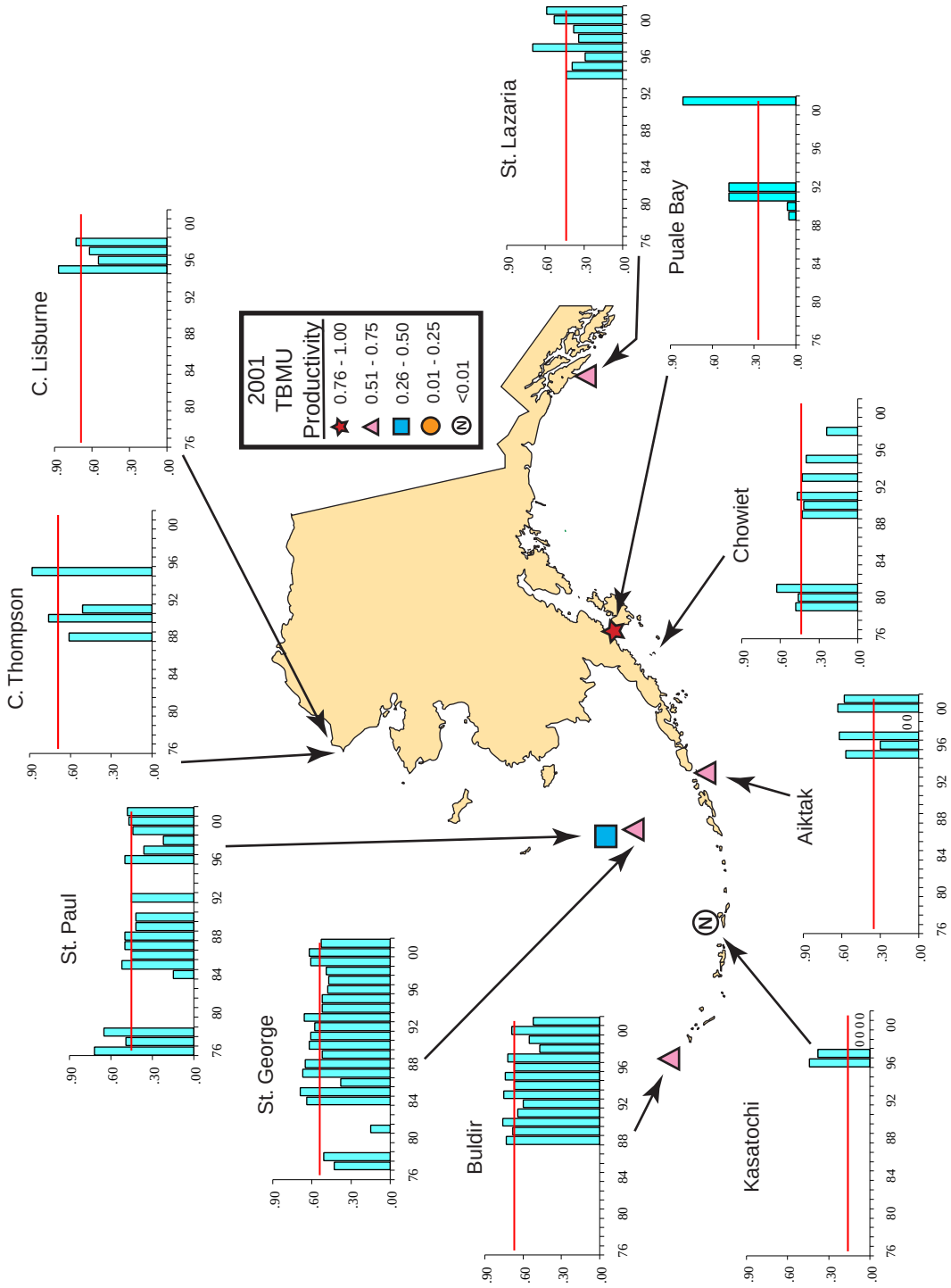



Figure 32. Productivity of thick-billed murres (chicks fledged/nest site) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

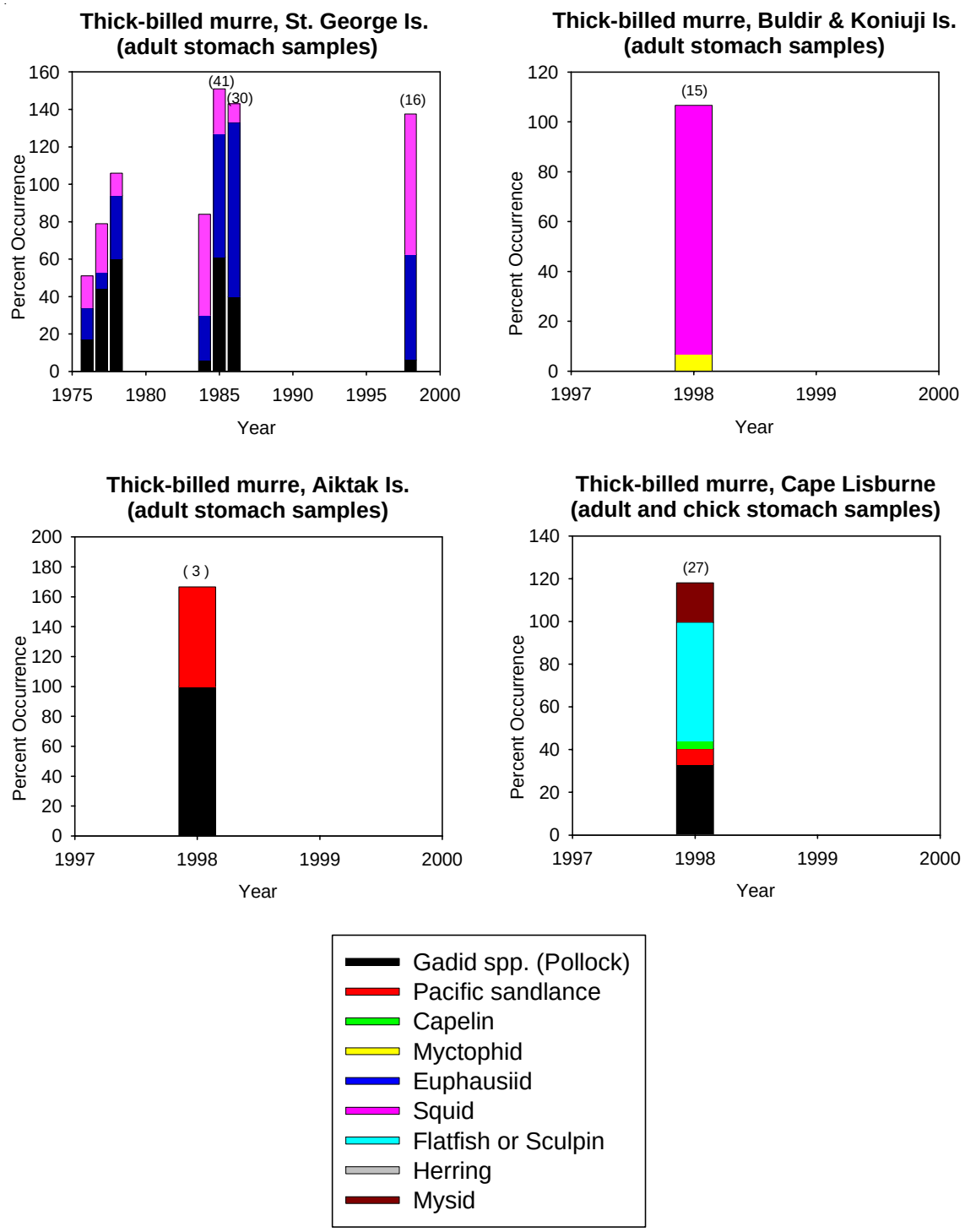



Figure 33. Diets of thick-billed murres at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Pigeon Guillemot** (*Cepphus columba*)

Breeding Chronology.–No data.

Productivity.–No data.

Populations.–Pigeon guillemot populations appeared to be declining at Aleutian Island locations but increasing at St. Lazaria Island in the southern Gulf of Alaska (Fig. 34).

Diet.–No data.

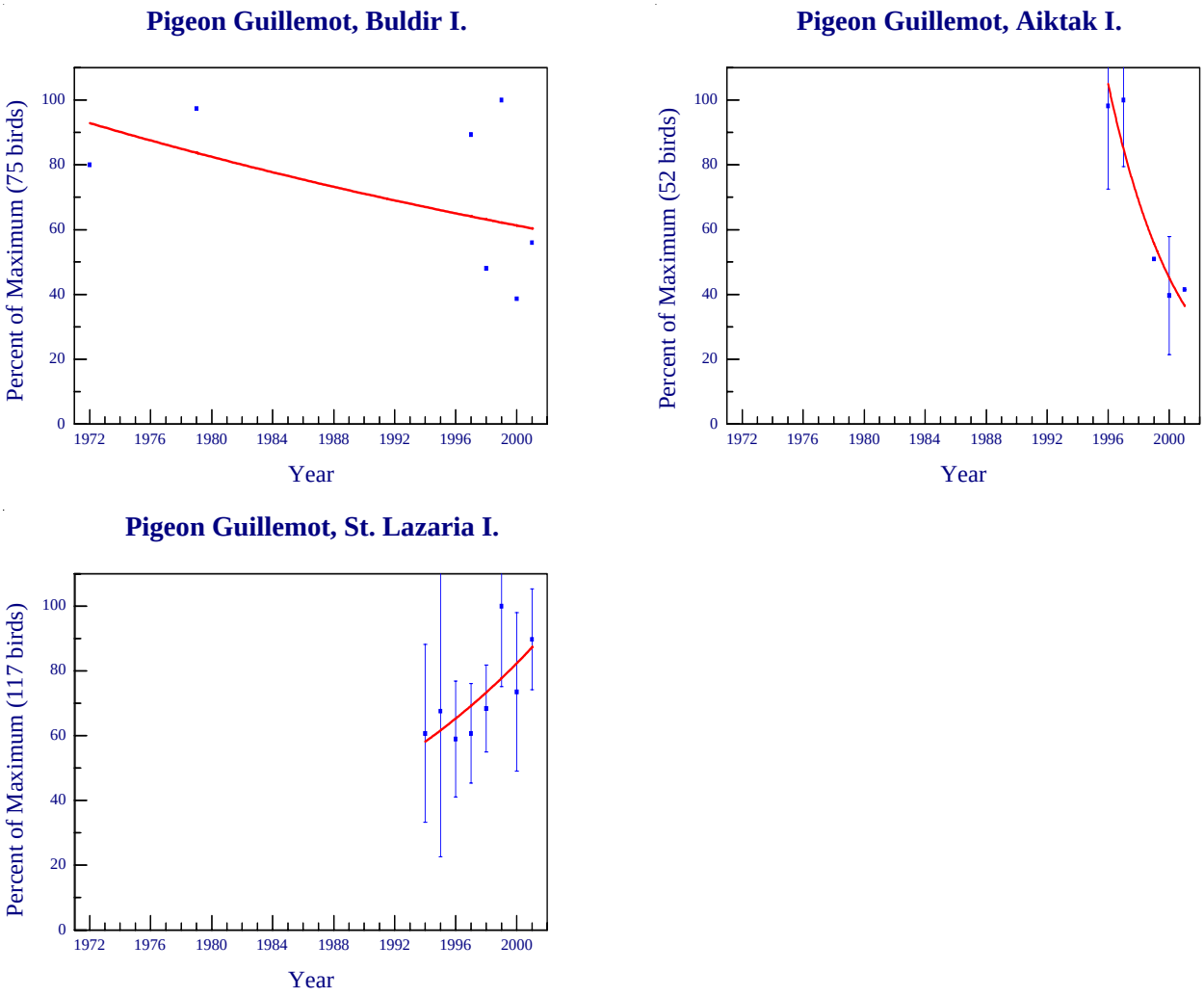



Figure 34. Trends in populations of pigeon guillemots at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

**Ancient Murrelet (*Synthliboramphus antiquus*)**

Breeding Chronology.–The mean hatching date for ancient murrelets was about average at Aiktak Island, the only site monitored in 2001 (Table 22).

Table 22. Hatching chronology of ancient murrelets at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Aiktak I. | 6 Jul (29)[a] | 5 Jul (29) | 6 Jul[b] (2)[a] | Sztukowski and Oleszczuk 2001 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date.
[b]Mean of annual means.

Productivity.–More than three-quarters of ancient murrelet eggs hatched at Aiktak Island in 2001 (Table 23), about average for this site.

Table 23. Reproductive performance of ancient murrelets at Alaskan sites monitored in 2001.

| Site | Hatching Success[a] | No. of Nest Sites | Reference |
|---|---|---|---|
| Aiktak I. | 0.82 | 35 | Sztukowski and Oleszczuk 2001 |

[a]Total chicks hatched/Total known-fate eggs.

Populations.–No data in 2001.

Diet.–No data.

**Parakeet Auklet (*Cyclorrhynchus psittacula*)**

Breeding Chronology.–This species was monitored only at one site (Buldir Island) in 2001 (Table 24). The mean hatch date was earlier than the long-term average.

Table 24. Hatching chronology of parakeet auklets at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Buldir I. | 29 Jun (9)[a] | 27 Jun (9) | 4 Jul[b] (9)[a] | Moore et al. 2001 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity.–In 2001, productivity was monitored only at Buldir Island, where no chicks fledged (Table 25).

Table 25. Reproductive performance of parakeet auklets at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/ Nest Site[a] | No. of Nest Sites | Reference |
|---|---|---|---|
| Buldir I. | 0.00 | 40 | Moore et al. 2001 |

[a]Nest site is defined as a site where an egg was laid.

Populations.–Methods for monitoring populations of parakeet auklets need to be developed and used at annual monitoring sites in the Aleutian, Pribilof, and Semidi islands.

Diet.–Diets of Parakeet auklets were examined on Buldir Island and were dominated by copepods, followed by amphipods and euphausiids (Fig. 35).

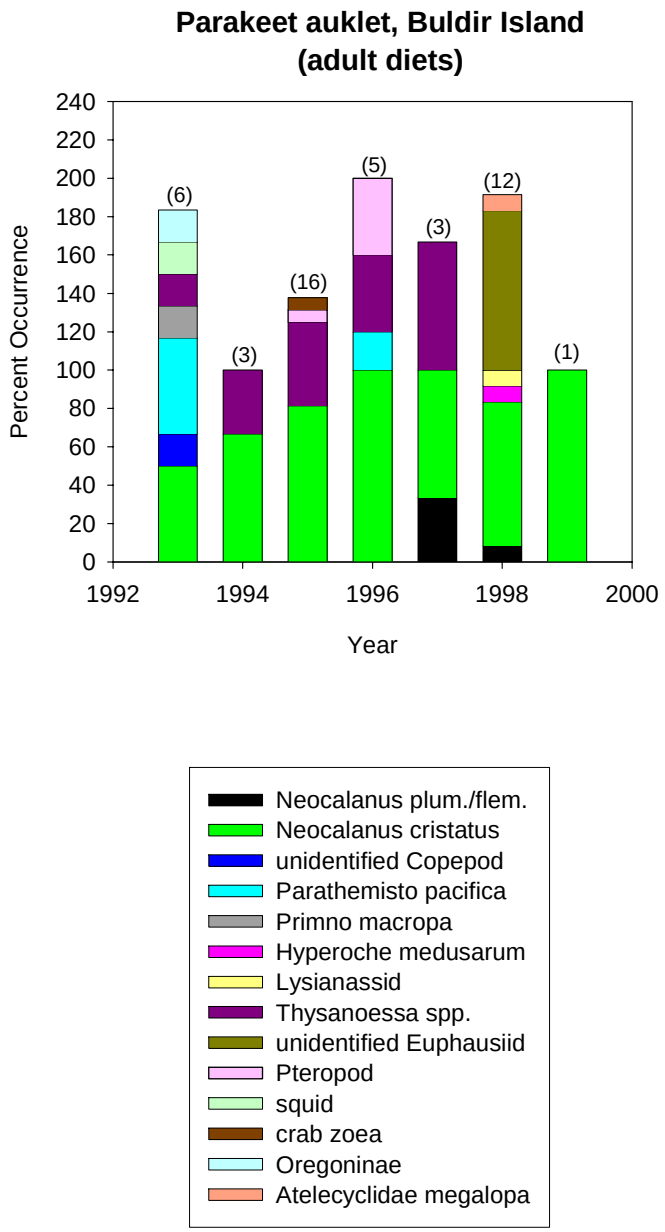



Figure 35. Diets of parakeet auklets at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Least Auklet (*Aethia pusilla*)**

Breeding Chronology.–The dates of hatching for least auklets were about average at both Buldir and Kasatochi islands in 2001 (Table 26, Fig. 36).

Table 26. Hatching chronology of least auklets at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Buldir I. | 29 Jun (20)[a] | 26 Jun (20) | 27 Jun[b] (11)[a] | Moore et al. 2001 |
| Kasatochi I. | 26 Jun (50) | 28 Jun (50) | 28 Jun[b] (5) | Syria 2001 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity.–Least auklets exhibited about average reproductive success in 2001 at both Buldir and Kasatochi islands, but had below average success at Kiska Island (Table 27, Fig. 37).

Table 27. Reproductive performance of least auklets at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/ Nest Site[a] | No. of Nest Sites | Reference |
|---|---|---|---|
| Buldir I. | 0.55 | 65 | Moore et al. 2001 |
| Kiska I. | 0.13 | 209 | Jones et al. 2001 |
| Kasatochi I. | 0.55 | 85 | Syria 2001 |

[a]Nest site is defined as a site where an egg was laid.

Populations.–In 2001, least auklet populations were monitored only at Kasatochi Island where numbers appeared to be declining slightly (Fig. 38).

Diet.–Least auklets are planktivorous and feed on several types of prey. Copepods *(Calanus marshallae*, *Neocalanus plumchrus/flemingeri*, *Neocalanus cristatus)* and euphausiids were generally the most common prey (Fig. 39). All least auklet diets were diverse and had several prey species in each sample (indicated by the cumulative "Percent Occurrence" being up to 400%).

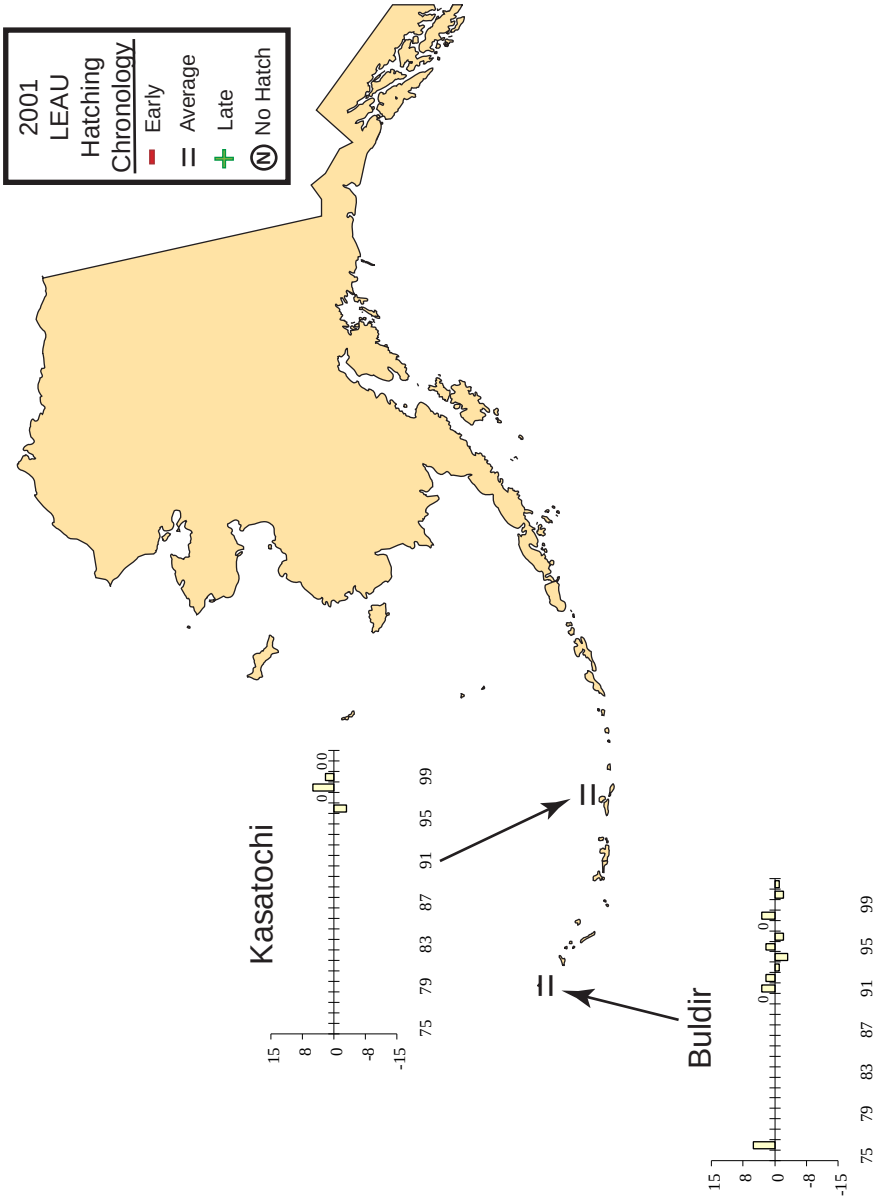



Figure 36. Hatching chronology of least auklets at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

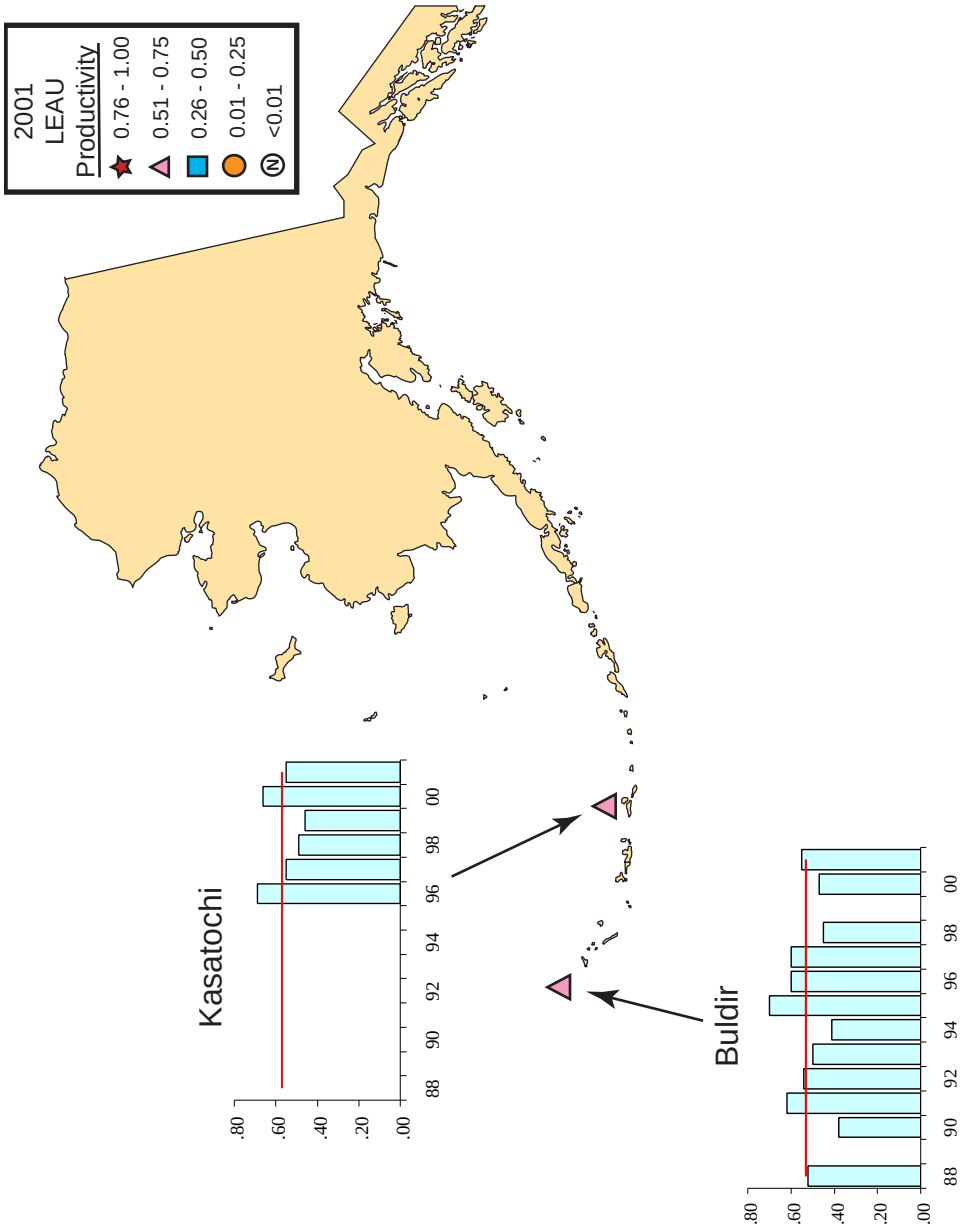



Figure 37. Productivity of least auklets (chicks fledged/nest site) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

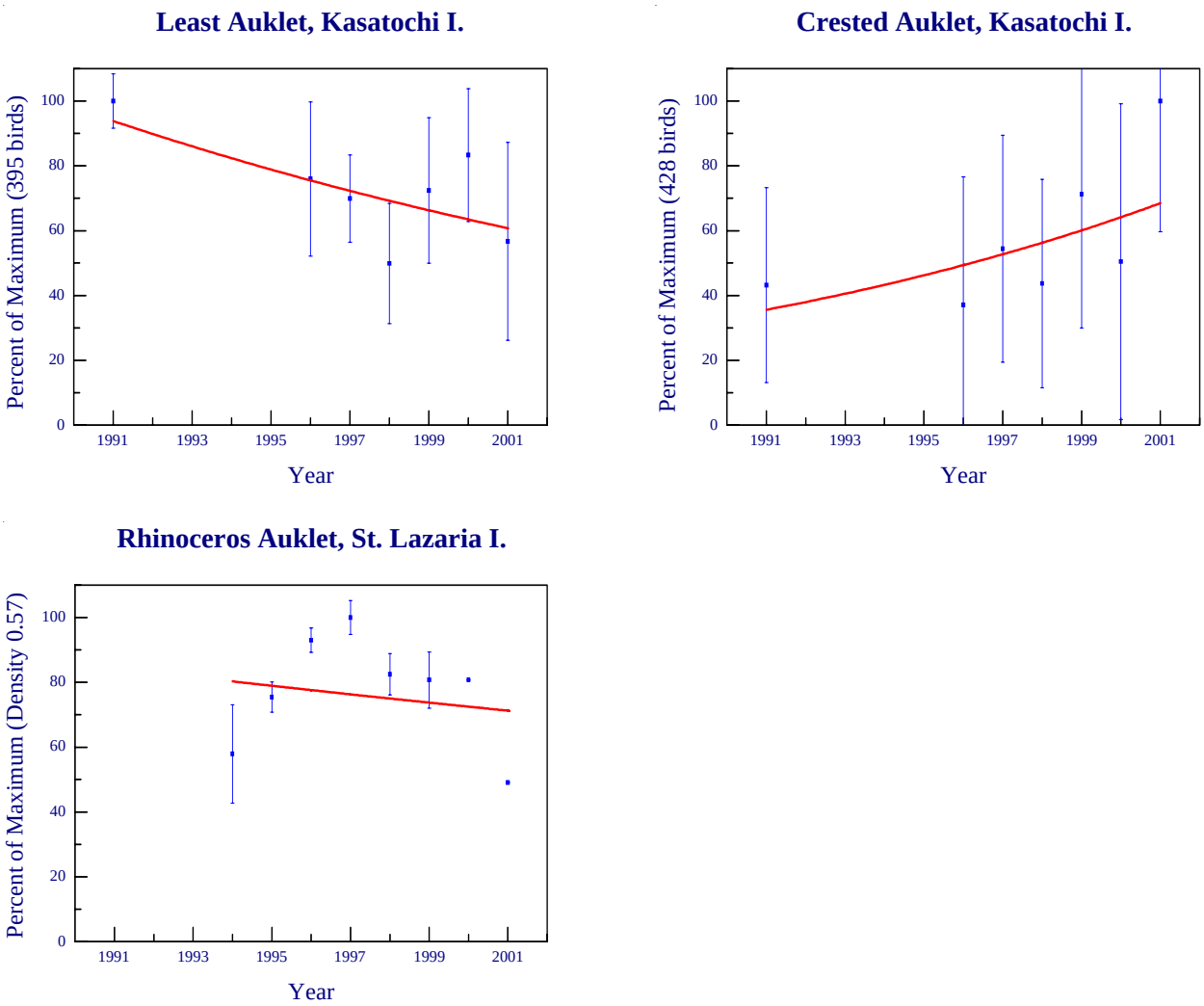



Figure 38. Trends in populations of auklets at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

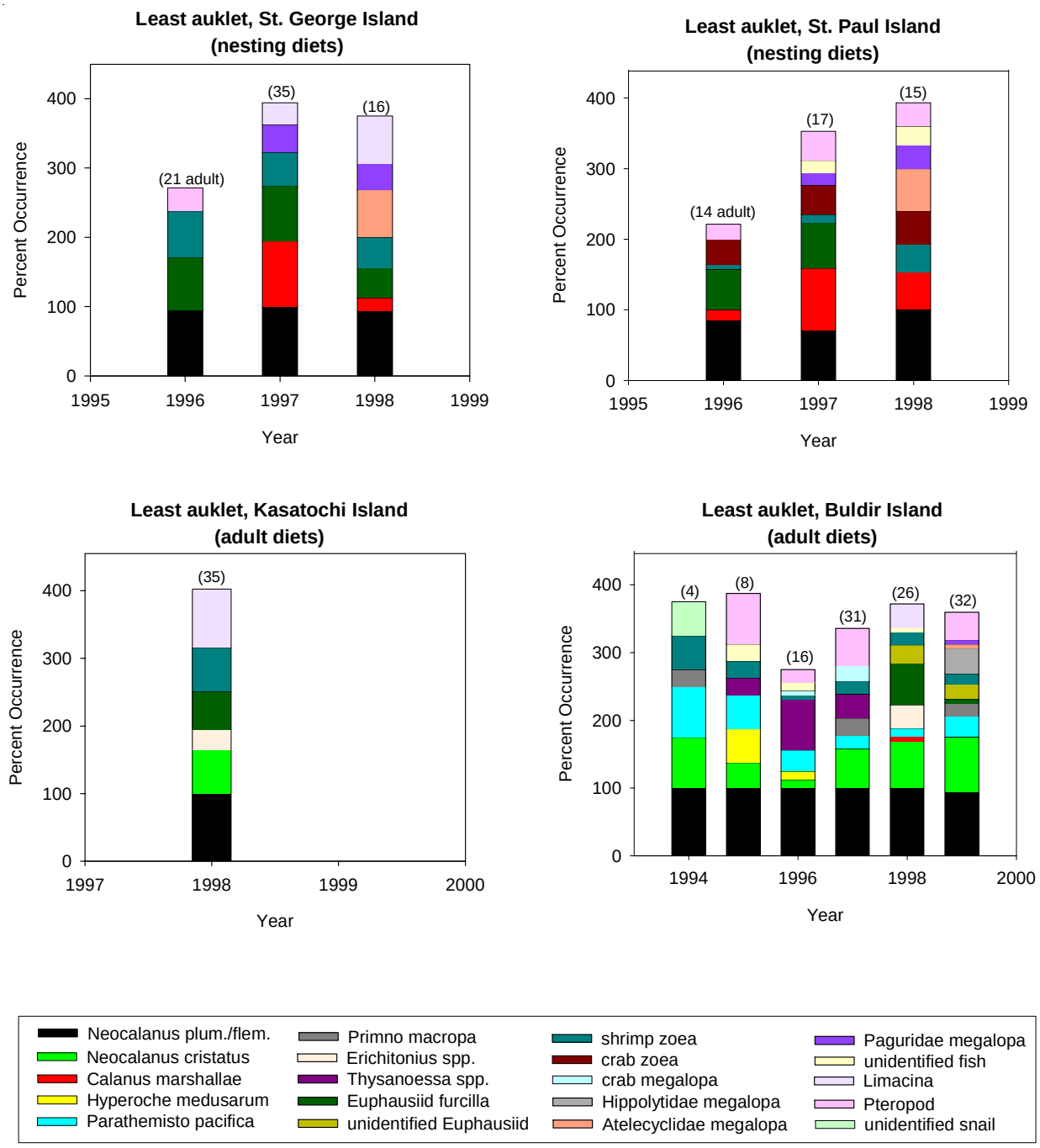



Figure 39. Diets of least auklets at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Whiskered Auklet (*Aethia pygmaea*)**

Breeding Chronology.–The mean hatching date for whiskered auklets at Buldir Island in 2001 was about average (Table 28).

Table 28. Hatching chronology of whiskered auklets at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Buldir I. | 20 Jun (36)[a] | 22 Jun (36) | 22 Jun[b] (11)[a] | Moore et al. 2001 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means

Productivity.–Productivity of whiskered auklets at Buldir Island was below average for this species at the only site at which it was monitored in 2001 (Table 29).

Table 29. Reproductive performance of whiskered auklets at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/ Nest Site[a] | No. of Nest Sites | Reference |
|---|---|---|---|
| Buldir I. | 0.36 | 75 | Moore et al. 2001 |

[a]Nest site is defined as a site where an egg was laid.

Populations.–Although experiments are being conducted with capture-recapture methods (J. Williams and I. Jones, Unpubl. Data), no accepted approach for monitoring population trends has yet been developed. Once methods are developed, it might be possible to monitor whiskered auklets at Buldir, Kasatochi/Koniuji/Ulak islands, and at several less-frequently visited sites.

Diet.–Whiskered auklet diets were only examined at Buldir Island. Their diet was predominantly made up of copepods and euphausiids (Fig. 40).

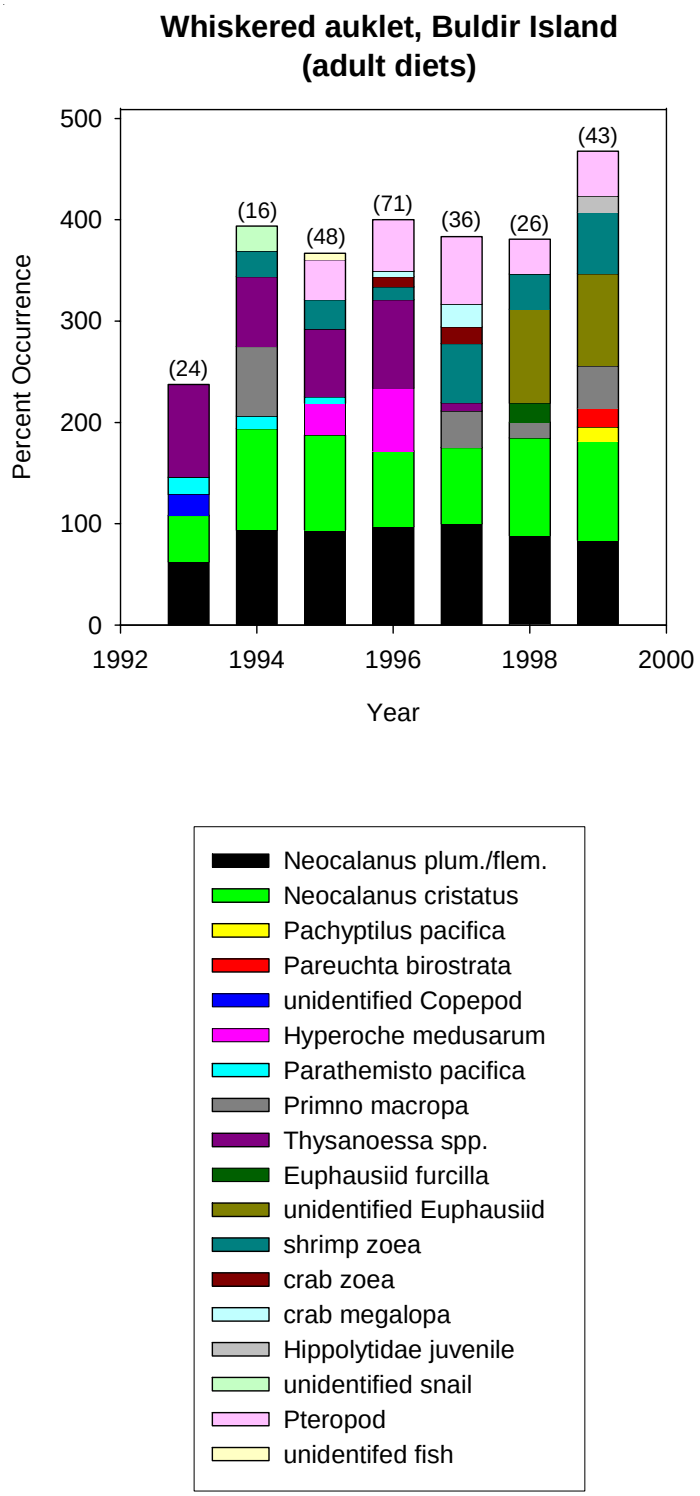



Figure 40. Diets of whiskered auklets at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Crested Auklet (*Aethia cristatella*)**

Breeding Chronology.–The mean date of hatching for crested auklets in 2001 was about average at both Buldir and Kasatochi islands (Table 30, Fig. 41).

Table 30. Hatching chronology of crested auklets at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Buldir I. | 28 Jun (16)[a] | 29 Jun (16) | 28 Jun[b] (11)[a] | Moore et al. 2001 |
| Kasatochi I. | 30 Jun (73) | 1 Jul (73) | 1 Jul[b] (5) | Syria 2001 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity.–Crested auklets had about average rates of success at Buldir Island and below average productivity at Kiska and Kasatochi islands in 2001 (Table 31, Fig. 42).

Table 31. Reproductive performance of crested auklets at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/ Nest Site[a] | No. of Nest Sites | Reference |
|---|---|---|---|
| Buldir I. | 0.64 | 75 | Moore et al. 2001 |
| Kiska I. | 0.39 | 31 | Jones et al. 2001 |
| Kasatochi I. | 0.45 | 109 | Syria 2001 |

[a]Nest site is defined as a site where an egg was laid.

Populations.–In 2001, crested auklet populations were monitored only at Kasatochi Island where numbers appeared to be increasing (Fig. 38).

Diet.–Crested auklets at Kasatochi and Buldir islands ate predominately copepods and euphausiids with amphipods being secondarily important at both sites (Fig. 43).

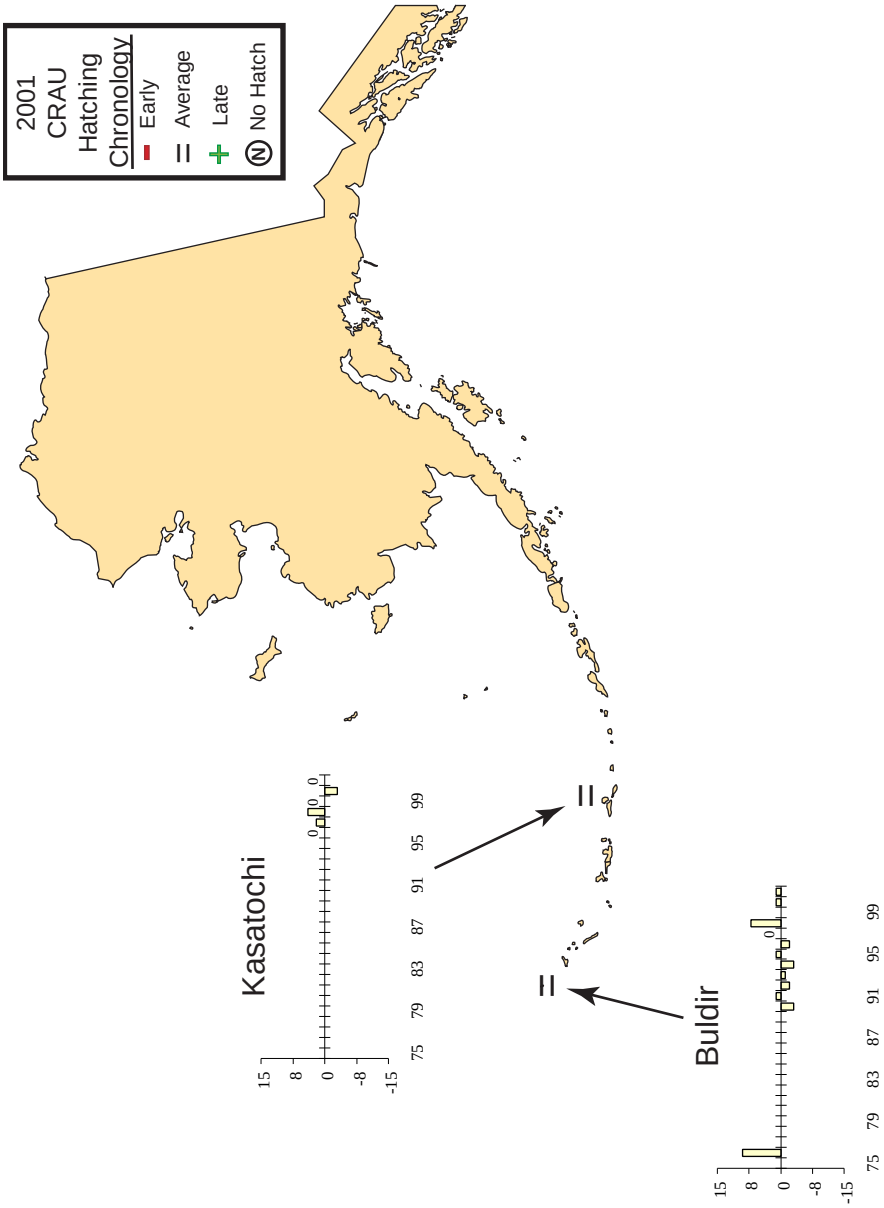



Figure 41. Hatching chronology of crested auklets at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

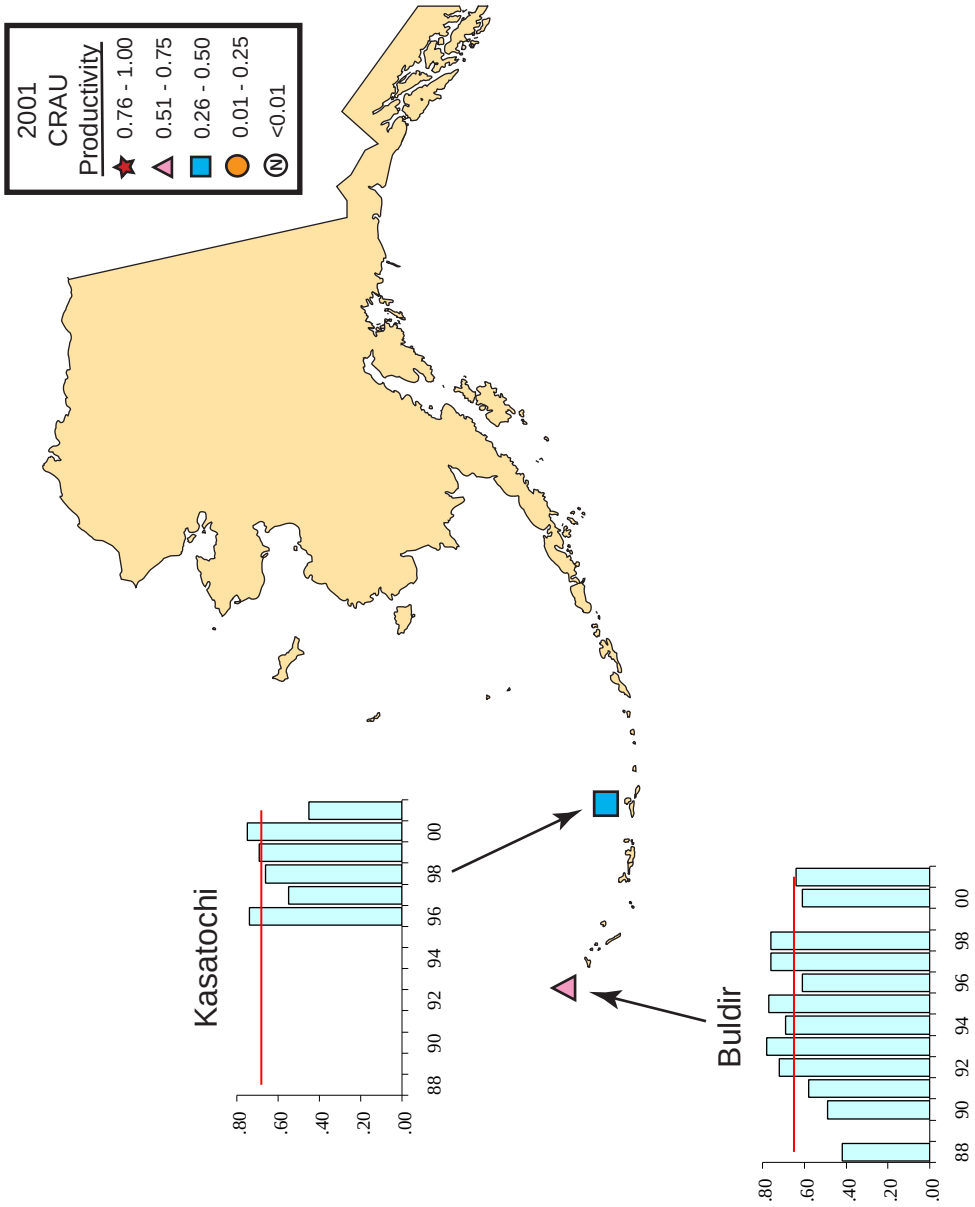



Figure 42. Productivity of crested auklets (chicks fledged/nest site) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

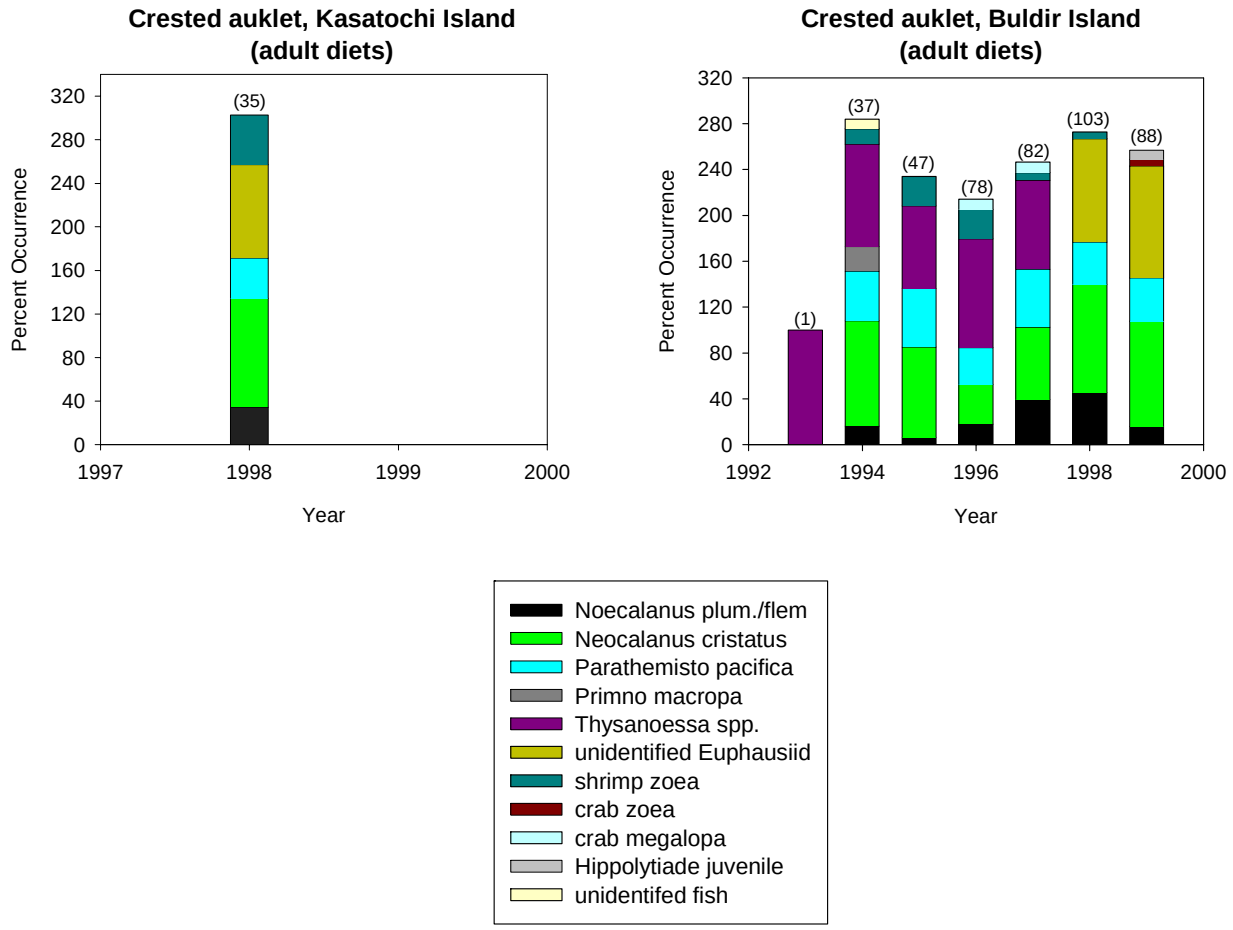



Figure 43. Diets of crested auklets at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Rhinoceros Auklet (*Cerorhinca monocerata*)**

Breeding Chronology.–In 2001, the mean hatch date of rhinoceros auklets at St. Lazaria Island was 22 June (Table 32).

Table 32. Hatching chronology of rhinoceros auklets at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| St. Lazaria I. | — | 22 Jun (11)[a] | N/A[b] | L. Slater Unpubl. Data |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Not applicable or not reported.

Productivity.–Rhinoceros auklet productivity was about average at Middleton and St. Lazaria islands in 2001 (Table 33, Fig. 44).

Table 33. Reproductive performance of rhinoceros auklets at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/Egg | No. of Eggs | Reference |
|---|---|---|---|
| Middleton I. | 0.81 | 56 | S. Hatch Unpubl. Data |
| St. Lazaria I. | 0.58 | 19 | L. Slater Unpubl. Data |

Populations.–There appeared to be no trend in populations of this species at St. Lazaria Island (Fig. 38).

Diet.–In 1998, a small sample of rhinoceros auklet diet samples from Chowiet Island consisted entirely of Pacific sandlance (Fig. 45).

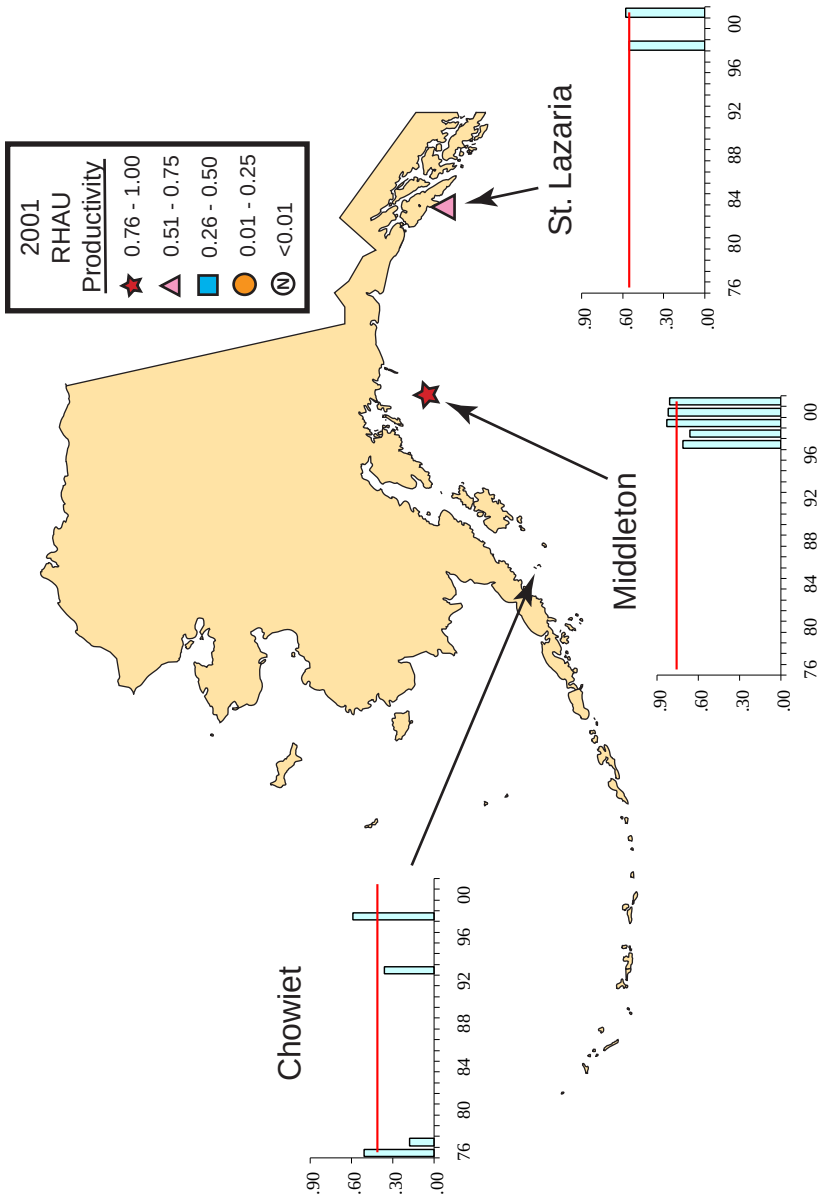



Figure 44. Productivity of rhinoceros auklets (chicks fledged/egg) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

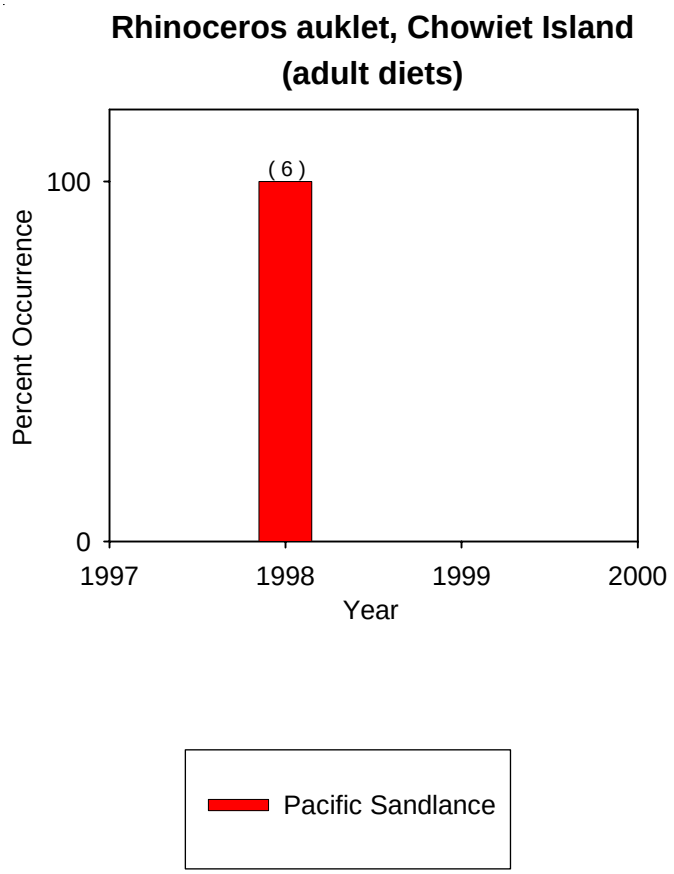



Figure 45. Diets of rhinoceros auklets at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Horned Puffin (*Fratercula corniculata*)**

Breeding Chronology.–Mean hatch date was later than average for this species at Buldir Island in 2001 (Table 34).

Table 34. Hatching chronology of horned puffins at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Buldir I. | 25 Jul (8)[a] | 27 Jul (8) | 23 Jul[b] (13)[a] | Moore et al. 2001 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.

Productivity.–Horned puffins exhibited above average productivity at Buldir Island in 2001 (Table 35, Fig. 46).

Table 35. Reproductive performance of horned puffins at Alaskan sites monitored in 2001.

| Site | Chicks Fledged/Egg | No. of Eggs | Reference |
|---|---|---|---|
| Buldir I. | 0.57 | 56 | Moore et al. 2001 |

Populations.–Although plots have been set up at Buldir Island to monitor trends in horned puffins, no accepted method of monitoring has been developed, and no counts were made in 2001.

Diet.–Horned puffin diets from Buldir Island consisted primarily of greenling, Pacific sandlance and some squid (Fig. 47).

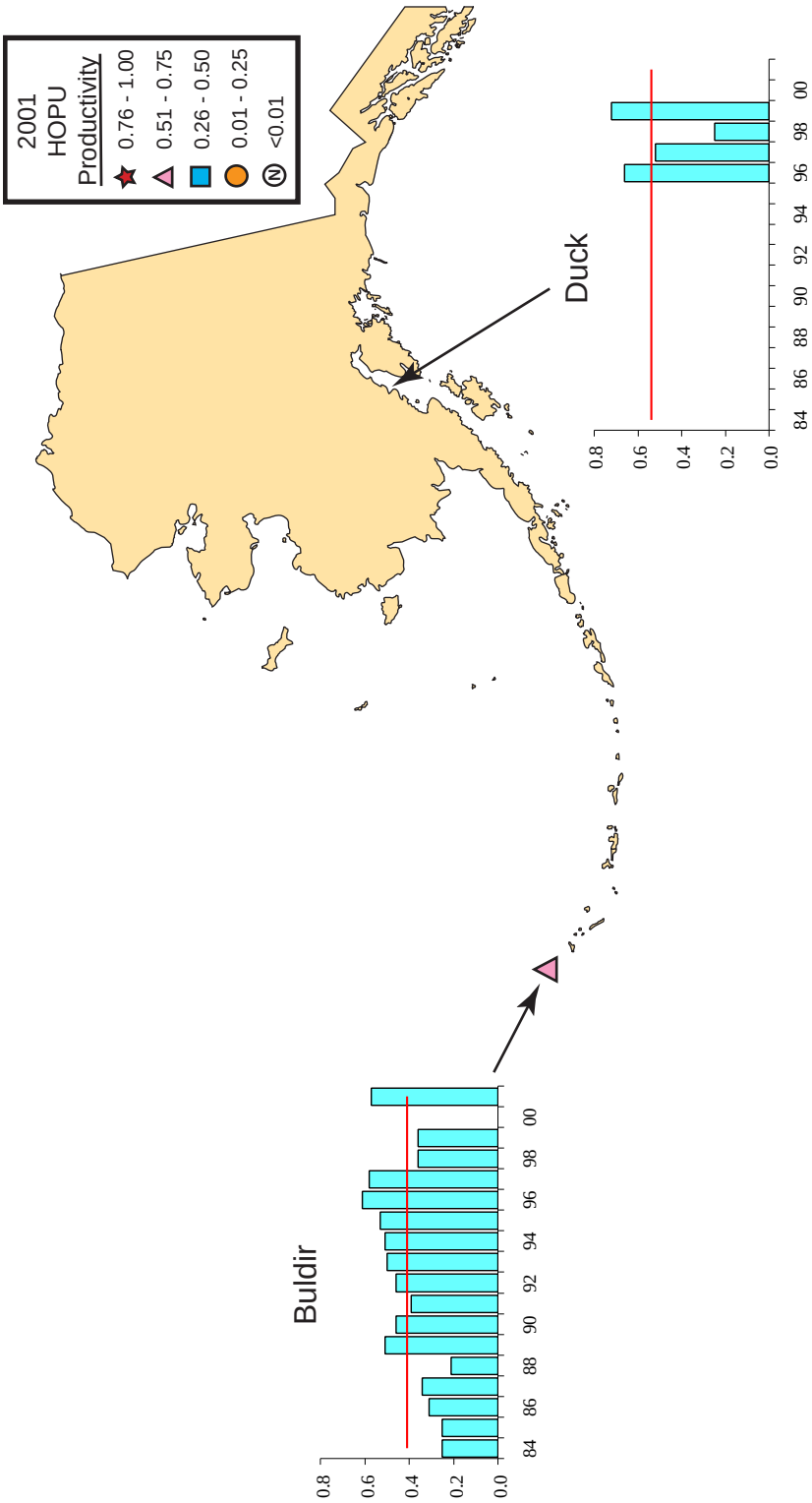



Figure 46. Productivity of horned puffins (chicks fledged/egg) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

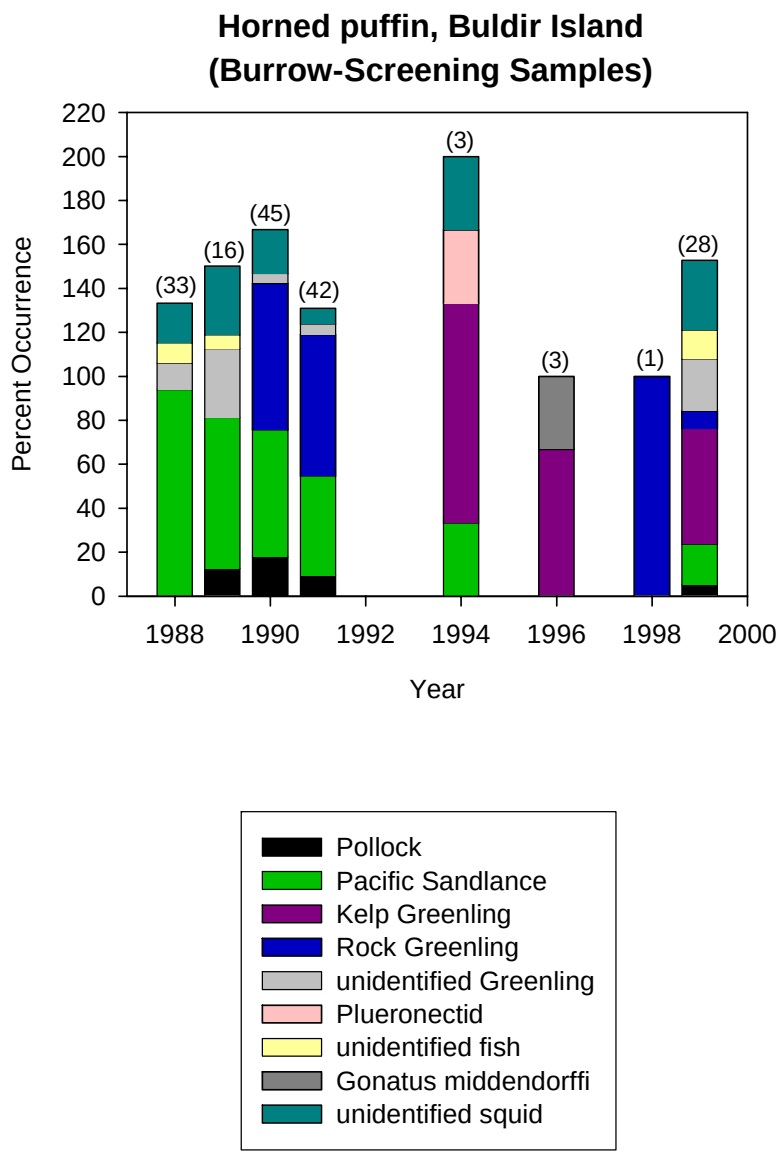



Figure 47. Diets of horned puffins at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

**Tufted Puffin (*Fratercula cirrhata*)**

Breeding Chronology.–Hatch dates for tufted puffins were about average at Aiktak Island and later than normal at Buldir Island in 2001 (Table 36, Fig. 48).

Table 36. Hatching chronology of tufted puffins at Alaskan sites monitored in 2001.

| Site | Median | Mean | Long-term Average | Reference |
|---|---|---|---|---|
| Buldir I. | 20 Jul (1)[a] | 20 Jul (1) | 13 Jul[b] (12)[a] | Moore et al. 2001 |
| Aiktak I. | 25 Jul (39)[a] | 27 Jul (39) | 28 Jul[b](5)[a] | Sztukowski and Oleszczuk 2001 |

[a]Sample size in parentheses represents the number of nest sites used to calculate the mean or median hatch date and the number of years used to calculate the long-term average. Current year not included in long-term average.
[b]Mean of annual means.

Productivity.–Tufted puffin productivity was about average in 2001 at Buldir Island, above average at Aiktak Island and relatively low at St. Lazaria Island (Table 37, Fig. 49).

Table 37. Reproductive performance of tufted puffins at Alaskan sites monitored in 2001.

| Site | Chicks Fledged[a]/Egg | No. of Eggs | Reference |
|---|---|---|---|
| Buldir I. | 0.47 | 30 | Moore et al. 2001 |
| Aiktak I. | 0.46 | 61 | Sztukowski and Oleszczuk 2001 |
| St. Lazaria I. | 0.44 | 63 | L. Slater Unpubl. Data |

[a]Fledged chick defined as being still alive at last check in August or September.

Populations.–The numbers of tufted puffin burrows apparently are increasing at Buldir, Bogoslof and Aiktak islands in the Aleutians but relatively stable at Gulf of Alaska sites (Fig. 50).

Diet.–The most frequently occurring prey species at Aiktak Island was walleye pollock (Fig. 51). Tufted puffins at the Barren Islands caught predominately capelin with lesser amounts of pollock and sandlance. Puffins on Buldir Island foraged on a diversity of prey types with the dominant prey species changing from year to year.

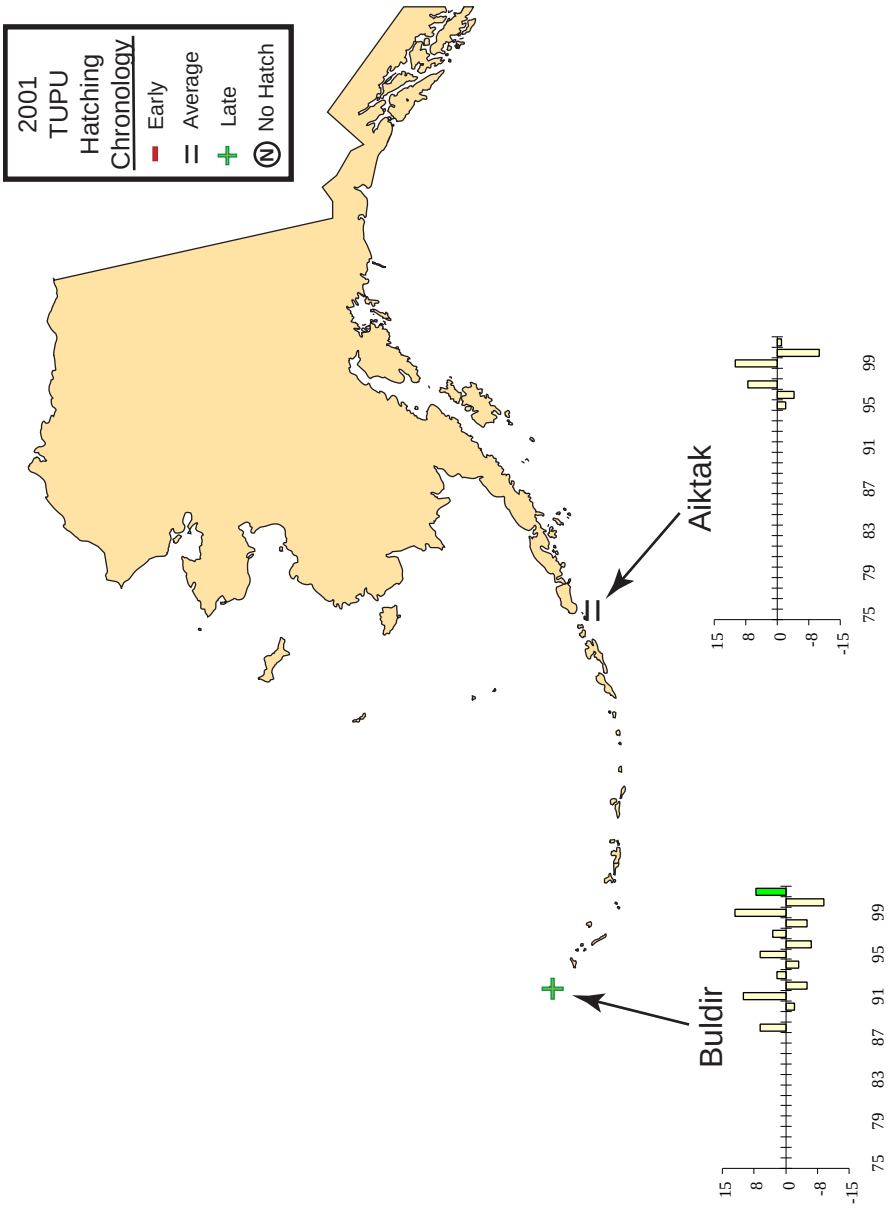



Figure 48. Hatching chronology of tufted puffins at Alaskan sites monitored in 2001. Graphs indicate the departure (if any), in days, from the site mean (current year not included).

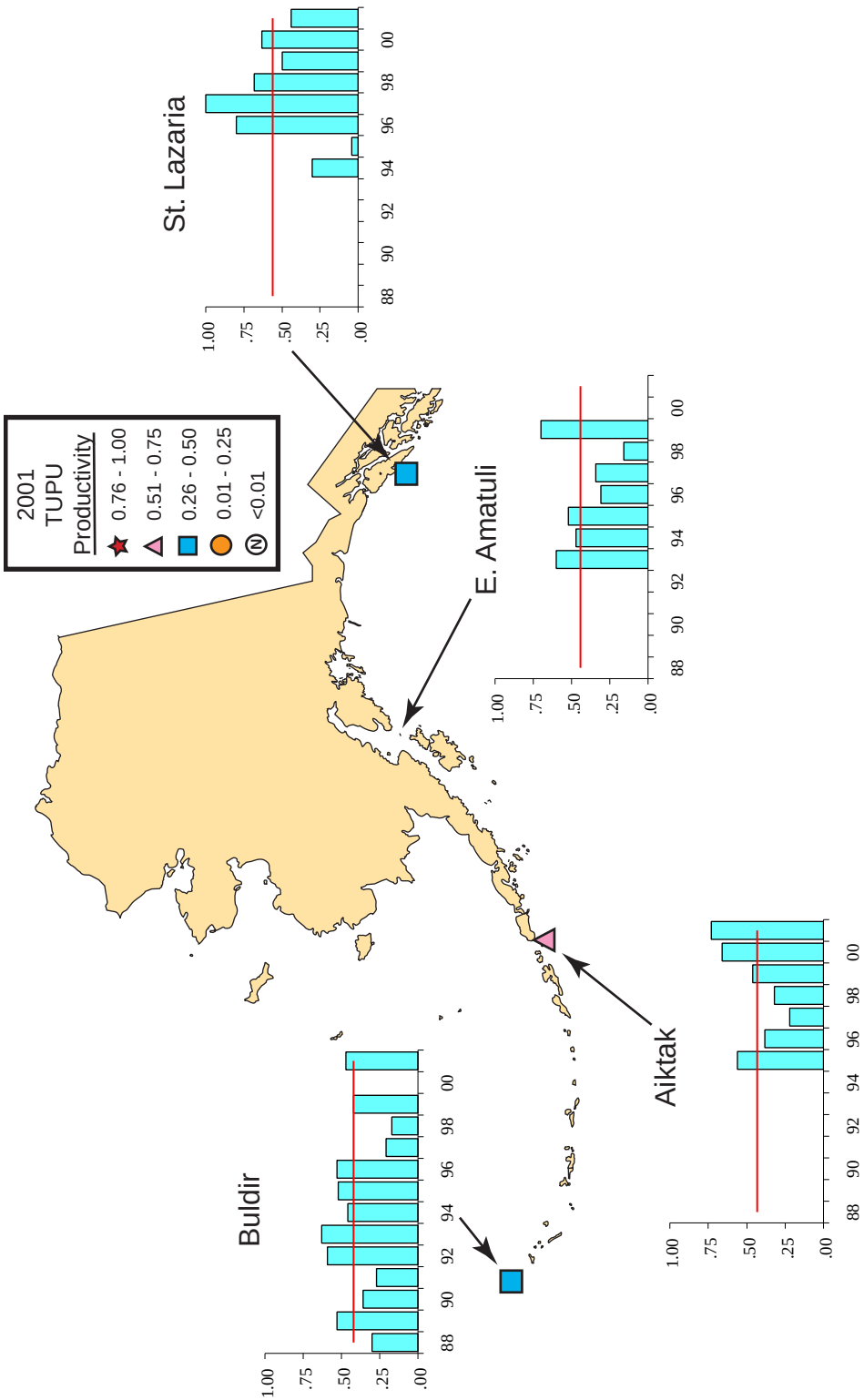



Figure 49. Productivity of tufted puffins (chicks fledged/egg) at Alaskan sites monitored in 2001. Lack of bars on graphs indicates that no data were gathered in those years. Red line is the mean productivity at the site in all years for which there are data (current year not included).

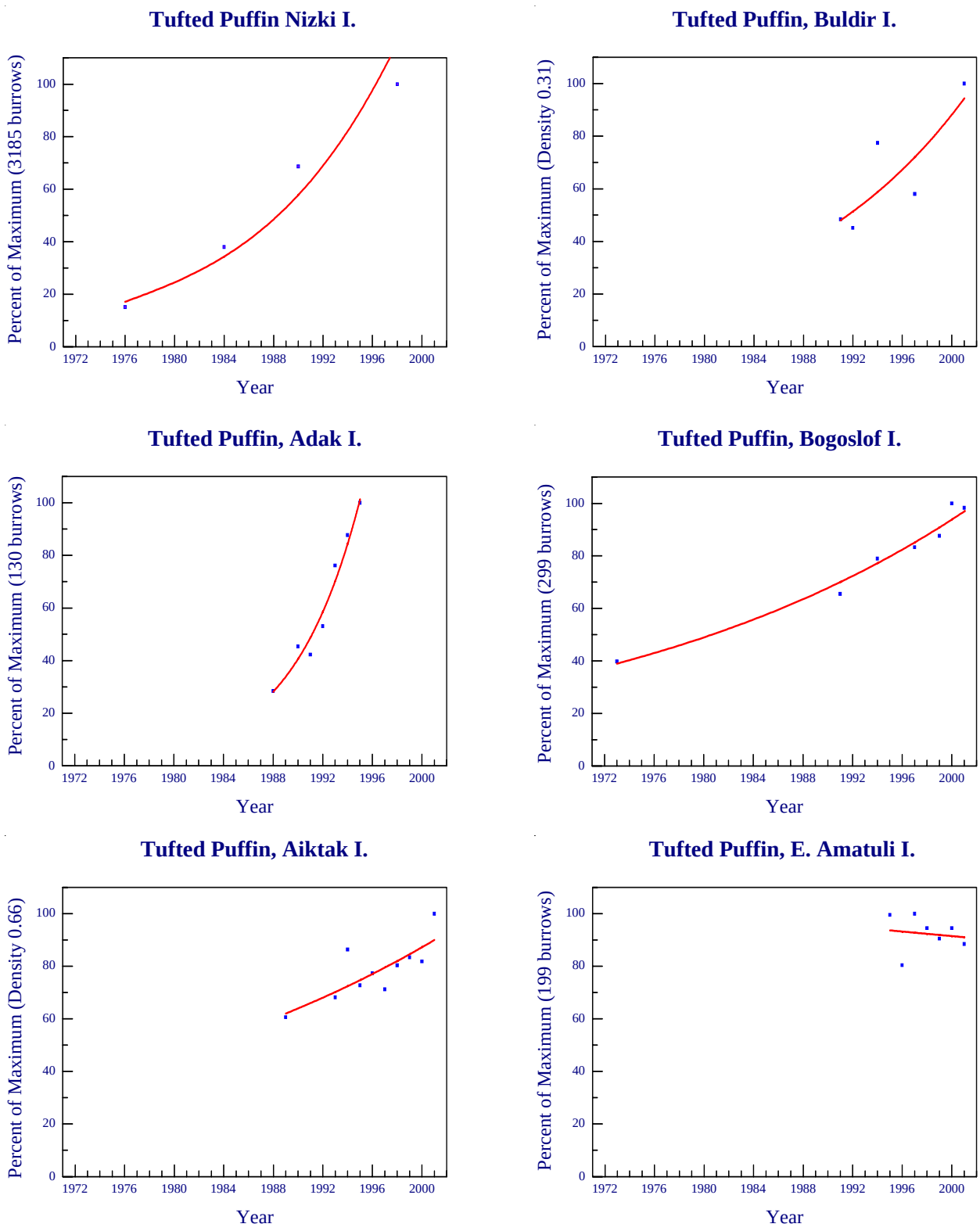
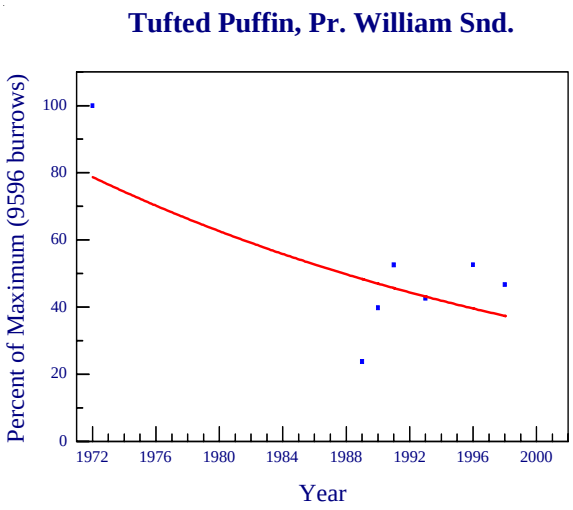



Figure 50. Trends in populations of tufted puffins at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.



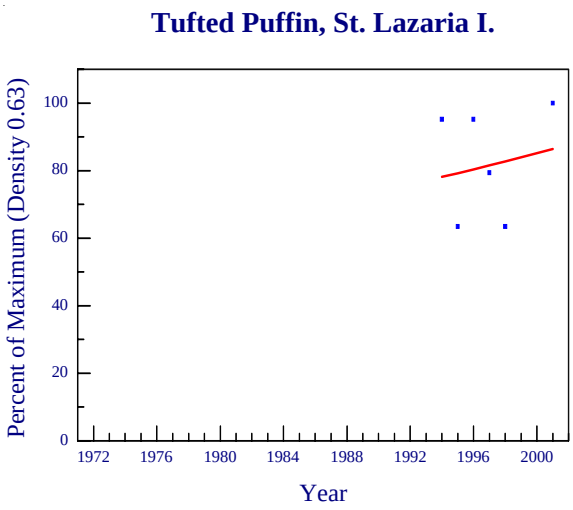




Figure 50 (continued). Trends in populations of tufted puffins at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts.

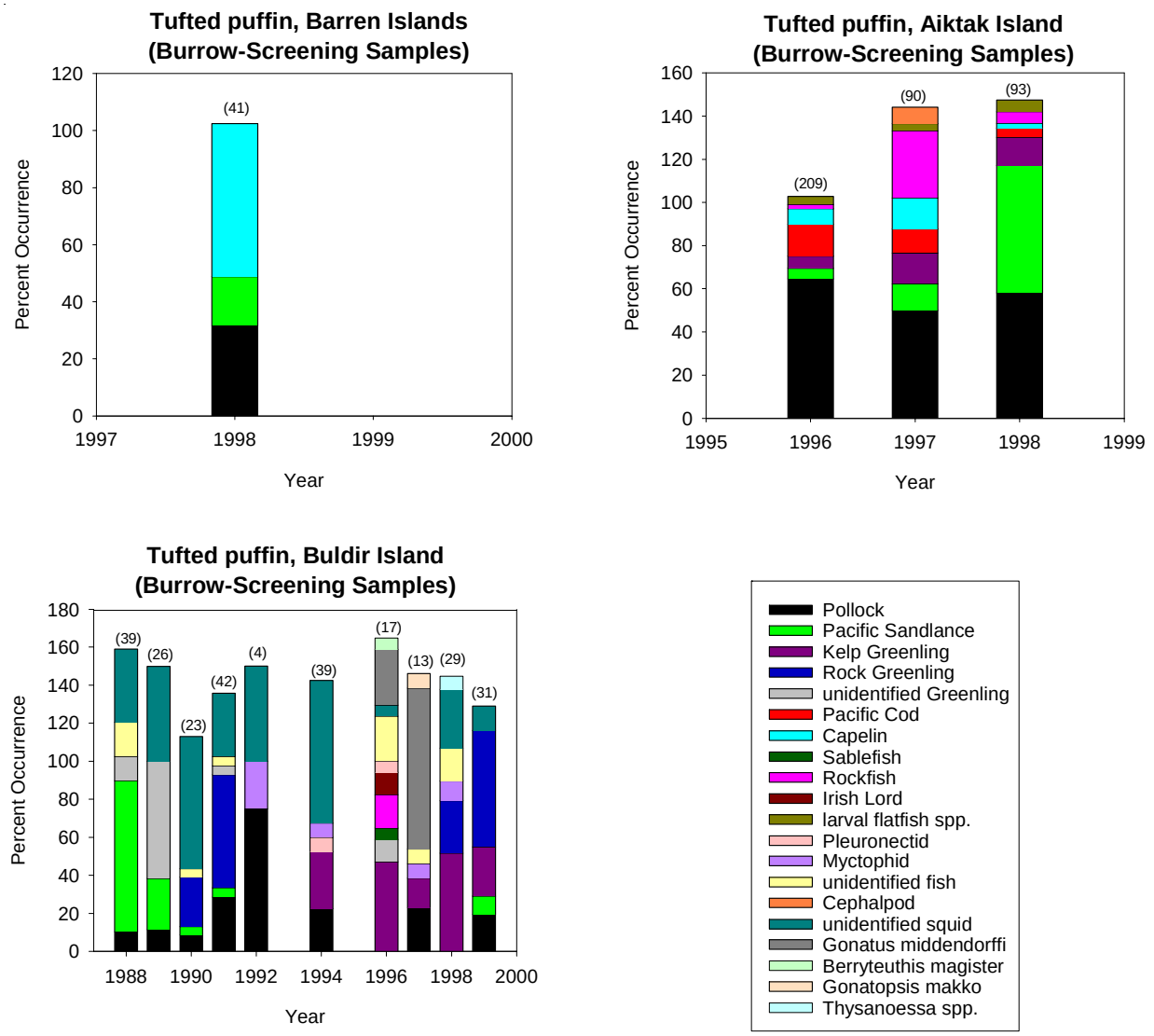



Figure 51. Diets of tufted puffins at Alaskan sites. Sample sizes are indicated by the number above the stacked bars. Source of samples (adult or chick) is indicated in the graph title. Data are reported as percent occurrence of prey type in the diet. Cumulative percent occurrence generally adds to more than100% because birds ate more than one prey type per foraging trip.

## CONCLUSIONS

### Species Differences

Surface Plankton-Feeders.–In 2001, the timing of hatching for both fork-tailed (FTSP) and Leach's (LHSP) storm-petrels was about average at Aiktak Island and late at St. Lazaria Island (Table 38). Both species of storm-petrels had better than average reproductive success at Aiktak Island, while both experienced average productivity at Buldir Island (Table 39). Fork-tailed Storm-petrels also had about average success at Ulak and St. Lazaria islands. Leach's storm-petrels at St. Lazaria Island had below normal success in 2001. Storm-petrel (STPE) burrow densities (both species combined) have increased or remained stable in recent years (Table 40).

Surface Fish-Feeders.–Northern fulmar (NOFU) populations appeared to be stable at the Pribilof Islands and at Chowiet Island (Table 40).

Glaucous-winged gulls (GWGU) are treated here, although they are opportunistic feeders taking other birds as well as fish for prey. In 2001, gull eggs hatched earlier than normal at both Aiktak and St. Lazaria islands (Table 38). Gulls had below average productivity at Buldir Island, average success at Aiktak Island and above average reproduction at St. Lazaria Island in 2001 (Table 39). Gull populations showed positive or stable trends at all but one colony (Table 40). Gull numbers appeared to be declining at Buldir Island.

Black-legged kittiwakes (BLKI) had earlier than normal hatch dates at three of the four sites monitored in 2001 (Table 38). Average or below average productivity occurred in 2001 at sites in the Bering Sea and Aleutian Islands, with nine of ten colonies experiencing below average success (Table 39). This species had above average productivity at all three monitored colonies in the Gulf of Alaska. Black-legged kittiwake populations exhibited stable trends at five sites, declines at seven colonies and increases at five locations (Table 40).

Red-legged kittiwake (RLKI) eggs hatched earlier than normal in 2001 at the Pribilof Islands (St. Paul and St. George islands), and at Buldir Island (Table 38). Reproductive success was lower than average at all four monitored colonies in 2001 (Table 39). This species appeared to be declining at three colonies but increasing at Buldir Island (Table 40).

Diving Fish-Feeders (nearshore).–Timing of hatching was about average for pelagic cormorants (PECO) at Cape Peirce in the eastern Bering Sea in 2001 (Table 38). Red-faced cormorants (RFCO) had average or better success at six of the seven monitored sites in 2001 (Table 39). Red-faced cormorant productivity was below average at St. George Island. Pelagic cormorants exhibited average or above average success at most monitored colonies, the exception being below average productivity at Kasatochi Island (Table 39). Red-faced cormorants appear to be in decline at both monitored colonies (Table 40). Pelagic cormorants showed downward trends at five locations, whereas numbers of this appeared to be increasing at St. Lazaria Island and are stable at Cape Peirce. Cormorant counts suggested declines at Aiktak Island and an increase at Kasatochi Island.

Pigeon guillemot (PIGU) numbers showed negative trends at both Aiktak and Buldir islands but appeared to be increasing at St. Lazaria Island (Table 40).

Table 38. Seabird relative breeding chronology compared to averages for past years within regions[a]. Only sites for which there were data from 2001 are included.

| Region | Site | FTSP | LHSP | PECO | GWGU | BLKI | RLKI | COMU | TBMU | AMNU | PAAU | LEAU | WHAU | CRAU | HOPU | TUPU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N. Bering/ Chukchi | Bluff | | | | | | | – | | | | | | | | |
| SE Bering | St. Paul I. | | | | | – | – | = | = | | | | | | | |
| | St. George I. | | | | | – | – | = | = | | | | | | | |
| | C. Peirce | | | = | | = | | = | | | | | | | | |
| | Aiktak I. | = | = | | – | | | = | = | = | | | | | | = |
| SW Bering | Buldir I. | | | | | – | – | – | = | | – | = | = | = | + | + |
| | Kasatochi I. | | | | | | | | | | | = | | = | | |
| Gulf of Alaska | Puale Bay | | | | | | | – | – | | | | | | | |
| Southeast | St. Lazaria I. | + | + | | – | | | – | – | | | | | | | |

[a] Codes:
"–" indicates hatching chronology was > 3 days earlier than average for this site or region,
"=" indicates within 3 days of average
"+" indicates hatching chronology was > 3 days later than average for this site or region.

Table 39. Seabird relative productivity levels compared to averages for past years within regions[a]. Only sites for which there were data from 2001 are included.

| Region | Site | FTSP | LHSP | RFCO | PECO | GWGU | BLKI | RLKI | COMU | TBMU | ANMU | PAAU | LEAU | WHAU | CRAU | RHAU | HOPU | TUPU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N. Bering/ Chukchi | C. Lisburne | | | | | | – | | | | | | | | | | | |
| | Bluff | | | | | | – | | | | | | | | | | | |
| SE Bering | St. Paul I. | | | + | | | – | – | + | = | | | | | | | | |
| | St. George I. | | | – | | | – | – | = | = | | | | | | | | |
| | C. Peirce | | | | = | | – | | – | | | | | | | | | |
| | Round I. | | | | + | | – | | – | | | | | | | | | |
| | Bogoslof I. | | | | | | = | – | | | | | | | | | | |
| | Aiktak I. | + | + | + | + | = | | | = | + | = | | | | | | | + |
| SW Bering | Buldir I. | = | = | | = | – | – | – | = | – | | – | = | – | = | | + | = |
| | Kiska I. | | | | | | – | | | | | | – | | – | | | |
| | Ulak I. | = | | + | + | | | | | | | | | | | | | |
| | Kasatochi I. | | | = | – | | | | – | – | | | = | | – | | | |
| | Koniuji I. | | | | | | – | | | | | | | | | | | |
| Gulf of Alaska | Puale Bay | | | + | | | | | + | + | | | | | | | | |
| | Chiniak Bay | | | + | + | | + | | | | | | | | | | | |
| | E. Amatuli I. | | | | | | + | | | | | | | | | | | |
| | Pr. Will. Snd. | | | | | | + | | | | | | | | | | | |
| | Middleton I. | | | | | | | | | | | | | | | = | | |
| Southeast | St. Lazaria I. | = | – | | = | + | | | + | + | | | | | | = | | – |

[a] Codes:
"–" indicates productivity was > 20% below average for this site or region,
"=" indicates within 20% of average
"+" indicates productivity was > 20% above average for this site or region.

Table 40. Seabird population trends compared within regions[a].

| Region | Site | NOFU | STPE | RFCO | PECO | UNCO | GWGU | BLKI | RLKI | COMU | TBMU | UNMU | PIGU | LEAU | CRAU | RHAU | TUPU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N. Bering/ Chukchi | C. Lisburne | | | | | | | = | | | | + | | | | | |
| | C. Thompson | | | | | | | = | | | | – | | | | | |
| | Bluff | | | | | | | = | | + | | | | | | | |
| | Hall I. | | | | | | | | | = | – | | | | | | |
| SE Bering | St. Paul I. | = | | | | | | – | – | – | – | | | | | | |
| | St. George I. | = | | | | | | – | – | = | = | | | | | | |
| | C. Newenham | | | | | | | = | | – | | | | | | | |
| | C. Peirce | | | | = | | | – | | – | | | | | | | |
| | Bogoslof I. | | | | | | | | | | | | | | | | + |
| | Aiktak I. | | + | | | – | = | | | | | = | – | | | | + |
| SW Bering | Nizki I. | | | | | | | | | | | | | | | | + |
| | Buldir I. | | = | | – | | – | + | + | | + | | – | | | | + |
| | Adak I. | | | | | | | | | | | | | | | | + |
| | Ulak I. | | | | | | | | | | | = | | | | | |
| | Kasatochi I. | | | | | + | = | | | | | | | – | + | | |
| | Koniuji I | | | | | | | = | – | | | + | | | | | |
| Gulf of Alaska | Semidi Is. | | | – | – | | | | | | | | | | | | |
| | Chowiet I. | = | | | | | | – | | | | + | | | | | |
| | Puale Bay | | | | | | = | – | | | | – | | | | | |
| | Chiniak Bay | | | – | – | | | + | | | | | | | | | |
| | Nord I. | | | | | | | | | = | | | | | | | |
| | E. Amatuli I. | | + | | | | + | + | | + | | | | | | | = |
| | Gull I. | | | | – | | | + | | + | | | | | | | |
| | Chisik/Duck Is. | | | | | | | – | | – | | | | | | | |
| | Chiswell Is. | | | | | | | | | = | | | | | | | |
| | P. William Snd | | | | | | | + | | | | | | | | | – |
| | Middleton I. | | | | – | | + | – | | | | – | | | | | |
| Southeast | St. Lazaria I. | | + | | + | | = | | | | | – | + | | | = | = |

[a]Codes:
"–" indicates negative population trend for this site or region,
"=" indicates no discernable trend
"+" indicates positive population trend for this site or region.

Diving Fish-Feeders (offshore).–Common murres (COMU) were early at Bluff, Buldir Island, Puale Bay and St. Lazaria Island and average elsewhere (Table 38). Thick-billed murre (TBMU) timing was earlier than average at Puale Bay and St. Lazaria Island and average elsewhere (Table 38).

Common murres exhibited average or above average reproductive success at all sites except Cape Peirce and Round Island where success was below normal, and at Kasatochi Island where this species failed completely (Table 39). Thick-billed murres also failed at Kasatochi Island and had below average success at Buldir Island in 2001 (Table 39). Average or above average productivity was achieved by this species at all other sites where it was monitored.

Numbers of common murres showed increasing trends at three colonies, declines at four sites and remained relatively stable at four locations (Table 40). Thick-billed murre populations appeared to be declining at two sites, increasing at one colony and remained stable at one location. At colonies where murres were not identified to species during counts (UNMU), numbers apparently increased or remained stable at five sites and showed negative trends at four colonies.

Ancient murrelet (ANMU) hatching chronology and productivity were about average at Aiktak Island in 2001 (Tables 38 and 39).

Rhinoceros auklets (RHAU) exhibited about average productivity in 2001 at both Middleton and St. Lazaria islands (Table 39). There was no discernible trend in populations of this species at St. Lazaria Island (Table 40).

Horned puffins (HOPU) exhibited later than normal hatching chronology and above average productivity at Buldir Island in 2001 (Tables 38 and 39).

Tufted puffin (TUPU) eggs hatched at about the normal time at Aiktak Island and later than average at Buldir Island in 2001 (Table 38). Reproductive success for tufted puffins was average or above average at Aiktak and Buldir islands but below average at St. Lazaria Island in 2001 (Table 39). An upward population trend was evident for tufted puffins at five colonies but no trends were discernible for this species at two sites (Table 40). Tufted puffin numbers appear to be declining in Prince William Sound.

Diving Plankton-Feeders.–Least (LEAU), whiskered (WHAU) and crested (CRAU) auklets had approximately average nesting chronologies at all sites where they were monitored in 2001 (Table 38). Timing was early for parakeet auklets (PAAU) at Buldir Island in 2001. Productivity was below average for parakeet auklets at Buldir Island in 2001 (Table 39). Least auklets had average success at Buldir and Kasatochi islands but lower than normal success at Kiska Island. Whiskered auklets exhibited below normal reproductive success at Buldir Island. Crested auklet productivity was about average at Buldir Island but below average at Kiska and Kasatochi islands in 2001. Populations of least auklets showed a negative trend at Kasatochi Island while crested auklet numbers appeared to be relatively stable there (Table 40).

**Regional Differences**

N. Bering/Chukchi.–Common murres hatched earlier than normal at Bluff in 2001 (Table 38). Reproductive success was below average for black-legged kittiwakes in the region in 2001 (Table 39). The only population trend data were for offshore fish-feeders (kittiwakes and murres). Black-legged kittiwake numbers appeared to be stable in this region (Table 40). Common murre populations exhibited no trend at Hall Island whereas thick-billed murres appeared to be declining there. Murres showed negative trends at one other location while apparently increasing at two colonies in this region.

SE Bering.–Hatch dates for fork-tailed and Leach's storm-petrels at Aiktak Island were about average in 2001 (Table 38). All species of fish-feeders exhibited early or normal timing in this region, with five of 16 cases resulting in earlier than normal breeding chronology.

Storm-petrels apparently had adequate plankton available for higher than normal reproduction in 2001 (Table 39). Cormorants experienced average productivity or above in this region with the exception of the below average success of red-faced cormorants at St. George Island. Glaucous-winged gulls had about average productivity at the only site monitored in the Southeastern Bering Sea area in 2001. Kittiwakes exhibited poorer than normal productivity in seven of eight instances in this region, the exception being the average success of black-legged kittiwakes at Bogoslof Island. Murre productivity was average or above average at six of the eight colonies monitored in this region in 2001. Common murres had lower than normal success at Cape Peirce and Round Island, both in the Bristol Bay area. Ancient murrelets exhibited average reproductive success at Aiktak Island while tufted puffins there had better than average success in 2001.

Northern fulmar numbers appeared to be stable at both monitored colonies in this region. (Table 40). Storm-petrel populations appeared to be increasing in the eastern Aleutians (Aiktak Island). There were no clear patterns among fish-feeders in this region (Table 40): 1) pelagic cormorants showed no trend at Cape Peirce but cormorants appeared to be declining at Aiktak Island; 2) glaucous-winged gull numbers appeared to be stable at Aiktak Island, while black-legged kittiwakes seemed to be declining at Cape Peirce and the Pribilof Islands but showed no trend at Cape Newenham; 3) red-legged kittiwakes exhibited declines at the Pribilofs; 4) murres showed declining trends at four colonies whereas murre numbers appeared to be stable at three sites; 5) pigeon guillemot populations seemed to be declining at Aiktak Island; and 6) tufted puffins showed increasing trends at both Bogoslof and Aiktak islands.

SW Bering.–Kittiwake and murre breeding chronology was either earlier than usual or about average in 2001 (Table 38). Plankton-feeders (auklets) also exhibited early or normal breeding chronology in this region. Both tufted and horned puffins exhibited later than normal hatching chronology in the southwestern Bering Sea in 2001.

Both species of storm-petrel had average productivity in this region in 2001 (Table 39). Cormorant success was average or above at four of the five sites monitored. Pelagic cormorants had low productivity at Kasatochi Island. Gulls and kittiwakes showed below average production at all monitored colonies within this region in 2001. The same is true for three of the four sites where reproductive performance was assessed for murres. Auklets exhibited average or below

average productivity at southwestern Bering Sea colonies monitored in 2001. Horned puffins had better than average productivity and tufted puffin success was about normal at Buldir Island.

Storm-petrel populations at Buldir Island appeared to be stable (Table 40). Pelagic cormorants declined at Buldir Island but cormorants appeared to be increasing at Kasatochi Island. Glaucous-winged gulls showed a negative population trend at Buldir Island and appeared to be stable at Kasatochi Island. Both black- and red-legged kittiwakes increased at Buldir Island. At Koniuji Island, black-legged kittiwakes were stable but the small colony of red-legged kittiwakes there appeared to be in decline. Murres were either stable or increasing in this region and pigeon guillemots exhibited declining numbers. Least auklet numbers appeared to be down at Kasatochi Island but crested auklet populations at the same colony showed a positive trend. Tufted puffins also exhibited positive trends at all three sites monitored in this region.

N. Gulf of Alaska.–Breeding chronology was earlier than normal for both species of murre at Puale Bay in 2001 (Table 38).

Productivity was above normal for all of the species we monitored in this region in 2001, with the exception of average success for rhinoceros auklets at Middleton Island (Table 39).

Northern fulmars showed no discernible trend in populations at Chowiet Island (Table 40). Storm-petrels at East Amatuli Island appeared to be increasing. Both red-faced and pelagic cormorants showed negative population trends at all six monitored colonies in the Gulf of Alaska. Glaucous-winged gull counts indicated either no trends or increases in this region. Black-legged kittiwake trends were down at four sites and up at four locations. Murre numbers exhibited increasing trends at three sites, declines at three sites and apparently stable populations at two colonies. Tufted puffin numbers appeared to be stable at East Amatuli Island but declined in Prince William Sound.

Southeast Alaska.–Storm-petrel eggs hatched late whereas gull and murre eggs hatched early at St. Lazaria Island, the only site monitored in this region in 2001 (Table 38).

Productivity of fork-tailed storm-petrels at St. Lazaria Island was approximately normal in 2001 whereas that of Leach's storm-petrels was below average there (Table 39). Success was at or above average for all other monitored species in this region except for tufted puffins, which had below average productivity in 2001.

Storm-petrel, pelagic cormorant and pigeon guillemot numbers appeared to be increasing at St. Lazaria Island (Table 40). Glaucous-winged gull, rhinoceros auklet and tufted puffin populations were stable whereas murres showed negative trends at this colony.

## ACKNOWLEDGMENTS

The data summarized in this report were gathered by many people, most of which are cited in the references section. We appreciate their efforts. We also would like to thank Scott Hatch (USGS, BRD), David Roseneau (Alaska Maritime NWR), Leslie Slater (Alaska Maritime NWR), and Jeff Williams (Alaska Maritime NWR) for the data they kindly provided. Diet samples were identified by Dr. Alan Springer (Falco). Finally, we would like to extend our thanks to the staff of the Alaska Maritime NWR for their assistance during both the data collection and writing phases of this project.

All photographs used in this report are Fish and Wildlife Service pictures except those of the fork-tailed storm-petrel, parakeet auklet, least auklet, tufted puffin and horned puffin which were taken by Ian Jones, and the ancient murrelet taken by Fiona Hunter, and used with permission. Cover art by Susan Steinacher.

## REFERENCES


Byrd, G. V. Alaska Maritime NWR, USFWS. Unpublished Data, 2001. Homer, Alas.

_____, and D. E. Dragoo. 1997. Breeding success and population trends of selected seabirds in Alaska in 1996. U. S. Fish and Wildl. Serv. Report AMNWR 97/11. Homer, Alas.

_____, and D. B. Irons. 1998. Breeding status and population trends of seabirds in Alaska in 1997.
U. S. Fish and Wildl. Serv. Report AMNWR 98/02. Homer, Alas.

_____. 1999. Breeding status and population trends of seabirds in Alaska in 1998. U. S. Fish and Wildl. Serv. Report AMNWR 99/02. Homer, Alas.

Cody, M. 2001. Round Island field report, May 14 - August 10, 2001. U. S. Fish and Wildl. Serv. Report. Anchorage, Alas.

Doster, J., and S. Savage. 2002. Populations and productivity of seabirds on the Pacific coast of Becharof National Wildlife Refuge, Alaska Peninsula, Alaska, June-September 2001. U. S. Fish and Wildl. Serv. Report, King Salmon, Alaska.

Dragoo, D. E., G. V. Byrd, and D. B. Irons. 2000. Breeding status and population trends of seabirds in Alaska in 1999. U. S. Fish and Wildl. Serv. Report AMNWR 2000/02.

_____. 2001. Breeding status, population trends and diets of seabirds in Alaska, 2000. U. S. Fish and Wildl. Serv. Report AMNWR 01/07.

Hatch, S., BRD, USGS. Unpublished Data, 2001. Anchorage, Alas.

Irons, D. B., Migratory Bird Management, USFWS, Unpubl. Data 2001. Anchorage, Alas.

Jones, I. L., C. M. Gray. J. Dusureault, and A. L. Sowls. 2001. Auklet demography and Norway rat distribution and abundance at Sirius Point, Kiska Island, Aleutian Islands, Alaska. Memorial University of Newfoundland. St. John's, Newfoundland, Canada.

Kettle, A., Alaska Maritime NWR, USFWS. Unpublished Data, 2001. Homer, Alas.

MacDonald, R. 2002. The status of kittiwakes, murres and cormorants at Cape Peirce, Bristol Bay, Alaska, Summer 2001. U. S. Fish and Wildl. Serv. Report, Togiak NWR, Dillingham, Alas.

Mavor, R. A., G. Pickerell, M. Heubeck, and P. I. Mitchell. 2002. Seabird numbers and breeding success in Britain and Ireland, 2001. UK Nature Conservation, No. 26. Petersborough, Joint Nature Conservation Committee.

Moore, H., P. Kappes, and M. Grinnell. 2001. Biological monitoring at Buldir Island, Alaska in 2001: Summary appendices. U. S. Fish and Wildl. Serv. Report AMNWR 01/11. Homer, Alas.

Murphy, E. C. 2001. Monitoring cliff-nesting seabirds at Bluff, Alaska. Report of activities and findings in 2001. Report to Alaska Maritime NWR from Institute of Arctic Biology, University of Alaska, Fairbanks, Alas.

Papish, R. 2001. Results of seabird monitoring at St. George Island, Alaska in 2001: Summary appendices. U. S. Fish and Wildl. Serv. Report AMNWR 01/12. Homer, Alas.

Roseneau, D., Alaska Maritime NWR, USFWS. Unpublished Data, 2001. Homer, Alas.

Slater, L., Alaska Maritime NWR, USFWS. Unpublished Data, 2001. Homer, Alas.

Snorek, J. 2001. Results of seabird monitoring at St. Paul Island, Alaska in 2001: Summary appendices. U. S. Fish and Wildl. Serv. Report AMNWR 01/13. Homer, Alas.

Syria, S. J. 2001. Biological monitoring in the central Aleutian Islands, Alaska in 2001: Summary appendices. U. S. Fish and Wildl. Serv. Report AMNWR 01/09. Homer, Alas.

Sztukowski, L., and D. Oleszczuk. 2001. Biological monitoring at Aiktak Island, Alaska in 2001. Summary appendices. U. S. Fish and Wildl. Serv. Report AMNWR 01/14. Homer, Alas.

Williams, J., Alaska Maritime NWR, USFWS. Unpublished Data, 2001. Homer, Alas.

USFWS. 1997*a*. Standard operating procedures for population inventories: Ledge-nesting seabirds. U. S. Fish and Wildl. Ser. Rep Homer, Alas.

USFWS. 1997*b*. Standard operating procedures for population inventories: Burrow-nesting seabirds. U. S. Fish and Wildl. Ser. Rep Homer, Alas.

USFWS. 1997*c*. Standard operating procedures for population inventories: Crevice-nesting seabirds. U. S. Fish and Wildl. Ser. Rep Homer, Alas.