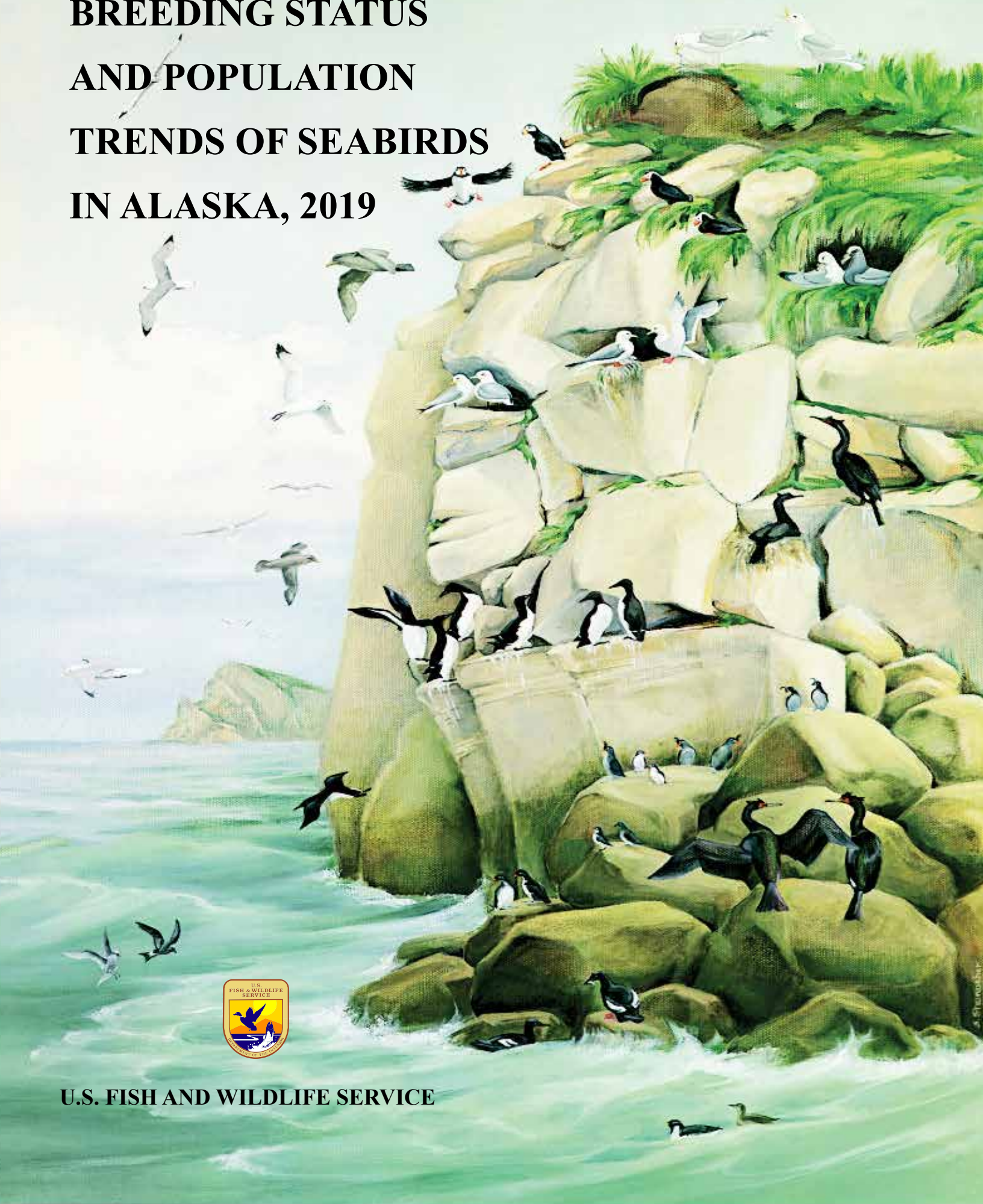# BREEDING STATUS AND POPULATION TRENDS OF SEABIRDS IN ALASKA, 2019

U.S. FISH AND WILDLIFE SERVICE

BREEDING STATUS AND POPULATION TRENDS OF SEABIRDS IN ALASKA, 2019

Compiled By:

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

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The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the U.S. Fish and Wildlife Service or the Department of the Interior.

Executive Summary

Data are 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 U. S. Fish and Wildlife Service. The strategy for colony monitoring includes estimating timing of nesting events, rates of reproductive success, and population trends of representative species of various foraging guilds (e.g., offshore diving 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.

During the summer of 2019, seabird data were gathered at eight annual monitoring sites on the Alaska Maritime NWR. The species/species groups monitored were murres, pigeon guillemots, ancient murrelets, auklets, puffins, kittiwakes, glaucous-winged gulls, storm-petrels, northern fulmars, and cormorants. In addition, data were gathered at five other locations which are visited intermittently, or were part of a research or monitoring program outside the refuge.

Timing of breeding (Table A)

● Statewide, in 2019 mean hatch date was early in 44%, average in 37%, and late in 19% of monitored species. Hatch dates of seven species were earlier than average in 2019. Timing for most other species was average, with three species exhibiting late timing.

● Least auklets hatched early at St. George Island for the sixth year in a row and ancient murrelet hatch date was early for the forth year in a row at Aiktak Island. Mean hatch dates of black-legged kittiwakes were early at four of the five colonies where this species was monitored in 2019.

Table A. Regional and statewide seabird breeding chronology[a] compared to averages for past years within regions and the state of Alaska as a whole. Only regions for which there were data from 2019 are included.

Region	COMU[b]	TBMU	ANMU	PAAU	LEAU	WHAU	CRAU	RHAU	HOPU	TUPU	BLKI	RLKI	GWGU	FTSP	LHSP	RFCO
SE Bering	A	L	E		E				A	A	E	E	E	E	A	E
SW Bering		A		A	E	A	E		A	L	E		A	E	A	
N. GOA[c]	A	A		L					E	A	E		E			
Southeast	L	L						L					A	A	E	
Alaska	A	L	E	A	E	A	E	L	A	L	E	E	A	E	A	E

  [a]Codes:
"E" and red cell color indicate hatching chronology was > 3 days earlier than the average for sites in this region.
"A" and yellow cell color indicate hatching chronology was within 3 days of average.
"L" and green cell color indicate hatching chronology was > 3 days later than the average for sites in this region.
  [b]COMU=common murre, TBMU=thick-billed murre, ANMU=ancient murrelet, PAAU=parakeet auklet, LEAU=least auklet, WHAU=whiskered auklet, CRAU=crested auklet, RHAU=rhinoceros auklet, HOPU=horned puffin, TUPU=tufted puffin, BLKI=black-legged kittiwake, RLKI=red-legged kittiwake, GWGU=glaucous-winged gull, FTSP=fork-tailed storm-petrel, LHSP=Leach's storm-petrel, RFCO=red-faced cormorant.
  [c]GOA=Gulf of Alaska.

Productivity (Table B)

● Statewide, 41% of monitored species exhibited higher than average productivity in 2019, and productivity was average in the remainder of species. No monitored species had a statewide productivity that was below average in 2019.

● Overall, seabird reproductive success was higher in 2019 than in 2018. In 2019, complete breeding failures occurred in only four instances (common murres at Buldir and Chisik islands, black-legged kittiwakes at

Cape Peirce, and pelagic cormorants at St. Lazaria Island).

● Least auklet productivity was below average for the fourth year in a row at St. George Island. This species exhibited average success during the same time period at Buldir Island.

Table B. Regional and statewide seabird breeding productivity levels[a] compared to averages for past years within regions and the state of Alaska as a whole. Only regions for which there were data from 2019 are included.

Region[b]	COMU[c]	TBMU	ANMU	PAAU	LEAU	WHAU	CRAU	RHAU	HOPU	TUPU	BLKI	RLKI	GWGU	FTSP	LHSP	RFCO	PECO
N. BS/CS											H						
SE Bering	H	H	A		L				H	H	A	H	A	A	A	A	L
SW Bering		A		H	A	H	H		H	H	A	L	H	L	A		
N. GOA	L	H		A				A	A	H	H		H			H	H
Southeast	H	H						H					H	A	A		L
Alaska	A	H	A	A	A	H	H	A	A	H	A	H	H	A	A	H	A

Population trends during 2010-2019 (Table C)

● Statewide, only glaucous-winged gulls showed increasing population trends (6%), whereas 38% of species/ species groups were stable, and 56% declined between 2010 and 2019.

● In some cases, recent counts were a small fraction of prior years' counts. 2019 counts suggested that seabird populations were increasing at several colonies but many populations remained well below their historic levels. Future counts will be necessary to determine whether there was mortality, whether breeding birds emigrated out of the area, or whether they simply didn't return to the colonies to breed in recent years.

Table C. Regional and statewide seabird population trends[a] between 2010 and 2019 within regions and the state of Alaska as a whole.

Region[b]	COMU[c]	TBMU	UNMU	PIGU	LEAU	RHAU	TUPU	BLKI	RLKI	GWGU	FTSP	STPE	NOFU	RFCO	PECO	UNCO
N. BS/CS			↔					↑								
SE Bering	↓	↔	↓		↓		↔	↓	↓	↔		↔	↔	↓	↓	
SW Bering			↓												↓	↔
N. GOA	↑		↓	↓		↔	↓	↔		↔	↓		↓			
Southeast			↔	↔		↑				↑		↔			↑	
Alaska	↓	↔	↓	↓	↓	↔	↓	↔	↓	↑	↓	↔	↔	↓	↓	↔

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Introduction

This report is the latest in a series of annual reports summarizing the results of seabird monitoring efforts at breeding colonies on the Alaska Maritime National Wildlife Refuge (NWR) and elsewhere in Alaska (see Byrd and Dragoo 1997, Byrd et al. 1998 and 1999, Dragoo et al. 2000, 2001, 2003, 2004 and 2006-2019 for compilations of previous years' data). The seabird monitoring program in Alaska is designed to keep track of selected species of marine birds that indicate changes in the ocean 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 and provides data that can be used to define "normal" variability in demographic parameters and identify patterns that fall outside norms and thereby constitute potential 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 (e.g., 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 surface-feeding fish-feeders, auklets are diving plankton-feeders, etc.) at geographically dispersed breeding sites along the entire coastline of Alaska (Figure 1). A total of eight sites on the Alaska Maritime NWR, located roughly 300-500 km apart, are scheduled for annual surveys (Byrd 2007). During the summer of 2019, seabird data were gathered at all eight annual monitoring sites on the Alaska Maritime NWR. Furthermore, data are recorded annually or semiannually at other sites in Alaska (e.g., Cape Peirce, Togiak NWR; Middleton Island; Prince William Sound). In addition, colonies near the annual sites are identified for less frequent surveys to "calibrate" the information at the annual sites (e.g., Cape Thompson). Data provided from other research projects (e.g., those associated with evaluating the impacts of invasive rodents on marine birds) also supplement the monitoring database.

In this report, we summarize information from 2019 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 reproductive success at various sites. In addition, historical patterns of hatching chronology and productivity are illustrated for those sites for which we have sufficient data. Population trend information is included for sites where adequate data are available.

Methods

Data collection methods followed standardized protocols (e.g., AMNWR 2019). Timing of nesting events and productivity usually were based on periodic checks of samples of nests (usually 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 the tables). Hatch dates were used to describe nesting chronology. Productivity typically was expressed as chicks fledged per egg (or nest), but other variables were sometimes used (consult reports cited in the tables for details). 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 referenced herein.
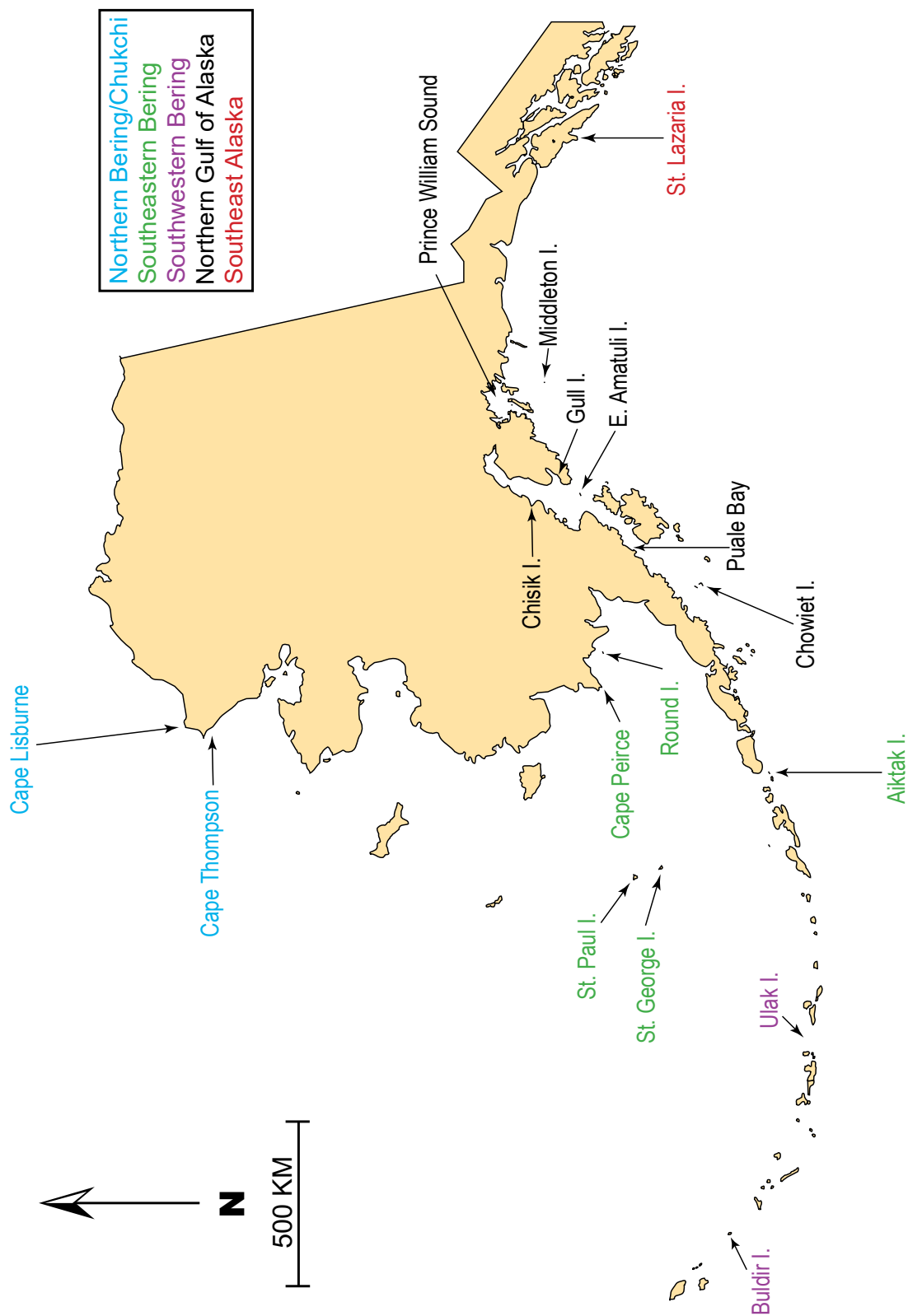
Figure 1. Map of Alaska showing the locations of seabird monitoring sites summarized in this report. Text color indicates geographic regions.

This report summarizes monitoring data from 2019, and compares 2019 results with previous years. For sites with at least two years of data prior to 2019, site averages were used for comparisons. For chronology, we considered dates within 3 days of the long-term average to be "normal"; larger deviations represented relatively early or late dates. For productivity, we defined significant deviations from "normal" as any that differed by more than 20% from the site average. Population trends were analyzed using linear regression models on log-transformed data (ln) to calculate the slope of the line. The resultant slope is equivalent to the annual rate of population change. A trend was defined as any change greater than or equal to a three percent per annum increase or decline ($\geq$3% p.a.). Population counts were analyzed using two time frames: 1) data from all available years, and 2) data from just the last decade (2010-2019 for this report). A percent per annum change was calculated for each data set during both time periods, if sufficient data were available. We also summarized seabird phenology and productivity, as well as recent population trends (from 2010-2019), by region and for the entire state.

Chronology was calculated for each species in a region using data from all colonies. Each colony was weighted equally within each region. The chronology was averaged for all sites within each region resulting in a value for each species, thus producing one statewide value for each species.

Productivity was calculated for each species in a region using data from all colonies. Each colony was weighted equally within each region. The productivity was averaged for all sites within each region resulting in a value for each species. Species productivities were then averaged to calculate a statewide value for each species.

Population trends were calculated for each species/species group in a region using data from all colonies. In some cases, birds were not identified to species during counts, making it necessary for us to use species groups for analysis (e.g., unspecified murres [UNMU], storm-petrels [STPE], and cormorants [CORM]). Each colony was weighted equally within each region. Trends (line slopes) were averaged for all sites within each region resulting in a regional value for each species/species group. Only sites for which there were data from at least two years (at least 5 years apart) between 2010 and 2019 were included.

Results

Common murre (*Uria aalge*)

Table 1. Hatching chronology of common murres at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	4 Aug (16)[a]	4 Aug (31)[a]	Tanedo et al. 2019
St. George I.	9 Aug (5)	4 Aug (34)	M. Romano Unpubl. Data
Chowiet I.	19 Jul (97)	22 Jul (22)	Mudge et al. 2019
St. Lazaria I.	20 Aug (33)	13 Aug (23)	Higgins et al. 2019

[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.

Table 2. Reproductive performance of common murres at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
St. Paul I.	0.36	3 (55)[a]	0.47 (32)[a]	Tanedo et al. 2019
St. George I.	0.50	4 (20)	0.48 (35)	M. Romano Unpubl. Data
Aiktak I.	0.43	1 (7)	0.21 (22)	Youngren et al. 2019
Chowiet I.	0.71	10 (207)	0.50 (24)	Mudge et al. 2019
Chisik I.	0.00	NA[b]	0.32 (7)	S. Schoen Unpubl. Data
St. Lazaria I.	0.60	8 (45)	0.47 (24)	Higgins et al. 2019

[a]Sample size in parentheses represents the number of nest sites used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
[b]Not applicable or not reported.
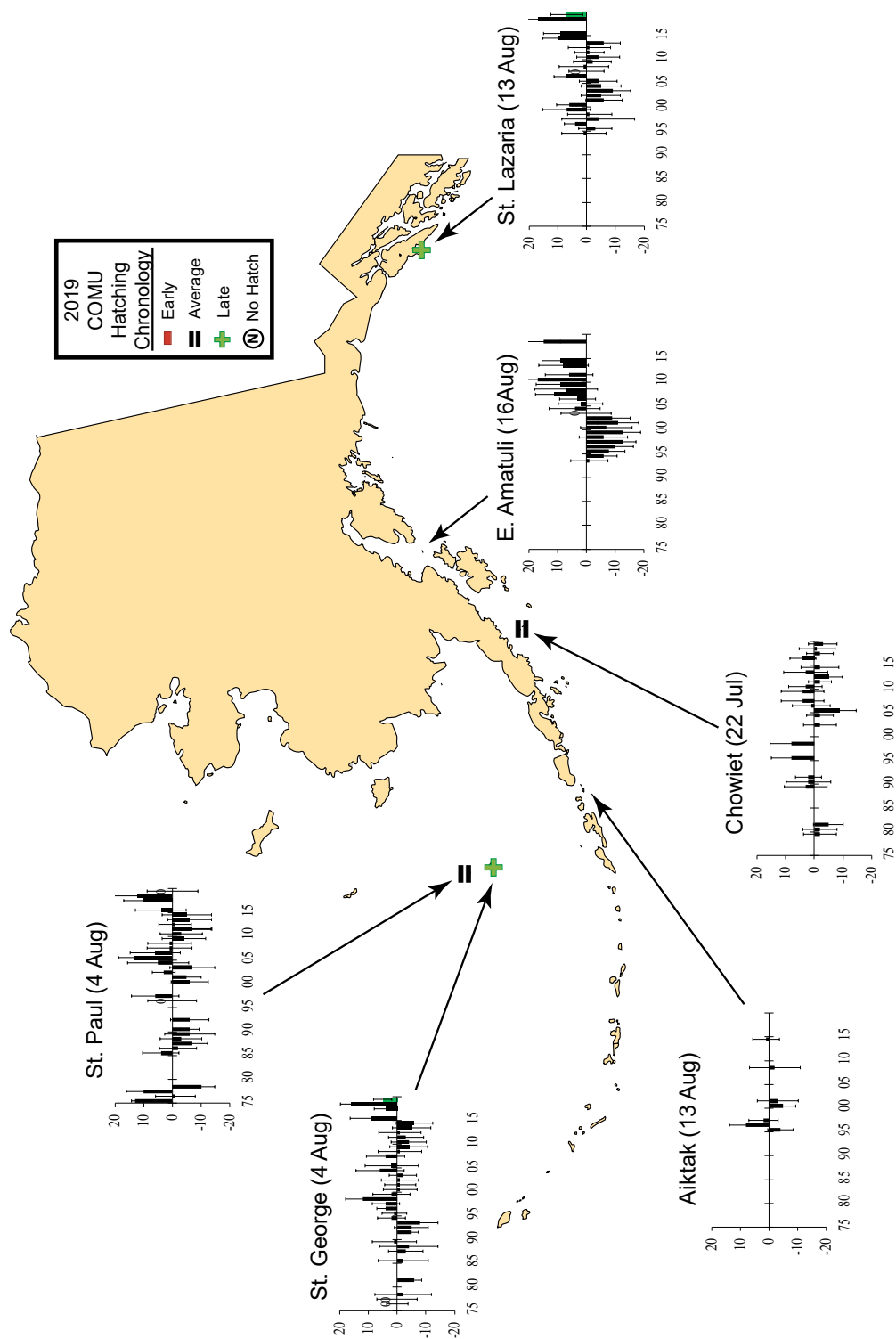
Figure 2. Hatching chronology of common murres at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.
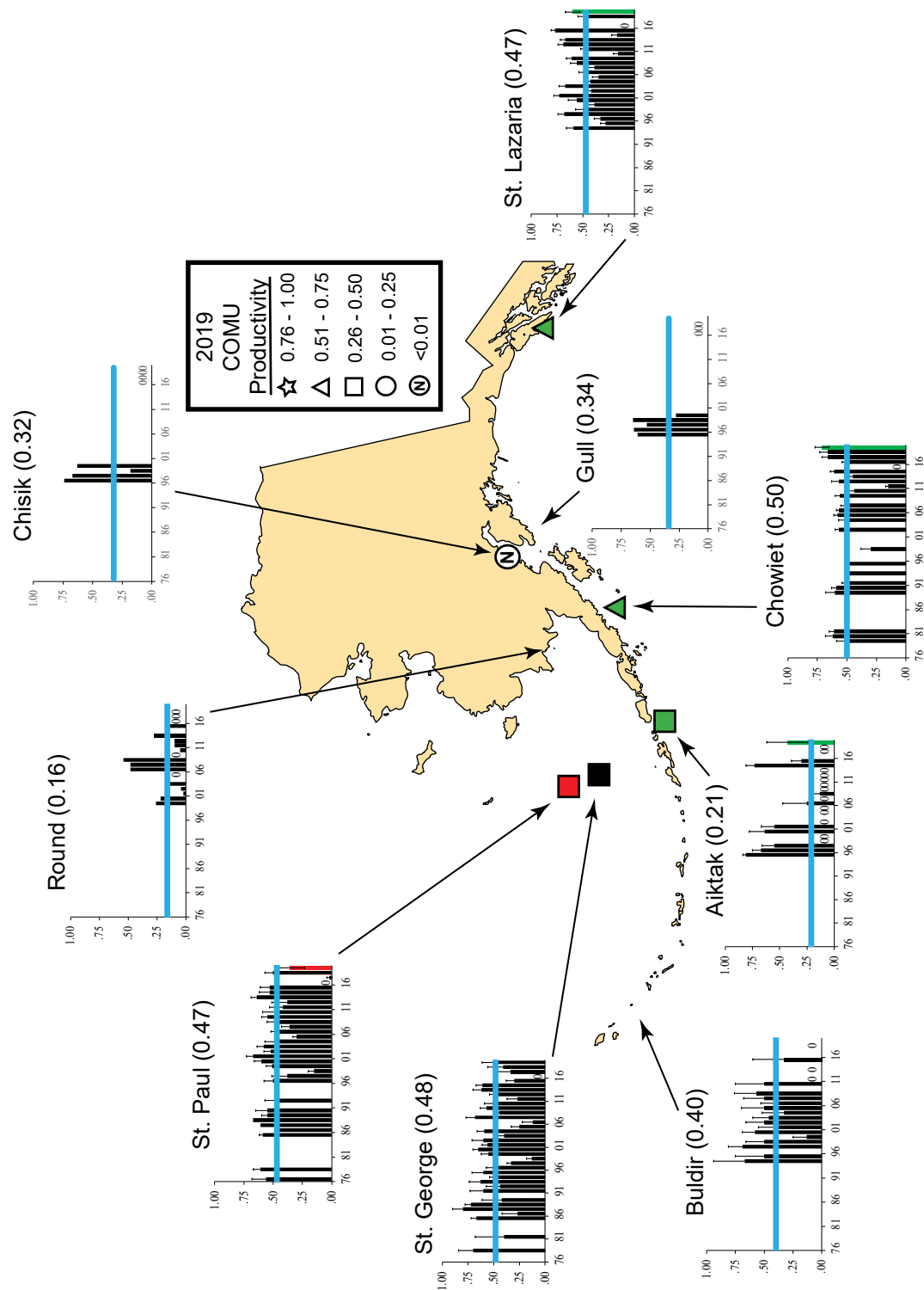
Figure 3. Productivity of common murres (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.

Figure 4. Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses). "N/A" indicates that insufficient data were available.

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Figure 4 (continued). Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses). "N/A" indicates that insufficient data were available.
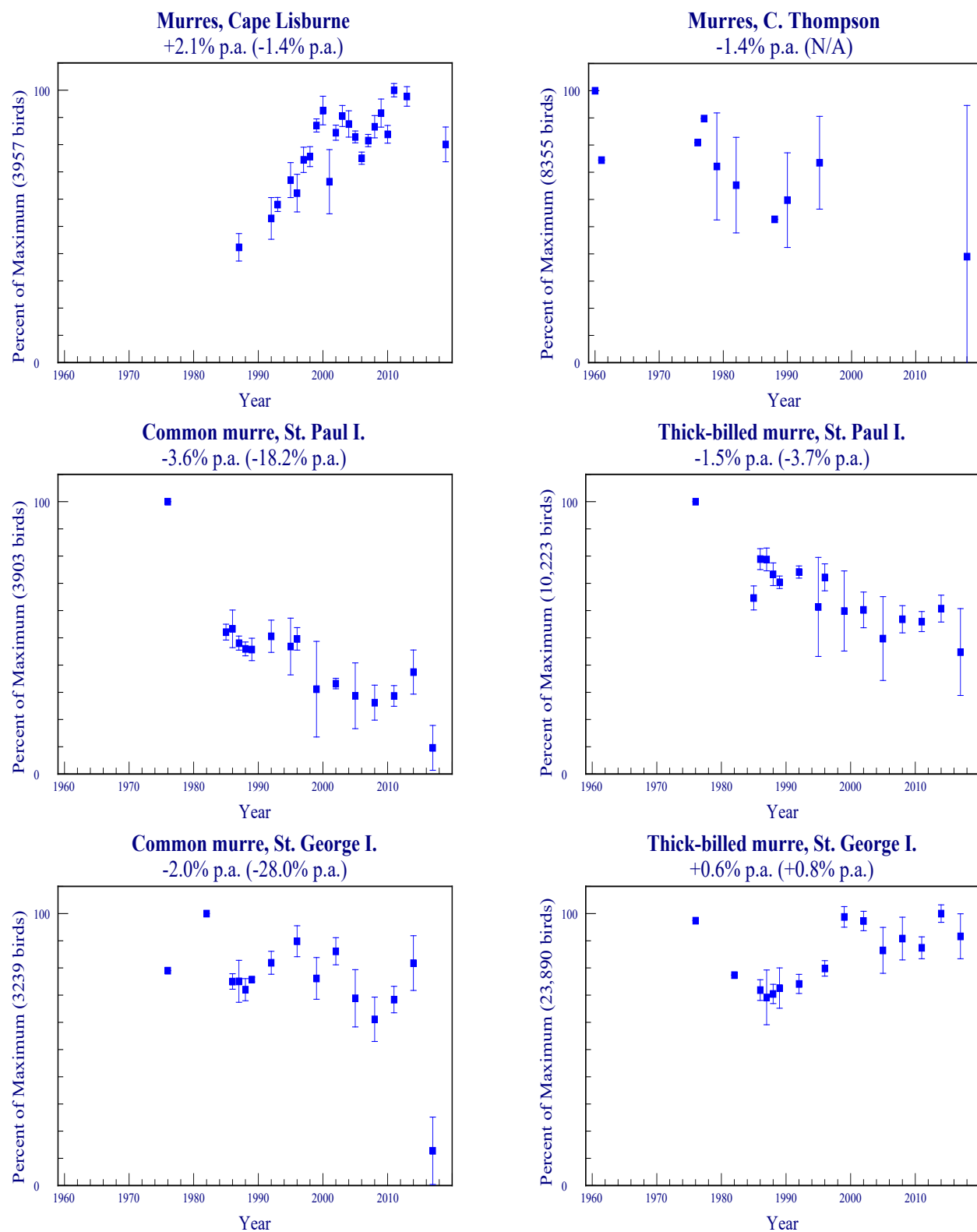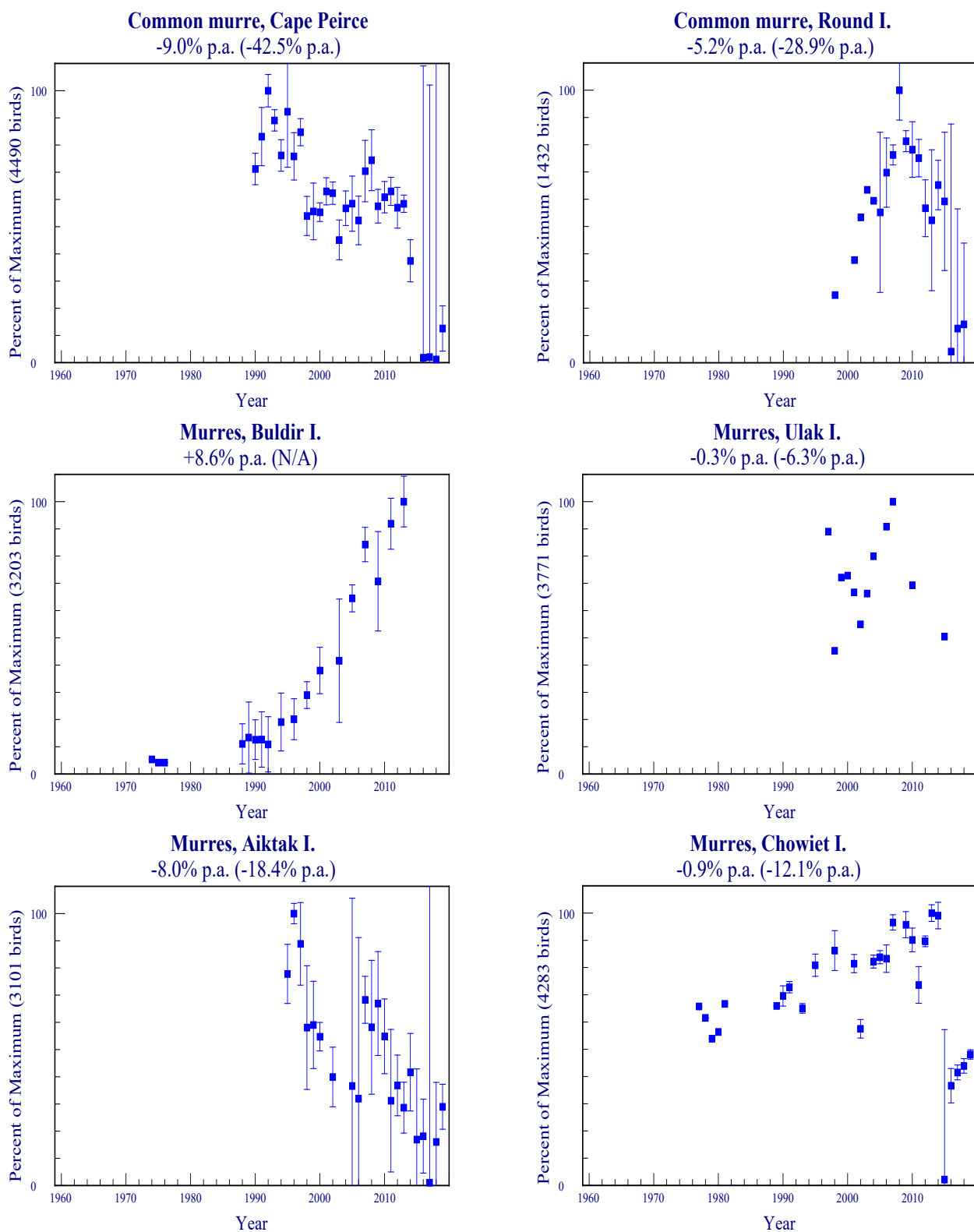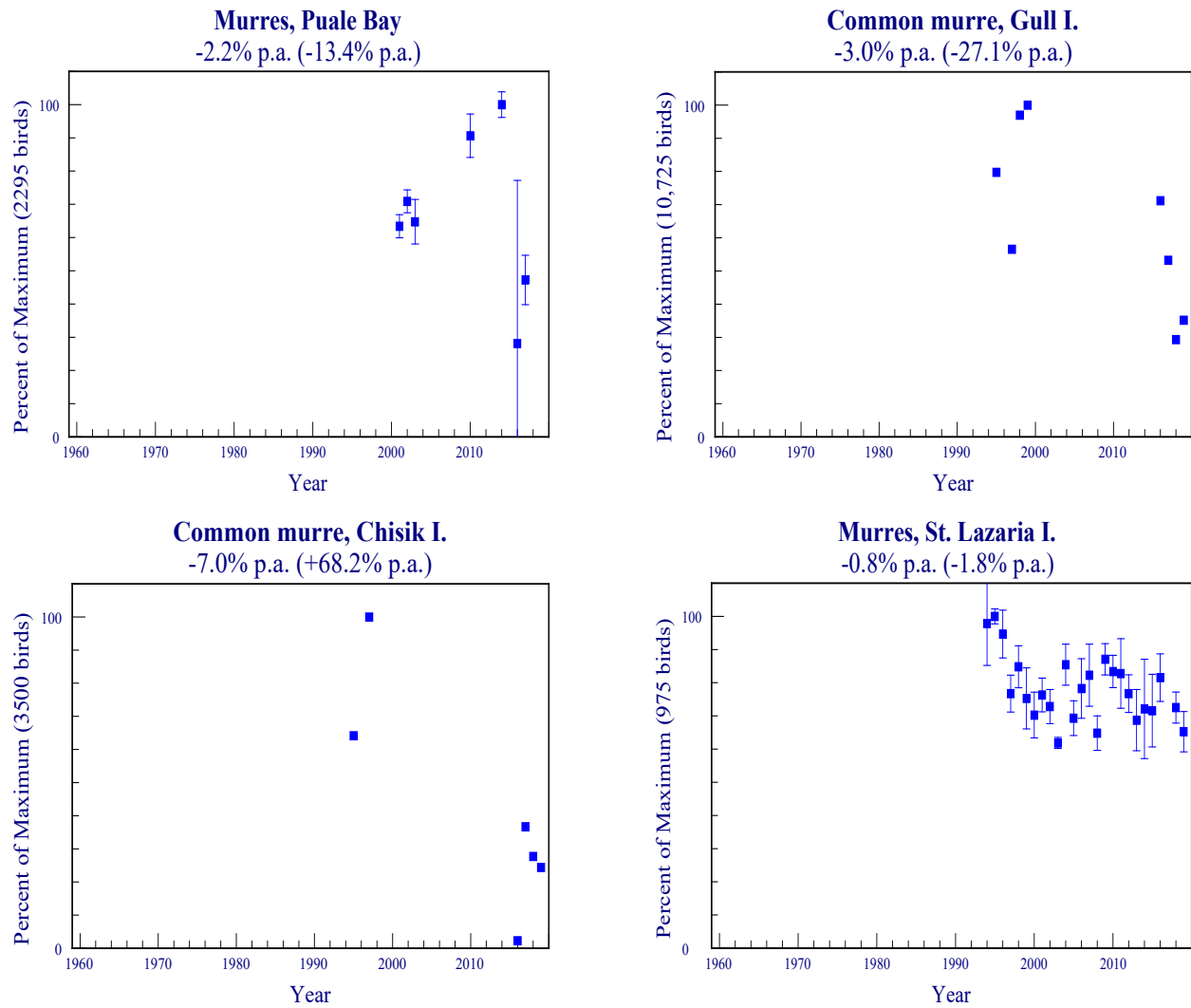
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Figure 4 (continued). Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).

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

Table 3. Hatching chronology of thick-billed murres at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	14 Aug (183)[a]	6 Aug (34)[a]	Tanedo et al. 2019
St. George I.	10 Aug (73)	1 Aug (37)	M. Romano Unpubl. Data
Buldir I.	18 Jul (143)	19 Jul (31)	Evans et al. 2019
Chowiet I.	19 Jul (53)	21 Jul (21)	Mudge et al. 2019
St. Lazaria I.	20 Aug (10)	12 Aug (22)	Higgins et al. 2019

[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.

Table 4. Reproductive performance of thick-billed murres at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
St. Paul I.	0.35	16 (433)[a]	0.43 (34)[a]	Tanedo et al. 2019
St. George I.	0.58	17 (271)	0.49 (38)	M. Romano Unpubl. Data
Buldir I.	0.67	9 (315)	0.64 (31)	Evans et al. 2019
Aiktak I.	0.69	2 (13)	0.19 (22)	Youngren et al. 2019
Chowiet I.	0.53	5 (148)	0.41 (24)	Mudge et al. 2019
St. Lazaria I.	0.85	6 (13)	0.45 (24)	Higgins et al. 2019

[a]Sample size in parentheses represents the number of nest sites used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
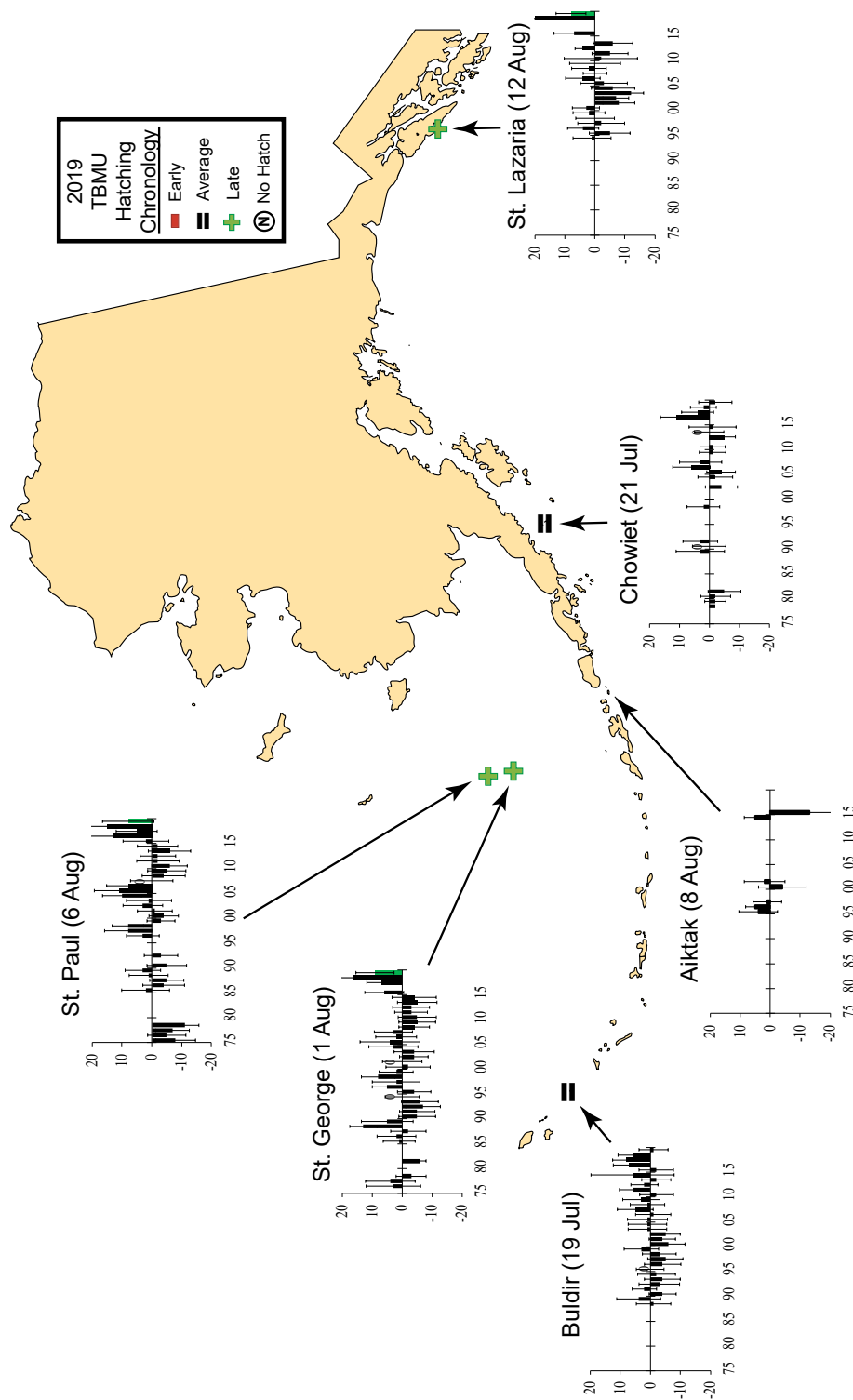
Figure 5. Hatching chronology of thick-billed murres at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.
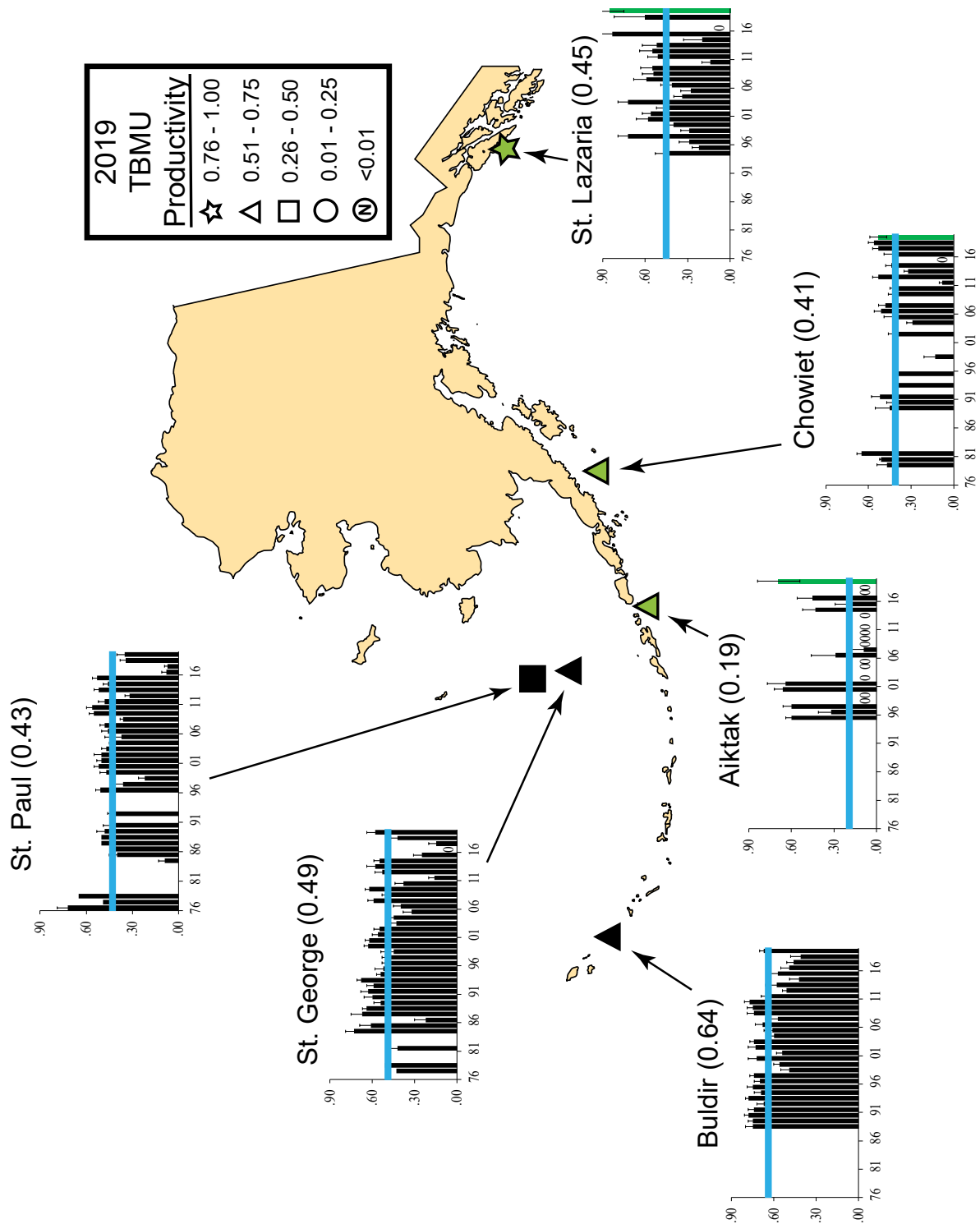
Figure 6. Productivity of thick-billed murres (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.

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Pigeon guillemot (*Cepphus columba*)

Pigeon guillemot, Pr. William Snd.
-5.0% p.a. (-14.3% p.a.)

Pigeon guillemot, St. Lazaria I.
-0.7% p.a. (-1.8% p.a.)
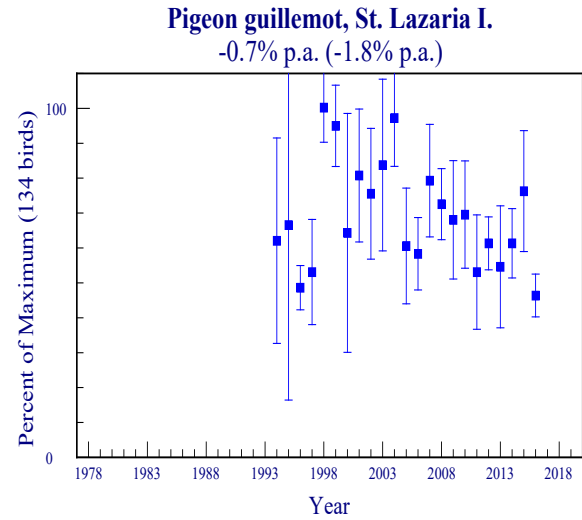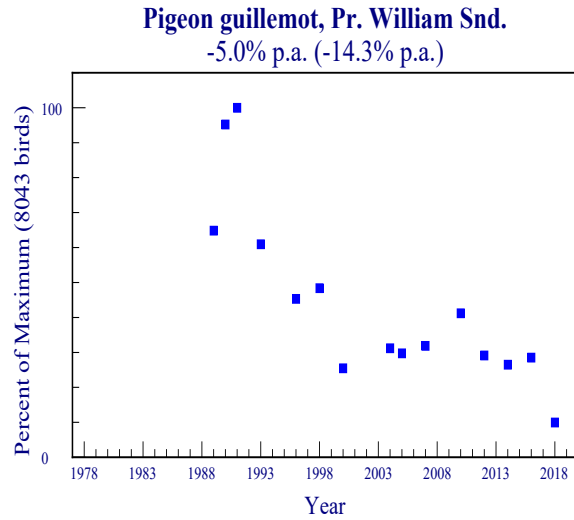
Figure 7. Trends in populations of pigeon guillemots at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).

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Ancient murrelet (*Synthliboramphus antiquus*)

Table 5. Hatching chronology of ancient murrelets at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Aiktak I.	26 Jun (88)[a]	3 Jul (22)[a]	Youngren et al. 2019

[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.

Table 6. Reproductive performance of ancient murrelets at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Aiktak I.	0.90	NA[a] (188)[b]	0.80 (22)[b]	Youngren et al. 2019

[a]Not applicable or not reported.

[b]Sample size in parentheses represents the number of eggs used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.

Parakeet auklet (*Aethia psittacula*)

Table 7. Hatching chronology of parakeet auklets at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	1 Jul (31)[a]	4 Jul (27)[a]	Evans et al. 2019
Chowiet I.	8 Jul (5)	4 Jul (14)	Mudge et al. 2019

[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.

Table 8. Reproductive performance of parakeet auklets at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Buldir I.	0.68	NA[a] (62)[b]	0.54 (27)[b]	Evans et al. 2019
Chowiet I.	0.43	NA (49)	0.39 (14)	Mudge et al. 2019

[a]Not applicable or not reported.

[b]Sample size in parentheses represents the number of nest sites used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
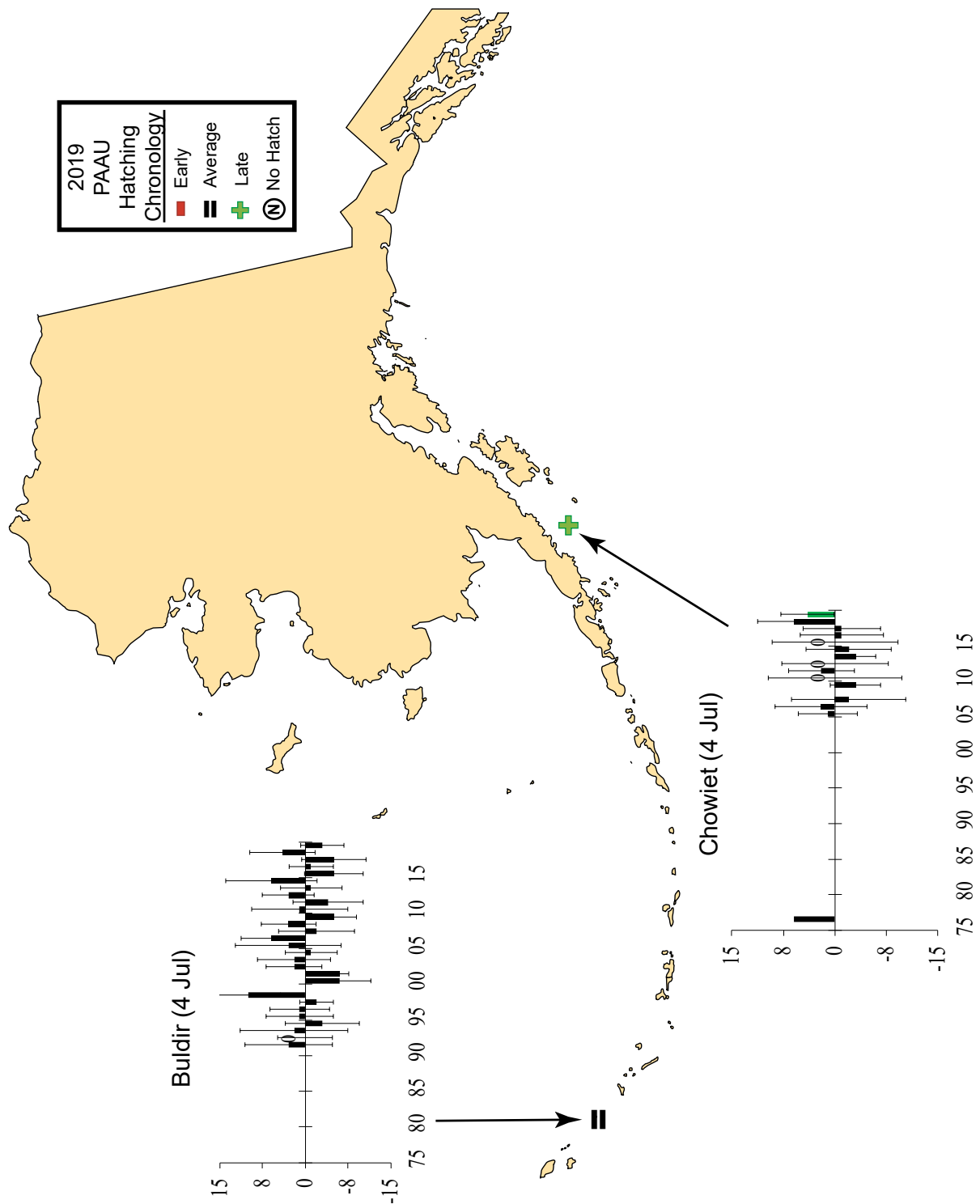
Figure 8. Hatching chronology of parakeet auklets at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.

Figure 9. Productivity of parakeet auklets (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.

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Least auklet (*Aethia pusilla*)

Table 9. Hatching chronology of least auklets at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
St. George I.	3 Jul (6)[a]	11 Jul (11)[a]	M. Romano Unpubl. Data
Buldir I.	23 Jun (32)	27 Jun (29)	Evans et al. 2019

[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.

Table 10. Reproductive performance of least auklets at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
St. George I.	0.29	NA[a] (35)[b]	0.55 (11)[b]	M. Romano Unpubl. Data
Buldir I.	0.69	NA (64)	0.59 (30)	Evans et al. 2019

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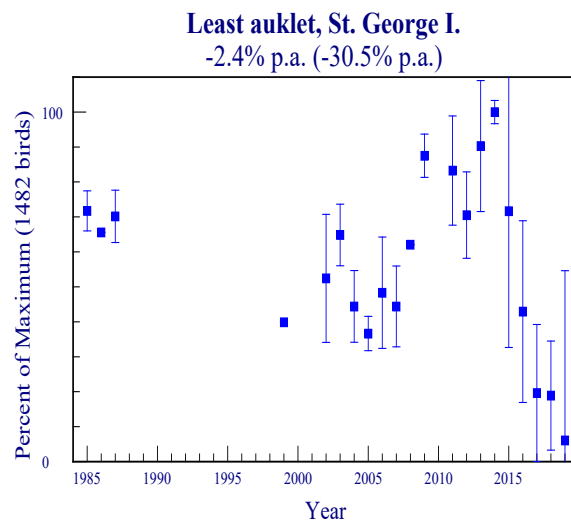

Figure 10. Trends in surface counts of least auklets at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).
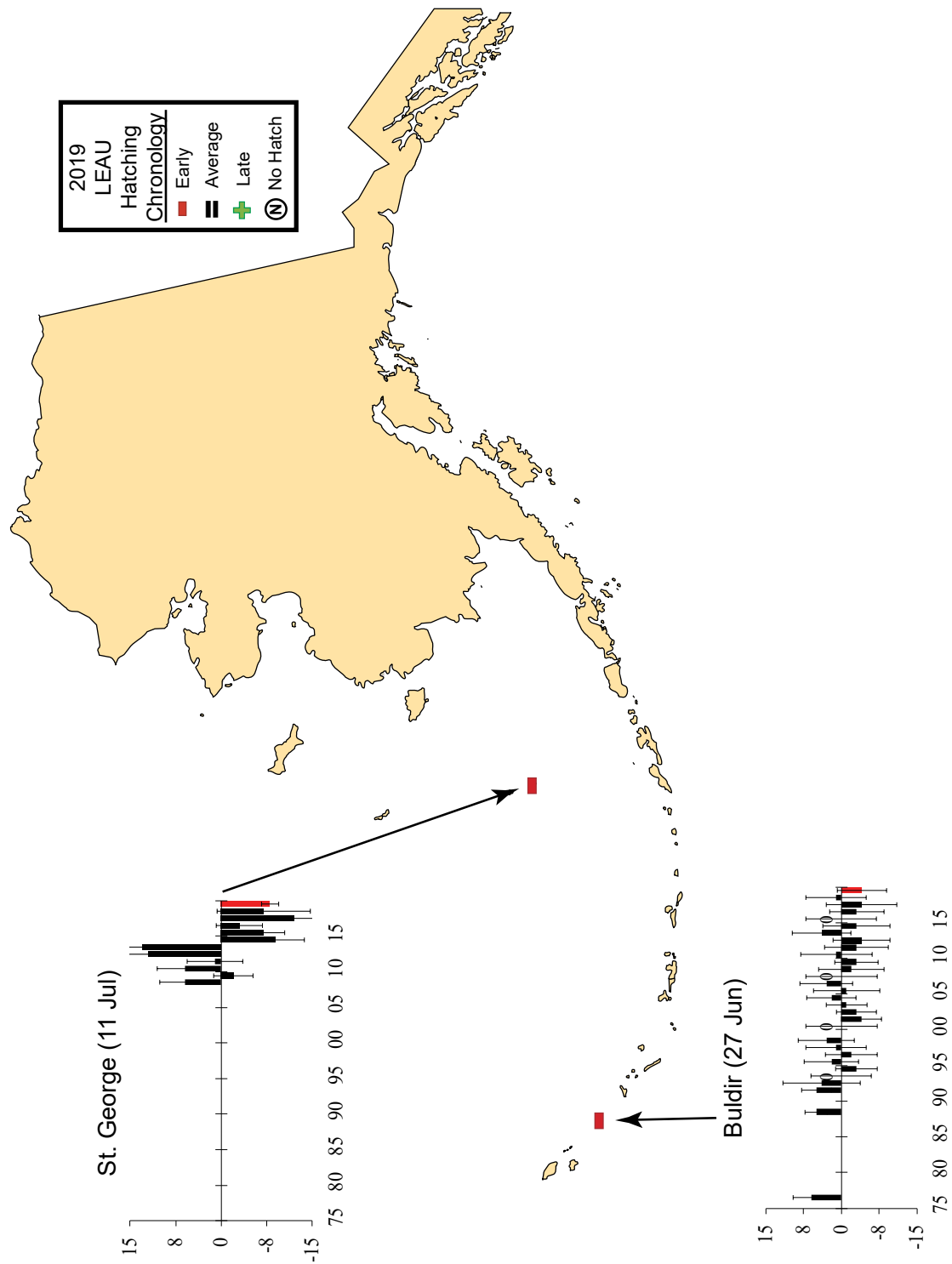
Figure 11. Hatching chronology of least auklets at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.
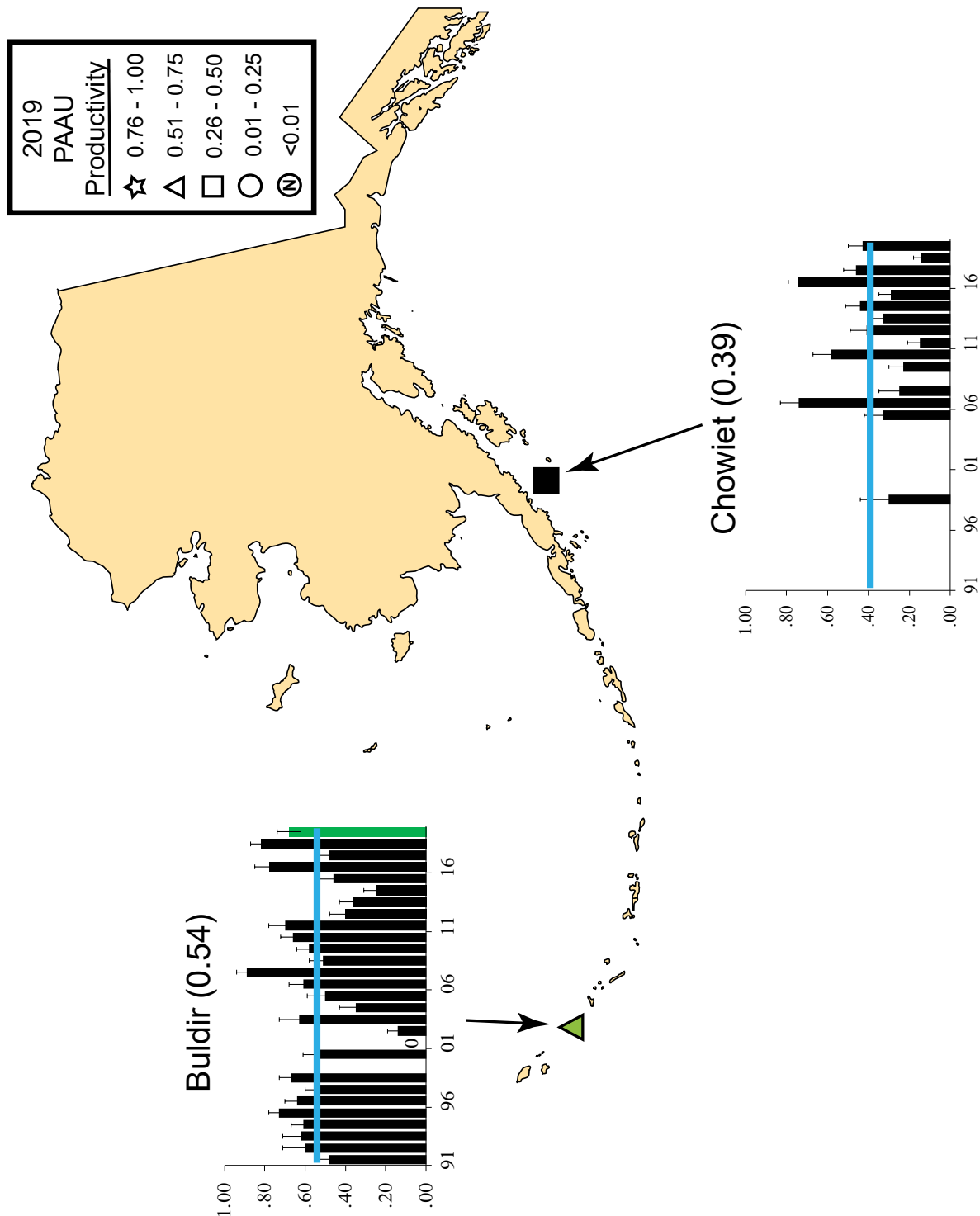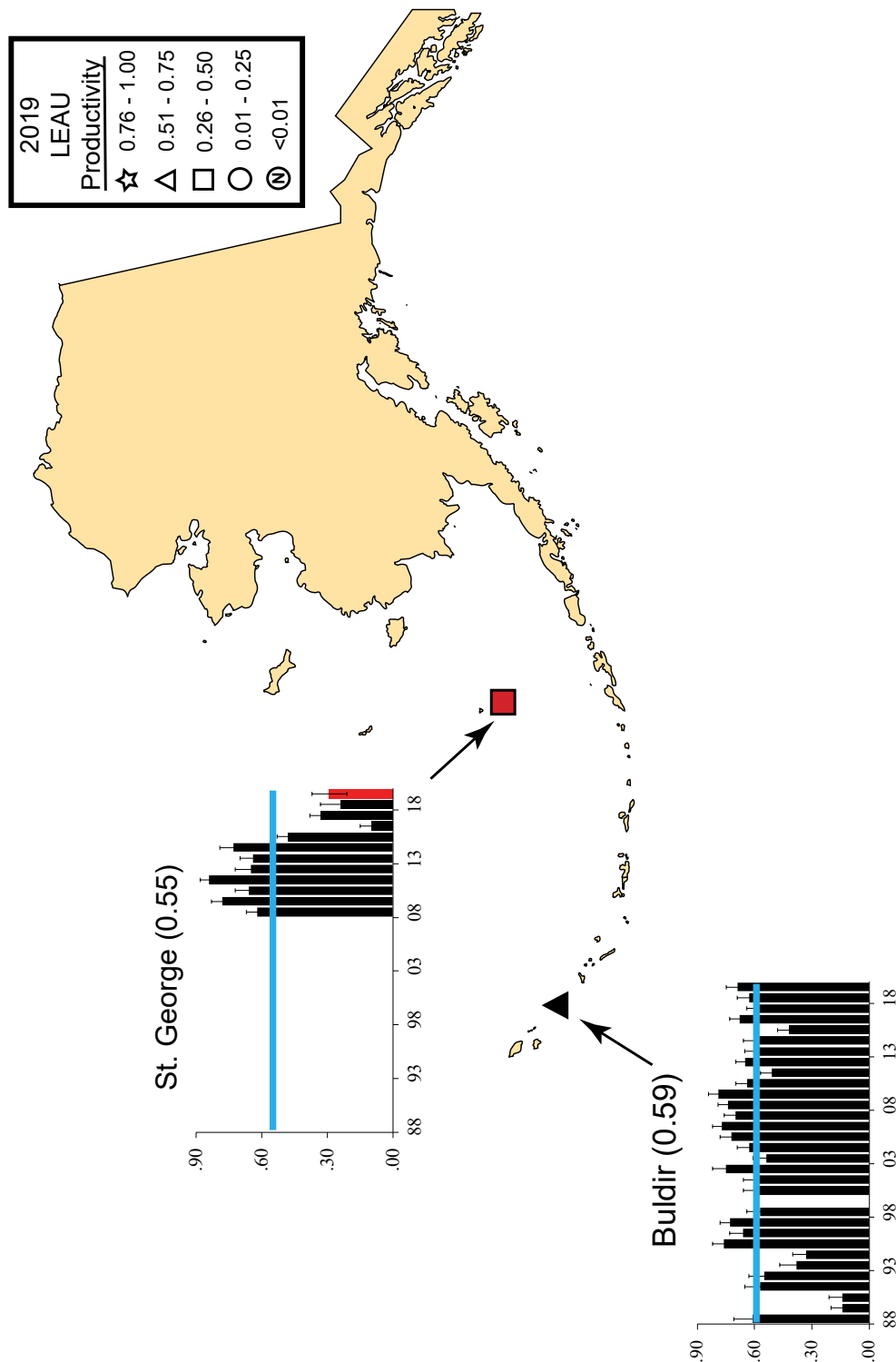
Figure 12. Productivity of least auklets (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.

Whiskered auklet (*Aethia pygmaea*)

Table 11. Hatching chronology of whiskered auklets at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	18 Jun (50)[a]	21 Jun (28)[a]	Evans et al. 2019

[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.

Table 12. Reproductive performance of whiskered auklets at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Buldir I.	0.85	NA[a] (96)[b]	0.65 (29)[b]	Evans et al. 2019

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

Crested auklet (*Aethia cristatella*)

Table 13. Hatching chronology of crested auklets at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	24 Jun (55)[a]	28 Jun (29)[a]	Evans et al. 2019

[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.

Table 14. Reproductive performance of crested auklets at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Buldir I.	0.90	NA[a] (102)[b]	0.65 (30)[b]	Evans et al. 2019

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

Rhinoceros auklet (*Cerorhinca monocerata*)

Table 15. Hatching chronology of rhinoceros auklets at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
St. Lazaria I.	30 Jun (5)[a]	25 Jun (22)[a]	Higgins et al. 2018

[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.

Table 16. Reproductive performance of rhinoceros auklets at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Middleton I.	0.61	NA[a] (72)[b]	0.67 (19)	ISRC 2020
St. Lazaria I.	1.06	3 (199)	0.65 (24)	Higgins et al. 2019

[a]Not applicable or not reported.

[b]Sample size in parentheses represents the number of burrows used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
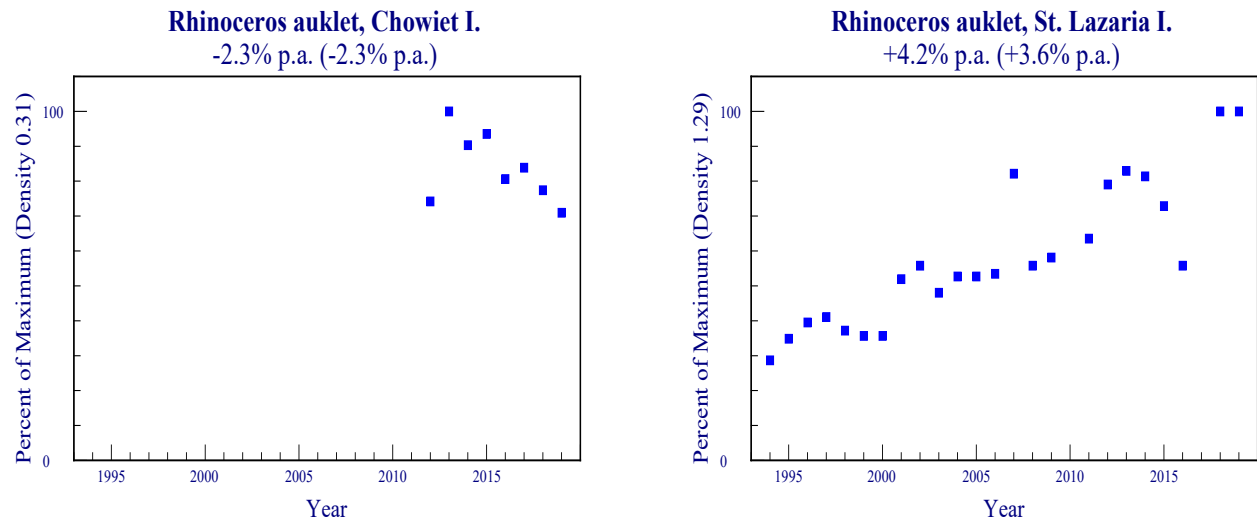
Figure 13. Trends in populations of rhinoceros auklets at Alaskan sites. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).

Figure 14. Productivity of rhinoceros auklets (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean).

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Horned puffin (*Fratercula corniculata*)

Table 17. Hatching chronology of horned puffins at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	27 Jul (56)[a]	25 Jul (29)[a]	Evans et al. 2019
Aiktak I.	28 Jul (8)	31 Jul (14)	Youngren et al. 2019
Chowiet I.	26 Jul (33)	30 Jul (15)	Mudge et al. 2019

[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.

Table 18. Reproductive performance of horned puffins at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Buldir I.	0.60	NA[a] (74)[b]	0.48 (31)[b]	Evans et al. 2019
Aiktak I.	0.80	NA (13)	0.56 (17)	Youngren et al. 2019
Chowiet I.	0.34	NA (88)	0.37 (14)	Mudge et al. 2019

[a]Not applicable or not reported.
[b]Sample size in parentheses represents the number of eggs used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
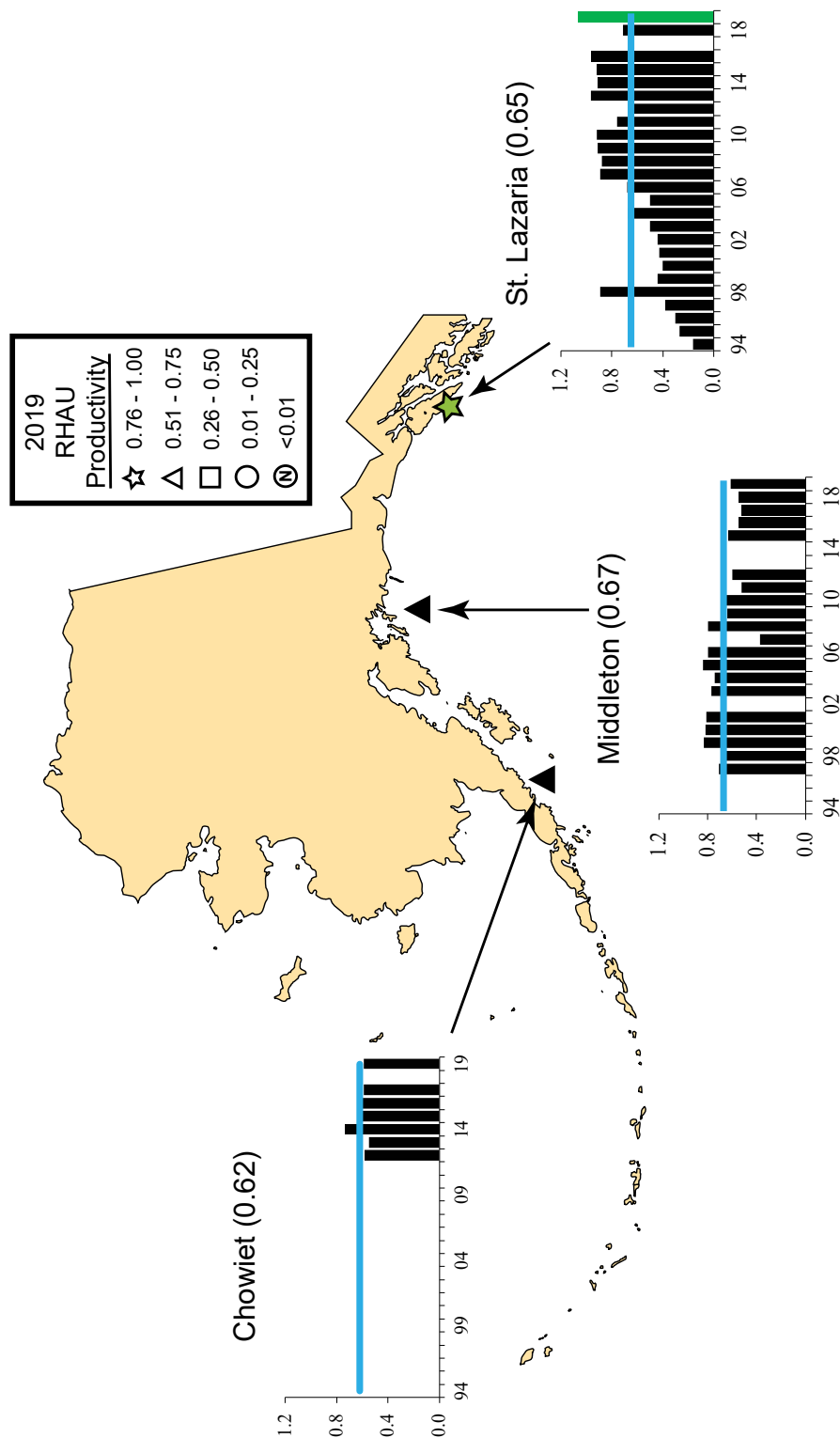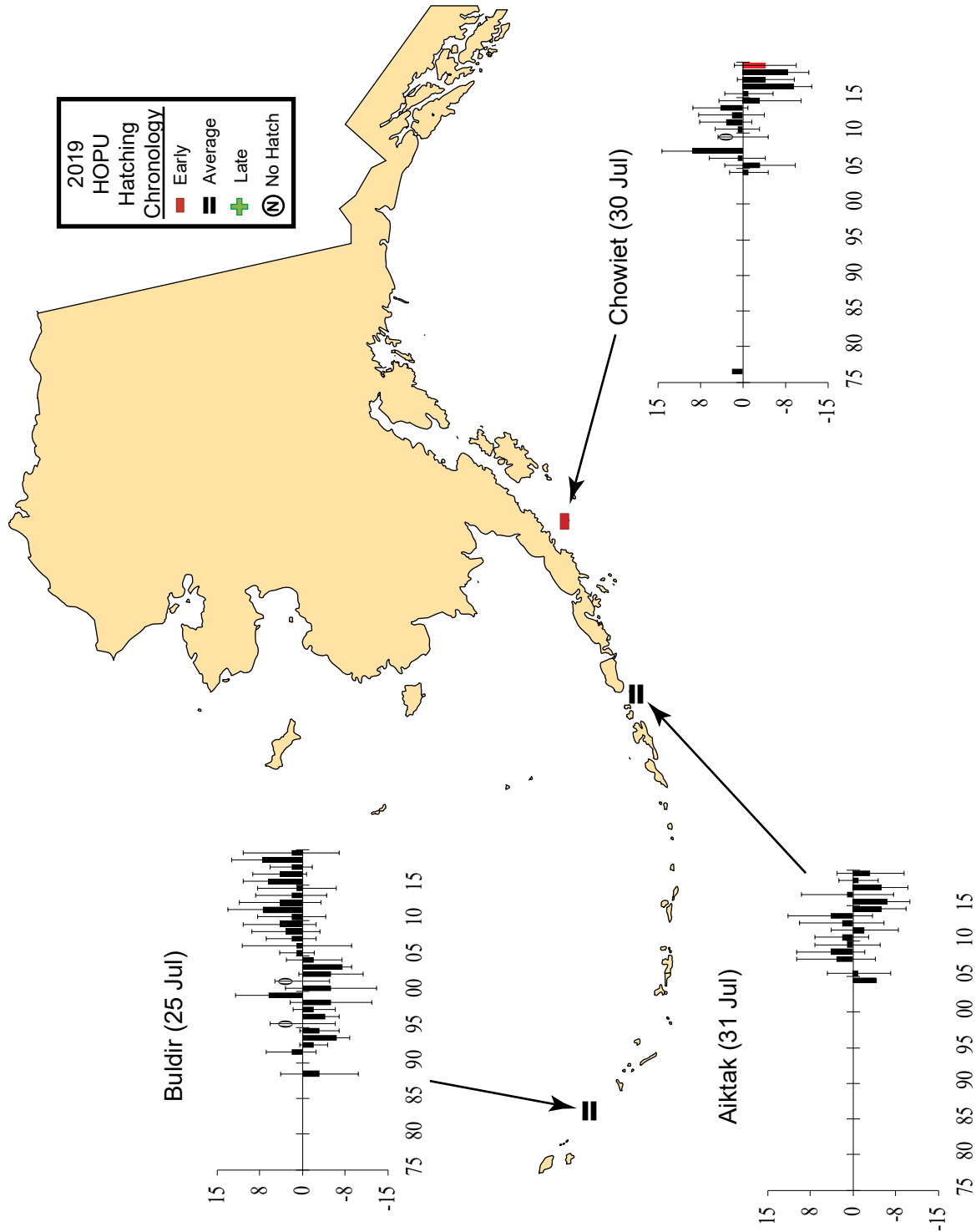
Figure 15. Hatching chronology of horned puffins at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.
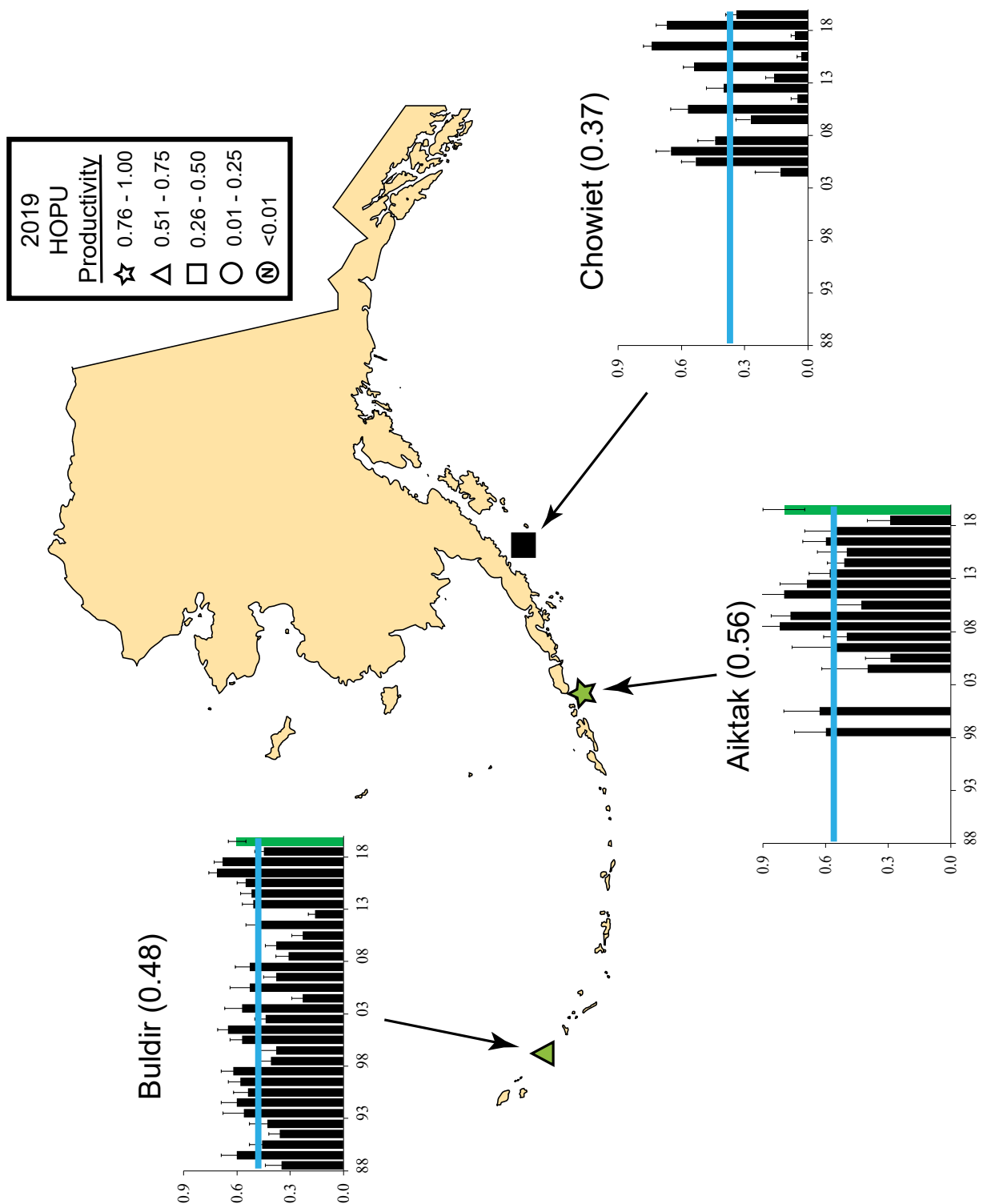
Figure 16. Productivity of horned puffins (chicks fledged/egg) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.

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 Tufted puffin (*Fratercula cirrhata*)

Table 19. Hatching chronology of tufted puffins at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	25 Jul (8)[a]	13 Jul (22)[a]	Evans et al. 2019
Aiktak I.	30 Jul (32)	31 Jul (22)	Youngren et al. 2019
Chowiet I.	25 Jul (26)	24 Jul (14)	Mudge et al. 2019

[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.

Table 20. Reproductive performance of tufted puffins at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Buldir I.	0.48	NA[a] (19)[b]	0.37 (31)[b]	Evans et al. 2019
Aiktak I.	0.91	NA (61)	0.55 (23)	Youngren et al. 2019
Chowiet I.	0.77	NA (48)	0.39 (13)	Mudge et al. 2019
Middleton I.	0.32	NA (60)	0.40 (14)	ISRC 2020

[a]Not applicable or not reported.
[b]Sample size in parentheses represents the number of burrows used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
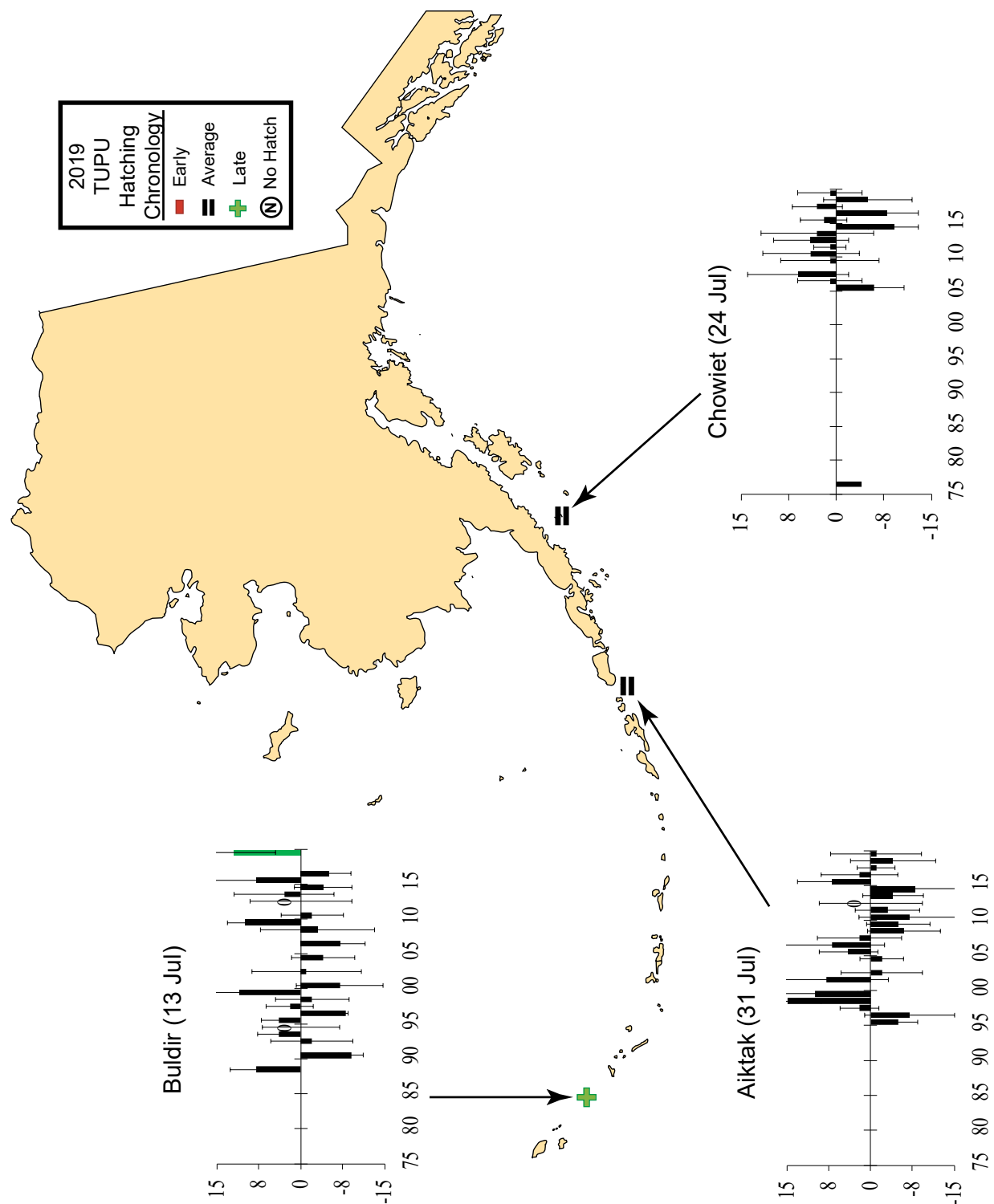
Figure 17. Hatching chronology of tufted puffins at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.

Figure 18. Productivity of tufted puffins (chicks fledged/egg) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.
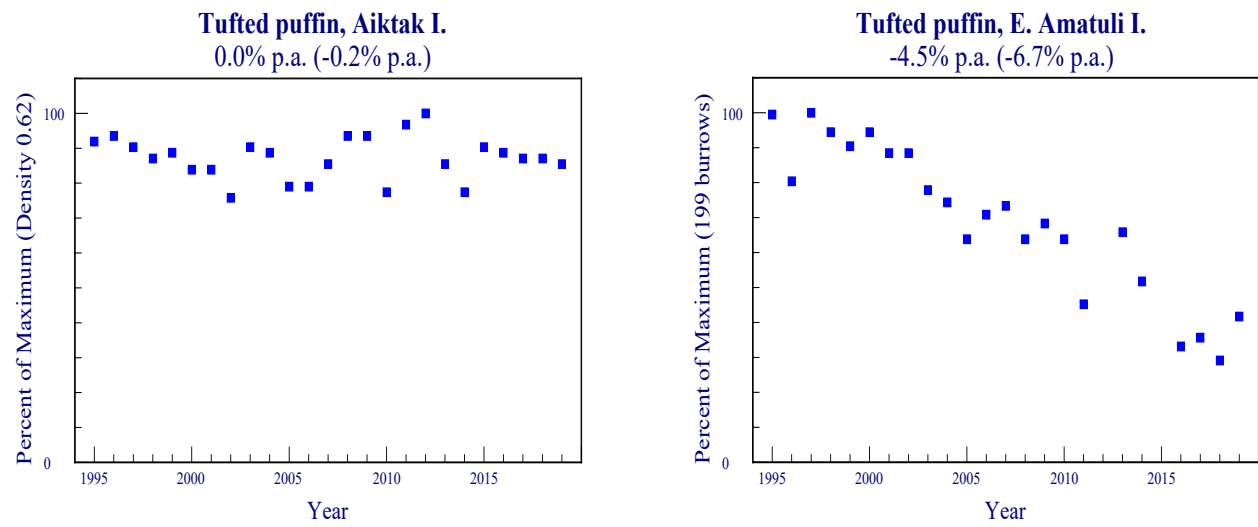
Figure 19. Trends in populations of tufted puffins at Alaskan sites. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).

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Black-legged kittiwake (*Rissa tridactyla*)

Table 21. Hatching chronology of black-legged kittiwakes at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	2 Jul (226)[a]	17 Jul (34)[a]	Tanedo et al. 2019
St. George I.	4 Jul (83)	16 Jul (32)	M. Romano Unpubl. Data
Buldir I.	1 Jul (79)	8 Jul (31)	Evans et al. 2019
Chowiet I.	12 Jul (186)	17 Jul (22)	Mudge et al. 2019
E. Amatuli I.	12 Jul (92)	14 Jul (21)	A. Kettle Unpubl. Data

[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.

Table 22. Reproductive performance of black-legged kittiwakes at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
C. Lisburne	0.85[a]	2 (96)[b]	0.58 (34)[b]	Dragoo and Dragoo 2019
St. Paul I.	0.33	16 (345)	0.25 (39)	Tanedo et al. 2019
St. George I.	0.34	10 (148)	0.19 (43)	M. Romano Unpubl. Data
C. Peirce	0.00	10 (264)	0.19 (34)	K. Hilwig Unpubl. Data
Buldir I.	0.16	7 (221)	0.16 (31)	Evans et al. 2019
Chowiet I.	<0.01	11 (329)	0.20 (23)	Mudge et al. 2019
E. Amatuli I.	0.52	NA[c] (172)	0.34 (26)	A. Kettle Unpubl. Data
Chisik I.	0.01	NA	0.02 (7)	S. Schoen Unpubl. Data
Inner PWS[d]	0.40[a]	NA (17,929)	0.27 (34)	D. Irons Unpubl. Data
Outer PWS[d]	0.27[a]	NA (3943)	0.09 (34)	D. Irons Unpubl. Data
Middleton I.	0.35	NA (368)	0.35 (39)	ISRC 2020

[a]Short visit.
[b]Sample size in parentheses represents the number of nests used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
[c]Not applicable or not reported.
[d]Prince William Sound.
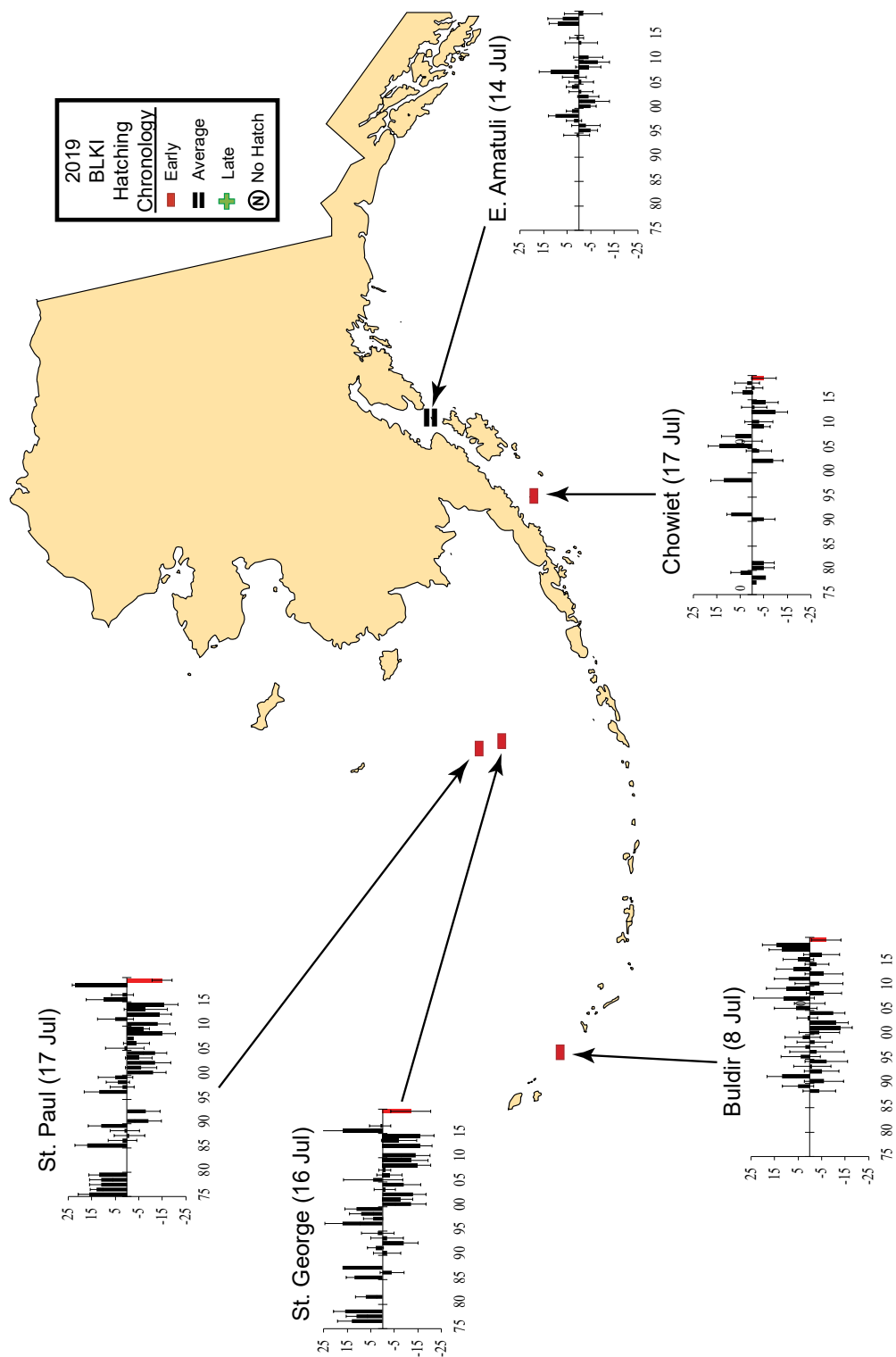
Figure 20. Hatching chronology of black-legged kittiwakes at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.
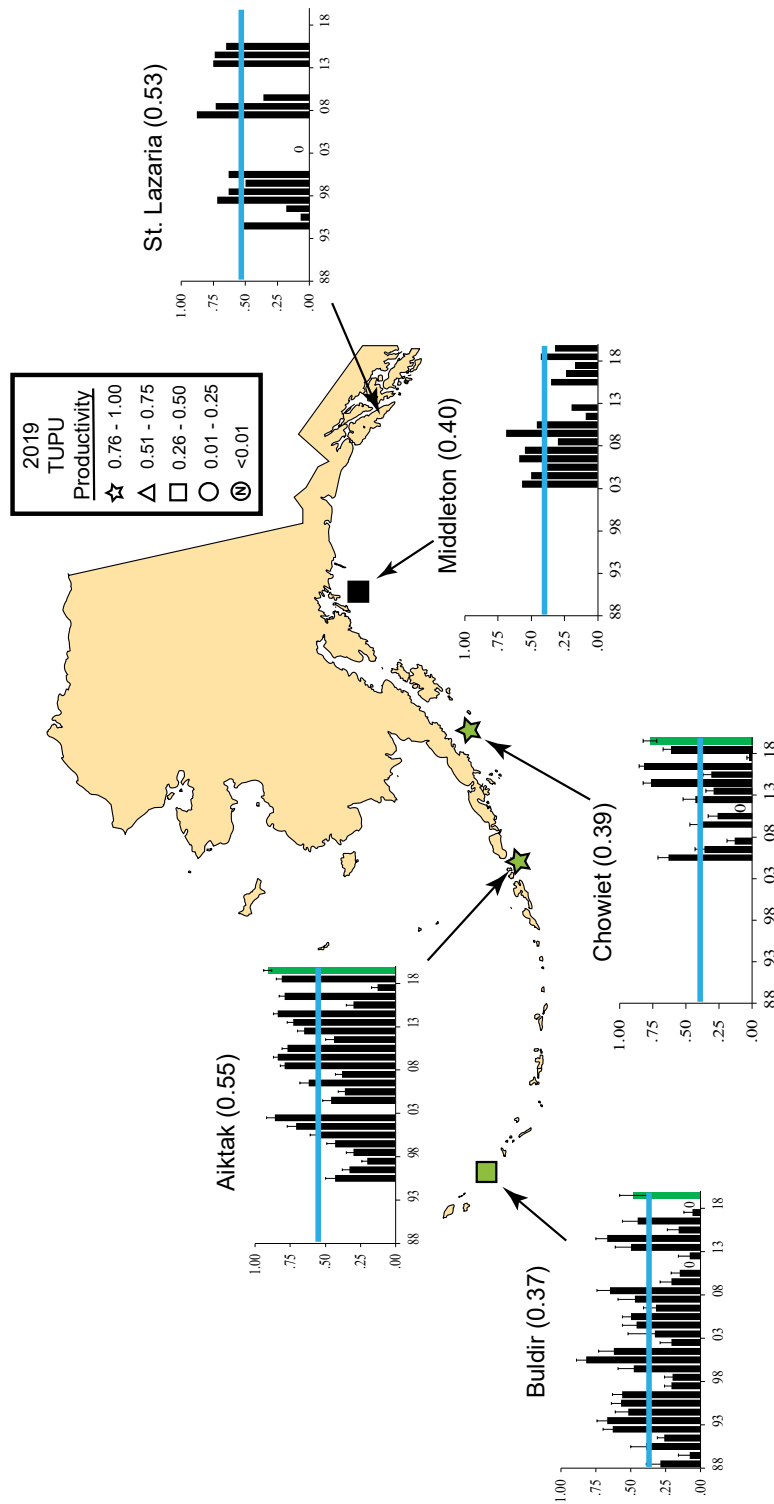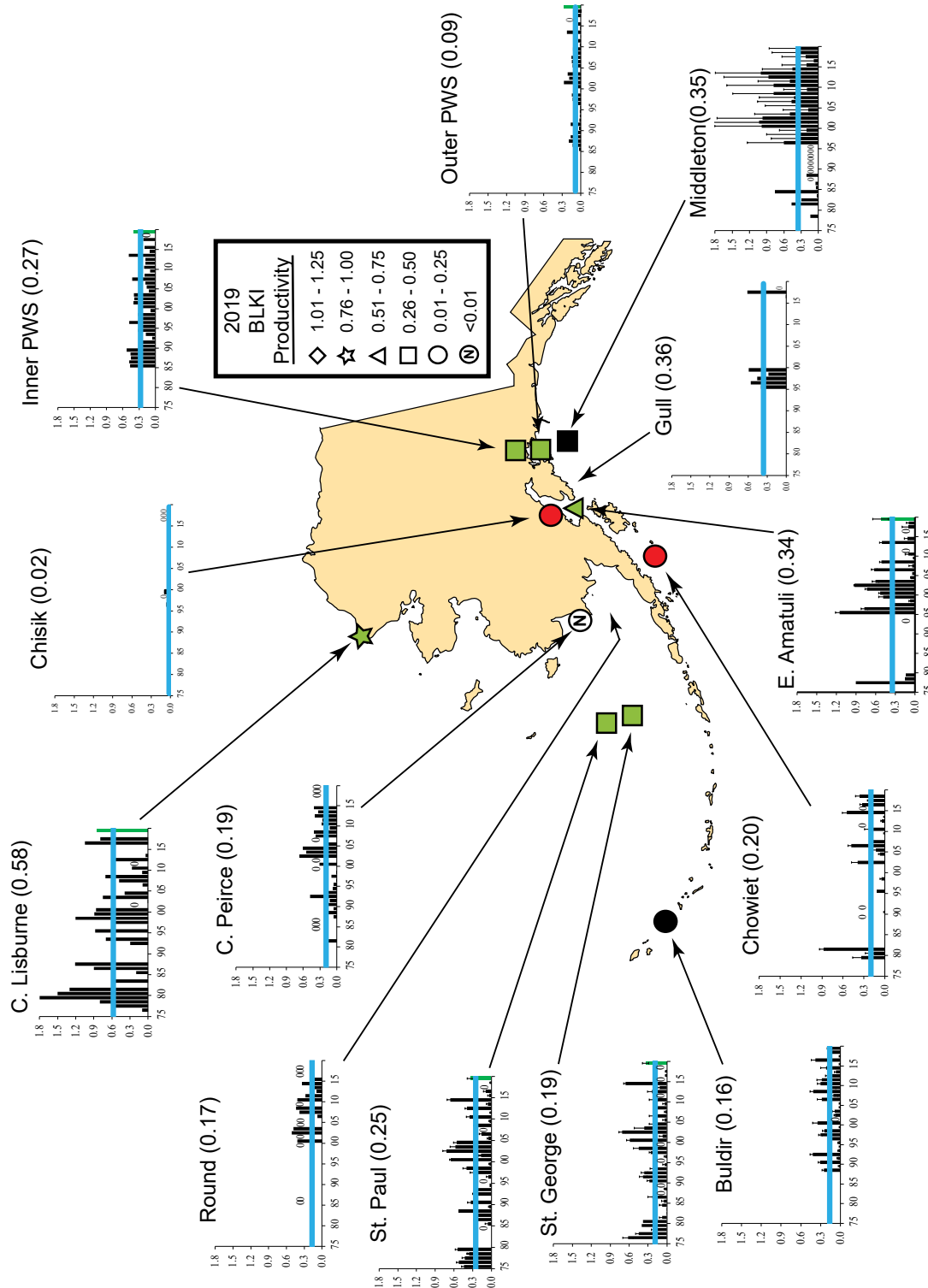
Figure 21. Productivity of black-legged kittiwakes (chicks fledged/nest) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.

Figure 22. Trends in populations of black-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses). "N/A" indicates that insufficient data were available.
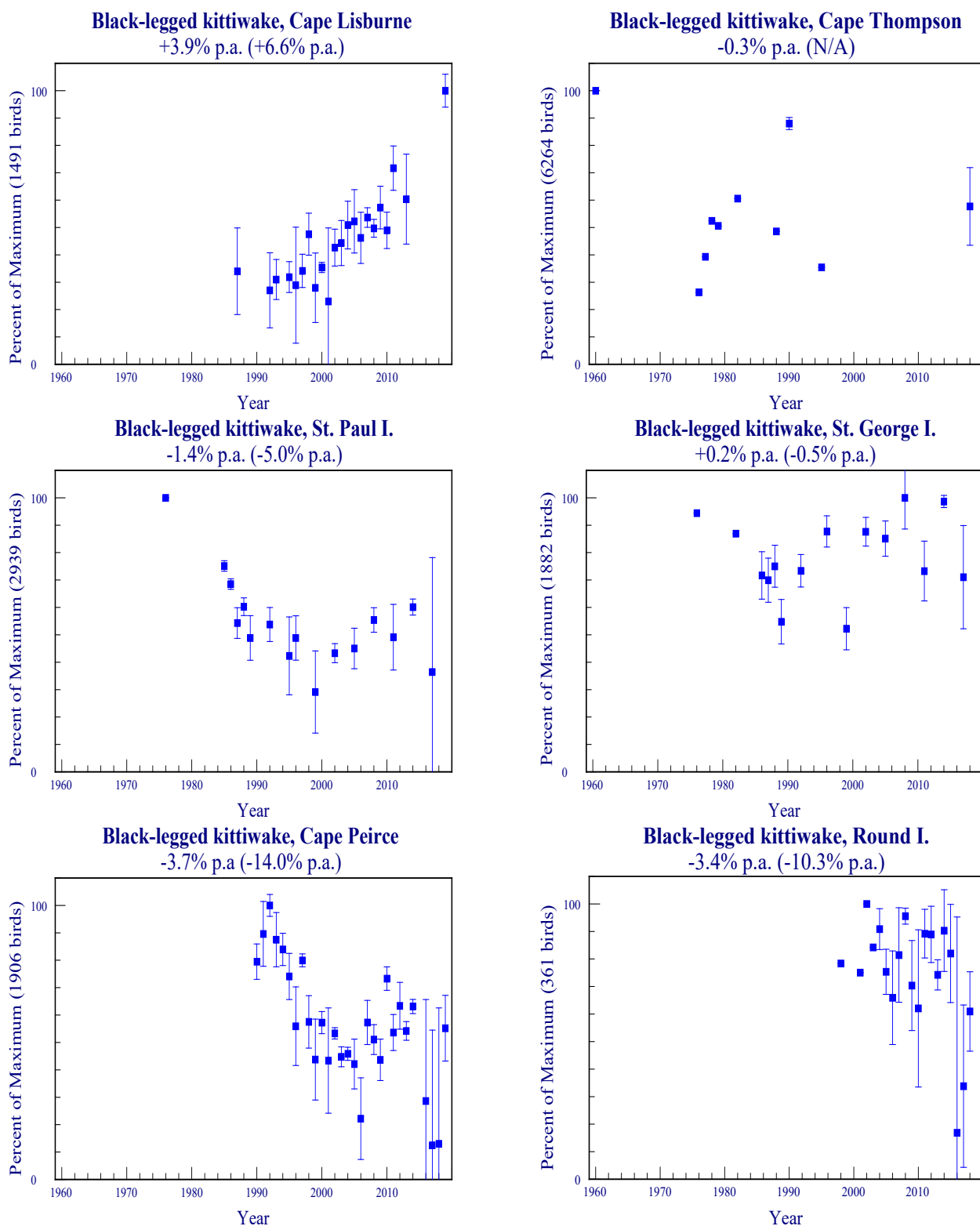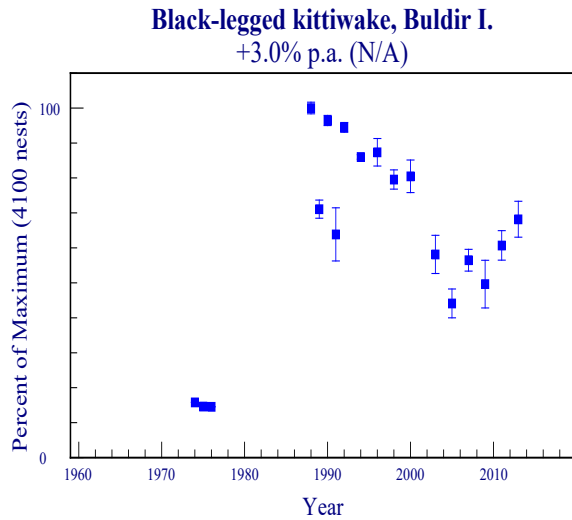
Figure 22 (continued). Trends in populations of black-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses). "N/A" indicates that insufficient data were available.
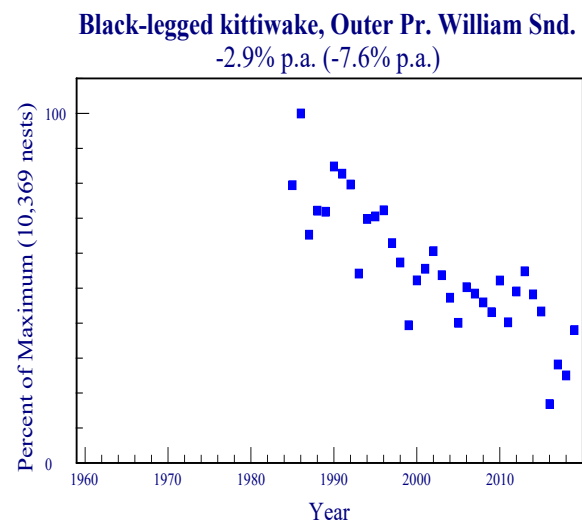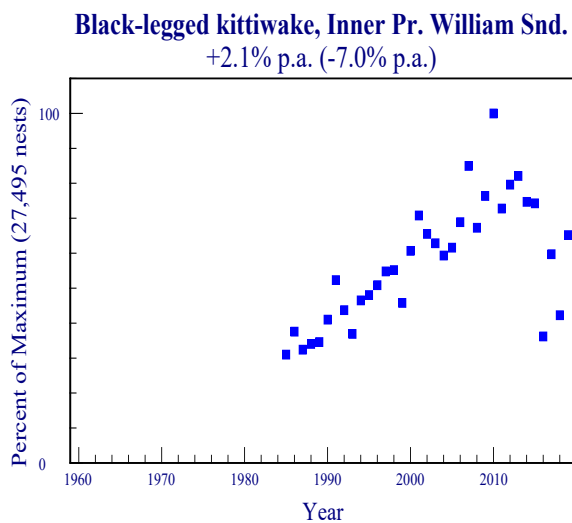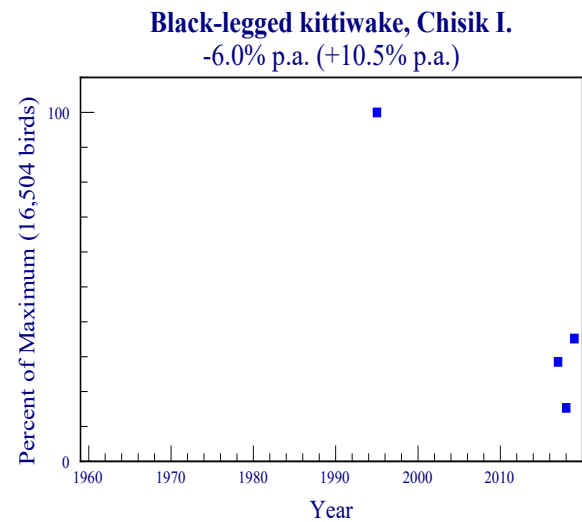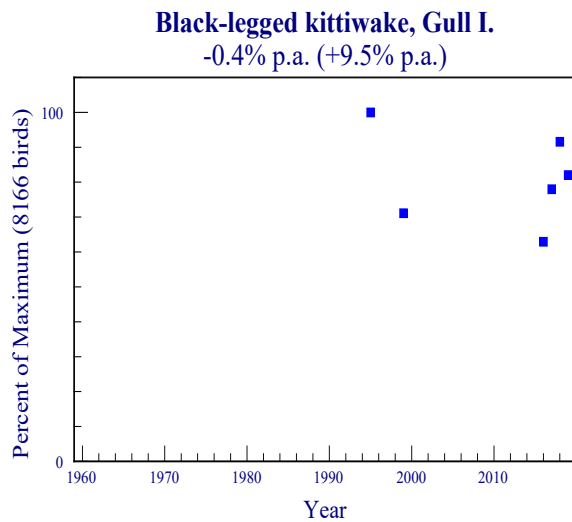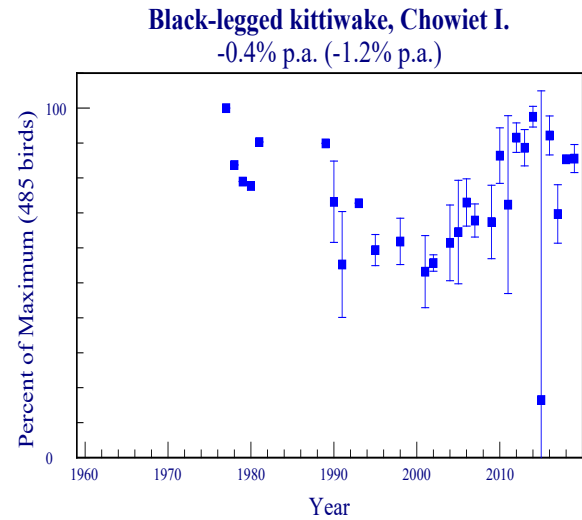
Red-legged kittiwake (*Rissa brevirostris*)

Table 23. Hatching chronology of red-legged kittiwakes at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	8 Jul (13)[a]	18 Jul (26)[a]	Tanedo et al 2019
St. George I.	2 Jul (110)	15 Jul (36)	M. Romano Unpubl. Data

[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.

Table 24. Reproductive performance of red-legged kittiwakes at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
St. Paul I.	0.48	3 (23)[a]	0.23 (39)[a]	Tanedo et al. 2019
St. George I.	0.36	10 (234)	0.23 (43)	M. Romano Unpubl. Data
Buldir I.	0.03	6 (37)	0.18 (31)	Evans et al. 2019

[a]Sample size in parentheses represents the number of nests used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.

Figure 23. Hatching chronology of red-legged kittiwakes at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.

Figure 24. Productivity of red-legged kittiwakes (chicks fledged/nest) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.
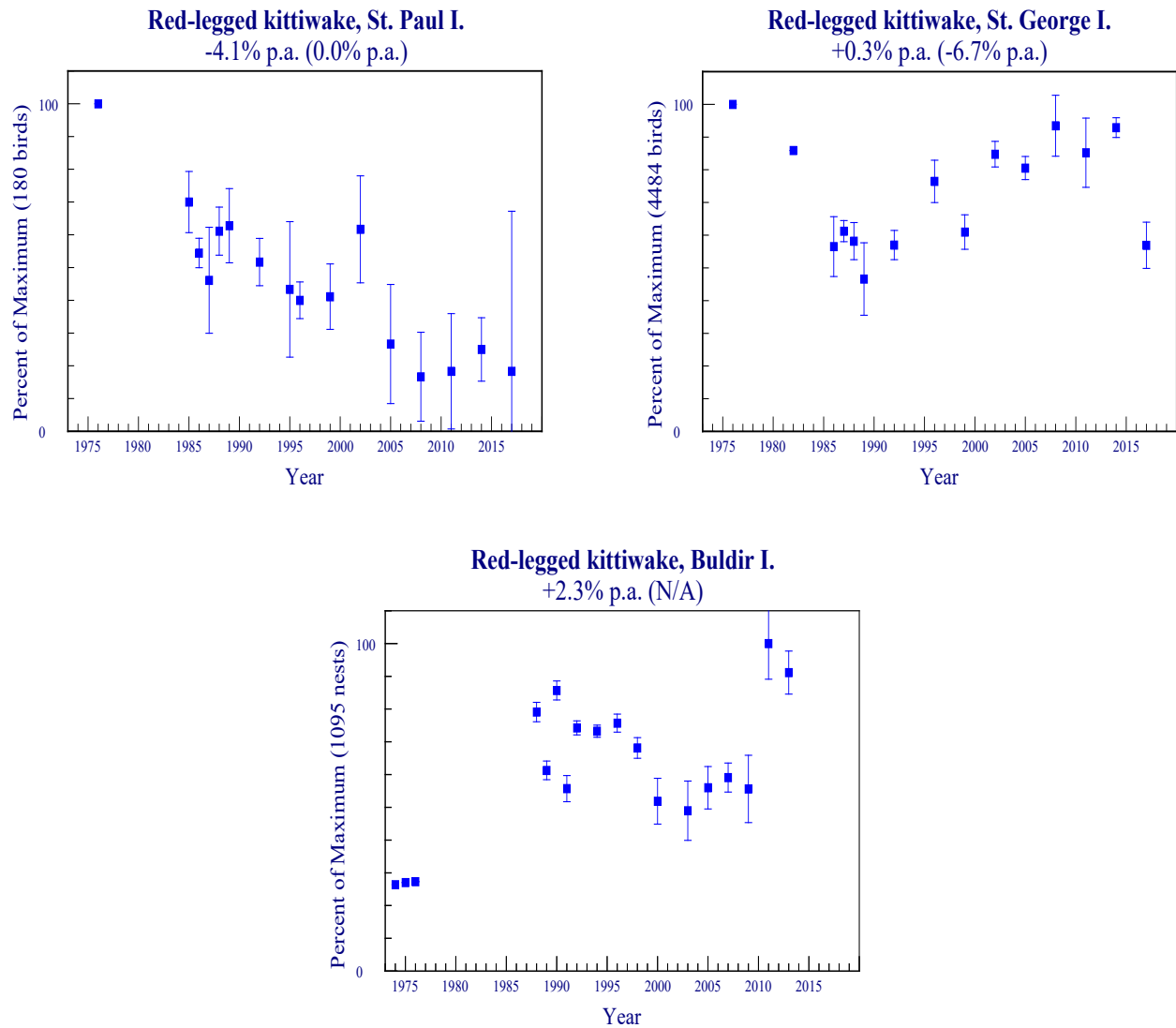
Figure 25. Trends in populations of red-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses). "N/A" indicates that insufficient data were available.

Glaucous-winged gull (*Larus glaucescens*)

Table 25. Hatching chronology of glaucous-winged gulls at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	25 Jun (26)[a]	24 Jun (18)[a]	Evans et al. 2019
Aiktak I.	6 Jul (97)	10 Jul (24)	Youngren et al. 2019
Chowiet I.	23 Jun (44)	2 Jul (13)	Mudge et al. 2019
St. Lazaria I.	7 Jul (131)	6 Jul (20)	Higgins et al. 2019

[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.

Table 26. Reproductive performance of glaucous-winged gulls at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Buldir I.	0.68	NA[a] (37)[b]	0.47 (21)[b]	Evans et al. 2019
Aiktak I.	0.61	4 (209)	0.53 (24)	Youngren et al. 2019
Chowiet I.	0.81	3 (74)	0.64 (12)	Mudge et al. 2019
St. Lazaria I.	0.71	4 (282)	0.52 (24)	Higgins et al. 2019

[a]Not applicable or not reported.
[b]Sample size in parentheses represents the number of eggs used to calculate hatching success and the number of years used to calculate the long-term average. Current year not used in long-term average.
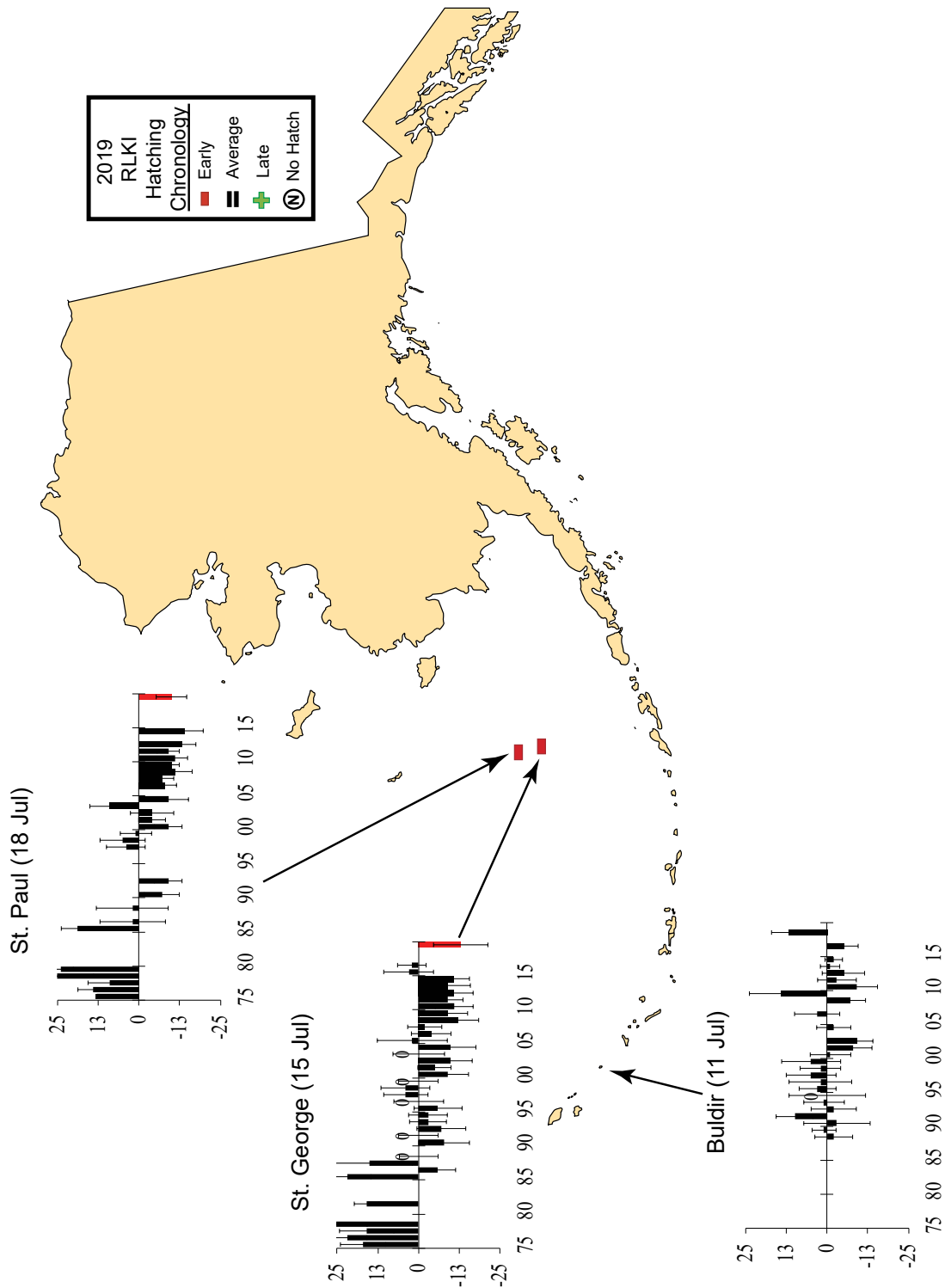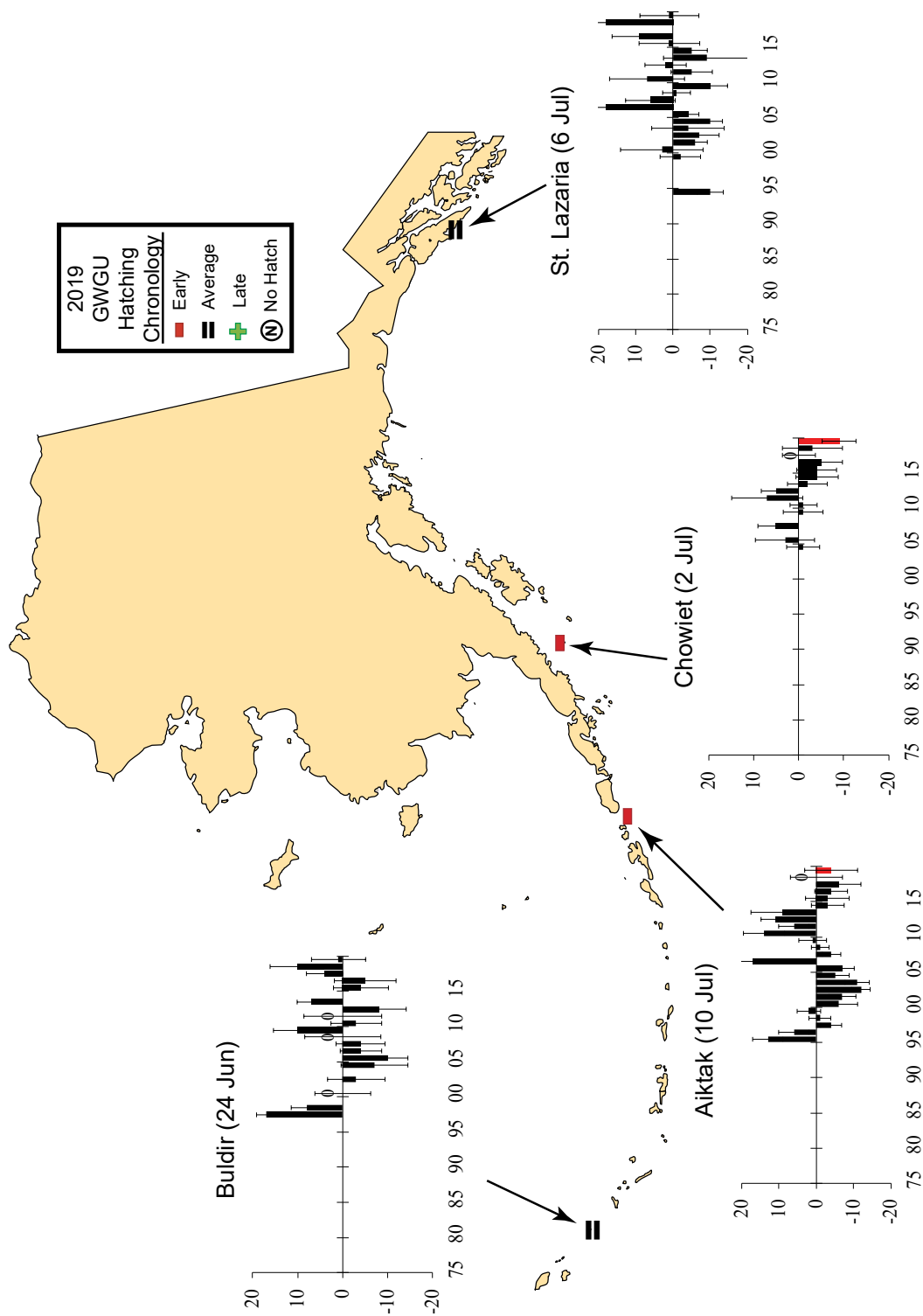
Figure 26. Hatching chronology of glaucous-winged gulls at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.
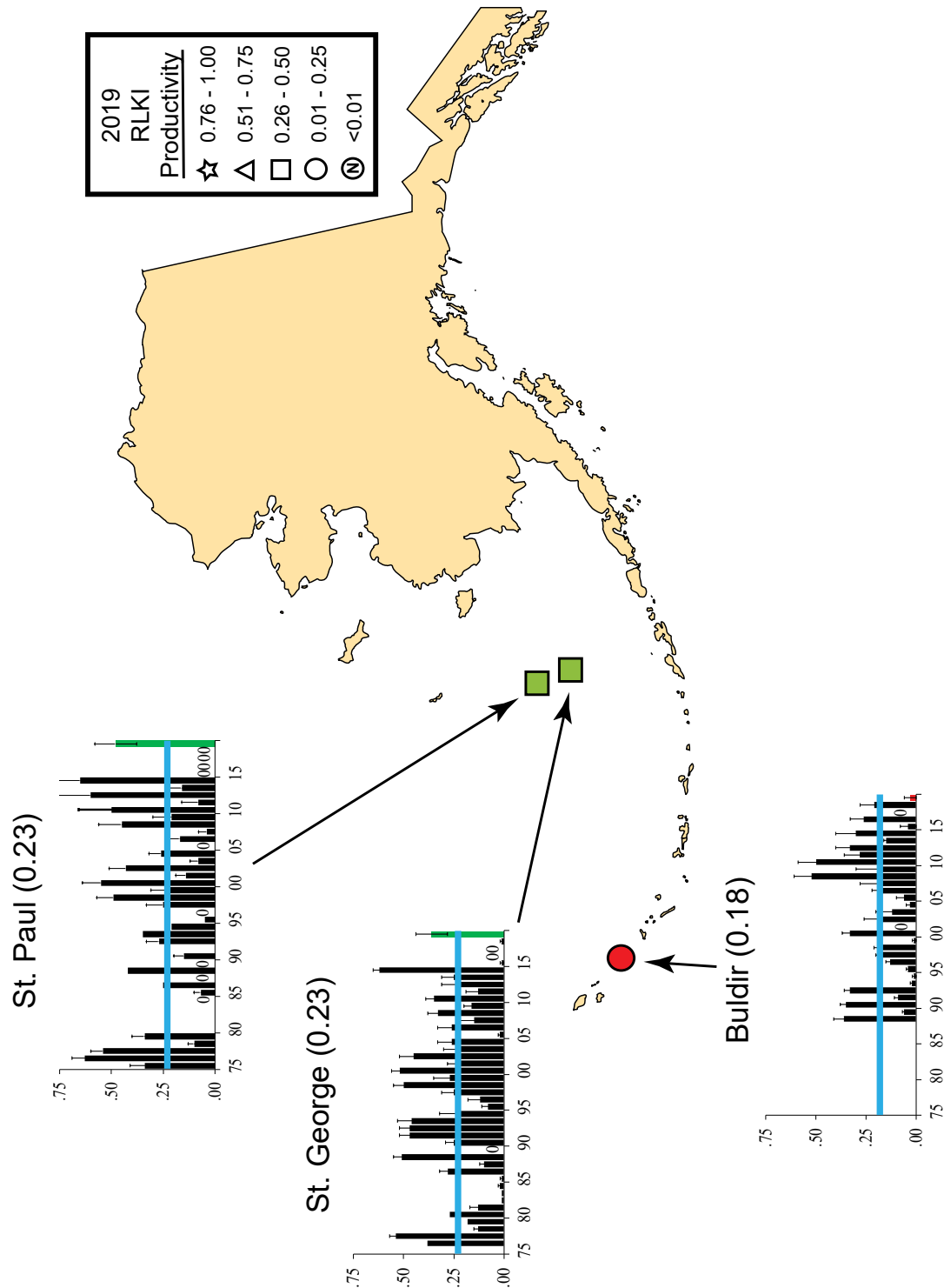
Figure 27. Productivity of glaucous-winged gulls (hatching success) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.

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Glaucous-winged gull, Aiktak I.
-0.1% p.a. (+0.1% p.a.)

Glaucous-winged gull, Chowiet I.
-0.1% p.a. (+1.1% p.a.)

Glaucous-winged gull, St. Lazaria I.
+8.5% p.a. (+9.6% p.a.)

Figure 28. Trends in populations of glaucous-winged gulls at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).

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Fork-tailed storm-petrel (*Hydrobates furcatus*)

Table 27. Hatching chronology of fork-tailed storm-petrels at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	1 Jul (18)[a]	18 Jul (3)[a]	Evans et al. 2019
Aiktak I.	9 Jul (48)	16 Jul (22)	Youngren et al. 2019
St. Lazaria I.	6 Jul (36)	5 Jul (22)	Higgins et al. 2019

[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.

Table 28. Reproductive performance of fork-tailed storm-petrels at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Buldir I.	0.50	5 (48)[a]	0.71 (32)[a]	Evans et al. 2019
Aiktak I.	0.87	13 (75)	0.79 (19)	Youngren et al. 2019
St. Lazaria I.	0.74	8 (95)	0.69 (23)	Higgins et al. 2019

[a]Sample size in parentheses represents the number of eggs used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.

Figure 29. Hatching chronology of fork-tailed storm-petrels at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.
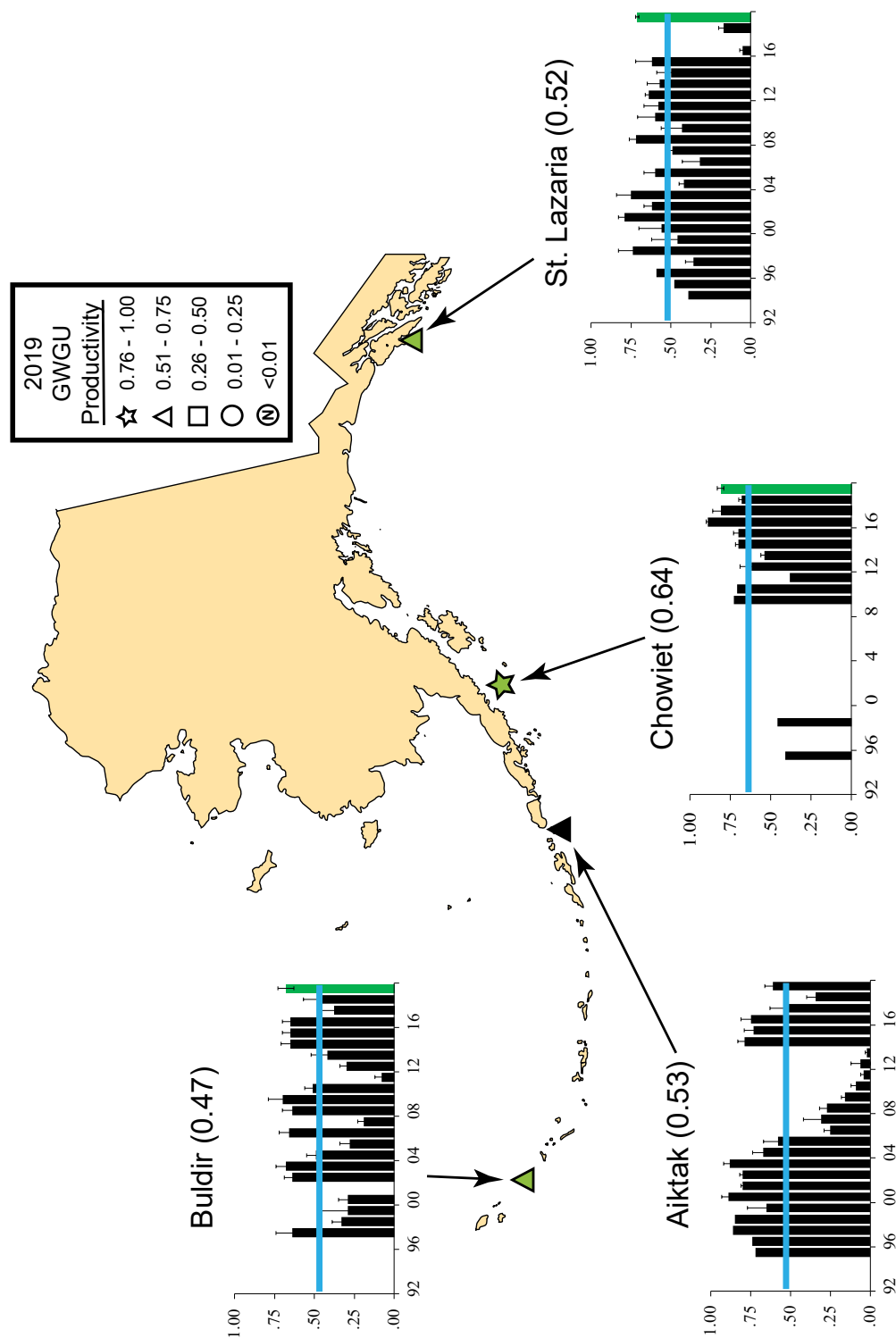
Figure 30. Productivity of fork-tailed storm-petrels (chicks fledged/egg) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.
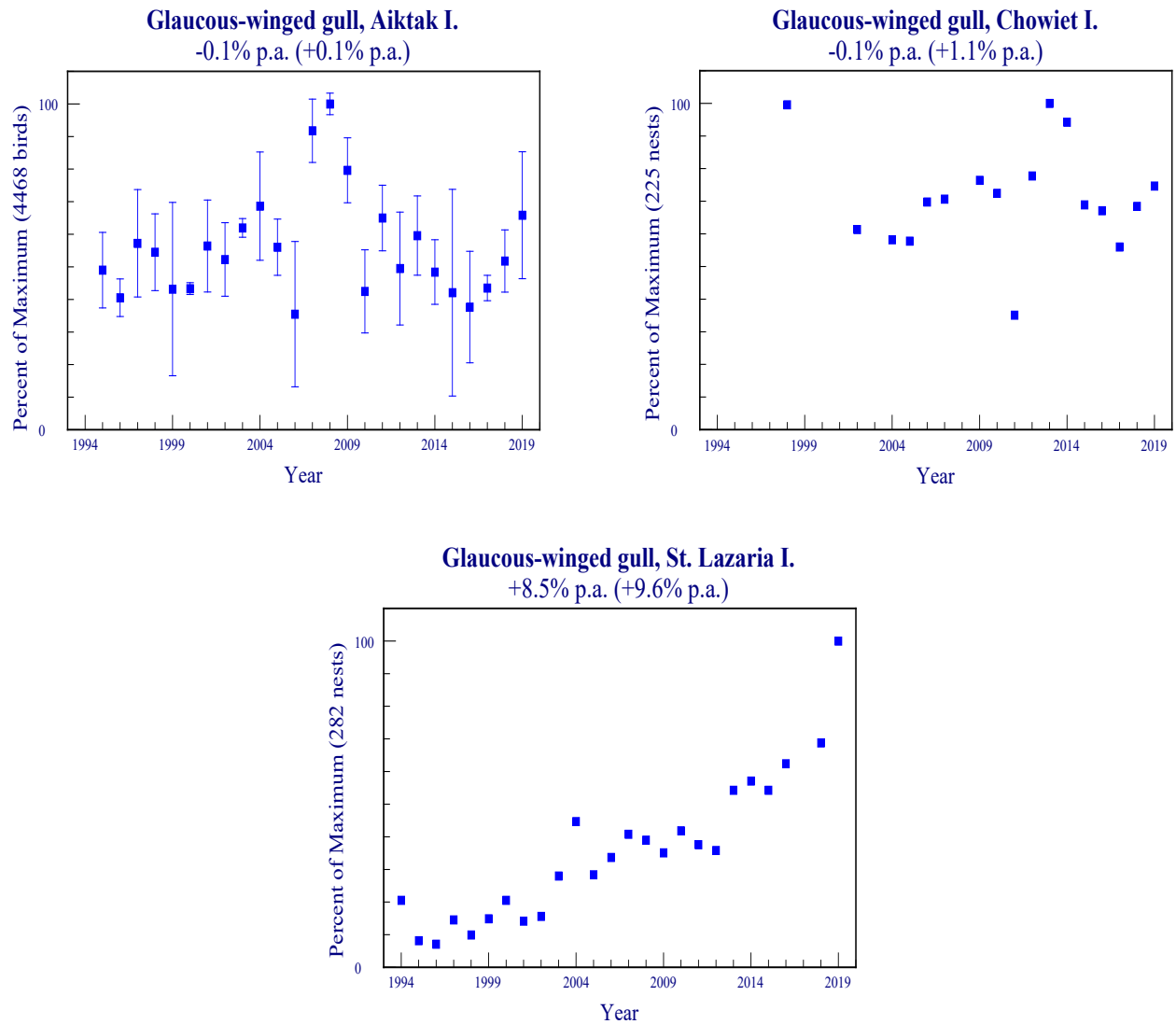
Storm-petrels, Aiktak I.
+3.4% p.a. (+1.1% p.a.)

Fork-tailed storm-petrel, E. Amatuli I.
-0.0% p.a. (-3.3% p.a.)

Storm-petrels, St. Lazaria I.
+0.9% p.a. (+0.8% p.a.)

Figure 31. Trends in populations of storm-petrels at Alaskan sites. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).

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Leach's storm-petrel (*Hydrobates leucorhous*)

Table 29. Hatching chronology of Leach's storm-petrels at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	1 Aug (26)[a]	4 Aug (3)[a]	Evans et al. 2019
Aiktak I.	28 Jul (54)	30 Jul (22)	Youngren et al. 2019
St. Lazaria I.	26 Jul (35)	30 Jul (21)	Higgins et al. 2019

[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.

Table 30. Reproductive performance of Leach's storm-petrels at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
Buldir I.	0.82	5 (73)[a]	0.76 (32)[a]	Evans et al. 2018
Aiktak I.	0.94	12 (127)	0.85 (19)	Youngren et al. 2019
St. Lazaria I.	0.82	8 (94)	0.71 (23)	Higgins et al. 2019

[a]Sample size in parentheses represents the number of eggs used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
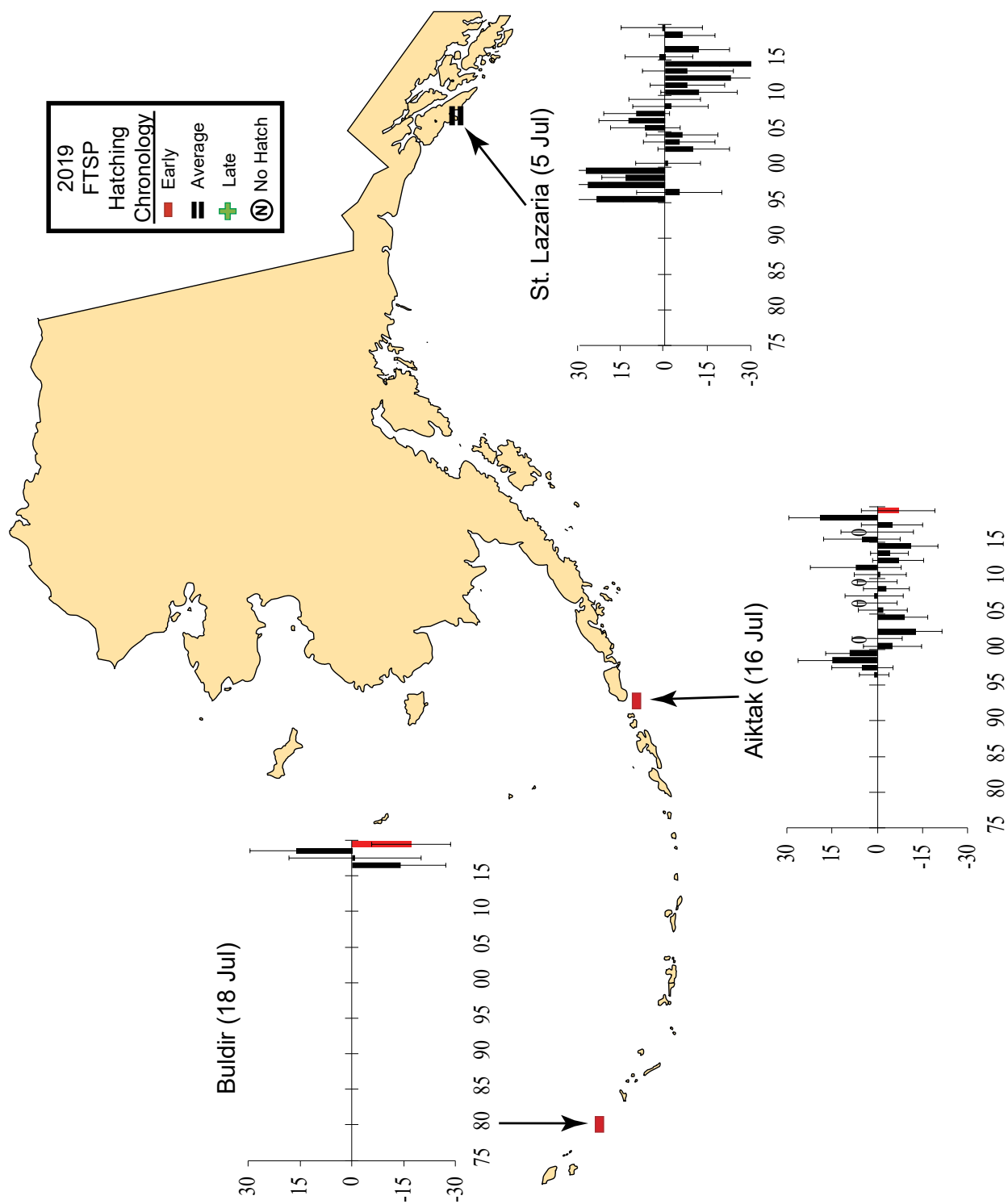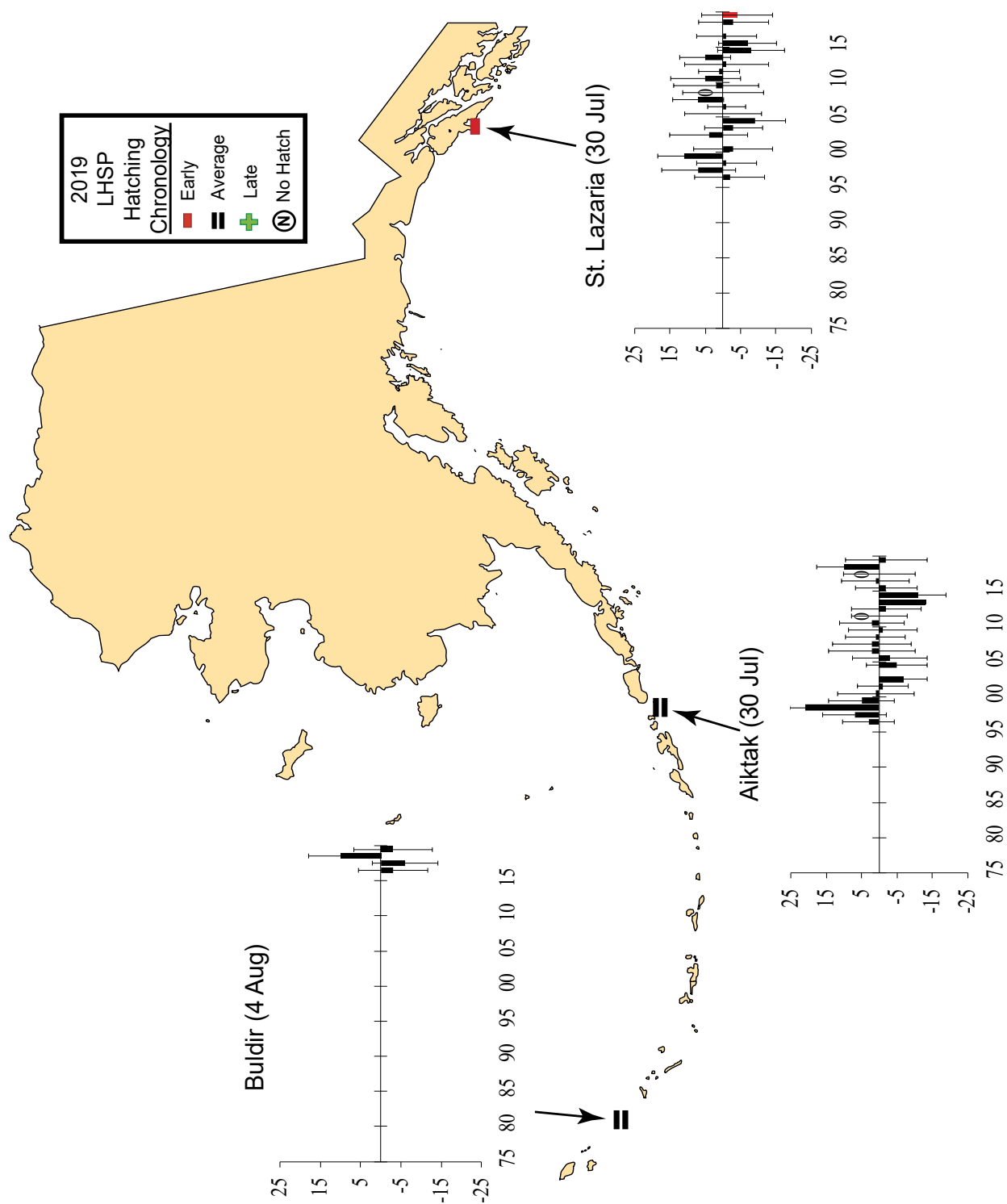
Figure 32. Hatching chronology of Leach's storm-petrels at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >3 days early, black is within 3 days and green is >3 days later than the site mean). Error bars represent ± 1 standard deviation.
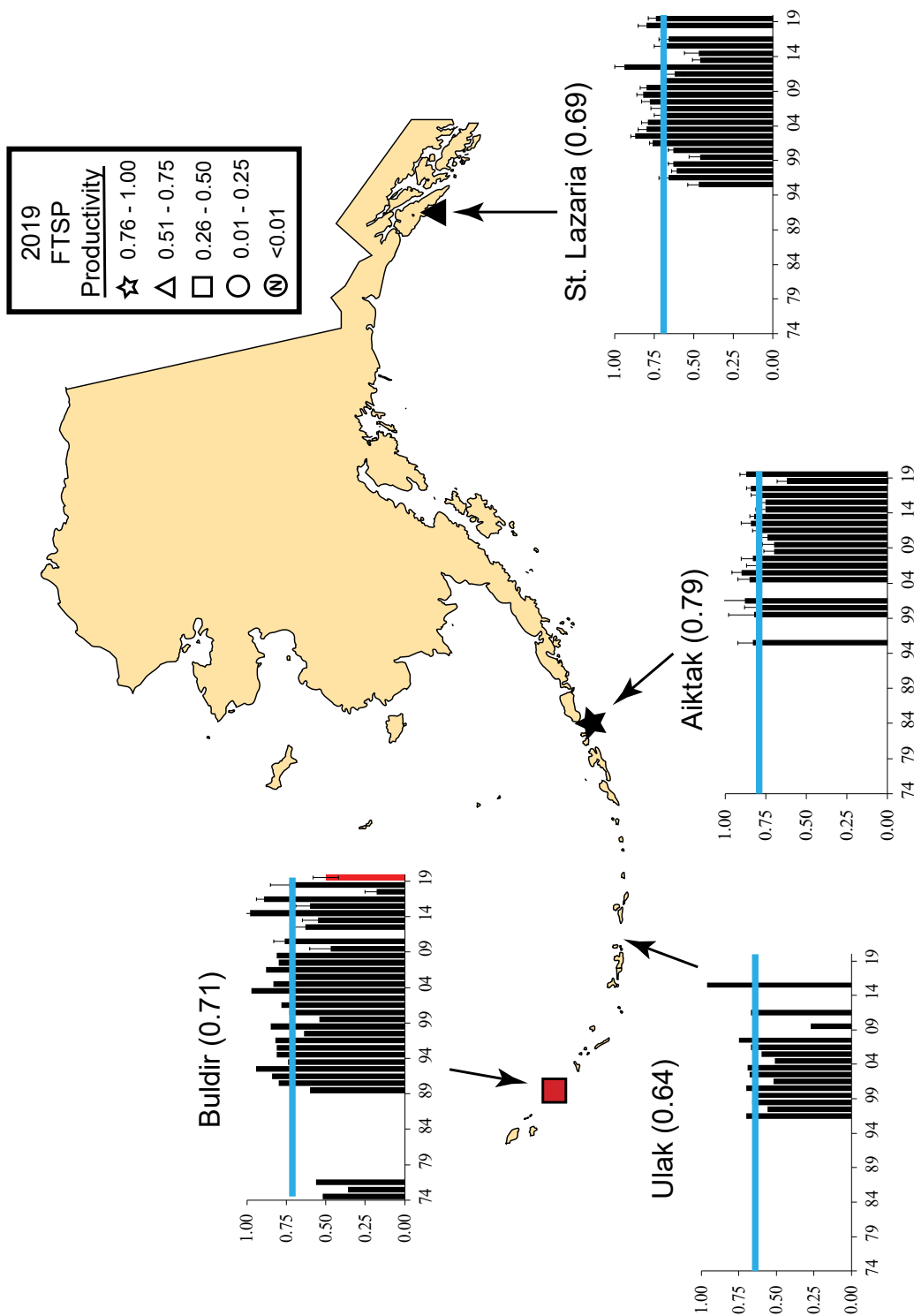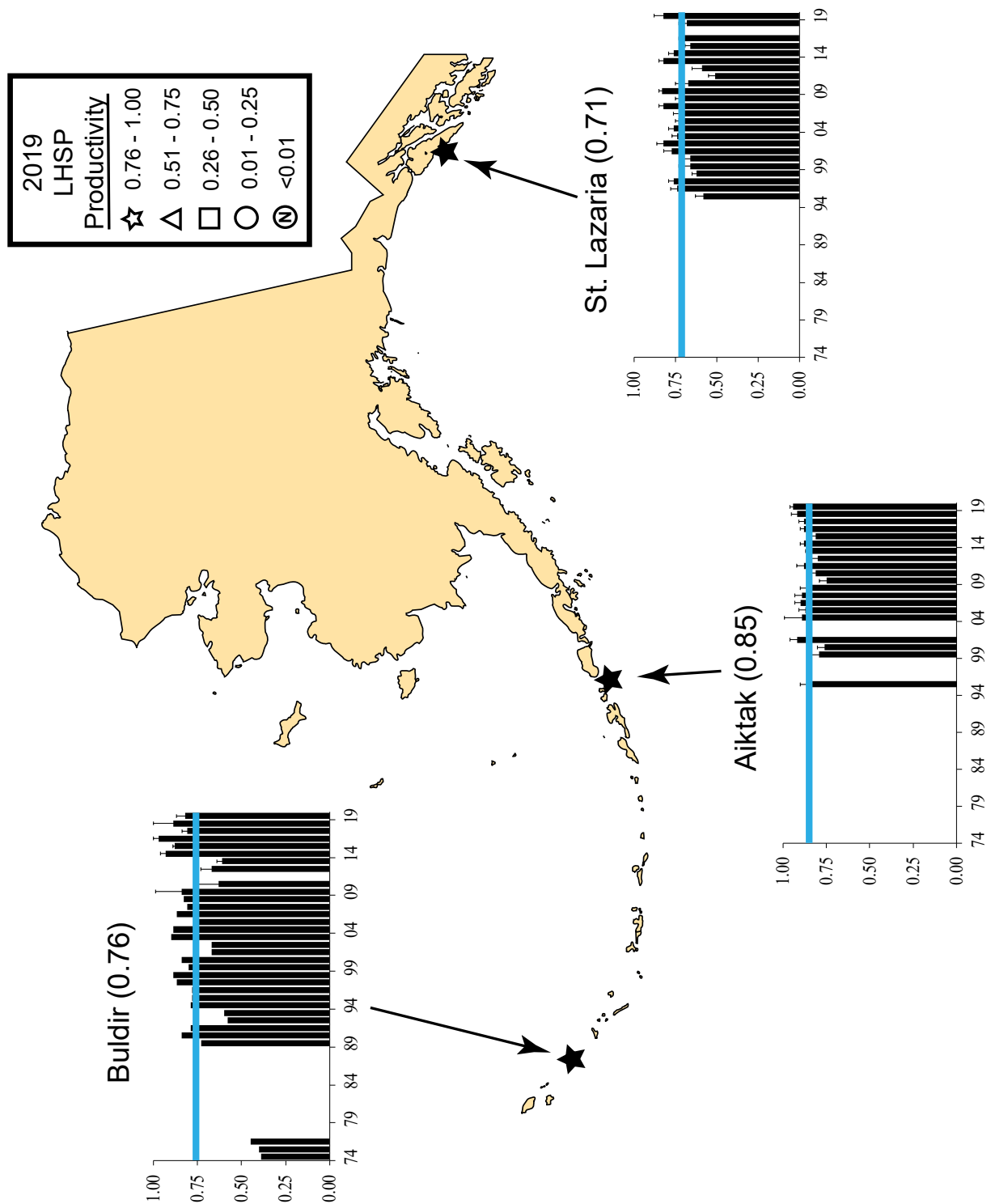
Figure 33. Productivity of Leach's storm-petrels (chicks fledged/egg) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.
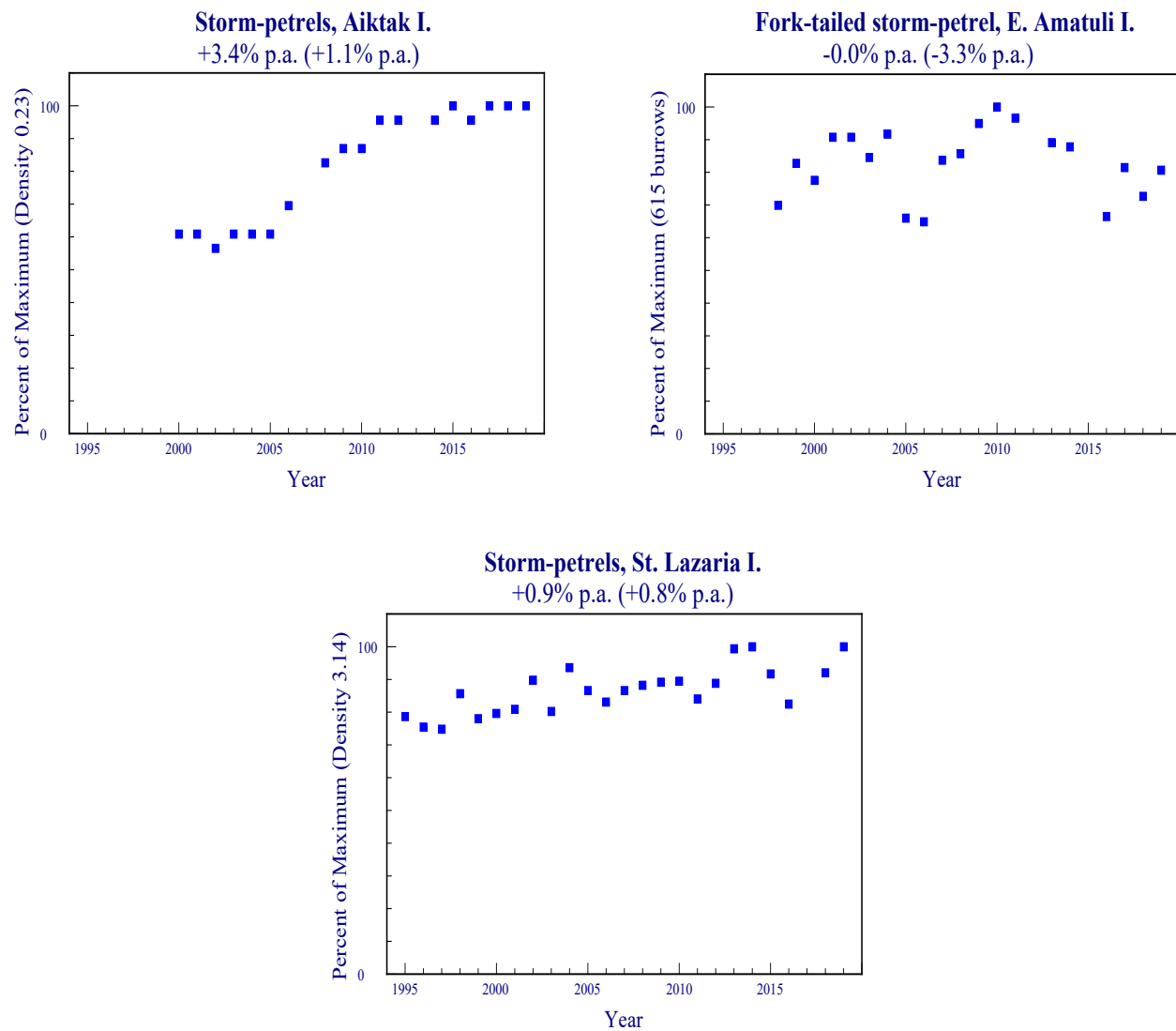
Northern fulmar (*Fulmarus glacialis*)
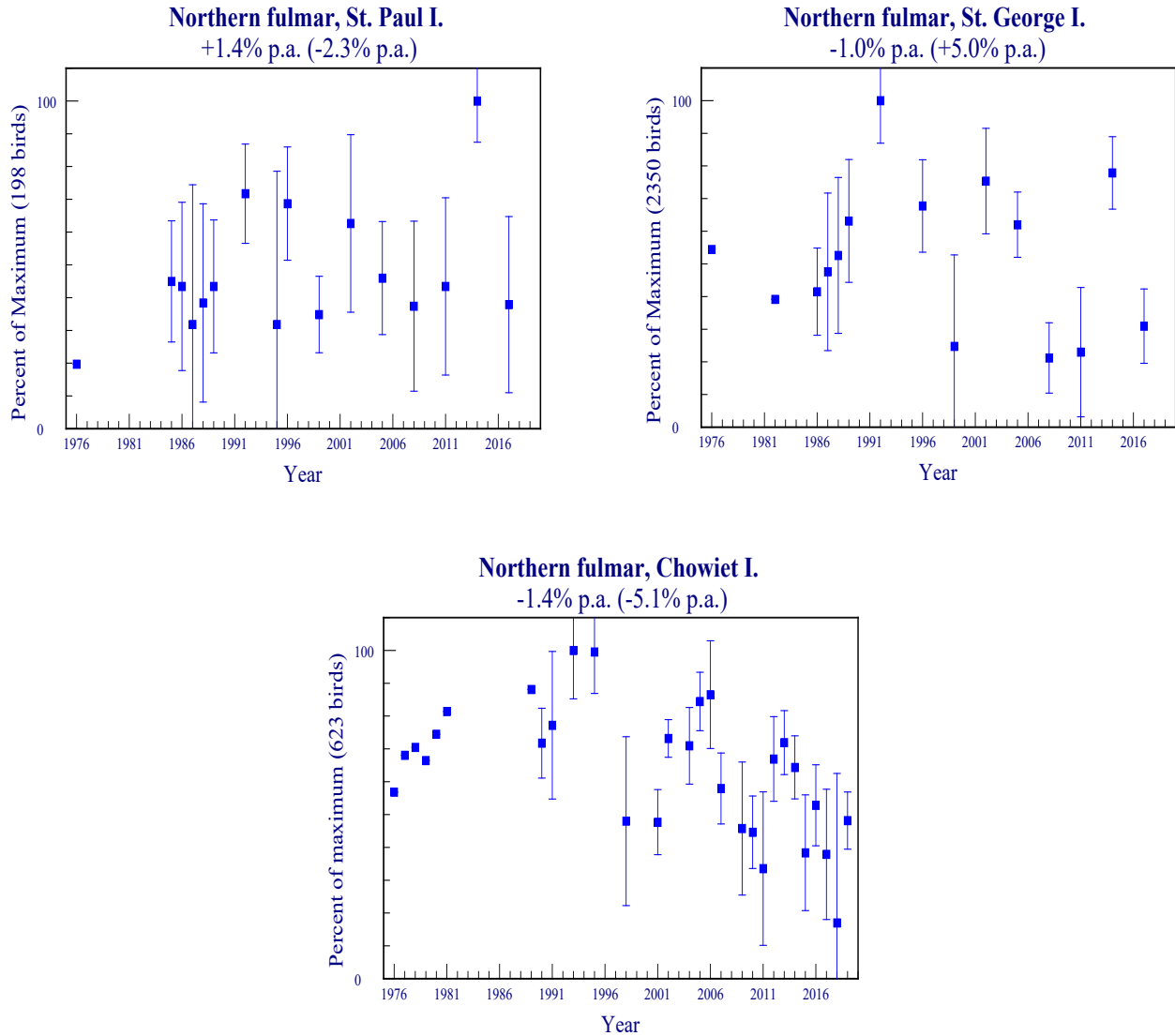
Figure 34. Trends in populations of northern fulmars at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).

Red-faced cormorant (*Phalacrocorax urile*)

Table 31. Hatching chronology of red-faced cormorants at Alaskan sites monitored in 2019.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	13 Jun (22)[a]	29 Jun (29)[a]	Tanedo et al. 2019

[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.

Table 32. Reproductive performance of red-faced cormorants at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
St. Paul I.	1.10	4 (47)[a]	1.30 (34)[a]	Tanedo et al. 2019
St. George I.	0.70	5 (47)	1.10 (19)	M. Romano Unpubl. Data
Aiktak I.	1.50	NA[b] (10)	0.77 (12)	Youngren et al. 2019
Chowiet I.	1.70	3 (30)	0.26 (7)	Mudge et al. 2019

[a]Sample size in parentheses represents the number of nests used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
[b]Not applicable or not reported.

Figure 35. Productivity of red-faced cormorants (chicks fledged/nest) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.
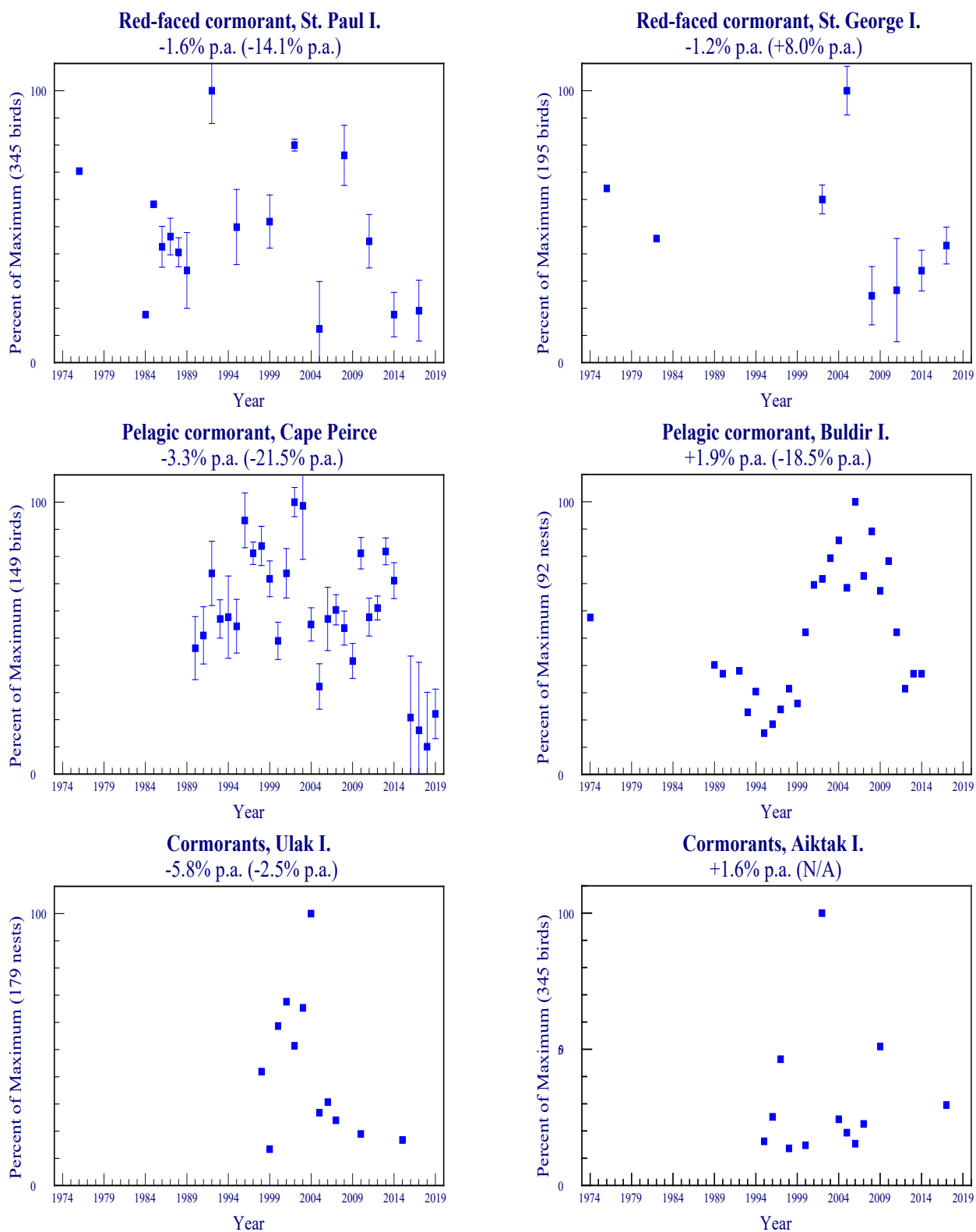
Figure 36. Trends in populations of cormorants at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses). "N/A" indicates that insufficient data were available.

Pelagic cormorant, St. Lazaria I.
+5.1% p.a. (+9.6% p.a.)
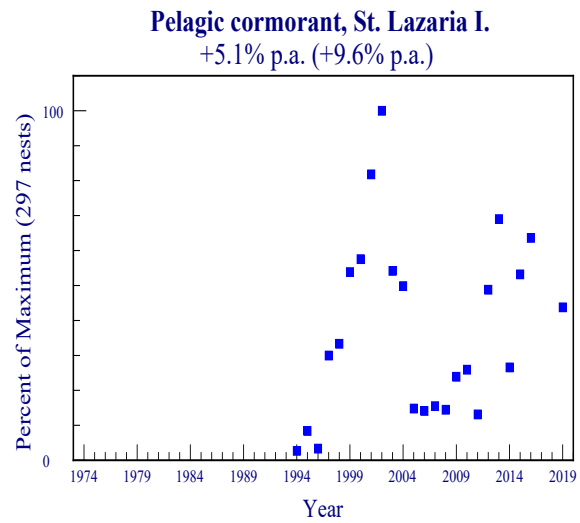
Figure 36 (continued). Trends in populations of cormorants at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2010-2019, in parentheses).

Pelagic cormorant (*Phalacrocorax pelagicus*)

Table 33. Reproductive performance of pelagic cormorants at Alaskan sites monitored in 2019.

Site	Reproductive Performance	No. of Plots	Long-term Average	Reference
C. Peirce	0.41	2 (16)[a]	1.09 (31)[a]	K. Hilwig Unpubl. Data
Chowiet I.	1.60	3 (11)	0.64 (7)	Mudge et al. 2019
St. Lazaria I.	0.00	NA[b] (130)	0.68 (23)	Higgins et al. 2019
Middleton I.	0.40	NA (75)	0.86 (36)	ISRC 2020

[a]Sample size in parentheses represents the number of nests used to calculate productivity and the number of years used to calculate the long-term average. Current year not used in long-term average.
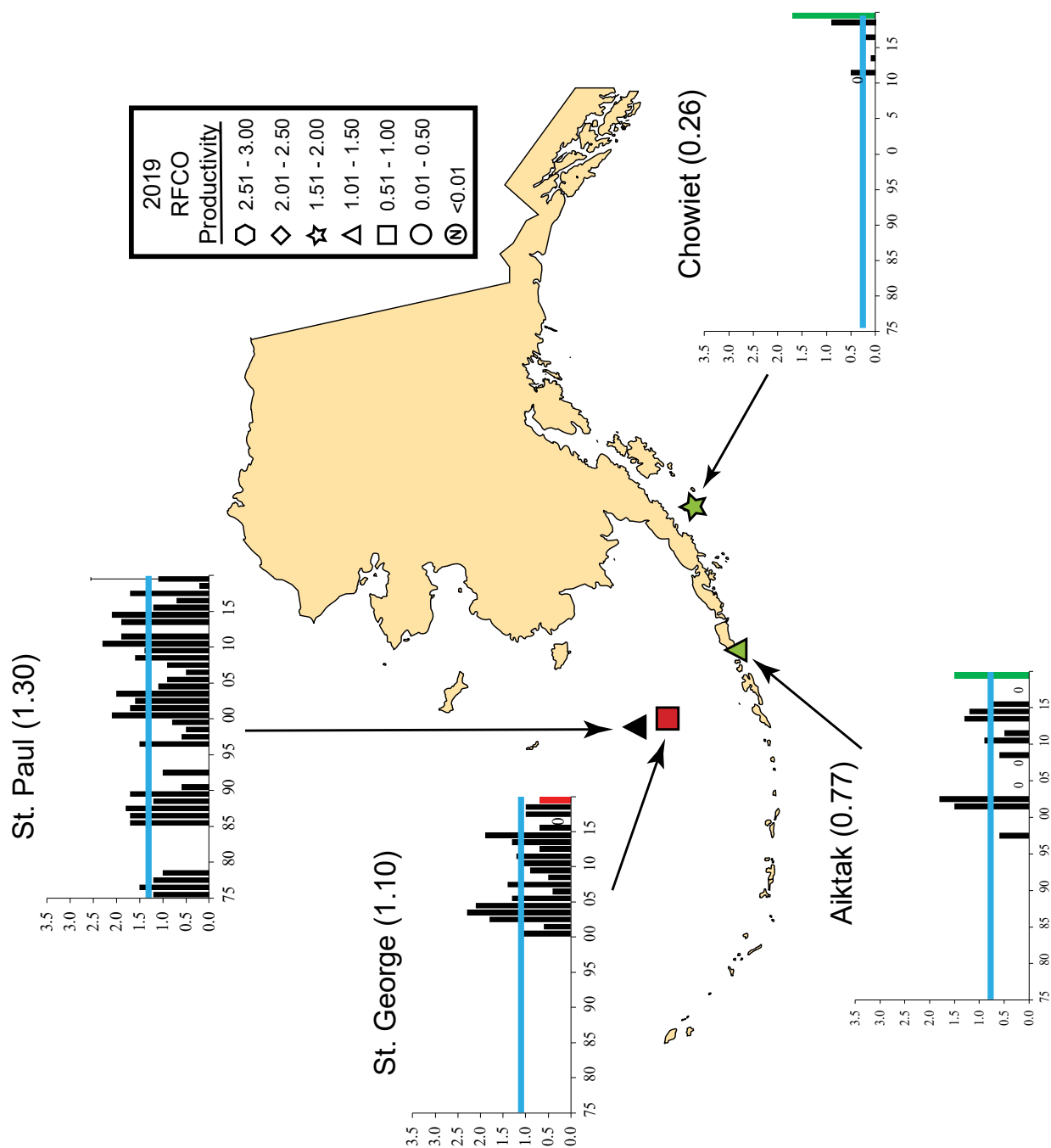
[b]Not applicable or not reported.
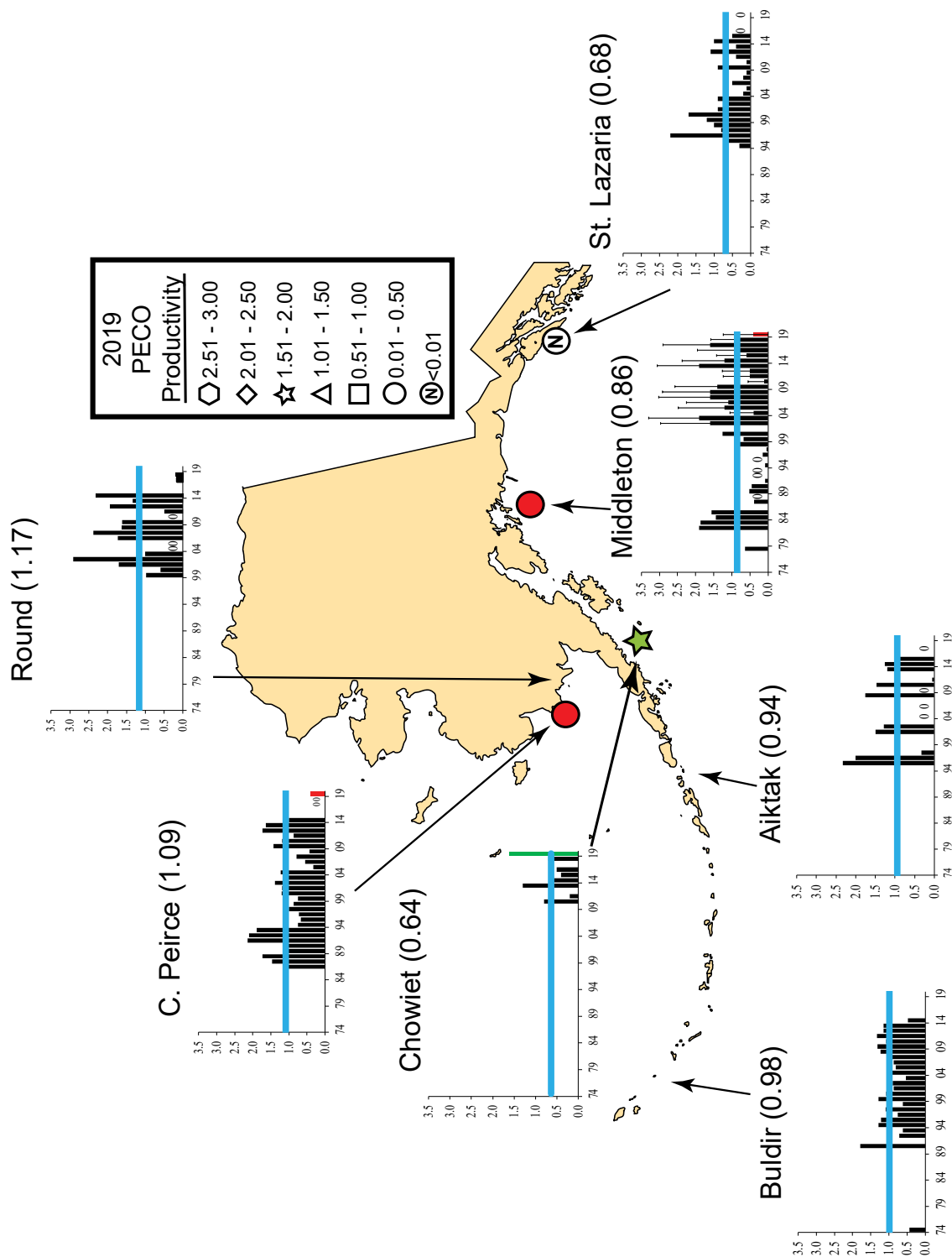
Figure 37. Productivity of pelagic cormorants (chicks fledged/nest) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean). Error bars represent ± 1 standard deviation.

Table 34. Seabird relative breeding chronology[a] compared to averages for past years. Only sites for which there were data from 2019 are included.

Region	Site	COMU[b]	TBMU	ANMU	PAAU	LEAU	WHAU	CRAU	RHAU	HOPU	TUPU	BLKI	RLKI	GWGU	FTSP	LHSP	RFCO
SE Bering	St. Paul I.	A	L									E	E				E
SE Bering	St. George I.	L	L			E						E	E				
	Aiktak I.			E						A	A			E	E	A	
SW Bering	Buldir I.		A		A	E	A	E		A	L	E		A	E	A	
N Gulf of Alaska	Chowiet I.	A	A		L					E	A	E		E			
	E. Amatuli I.											A					
Southeast	St. Lazaria I.	L	L						L					A	A	E	

Table 35. Seabird relative productivity levels[a] compared to averages for past years. Only sites for which there were data from 2019 are included.

Region	Site	COMU[b]	TBMU	ANMU	PAAU	LEAU	WHAU	CRAU	RHAU	HOPU	TUPU	BLKI	RLKI	GWGU	FTSP	LHSP	RFCO	PECO
N. Ber./Chukchi	C. Lisburne											H						
SE Bering	St. Paul I.	L	A									H	H				A	
	St. George I.	A	A									H	H				L	
	C. Peirce					L						L						L
	Aiktak I.	H	H	A						H	H						H	
SW Bering	Buldir I.	H	A		H	A	H	H		H	H	A		A	A	A		
N. Gulf of Alaska	Chowiet I.	H	H		A				A	A	H	L	L	H	L	A	H	H
	E. Amatuli I.											H						
	Chisik I.	L										L						
	Inner PWS[c]											H						
	Outer PWS[c]											H						
	Middleton I.								A		A	A						L
Southeast	St. Lazaria I.	H	H						H					H	A		H	L

[a]Codes:

"L" and red cell color indicate productivity was > 20% below the average for the region.

"A" and yellow cell color indicate productivity was within 20% of average.

"H" and green cell color indicate productivity was > 20% above the average for the region.

[b]COMU=common murre, TBMU=thick-billed murre, ANMU=ancient murrelet, PAAU=parakeet auklet, LEAU=least auklet, WHAU=whiskered auklet, CRAU=crested auklet, RHAU=rhinoceros auklet, HOPU=horned puffin, TUPU=tufted puffin, BLKI=black-legged kittiwake, RLKI=red-legged kittiwake, GWGU=glaucous-winged gull, FTSP=fork-tailed storm-petrel, LHSP=Leach's storm-petrel, RFCO=red-faced cormorant, PECO=pelagic cormorant.

[c]Prince William Sound.

Table 36. Seabird population trends[a] for all available years ("A" columns), and the past decade (2010-2019, "D" columns).

Region	Site	COMU		TBMU		UNMU		PIGU		LEAU		RHAU		TUPU		BLKI		RLKI		GWGU		FTSP		STPE		NOFU		RFCO		PECO		UNCO	
		A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D
Chukchi	C. Lisburne					↔	↔									↑	↑																
	C. Thompson					↔	N/A										N/A																
SE Bering	St. Paul I.	↓	↓	↔	↓											↔	↓	↓	↔							↔	↔	↔	↓				
	St. George I.	↔	↓	↔	↔					↔	↓					↔	↔	↔	↓							↔	↑	↔	↑				
	C. Peirce	↓	↓													↓	↓													↓	↓		
	Round I.	↓	↓													↓	↓																
	Aiktak I.					↓	↓							↔	↔					↔	↔			↑	↔							↑	N/A
SW Bering	Buldir I.					↑	↔									↔	N/A	↔	N/A											↔	↓		
	Ulak I.					↔	↓									↔	↔															↓	↔
N Gulf of Alaska	Chowiet I.					↔	↔					↔	↔			↔	↔			↔	↔												
	Puale Bay					↔	↔																										
	E. Amatuli I.													↓	↓		↑					↔	↓				↓						
	Gull I.	↔	↓													↔	↑																
	Chisik I.	↓	↑													↓	↓																
	Inner PWS[c]							↓	↓							↔	↓																
	Outer PWS[c]															↔	↓																
Southeast	St. Lazaria I.					↔	↔	↔	↔			↑	↑							↑	↑			↔	↔					↑	↑		

[a]Codes:

↓ and red cell color indicate a negative population trend of ≥3% per annum for this site or region.

↔ and yellow cell color indicate no population trend.

↑ and green cell color indicate a positive population trend of ≥3% per annum for this site or region.

"N/A" indicates that there were insufficient data to determine a trend.

[b]COMU=common murre, TBMU=thick-billed murre, UNMU=unspecified murre, PIGU=pigeon guillemot, LEAU=least auklet, RHAU=rhinoceros auklet, TUPU=tufted puffin, BLKI=black-legged kittiwake, RLKI=red-legged kittiwake, GWGU=glaucous-winged gull, FTSP=fork-tailed storm-petrel, STPE=unspecified storm-petrel, NOFU=northern fulmar, RFCO=red-faced cormorant, PECO=pelagic cormorant, UNCO=unspecified cormorant.

[c]Prince William Sound. PIGU counts are for the entirety of PWS.

Acknowledgments

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