BRISTOL BAY SUBSISTENCE REGIONAL ADVISORY COUNCIL

Meeting Materials

October 30-31, 2019
Dillingham

What's Inside

On the cover...

Caribou on Togiak National Wildlife Refuge

USFWS photo

What's Inside

BRISTOL BAY SUBSISTENCE REGIONAL ADVISORY COUNCIL

Dillingham Middle School Gym
Dillingham

October 30, 2019, convening at 10:00 a.m.
October 31, 2019, convening at 8:30 a.m.

TELECONFERENCE: call the toll free number: 1-866-916-7020, then when prompted enter the passcode: 37311548.

PUBLIC COMMENTS: Public comments are welcome for each agenda item and for regional concerns not included on the agenda. The Council appreciates hearing your concerns and knowledge. Please fill out a comment form to be recognized by the Council chair. Time limits may be set to provide opportunity for all to testify and keep the meeting on schedule.

PLEASE NOTE: These are estimated times and the agenda is subject to change. Contact staff for the current schedule. Evening sessions are at the call of the chair.

AGENDA

*Asterisk identifies action item.

1. **Invocation**
2. **Call to Order** (*Chair*)
3. **Roll Call and Establish Quorum** (*Secretary*) 4
4. **Welcome and Introductions** (*Chair*)
5. **Review and Adopt Agenda*** (*Chair*) 1
6. **Review and Approve Previous Meeting Minutes*** (*Chair*) 5
7. **Reports**
   - Council Member's Reports
   - Chair's Report
   - Coordinator's Report
8. **Public and Tribal Comment on Non-Agenda Items** (available each morning)
9. **Old Business (Chair)**
   a. Wildlife Closure Review WCR20-04/06 - information update (*Suzanne Worker*) 17
   b. 805(c) Report - information update (*Council Coordinator*) 30

10. New Business (*Chair*)

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Regional Proposals

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WP20-27: Allow use of snowmachines to assist in take of caribou in Unit 17 51

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b. 2020 Fisheries Resource Monitoring Program* (*OSM Fishery/Anthropology*) 113

c. Identify Issues for FY2019 Annual Report* (*Council Coordinator*) 132

d. Alaska Board of Fisheries Proposals, Bristol Bay area (*George Pappas*)

11. Agency Reports

(Time limit of 15 minutes unless approved in advance)

a. Tribal Governments

b. Native Organizations

1. Bristol Bay Native Association (BBNA)

c. USFWS

1. Togiak National Wildlife Refuge (NWR) 266
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NPS

1. Lake Clark National Park
2. Katmai National Park/Aniakchak National Monument
   a). Pikes Ridge Trail update
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ADF&G

OSM

11. Future Meeting Dates*

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12. Closing Comments

13. Adjourn (*Chair*)

To teleconference into the meeting, call the toll free number: 1-866-916-7020, then when prompted enter the passcode: 37311548.

Reasonable Accommodations

The Federal Subsistence Board is committed to providing access to this meeting for all participants. Please direct all requests for sign language interpreting services, closed captioning, or other accommodation needs to Donald Mike, 907-786-3629, donald_mike@fws.gov, or 800-877-8339 (TTY), by close of business on September 12, 2019.

REGION 4
Bristol Bay Subsistence Regional Advisory Council

Seat	Year Appointed *Term Expires*	Member Name and Community	
1	2018 ***2019***	**Frank G. Woods III** Dillingham	
2	2016 ***2019***	**Dennis Andrew, Sr.** New Stuyahok	
3	2003 ***2019***	**Nanci Ann Morris Lyon** King Salmon	**Vice Chair**
4	2007 ***2020***	**Molly B. Chythlook** Dillingham	**Chair**
5	2017 ***2020***	**William W. Trefon, Jr.** Nondalton	
6	2014 ***2020***	**William J. Maines** Dillingham	
7	2003 ***2020***	**Dan O. Dunaway** Dillingham	
8	2012 ***2018***	**Lary J. Hill** Iliamna	
9	2018 ***2021***	**Robert A. Larson** Koliganek	
10	2009 ***2021***	**Richard J. Wilson** Naknek	**Secretary**

BRISTOL BAY SUBSISTENCE REGIONAL ADVISORY COUNCIL

Dolly's Hall Naknek, Alaska
March 12 -13, 2019
Convening at 9:00 am March 12, 2019

Invocation
Mr. Richard Wilson provided the invocation

Call to Order
Meeting called to order at 9:05 am

Roll Call and Establish Quorum
Present
Frank Woods III
Nanci Morris Lyon
Molly Chythlook
William Trefon, Jr.
Dan Dunaway
Larry Hill
Richard Wilson

Online
William Maines
Dennis Andrew, Sr.

Excused
Robert Larson
Quorum established. Roll call by Council Coordinator

Welcome and Introductions
Agency staff

Robbin La Vine	Office of Subsistence Management (OSM)
Susanna Henry	Togiak Natioal Wildlife Refuge (NWR)
Linda Chisholm	Katmai National Park & Preserve
Glenn Chen	Bureau of Indian Affairs (BIA)
Susan Worker	OSM
Donald Mike	OSM
Troy Hamon	Katmai National Park & Preserve
Mark ???	Katmai National Park & Preserve
Susan Alexander	AP/Becharof NWR
Orville Lind	OSM

NGOs/Public

Gayla Hoseth	Bristol Bay Native Association (BBNA) (online)
Cody Larson	BBNA
Dan O'Hara	Naknek
Randy Alveraz	Iguigig
Paul Boskofsky	Naknek
Kenneth Nukwak	Manokotak (online)

Review and Adopt Agenda
The Council added agenda subject heading "Old Business" as 9(a) Positioning of Animals, following Public and Tribal Comment on Non-Agenda Items, and resequencing the remaining agenda items identifying "New Business" as agenda item number 10. The Council added under 10) New Business, e) Tribal Engagement. The Council also added additional language on agenda 9. Public and Tribal Comment… to state "available each morning *and throughout the meeting*" to encourage public participation throughout the public meeting.

Agenda adopted as amended.

Welcome and Introductions of members
Dan Dunaway
Richard Wilson
Molly Chythlook
Nanci Morris Lyon
Larry Hill
William Trefon, Jr.

Council members online:
Dennis Andrew
Billy Maines

Election of Officers
The Council Coordinator opened the election of officers of the Bristol Bay Subsistence Regional Advisory Council (Council). Mr. Lary Hill moved to maintain the current seats held by Ms. Molly Chythlook as chairperson, Ms. Nanci Morris Lyon as the vice-chair, and Mr. Richard Wilson as the Secretary for the Council. Mr. Hill's motion requested the consensus of the Council, no objection. Ms. Molly Chythlook nominated as Chair, and Ms. Morris Lyon and Mr. Wilson were nominated for another one-year term to serve as the officers of the Council.

Review and Approve Previous Meeting Minutes
Mr. Dunaway moved to adopt the meeting minutes November 6, 2018 as submitted. Second by Mr. Wilson. Minutes approved and adopted.

Reports
Council Member Reports
Mr. Dunaway reported a good year on Local Advisory Community meetings and discussed taking action on various resource issues. The subsistence season for salmon was good for the rural subsistence users; the Chinook run was okay.

Mr. Wilson shared his hunting and fishing activities and stated that they were dependent on local weather. ADF&G staff need to put in effort to attend Council meetings; more effort is needed from the King Salmon ADF&G staff.

The Council discussed important subsistence-related issues affecting them and needs accurate information from staff to develop sound and educated recommendations.

Ms. Morris Lyon affirmed Mr. Wilson's comments and concerns. She commented on the decent amount of moose hunting success in her area.

Mr. Woods commented that he has a passion for feeding himself/family and noted that there is more competition for the limited resources in his area, and there are fewer Chinook Salmon to meet the locals' subsistence needs. Mr. Woods also stated that more youths need to be engaged and consult with elders.

Mr. Larry Hill reported that poor winter travel conditions persisted throughout the area and the lack of snow brought the bears out early this year, earlier than normal. He also provided an observation that the ptarmigan population is very low. No trapping due to weather conditions. The Iliamna Lake has not frozen over, except for a few bays. Mr. Hill reported the subsistence moose harvest was low, with only about five moose taken. In addition, only about three to five or more wolves were harvested. Issues with agency staff attending Council meetings continue to be a concern: Lake Clark National Park is not attending and participating in public meetings; their absence is noted; subsistence rights and lifestyle need to be protected.

Mr. Billy Trefon commented on Chulitna River traffic issues regarding aircraft, but, winter hunt was good.

Mr. Dennis Andrew Sr. was impressed with students active in the communities on resource related issues. Caribou returns are good near his community, and the population of the herd is on the increase or ranging within the community.

Mr. Billy Maines apologized for not showing up. He stated that it is good to hear from Native organizations, and Federal and State agencies.

Chair's Report: Ms. Molly Chythlook. Lack of ice on lakes is making it difficult to fish through the ice.

Public and Tribal Comment on Non-Agenda Items (available each morning and throughout the day) Mr. Dan O'Hara, Naknek, commented on community concerns over resource issues. Sockeye returns are down, and some communities are not meeting their subsistence needs.

Old Business

Positioning of animals in Unit 17

The Council, prior to adjourning in 2018, moved to form a Working Group (WG) on positioning of animals and report to the Council at its February 2019 winter meeting with a recommendation to the Council for consideration. Due to the Federal Government shut down in late December 2018 and throughout January 2019, the WG had a very short window to convene prior to the Council's 2019 winter meeting. The February 2019 meeting was rescheduled for March 2019. The Council in its winter 2019 meeting, discussed the issue and recessed on March 12, 2019 to allow the WG an opportunity to meet and develop a proposal for the Council to review and consider, when the Council reconvenes on March 29, 2019. Through consensus, the WG agreed to present its proposed regulatory language, as presented by OSM staff, to the Council. The Council had an opportunity to review the proposed language and make the necessary amendments, or adopt the language, to submit as a Federal wildlife proposal to the Board. The Council adopted the WG's recommendation for a proposal to be submitted to the Board call for wildlife proposals.

Council Coordinator Mike provided background about Council and Board action on **WP18-24**, which requests that Federally qualified subsistence users be allowed to use a snowmachine to position caribou, wolves, and wolverines for harvest in Unit 17, provided the animals are not shot from a moving vehicle. Following a motion to support the proposal with a second, the Council adopted

an amendment to modify the proposal to insert the regulatory language: "a hunter may position him/herself with a snowmachine and not the animal". However, the motion as modified by the amendment failed. As such, the Council **opposed** the proposal. The proposal failed at the Board public meeting.

The Council discussed the positioning issue and advocated to move it forward as a statewide issue. Mr. Wood moved to form a WG to develop a proposal for the next call for wildlife proposals. Motion passed to form a WG.

The WG met on two different times in March of 2019. See attachment of the WG's recommendations to the Council.

New Business
Wildlife Closure Reviews

WCR18-04/06 (Unit 9C and 9E caribou) Ms. Suzanne Worker presented the analysis.
The Council supported the Wildlife Closure review to eliminate the closure for Unit 9C draining into the Naknek River from the North and Graveyard Creek and Coffee Creek, while the remainder of Unit 9C and Unit 9E remain closed. The Council supported the OSM recommendation to initiate a proposal to modify the existing regulations.

Call for Federal Wildlife Proposals
Ms. Suzanne Worker announced call for proposals.

Mr. Woods moved to submit a proposal for hunting wolf and wolverines on BLM managed lands on behalf of BBRAC. Second by Mr. Dunaway. Motion carries.

Council Charter Review
Nanci move to adopt the Charter as recommended. Second by Woods. Dunaway, working pretty well. Question called. Motion adopted. The Council approved its Charter as submitted by OSM.

FY2018 Annual Report
The Council approved its FY2018 Annual Report to include an all Council Chairs meeting at Board meetings in Anchorage. The following are the annual report items approved by the Council.

1. Low Level Aircraft Flights
Residents in the Lake Iliamna and Lake Clark region have expressed concerns about aircraft flying at low levels and disrupting wildlife and user groups in the area. The Chulitna River drainage in particular is an important habitat for moose and other resources central to the subsistence practices of rural residents. The area is primarily accessed by boat or snowmachine in the winter. Low level flights disrupt all users from having a successful harvest. Local residents have approached the Lake Clark Subsistence Resource Commission (SRC) and brought these concerns to its attention. Transporters also access remote lakes to drop hunters at hunting camps, which have been used by local residents for generations. This results in user conflict, trespass on private property, and local concerns about competition for limited resources.

Glen Alsworth, Jr., a pilot and tour operator and member of the Lake Clark SRC, initiated an educational outreach effort by writing to area pilots and asked that they avoid the river corridor and keep flights above 1,000 feet in altitude during the moose season (see enclosed). Additional outreach efforts can include notifying other pilots about avoiding the river corridor and flying at a

low level directly over Long and Nikabuna Lakes within the Chulitna River drainage. These outreach efforts could be coordinated through the SRC and local communities.

Additionally, local communities are communicating with the National Park Service (NPS) to address the issue of increased air traffic and low level flights over sensitive areas. The Council encourages continued efforts by local communities, and also encourages the NPS to actively work with communities to begin management planning for air traffic over subsistence use corridors through the use of concession permits or other management tools.

2. Historical Migratory Bird Management
The Alaska Migratory Bird Co-Management Council co-chair brought to the Council's attention a recent apology letter signed on September 13, 2018 by the Regional Director of the U.S. Fish and Wildlife Service (FWS) and ADF&G, Commissioner stating the need to: "reconcile the past and acknowledge that those regulations harmed hunters and their families. We seek to continue rebuilding relationships with Alaska's Indigenous peoples who were affected by the unintended consequences of past harvest regulations…".

The Council urges the Board to acknowledge the letter signed by the FWS and ADF&G in its next scheduled public meeting.

3. All Council Meeting
The Council supports conducting another all-Council meeting in Anchorage. It would be beneficial to all Council members attending training sessions.

The Council suggests that the following items be on the agenda or part of the program at the next all-Council meeting:

- Regulations, and interpretation of them, related to the use of snowmobiles for hunting
- Closing session with all Councils to develop resolutions to submit to the Board
- Discussion during the closing session for all Councils to develop consensus on management plans or other issues affecting all Councils

4. Gull Population
Rural communities rely on various subsistence resources throughout the seasonal cycles of subsistence harvest. Local observations report that there are fewer gulls present in the Lake Iliamna area. Gulls are one of many subsistence resources available in the region. The Council would like to know if the local gull population decline is limited to a specific geographic area or is it occurring statewide. Therefore, the Council requests a briefing from the Migratory Bird Program on the population status of gulls in the Iliamna Lake area.

5. Council Chairs' Meeting
The Council requests the Board to consider a joint Regional Advisory Council Chairs' meeting in advance of a regulatory Board meeting. The joint meeting of the ten Regional Advisory Chairs will allow for a forum to discuss concerns they may share with other regions on administrative and resource management issues. The Council requests that the ten Council Chairs be consulted in advance on the agenda items for a joint Chairs meeting.

6. Positioning of Animals
Rural residents are dependent on winter and summer transportation modes to gather, harvest, and hunt subsistence resources. In recent history, snowmachines replaced dog sleds to seek and harvest moose, caribou, wolves, and other land mammals. This is necessary to provide for the

Federally qualified subsistence user families and communities, and to assure that subsistence needs are met.

Hunters are now using snowmachines to hunt for moose and caribou to meet their subsistence needs. The use of snowmachines to position animals for the purpose of taking has replaced the dog teams of past, and this method of positioning of animals has been used throughout the region. Agency specific regulations allow for the use of snowmachines traditionally employed by local rural residents engaged in subsistence use if they are operated "in such a manner as to prevent the herding…of wildlife for hunting or other purposes." As a result, the lack of specific regulatory language for Federal public lands in Alaska has caused some conflict among subsistence users and land managing agencies.

Tribal Engagement

Mr. Orville Lind presented a briefing of the Tribal Engagement policy and process.

Agency Reports (Note: Agency reports were presented after the invocation to accommodate Council members en route from Iliamna Lake)

Tribal Governments/ Native Organizations

BBNA was represented by Mr. Cody Larson, Ms. Gayla Hoseth, and Mr. Chris Maines.

Mr. Cody Larson provided a Partners for Fisheries Monitoring Program update. The sharing networks in the Chigniks of subsistence resources and currently the report is being developed. Mr. Cody also provided an update for the Togiak River.

Ms. Gayla Hoseth provided a briefing on recent (2019) Alaska Migratory Birds issues that included an update on the emperor goose harvest, reporting that it was a successful subsistence season.

USFWS

Ms. Susanna Henry, Togiak NWR Refuge Manager referred the Council to the refuge report on page 34 of the Council meeting materials. Highlights include:

-Kenton Moos is the new Deputy Refuge Manager for Togiak NWR.
-Black Lake moose survey request. FWS did a partial moose survey and abundance is average.

NPS

Mr. Mark Strum, Superintendent of Katmai National Park (Park), reported that elevated bridge and board walk at Brooks Camp are in progress; looking at June 2019 to be completed. The Park is concerned about motorboat use and is seeking public comments about bridge and motorboat access. The Pike Ridge access project had to be temporarily postponed. The reason for the delay is that the current administration requires additional environmental assessment.

Ms. Linda Chisholm provided a briefing of the Pikes Ridge trail and the Park has sent a copy of the proposed project to 52 Tribes for review and comment.

Ms. Chisholm provided a status update of membership for the Aniakchak SRC. The Park requested reappoint to Ms. Gerda Kosbruk of Port Heiden to serve another term on the SRC. Ms. Nanci Morris, move to reappoint Ms. Gerda Koskruk to the SRC, second by Dunaway. Motion carried.

ADF&G

Mr. Neil Barten, ADF&G Wildlife Biologist, provided biological report on moose and caribou in Unit 17. Mr. Barten also reported on the intensive management of wolves using airplanes use to harvest wolves. 30 wolves were taken by aerial hunters. The Mulchatna Caribou herd is growing; 26 radio collars will be deployed soon this winter and 50-60 collars are planned for the Mulchatna caribou herd this spring 2019. Moose in Unit 17A, 22 harvested and the season has been extended season to 25 Feb 2019.

OSM
OSM staff member Lind provided the Council with a general update and staffing update— Carl Johnson left OSM. Ms. Robbin La Vine provided an update on the FRMP and fisheries regulatory cycle.

Future Meeting Dates*

Confirmed the fall 2019 meeting dates and location; moved to October 30-31, 2019 in DLG
Selected the winter 2020 meeting dates and location: February 4-5, 2020.
Motion carried.

The Council recessed until March 29, 2019.

March 29, 2019. The meeting called back to order via teleconference.
Regional Advisory Council members present:
Molly Chythlook
Larry Hill
Nanci Morris Lyon
William Maines
William Trefon
Frank Woods

Excused:
Richard Wilson
Dennis Andrew, Sr.
Dan Dunaway
Robert Larson

Quorum established.
Donald Mike, Council Coordinator

Federal and State Staff:
Liza Rupp NPS
Neil Barten ADF&G
Todd Rinaldi AD&FG
Derek Thompson Togiak NWR
Susanna Henry Togiak NWR
Robbin La Vine OSM
Glen Chen BIA
Gayla Hoseth BBNA

Mr. Donald Mike provided the summary of the WG's two meetings via teleconference and the recommendation it developed for the Council to consider.

After discussion on the WG's recommendation, Ms. Nanci Morri Lyon moved to accept the WG's proposal to be submitted to the Board as a proposal from the Council (Attachment March 15, 2019).

Adjourn
Meeting adjourned March 29, 2019 via teleconference.

I hereby certify that, to the best of my knowledge, the forgoing minutes are accurate and complete.

_____
Donald Mike
FWS, Office of Subsistence Management

_____
Molly Chythlook, Chair
Bristol Bay Subsistence Regional Advisory Council

These minutes will be formally considered by the Bristol Bay Subsistence Regional Advisory Council at its next meeting, and any correction or notations will be incorporated in the minutes of that meeting.

For a more detailed report of this meeting, copies of the transcript and meeting handouts are available upon request. Call Donald Mike at 1-800-478-1456 or 907-786-3629, email donald_mike@fws.gov

March 15, 2019

To: Council Coordination Files

From: Donald Mike, Council Coordinator

Subject: Positioning of Animals; R4 Bristol Bay

The Bristol Bay RAC held its winter public meeting in Naknek, Alaska to address subsistence related issues and to discuss and submit wildlife proposals for the Federal Subsistence Management Regulations for the Harvest of Wildlife on Federal Public Lands in Alaska on March 12, 2019.

Background

Under Old Business, Positioning of Animals, the Council discussed the need to address the lack of general provisions in current Federal hunting regulations to allow for this practce. The lack of specific regulatory language for Federal Public lands in Alaska has caused conflict among subsistence users and land management agencies. At its fall 2019 public meeting in Dillingham, the Council addressed the issue in Proposal WP18-24 and opposed it, noting the confusion over the definition of "positioning" and "chasing", and further noting that current regulations are not clearly defined. Snowmachine use is currently allowed to access resources in Unit 17.

The Council, prior to adjourning in 2018, moved to form a Working Group (WG) on this issue and report to the Council at its February 2019 winter meeting with a recommendation. Due to the Federal Government shut down in late December 2018 through January 2019, the WG had a very short window to meet prior to the Council's 2019 winter meeting. The February 2019 meeting was rescheduled for March 2019. The Council discussed the issue and recessed on March 12, 2019 to allow the WG an opportunity to meet and develop a proposal that the Council could review and consider when the Council reconvened on March 29, 2019. The Council continued to endorse a WG to convene and develop a regulatory proposal. The Council was scheduled to reconvene on March 29, 2019 at 10:00 am via teleconference.

The WG convened on March 15, 2019 at 1:30 PM via teleconference to develop a proposal addressing the positioning of animals.. The WG teleconference meeting was facilitated by Council Coordinator, Donald Mike.

Working group members are:

BBRAC (alternates: Dennis Andrew and Billy Maines)
Frank Woods Dillingham
Richard Wilson Naknek

Public
Kenneth Nukwak Manokotak (alternate Moses Toyakuk)

Nick Neketa	New Stuyahok

BBNA

Gayla Hoseth	Dillingham

Federal/State staff

Robbin La Vine	Anchorage Office of Subsistence Management (OSM)
Suzanne Worker	Anchorage OSM
Neil Barten	Dillingham (alternate Mark Burch)
Pat Walsh	Togiak NWR
Joe Witkop	ADFG LE Dillingham
Derek Thompson	Dillingham Togiak NWR LE Officer

Background materials were provided for the WG and included the 2018 wildlife proposal analysis, and State and Federal regulations regarding positioning of animals. Each WG member had an opportunity to speak.

WG Comments

The WG discussed finding a way to allow hunting without becoming criminals for putting food on the table. There was also a desire to allow users to work with law enforcement (LE) to create better understanding and agreement on regulations. When State and Federal regulations are uniform, there is less confusion. One WG member commented that the language in State regulations seems to be user friendly.

Another WG member commented on U.S. Code Title 16 and the need to make sure it is in agreement with the Alaska National Interest Lands Conservation Act (ANILCA). ANILCA is supposed to supersede individual program/agency regulations. People need to be educated about current law and agency regulations. State regulations should be followed after the ANILCA issue is figured out.

Other WG members commented that we need to ensure regulations conserve the resources so that we can continue to provide subsistence opportunities. Resource conservation should come first and the use of resources is what it comes down to. LE personnel want to make it simple so that enforcement is possible, and regulations need to be easy to understand so that no one gets into trouble.

One WG member commented that the State Board of Game (BOG) changed the State regulatory language after people expressed confusion over existing language. The new language clarified existing wording. WG members would like the regulations to be less confusing, and "positioning" may need clarification because it is not found in Federal regulations.

One WG member commented that LE should make an effort to help people understand regulations. Definitions need to be defined and understandable for LE officers working in the field.

Next Step for the WG

The WG commented that current State Regulation is a good starting point for a proposal on Federal public lands, keeping in mind conservation concerns for the resource. The proposed Federal regulatory language should mirror the State regulatory language. The proposed Federal language brought forward by the WG would make the language simple for the subsistence users to understand. The WG commented that it is partial to the State's definition of positioning, and that the WG can fine-tune the language when it reconvenes. One WG member commented that it only applies to Unit 17, and would like the State and Federal regulations to be similar Statewide. As a starting point, adopting the State regulation as a tool is better than having none. The WG believed that the State regulation is okay to begin with, and consistency is key. Others commented that it is a good start with the recently adopted definition by the State BOG. The WG, through consensus, will use the definition to develop a proposal for Federal lands, even though it adds some complexity.

The WG also commented that there is no ideal way to define all the specifics of any hunt, that it is dangerous to add too much clarification due to fact that it will be enforced by LE officers, and that it should be simple and easy to understand for all users. There was also concern that it is difficult for LE personnel to enforce a 15 mph and 300 feet regulation, but understanding that it will be useful to the users. This process is about making sure people understand current regulatory rules. It is important for LE to have simple rules and regulations to reference. More definitions will likely lead to more confusion and would add complexity. Some stipulations are just impossible to enforce, such as trying to measure distance and speeds.

March 25, 2019

The Bristol Bay RAC WG met on March 25, 2019 and was provided a draft wildlife proposal, similar to the State of Alaska wildlife regulatory language as a starting point.

The following is the proposed regulatory language presented to the WG for input and comment from OSM staff.

> **Proposed wording changes**
> §100.26(n)(17)(iii) Unit 17—Unit-specific regulations
> . . .
>
> **(D) In Unit 17, a snowmachine may be used to assist in the taking of a caribou and caribou may be shot from a stationary snowmachine. "Assist in the taking of a caribou" means a snowmachine may be used to approach within 300 yards of a caribou at speeds under 15 miles per hour, in a manner that does not involve repeated approaches or that causes a caribou to run. A snowmachine may not be used to contact an animal or to pursue a fleeing caribou.**

WG Comments on Proposed language

The majority of the WG agreed with the language as presented by OSM staff as a starting point for the Council to consider when it reconvenes on March 29, 2019 at 10 am via teleconference.

The WG discussed modification to the language to remove the word "a" on the last sentence, to state "or to pursue fleeing caribou" to make it singular or plural. The WG is in favor of aligning Federal and State regulations.

WG members commented that keeping State and Federal regulations aligned would make it easier for everyone.

One WG member inquired how enforceable are the regulations if a caribou flees and then stops; can the animal still be pursued? No LE staff were present to answer the question.

> Follow-up, OSM Staff contacted LE Officer Thompson, who stated that once an animal flees, pursuit must end. When the animal stops, pursuit may continue.

Through consensus, the WG agreed to present its proposed regulatory language, as presented by OSM staff, to the Council. The Council will have an opportunity to review the proposed language and make the necessary amendments, or adopt the language, to submit as a Federal wildlife proposal to the Federal Subsistence Board.

FEDERAL WILDLIFE CLOSURE REVIEW
WCR20-04/06

Closure Location: Unit 9C, that portion draining in the Naknek River from the north and Graveyard Creek and Coffee Creek, Unit 9C remainder (WCR18-04), and Unit 9E (WCR18-06)—Caribou

Current Federal Regulation

Unit 9−Caribou

Unit 9C, that portion draining into the Naknek River from the north and Graveyard Creek and Coffee Creek—2 caribou by State registration permit. Federal public lands are closed to the taking of caribou except by residents of Unit 9C and Egegik	*Aug. 1 – Mar. 15*
Unit 9C, remainder—1 bull by Federal registration permit or State permit. Federal public lands are closed to the taking of caribou except by residents of Unit 9C and Egegik	*May be announced*
Unit 9E—1 bull by Federal registration permit or State permit. Federal public lands are closed to the taking of caribou except by residents of Unit 9E, Nelson Lagoon, and Sand Point	*May be announced*

Closure Dates: Year-round

Current State Regulation

Unit 9−Caribou

Unit 9C, that portion north of the north bank of the Naknek River and south of the Alagnak River drainage—two caribou by permit	*RC503*	*Aug. 1 – Mar. 31*
Unit 9C south of the north bank of the Naknek River—one caribou by permit	*TC505*	*Aug. 10 – Oct. 10* *Nov. 1 – Feb. 28*

Unit 9E	*TC505*	*Aug. 10 – Oct. 10* *Nov. 1 – Apr. 30*

Regulatory Year Initiated: 1999, closed except to residents of 9C and 9E; 2006, closed to all users.

Regulatory History

Prior to 1999, the harvest limit in Unit 9C remainder and Unit 9E remainder (which included most of Unit 9E) was 4 caribou. The season began on August 1 in both hunt areas, and ended on March 31 in Unit 9C remainder and on April 30 in Unit 9E remainder. At that time, there was no Federal season in the southernmost portion of Unit 9E.

The Federal Subsistence Board's (Board) 1999 decision on three proposals resulted in the first iteration of the current closure. Collectively, WP99-32, submitted by the Bristol Bay Subsistence Regional Advisory Council (Council), WP99-33, submitted by Tim Enright of Pilot Point, and WP99-34, submitted by Chignik Lagoon Traditional Council, requested more restrictive harvest limits, more conservative seasons, and closure of some Federal public lands to the harvest of caribou in Units 9C and 9E. In response to a decline in the Northern Alaska Peninsula Caribou Herd (NAPCH), the Board adopted these proposals with modification. In addition to reduction in harvest limits and seasons, this action resulted in the closure of Federal public lands within Unit 9C remainder and all of Unit 9E to caribou harvest except by residents of Unit 9C and 9E. The Alaska Board of Game (BOG) implemented a Tier II hunt for the NAPCH the same year.

In 2000, the Board considered WP00-33, which was submitted by the Bristol Bay Native Association and requested the provision of designated hunter permits for caribou in Unit 9C and 9E. The Board approved this request because it was consistent with customary and traditional hunting practices and was not expected to impact the caribou population.

In 2004, the Board considered WP04-43, a request from the Council to allow same day airborne hunting for caribou throughout Unit 9 and 17, except on National Park Service (NPS) ands. All four Subsistence Regional Advisory Councils that voted on this proposal (Bristol Bay, Yukon-Kuskokwim Delta, Western Interior Alaska, Kodiak/Aleutians) opposed it, and the Board rejected the request.

In 2005, caribou seasons in Units 9C remainder and 9E were the subject of two special actions, both submitted by the Office of Subsistence Management (OSM). The first, Emergency Special Action WSA05-02, requested that caribou hunting on Federal lands be closed in Unit 9C remainder and Unit 9E, following the rapid decline of the Northern Alaska Peninsula Caribou Herd and the State's closure of the Tier II season. As authorized by the Board, this request was approved with the unanimous consent of the Interagency Staff Committee. Subsequently, Temporary Special Action WSA05-11 was submitted, a necessary step to extend the closure beyond the 60-day period approved through WSA05-02. With

support of the Council, the Board adopted this proposal, resulting in elimination of the caribou season for the entirety of the 2005-06 regulatory year.

The Federal public lands closures in Units 9C remainder and 9E were reviewed in 2005 (WCR05-04/06). The Council concurred with OSM's recommendation, which was to maintain the status quo given continued population decline and insufficient recruitment. At the same meeting, the Council voted to submit a proposal to close Federal public lands in Units 9C remainder and 9E to the harvest of caribou by all users, effectively extending the closure that resulted from the Board's actions on WSA05-02 and WSA05-11. This proposal, WP06-22, was adopted by the Board, resulting in elimination of the Federal season for caribou in these units (BBRAC 2005). The State Tier II hunt was closed in 2005 as well.

The Council reviewed the Federal public lands closure again in 2010 (WCR10-04/06) and 2014 (WCR14-04/06). In response to the 2010 review, the Council voted in favor of maintaining the closure (BBRAC 2011). In response to the 2014 review, the Council voted to submit Proposal WP16-21 to modify the conditions of the hunt. Specifically, the Council requested that the closure be modified to allow caribou harvest by residents of 9C and 9E. The Council also requested that a may-be-announced caribou season be established in Units 9C remainder and 9E, noting that the State was considering opening a Tier II drawing hunt. The Council believed that it would be useful for Federal managers to have the flexibility to open a hunt on Federal lands as well, particularly considering the extent of Federal land in Unit 9 (BBRAC 2015). Proposal WP16-21 was considered by the Board at their April 2016 meeting. With the support of the Council, the Board adopted the proposal with modification to reduce the pool of eligible subsistence users on Federal public lands in Unit 9C remainder to residents of Unit 9C and Egegik, and on Federal public lands in Unit 9E to residents of 9E, Nelson Lagoon and Sand Point. The new Federal hunt coincided with 2016 changes in State regulations that opened a Tier II hunt (TC505).

In 2018, State harvest regulations for caribou in Unit 9 were again modified when the BOG acted on Proposals 125 and 127. As a result of the BOG's action on Proposal 125, the Tier II season for the NAPCH was extended throughout the TC505 permit area. In the portion of Unit 9C south of the north bank of the Naknek River, it was extended by 34 days to Aug. 10 – Oct. 10 and Nov. 1 – Feb. 28. In Unit 9E, it was extended by 20 days to Aug. 10 – Oct. 10 and Nov. 1 – Apr. 30. The BOG's action on proposal 127 resulted in the portion of Unit 9C north of the Naknek River and south of the Alagnak River drainage becoming part of the RC503 Mulchatna Caribou Herd (MCH) permit area, with an Aug. 1 – Mar. 31 season, rather than part of the NAPCH TC505 permit area.

The Board considered a similar change in 2018. Proposal WP18-21, submitted by the Council, in part requested that the caribou season in Unit 9C north of the Naknek River be changed from a may-be-announced season to an Aug. 1 – Mar. 15 season with a harvest limit of 2 caribou. This request was consistent with requested Federal regulation changes throughout the range of the MCH and similar to the new State regulations in this hunt area. The Board adopted WP18-21 with modification to create a new hunt area, removing the portion of Unit 9C that drains into the Naknek River from the north and Graveyard Creek and Coffee Creek from Unit 9C remainder. The Board's action effectively shifted the regulatory emphasis within the new hunt area from the NAPCH to the MCH, reflecting current distribution patterns of these two herds. Consequently, the Federal public lands closure within the new

hunt area should be considered separately from the closure in Unit 9C remainder and Unit 9E, since they apply to different populations.

Unit 9C is comprised of 85% Federal Public Lands and consists of 78% NPS managed lands, 4% U.S. Fish and Wildlife Service (USFWS) managed lands and 4% Bureau of Land Management (BLM) managed lands. Unit 9E is comprised of 49% Federal public lands and consists of 44% USFWS managed lands and 5% NPS managed lands (**Figure 1**).

Closure last reviewed: 2014 – WCR14-04/06

Justification for Original Closure (ANILCA Section 815 (3) criteria):

> *Nothing in this title shall be construed as – (3) authorizing a restriction on the taking of fish and wildlife for nonsubsistence uses on public lands (other than national parks and monuments) unless necessary for the conservation of healthy populations of fish and wildlife, for the reasons set forth in section 816, to continue subsistence uses of such populations, or pursuant to other applicable law…*

The original closure, in 1999, was initiated at a time when the population was declining and there was a need to ensure subsistence opportunity for local users. By 2006, when Federal public lands were closed to all users, the population had declined to a point that any harvest was unsustainable.

Council Recommendation for Original Closure:

The Council's actions in 1999 addressed both conservation concerns and the need to provide continued subsistence opportunity for local communities. Specifically, the Council supported more restrictive harvest limits and seasons due to declining population size. They also supported closing Federal public lands in Units 9C remainder and 9E to caribou harvest except by residents of Unit 9C and 9E. The Council believed it was reasonable to limit distribution of Federal permits to these users, considering who has a customary and direct dependence on the resource, who is in closest proximity to the resource, and who has access to alternative resources. In 2006, noting that recruitment was insufficient to offset adult mortality, the Council agreed that closing Federal public lands to all users was an appropriate compliment to the State's decision to close the State Tier II season.

State Recommendation for Original Closure:

In 1999, the State supported efforts to improve herd productivity by restricting harvest limits, reducing the season and limiting harvest through the use of quotas. In 2006, acknowledging the serious conservation concern, the State stopped issuing Tier II permits and supported closing the Federal caribou season.

Biological Background

Northern Alaska Peninsula Caribou Herd

Generally speaking, the NAPCH occupies Units 9C and 9E, from the Naknek River in the north to Port Moller in the south. It has varied considerably in size in the last century, ranging from approximately

2,000 during population lows to approximately 20,000 during population highs. These fluctuations in population size have been accompanied by shifts in distribution and movement patterns, likely due to impacts of population size on habitat quality. Following the most recent population peak in the mid-1980s, the herd began wintering north of the Naknek River. More recently, this northern range has become less important, with few caribou crossing to the north side of the Naknek River by 2000 (Crowley 2015).

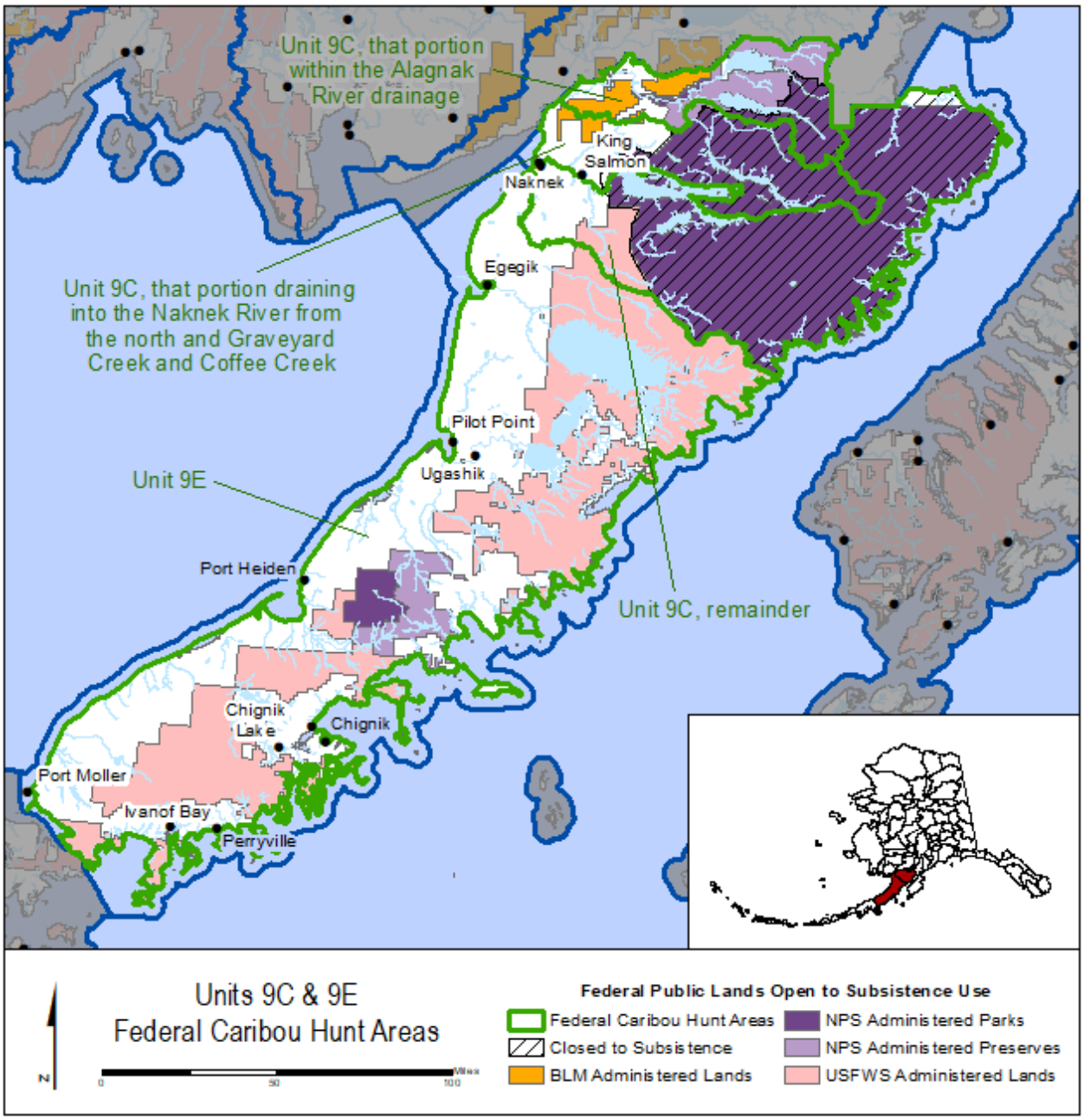

Figure 1. Units 9C and 9E Federal caribou hunt areas.

The NAPCH experienced a steady multi-decade decline in population size between the mid-1980s and the mid-2010s, approximating historical lows of 2,000 caribou. Nutritional limitations have been implicated

in the decline. In recent years, the population has showed a positive growth trend and is currently estimated to be approximately 3,800 caribou (**Table 1**), but remains well below the State's population objective of 12,000 – 15,000 caribou (Crowley 2014, 2015, 2016, 2019, pers. comm.).

Table 1. Northern Alaska Peninsula Caribou Herd composition counts and population estimates, 1984 – 2016 (Crowley 2014, 2016, 2019, pers. comm.).

Year	Bulls: 100 cows	Calves: 100 cows	% of Total bulls			Composition sample size	Population Estimate
			Small bulls	Medium bulls	Large bulls		
1984	39	39	67	16	17	1,087	20,000
1990	41	29	-	-	-	1,484	17,000
1991	42	47	54	34	12	1,639	17,000
1992	40	44	44	38	19	2,766	17,500
1993	44	39	52	29	19	3,021	16,000
1994	34	34	58	28	14	1,857	12,500
1995	41	24	49	29	22	2,907	12,000
1996	48	38	71	19	10	2,572	12,000
1997	47	27	54	31	14	1,064	10,000
1998	31	30	57	28	15	1,342	9,200
1999	40	21	58	30	12	2,567	8,600
2000	38	18	59	24	18	1,083	7,200
2001	49	28	61	24	15	2,392	6,300
2002	46	24	57	19	24	1,007	6,600
2003	36	11	46	30	24	2,776	-
2004	34	7	40	34	25	1,355	-
2005	23	7	37	41	22	1,914	-
2006	26	14	26	43	31	1,725	-
2007	27	7	29	38	33	1,719	-
2008	19	10	33	25	43	1,841	-
2009	19	16	30	35	35	2,126	-
2010	25	18	30	31	39	1,795	2,169[a]
2011	26	20	26	37	37	2,395	2,321[a]
2012	28	22	24	37	40	1,352	2,525[a]
2013	31	21	26	41	33	2,076	2,708[a]
2014	40	34	23	50	28	2,295	3,101[a]
2015[b]	38	29	53	29	18	2,122	3,411[a]
2016	70[c]	24	30	47	23	1,556	3,617[a]
2017	-	-	-	-	-	-	-
2018	72[c]	35	29	42	29	1,327	3,800 [a]

[a]Estimate based on simulation modeling.

[b]Survey limited to northern portion of NAP range.

[c]Likely biased high due to inability to locate entire herd

Calf-cow ratios have improved markedly from the single digit ratios of the mid-2000s. At last count, in 2018, there were 35 calves:100 cows. Bull:cow ratios have also improved in the last decade. The two most recent surveys have estimated at least 70 bulls:100 cows, an improbably high number of bulls (**Table 1**). Regardless, the bull:cow ratios have shown an increasing trend and local biologists believe that the current bull:cow ratio exceeds the management objective of 35 bulls:100 cows (Crowley 2014, 2016, 2018 pers. comm.).

Mulchatna Caribou Herd

Currently, the MCH range covers ~60,000 square miles, primarily within Units 9B, 9C, 17A, 17B, 17C, 18, 19A and 19B. This population has experienced dramatic changes in population size and distribution in the past 40 years. In the early 1980s, the population was estimated to include approximately 20,000 caribou. Its winter range included the north and west side of Iliamna Lake north of the Kvichak River, where it intermingled with the NAPCH. By the mid-1990s, the herd had grown to its peak size of approximately 200,000 caribou and had begun wintering in southern Unit 18 and southwestern Unit 19B. Subsequently, the herd began a period of decline that persisted until recently (Barten 2015).

In 2013, population estimate for the MCH was 18,308 caribou, the lowest estimate in over 30 years and well below the State's population objective of 30,000 – 80,000 caribou **(Table 2)**. Since then, the population appears to have grown. Surveys indicate that the population has been between 26,000 and 31,000 caribou since 2014. The most recent estimate, in 2016, was 27,242 caribou (Barten 2017).

The MCH experienced a steady increase in the bull:cow ratio between 2010 and 2016. In 2016, the ratio was 39 bulls:100 cows, which is the highest estimate since the late 1990s (**Table 2**). The proportion of bulls classified as large in 2016 was 28%, which is among the highest estimates on record and is well above the long-term average of 19%. In 2017, the bull:cow ratio declined to 32 bulls:100 cows, just below the State's management objective of 35 bulls:100 cows. Calf:cow ratios have been variable, which is typical of caribou herds occupying interior and southwest Alaska. In 2017, the calf:cow ratio was 23 calves:100 cows, within the range of variability observed in recent years (Barten 2017, ADF&G 2018a).

Harvest History

Northern Alaska Peninsula Caribou Herd

Harvest of the NAPCH has varied considerably since 1990. These changes correspond to population size and harvest restrictions. Between 1990 and 1993, when the herd was large and seasons and harvest limits were liberal, annual reported harvest approached or exceeded 800 caribou annually. Declining herd size, fluctuating distribution and more restrictive regulations resulted in reported harvests of 400 – 500 caribou between 1994 and 1999 (**Table 3**). Reported harvest during the 1990s was skewed heavily toward hunters residing outside of Units 9C and 9E. However, unreported harvest was high at an estimated 500 – 1,500 caribou annually, particularly among residents of Units 9C and 9E. Accounting for this, residents of Units 9C and 9E likely harvested a greater proportion than harvest data suggests (Sellers 1995, 1999).

In 1999, following implementation of the State Tier II hunt, more restrictive Federal regulations, and implementation of the Federal public lands closure, reported harvest declined dramatically, averaging just

96 caribou per year between 1999 and 2004 (**Table 3**). User demographics shifted as well, with at least 90% of the reported harvest attributable to local users, defined here as those who are currently eligible to harvest caribou on Federal public lands in either Unit 9C remainder or in Unit 9E (residents of Units 9C, 9E, Sand Point and Nelson Lagoon). Legal harvest ceased in 2005, following closure of the State and Federal hunting seasons (ADF&G 2018b).

Table 2. Mulchatna Caribou Herd composition counts and population estimates, 1975 – 2016 (Barten 2017).

			% of Total bulls				
Year	Bulls: 100 cows	Calves: 100 cows	Small bulls	Medium bulls	Large bulls	Composition sample size	Population Estimate
1975	55	35	-	-	-	1,846	14,000
1978	50	65	-	-	-	758	7,500
1980	31	57	-	-	-	2,250	-
1981	53	45	-	-	-	1,235	20,600
1986	56	37	-	-	-	2,172	-
1987	68	60	-	-	-	1,858	52,500
1988	66	54	-	-	-	536	-
1993	42	44	-	-	-	5,907	150,000[a]
1996	42	34	49	29	22	1,727	200,000[a]
1998	41	34	28	43	29	3,086	-
1999	30	14	60	26	14	4,731	175,000[b]
2000	38	24	47	33	20	3,894	-
2001	25	20	32	50	18	5,728	-
2002	26	28	57	30	13	5,734	147,000[b]
2003	17	26	36	45	19	7,821	-
2004	21	20	64	29	7	4,608	85,000[b]
2005	14	18	55	33	12	5,211	-
2006	15	26	57	34	9	2,971	45,000[b]
2007	23	16	53	36	11	3,943	-
2008	19	23	47	36	17	3,728	30,000[b]
2009	19	31	40	44	16	4,595	-
2010	17	20	30	44	26	4,592	-
2011	22	19	32	41	27	5,282	-
2012	23	30	38	38	24	4,853	22,809[c]
2013	27	19	39	36	25	3,222	18,308[c]
2014	35	30	44	31	25	4,793	26,275[c]
2015	35	29	35	43	22	5,414	30,736[c]
2016	39	22	43	29	28	5,195	27,242[c]
2017	32	23	44	28	28	5,160	-

[a]Estimate derived from photo-counts, corrected estimates, subjective estimate of number of caribou in areas not surveyed, and interpolation between years when aerial photo surveys were not conducted.

[b]Estimate of minimum population size based on July photo census.

[c]Estimate based on Rivest et al. (1998) caribou abundance estimator.

Federal and State seasons were reestablished in 2016. Since then, harvest has averaged 68 caribou annually (**Table 3**), all of which were taken by local users. On average, harvest was 84% bulls, and 64% of reporting hunters were successful. Nearly two-thirds of the total harvest was taken during the winter hunt, between December and April. September and December were the most popular months, with an average of 19% of the total harvest occurring during each of these months (ADF&G 2018b, 2019). Local biologists believe that the NAPCH can sustain a 4% harvest rate (150 caribou) and continue to grow (BOG 2018). Local State and Federal managers have the authority to manage for this quota through Emergency Orders and Special Actions. The quota has not been exceeded since seasons were opened in 2016.

Table 3. Reported harvest of the Northern Alaska Peninsula Caribou Herd 1990 – 2017, by sex. (Sellers 1995, 1999; ADF&G 2018b, 2019).

	Harvest (number of caribou)			
Year	Total	Males	Females	Unknown Sex
1990	791	679	110	2
1991	806	688	115	3
1992	921	816	98	7
1993	1,345	1,165	175	5
1994	569	478	91	-
1995	533	486	47	-
1996	481	438	43	-
1997	482	446	36	-
1998	490	453	31	6
1999	155	147	8	-
2000	82	76	6	-
2001	95	87	8	-
2002	82	78	4	-
2003	128	122	6	-
2004	32	30	2	-
2005[a]	-	-	-	-
2006[a]	-	-	-	-
2007[a]	-	-	-	-
2008[a]	-	-	-	-
2009[a]	-	-	-	-
2010[a]	-	-	-	-
2011[a]	-	-	-	-
2012[a]	-	-	-	-
2013[a]	-	-	-	-
2014[a]	-	-	-	-
2015[a]	-	-	-	-
2016	82	74	8	-
2017	58	42	16	-
2018	63	55	8	-

[a]No season

Mulchatna Caribou Herd

Like the NAPCH, harvest from the MCH has declined significantly as a result of declining population size and more restrictive harvest regulations (**Table 4**). Harvest among all user groups has declined since 2000, but is especially pronounced among non-local residents and nonresidents due to regulatory restrictions. Since 2009, local users, defined as those with a customary and traditional use determination, have harvested 84% of the total reported MCH harvest. Of total reported harvest, 9% has occurred in Unit 9C since 2009. .

Table 4. Reported harvest from the Mulchatna Caribou Herd 2000 – 2018, by game management unit (ADF&G 2017, 2019).

	Harvest (number of caribou)												
Year	Total	Unit 9A	Unit 9B	Unit 9C	Unit 9E	Unit 17A	Unit 17B	Unit 17C	Unit 18	Unit 19A	Unit 19B	Unit 19C	Unknown
2000	4022	3	601	55	0	77	1867	346	134	199	740	0	0
2001	3941	1	653	117	0	114	1617	215	378	108	738	0	0
2002	2693	1	324	26	0	16	1512	197	248	53	316	0	0
2003	3123	6	401	84	0	16	1127	320	672	64	433	0	0
2004	2380	4	325	104	0	36	1002	247	469	24	169	0	0
2005	2135	0	330	117	0	41	629	334	525	38	121	0	0
2006	956	1	178	10	0	22	256	95	315	21	58	0	0
2007	799	1	16	188	0	17	136	6	374	15	46	0	0
2008	546	0	21	152	0	25	76	10	234	3	25	0	0
2009	318	0	12	2	0	5	38	39	217	0	5	0	0
2010	469	0	3	6	0	4	38	32	376	0	10	0	0
2011	474	0	37	208	0	2	40	66	116	0	5	0	0
2012	348	0	29	27	0	3	28	41	218	0	2	0	0
2013	106	0	11	1	0	1	38	6	40	0	2	1	6
2014	182	0	14	2	1	1	40	21	88	1	10	0	4
2015	235	0	15	0	0	4	60	26	119	1	4	0	6
2016	330	0	29	5	0	25	76	55	131	0	6	0	2
2017	440	2	16	1	0	18	74	135	187	1	4	0	1
2018	219	0	8	5	0	0	60	39	52	0	4	0	51

OSM Preliminary Conclusion:

_ maintain status quo
X modify or eliminate the closure

Justification

OSM recommends that the Federal public lands closure in the portion of Unit 9C draining into the Naknek River from the north and Graveyard Creek and Coffee Creek be rescinded, while the closures

within Units 9C remainder and 9E be retained. This recommendation is consistent with the Board's 2018 decision to adjust the regulatory structure in Unit 9C to reflect current distributions of the NAPCH and the MCH.

Although the NAPCH wintered north of the Naknek River following the population peak of the mid-1980s, movement and distribution patterns have changed and this area is no longer considered important for the NAPCH. Rather, the MCH is currently the predominate occupant of the lands north of the Naknek River. While the MCH remains near the low end of the population objective, it has grown relative to the 2013 population low and has shown improvement in bull:cow ratios. In addition, the majority of harvest from the MCH occurs outside of Unit 9C. Collectively, there is no evidence that the Federal public lands closure in the portion of Unit 9C draining into the Naknek River from the north and Graveyard Creek and Coffee Creek is warranted for the conservation of either the NAPCH or the MCH.

The NAPCH remains the population of concern in Unit 9C remainder and Unit 9E. Although this population has also shown improvement in population size and bull:cow and calf:cow ratios in recent years, it remains well below the established population size objective. The current management approach, which includes the State's Tier II hunt, limiting harvest on Federal lands to those with customary and direct dependence on the resource, and a harvest quota managed by Emergency Order/Special Action, appears to be effective in allowing harvest while supporting population growth. Consequently retaining the Federal public lands closure within Units 9C remainder and 9E is appropriate and likely offers the best opportunity for continued recovery of the NAPCH.

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SUBSISTENCE REGIONAL ADVISORY COUNCIL RECOMMENDATIONS

Bristol Bay Subsistence Regional Advisory Council

Modify the closure for WCR20-04/06. The Council supported the OSM conclusion to rescind the Federal public lands closure in the portion of Unit 9C draining into the Naknek River from the north and Graveyard Creek and Coffee Creek, and to retain the Federal public lands closures in Unit 9C remainder and Unit 9E. The Council noted that residents of the area desire additional opportunities to harvest caribou, but don't believe that the Northern Alaska Peninsula herd is ready for additional harvest pressure. The Council agreed with the OSM conclusion there is no reason to retain the Federal public lands closure north of the Naknek River, the area occupied by the Mulchatna caribou herd.

Kodiak/Aleutians Subsistence Regional Advisory Council

The Kodiak Aleutians Subsistence Regional Advisory Council did not consider WCR20-04/06 at their winter 2019 meeting. They will have the opportunity to develop a recommendation at the Fall 2019 meeting.

Federal Subsistence Board

1011 East Tudor Road, MS 121
Anchorage, Alaska 99503 - 6199

FISH and WILDLIFE SERVICE
BUREAU of LAND MANAGEMENT
NATIONAL PARK SERVICE
BUREAU of INDIAN AFFAIRS

FOREST SERVICE

OSM 19032 KW

JUN 19 2019

Molly Chythlook, Chair
Bristol Bay Subsistence Regional Advisory Council
c/o Office of Subsistence Management
1011 E. Tudor Road, M/S 121
Anchorage, Alaska 99503-6199

Dear Ms. Chythlook:

The Federal Subsistence Board (Board) met on April 15-18, 2019 to consider proposed changes to subsistence fish and shellfish regulations. This letter and the enclosed report identify action taken on proposals affecting residents of the Bristol Bay Region.

Section 805(c) of the Alaska National Interest Lands Conservation Act (ANILCA) provides that the Board will accept the recommendations of a Subsistence Regional Advisory Council (Council) regarding take unless, (1) the recommendation is not supported by substantial evidence, (2) the recommendation violates recognized principles of fish and wildlife management, or (3) adopting the recommendation would be detrimental to the satisfaction of subsistence needs. When a Council's recommendation is not adopted, the Board is required by Secretarial regulations to set forth the factual basis and reasons for the decision. This letter and enclosure satisfy that requirement.

Out of twenty proposals submitted, (one was withdrawn by a proponent), and the Board accepted the majority recommendations of the Regional Advisory Councils, in whole or with modifications, on 18 of the 19 proposals. Details of these actions and the Boards' deliberations are contained in the meeting transcriptions. Copies of the transcripts may be obtained by calling toll free number, 1-800-478-1456, and are available online at the Federal Subsistence Management Program website, https://www.doi.gov/subsistence.

The Board uses a consensus agenda on those proposals where there is agreement among the affected Council(s), a majority of the Interagency Staff Committee, and the Alaska Department of Fish and Game concerning a proposed regulatory action. These proposals were deemed non-

controversial and did not require separate discussion. The consensus agenda contained no proposals affecting the Bristol Bay Region.

One proposal affecting the Bristol Bay Region appeared on the non-consensus agenda. The Board took action consistent with the Council's recommendations and *adopted as modified by the Office of Subsistence Management fisheries* proposal **FP19-11** to revise rod and reel regulations to allow for salmon in Sixmile Lake tributaries.

The Federal Subsistence Board appreciates the Bristol Bay Council's active involvement in and diligence with the regulatory process. The ten Regional Advisory Councils continue to be the foundation of the Federal Subsistence Management Program, and the stewardship shown by the egional Advisory Council chairs and their representatives at the Board meeting is very much appreciated.

If you have any questions regarding the summary of the Board's actions, please contact Donald Mike, Council Coordinator, at 907-786-3629 or donald_mike@fws.gov.

Sincerely,

Anthony Christianson, Chair
Federal Subsistence Board

Enclosure

cc: Federal Subsistence Board
Bristol Bay Subsistence Regional Advisory Council members
Thomas Doolittle, Acting Assistant Regional Director, Office of Subsistence Management
Jennifer Harding, PhD, Acting Deputy Assistant Regional Director, Office of Subsistence Management
Greg Risdahl, Fisheries Division Supervisor, Office of Subsistence Management
Katerina Wessels, Acting Council Coordination Division Supervisor, Office of Subsistence Management
Donald Mike, Council Coordinator, Office of Subsistence Management
Interagency Staff Committee
Administrative Record

FEDERAL SUBSISTENCE BOARD 805(c) REPORT

April 15-18, 2019
Anchorage, Alaska

Section 805(c) of the Alaska National Interest Lands Conservation Act provides that the "Secretary … shall consider the report and recommendations of the regional advisory councils concerning the taking of fish and wildlife on the public lands within their respective regions for subsistence uses." The Secretary has delegated authority to issue regulations for the take of fish and wildlife to the Federal Subsistence Board. Pursuant to this language in Section 805(c), the Board defers to the Council's recommendations. However, Section 805(c) also provides that the Board "may choose not to follow any recommendations which [it] determines is not supported by substantial evidence, violates recognized principles of fish and wildlife conservation, or would be detrimental to the satisfaction of subsistence needs." The purpose of this report is to detail how the Board's action differed from the Council's recommendations based on these criteria.

BRISTOL BAY AREA PROPOSALS

Proposal FP19-11: to revise rod and reel regulations to allow fishing for salmon in Sixmile Lake and tributaries

DESCRIPTION: Proposal FP19-11 requests the Federal Subsistence Board revise section §___.27(e)(5)(vii)(C) of the CFR that authorizes the take of salmon without a permit in Lake Clark and its tributaries. This section currently allows use of snagging (by handline or rod and reel), spear, bow and arrow, or capture by bare hand for the take of salmon in these areas. The requested change is to add Sixmile Lake and its tributaries to the regulation, and add rod and reel as a specified allowable methods and means. *Submitted by Bristol Bay Native Association on behalf of the Nondalton Tribal Council.*

COUNCIL RECOMMENDATIONS:

Bristol Bay Subsistence Regional Advisory Council – **Support as modified by OSM**

BOARD ACTION: **Adopt as modified by OSM**

JUSTIFICATION: Adopting the proposal will provide additional opportunity for Federally qualified subsistence users of Nondalton and other communities. Adding rod and reel allows the practice that has been used to continue, currently used by residents of the area, for the harvest of fish. It is consistent with the recommendation of the Bristol Bay Council, allowing rod and reel gear type in Sixmile Lake and its tributaries is reasonable, given existing regulations allowing for the use of fyke nets. No concerns exist related to the harvest of salmon by rod and reel for the Sixmile Lake area and its tributaries.

Presentation Procedure for Proposals

1. **Introduction and presentation of analysis**
2. **Report on Board Consultations**:
    a. Tribes;
    b. ANCSA Corporations
3. **Agency Comments**:
    a. ADF&G;
    b. Federal;
    c. Tribal
4. **Advisory Group Comments**:
    a. Other Regional Council(s);
    b. Fish and Game Advisory Committees;
    c. Subsistence Resource Commissions
5. **Summary of written public comments**
6. **Public testimony**
7. **Regional Council recommendation** (motion to adopt)
8. **Discussion/Justification**
    - Is the recommendation consistent with established fish or wildlife management principles?
    - Is the recommendation supported by substantial evidence such as biological and traditional ecological knowledge?
    - Will the recommendation be beneficial or detrimental to subsistence needs and uses?
    - If a closure is involved, is closure necessary for conservation of healthy fish or wildlife populations, or is closure necessary to ensure continued subsistence uses?
    - Discuss what other relevant factors are mentioned in OSM analysis
9. **Restate final motion for the record, vote**

WP20–26 Executive Summary	
General Description	WP20-26 requests that Federally qualified subsistence users be allowed to use a snowmachine to position wolves, and wolverines for harvest on Bureau of Land Management (BLM) lands in Units 9B, 9C, 17B, and 17C, provided the animals are not shot from a moving snowmachine. *Submitted by: Bristol Bay Subsistence Regional Advisory Council.*
Proposed Regulation	**§_____.26(n)(17)(iii) Unit 17—Unit-specific regulations** . . . ***(D) In Units 17B and 17C, on BLM-managed lands only, a snowmachine may be used to position a wolf or wolverine for harvest, provided that the animal is not shot from a moving snowmachine.***
OSM Preliminary Conclusion	**Support**
Bristol Bay Subsistence Regional Advisory Council Recommendation	
Yukon-Kuskokwim Delta Subsistence Regional Advisory Council Recommendation	
Interagency Staff Committee Comments	
ADF&G Comments	
Written Public Comments	**1 Oppose**

DRAFT
STAFF ANALYSIS
WP20-26

ISSUES

Proposal WP20-26, submitted by the Bristol Bay Subsistence Regional Advisory Council requests that Federally qualified subsistence users be allowed to use a snowmachine to position wolves, and wolverines for harvest on Bureau of Land Management (BLM) lands in Units 9B, 9C, 17B, and 17C, provided the animals are not shot from a moving snowmachine.

DISCUSSION

The proponent states that the use of snowmachines to position wolves and wolverines is a traditional practice in rural areas, and the proposed regulation will mirror Federal regulations in Unit 23.

Existing Federal Regulation

§____.26 Subsistence taking of wildlife

. . .

(b) Except for special provisions found at paragraphs (n)(1) through (26) of this section, the following methods and means of taking wildlife for subsistence uses are prohibited:

. . .

(4) Taking wildlife from a motorized land or air vehicle when that vehicle is in motion, or from a motor-driven boat when the boat's progress from the motor's power has not ceased.

(5) Using a motorized vehicle to drive, herd, or molest wildlife.

Proposed Federal Regulation

§____.26 Subsistence taking of wildlife

. . .

(b) Except for special provisions found at paragraphs (n)(1) through (26) of this section, the following methods and means of taking wildlife for subsistence uses are prohibited:

. . .

(4) Taking wildlife from a motorized land or air vehicle when that vehicle is in motion, or from a motor-driven boat when the boat's progress from the motor's power has not ceased.

(5) Using a motorized vehicle to drive, herd, or molest wildlife.

§_____.26(n)(9)(iii) Unit 9—Unit-specific regulations

. . .

(I) In Units 9B and 9C, on BLM-managed lands only, a snowmachine may be used to position a wolf or wolverine for harvest, provided that the animal is not shot from a moving snowmachine.

. . .

§_____.26(n)(17)(iii) Unit 17—Unit-specific regulations

. . .

(D) In Units 17B and 17C, on BLM-managed lands only, a snowmachine may be used to position a wolf or wolverine for harvest, provided that the animal is not shot from a moving snowmachine.

Existing State Regulations

AS 16.05.940. Definitions.

. . .

(34) "take" means taking, pursuing, hunting, fishing, trapping, or in any manner disturbing, capturing, or killing or attempting to take, pursue, hunt, fish, trap, or in any manner capture or kill fish or game.

5 AAC 92.080. Unlawful methods of taking game; exceptions

The following methods of taking game are prohibited:

. . .

(4) unless otherwise provided in this chapter, from a motor-driven boat or a motorized land vehicle, unless the motor has been completely shut off and the progress from the motor's power has ceased, except that a

. . .

(B) motorized land vehicle may be used as follows:

(iii) notwithstanding any other provision in this section, in Units 9(B), 9(C), 9(E), 17, 18, 19, 21, 22, 24, 25(C) and 25(D), except on any National Park Service or National Wildlife Refuge lands not approved by the federal agencies, a snowmachine may be used to position a hunter to select an individual wolf for harvest, and wolves may be shot from a stationary snowmachine;

. . .

(5) except as otherwise specified, with the use of a motorized vehicle to harass game or for the purpose of driving, herding, or molesting game.

5 AAC 92.990. Definitions

(a) In addition to the definitions in AS 16.05.940 , in 5 AAC 84 – 5 AAC 92, unless the context requires otherwise,

. . .

(70) "harass" means to repeatedly approach an animal in a manner which results in the animal altering its behavior;

NOTE: The complete text for 5 AAC 92.080(4)(B) is in **Appendix 1.**

Relevant Federal Regulations

50 CFR 100.4 and 36 CFR 242.4 Definitions

Take or taking as used with respect to fish or wildlife, means to pursue, hunt, shoot, trap, net, capture, collect, kill, harm, or attempt to engage in any such conduct.

§_____.26(n)(23)(iv) Unit 23—Unit-specific regulations

. . .

(E) A snowmachine may be used to position a hunter to select individual caribou for harvest provided that the animals are not shot from a moving snowmachine. On BLM-managed lands only, a snowmachine may be used to position a caribou, wolf, or wolverine for harvest provided that the animals are not shot from a moving snowmachine.

43 CFR 8341.1 (Bureau of Land Management)

(f.) No person shall operate an off-road vehicle on public lands: ... (4) In a manner causing or likely to cause significant, undue damage to or disturbance of ... wildlife

Extent of Federal Public Lands

Unit 9 is comprised of approximately 53% Federal public lands and consist of 28% National Park Service, 22% U.S. Fish and Wildlife Service, and 3% Bureau of Land Management managed lands. Bureau of Land Management lands comprise 8% of Unit 9B and 4% of Unit 9C.

Unit 17 is comprised of approximately 28% Federal public lands and consist of 21% U.S. Fish and Wildlife Service, 4% Bureau of Land Management, and 3% National Park Service managed lands. Bureau of Land Management lands comprise 1% Unit 17B and 10% of Unit 17C.

Customary and Traditional Use Determination

The Federal Subsistence Board (Board) has not made a customary and traditional use determination for wolverines in Unit 9 or Unit 17. Therefore, all Federally qualified subsistence users may harvest wolverines.

Residents of Units 6, 9, 10 (Unimak Island only), 11, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, and Chickaloon have a customary and traditional use determination for wolves in Units 9 and 17.

Regulatory History

In 1995, Proposal P95-52 requested that snowmachines and motor-driven boats be allowed in the taking of caribou and moose in Unit 25 during established seasons, except shooting from a snowmachine in motion was prohibited. There was no existing regulation on the use of motorized vehicles in Unit 25 prior to this. The Federal Subsistence Board (Board) adopted the recommendation of the Eastern Interior Alaska and Southcentral Alaska Subsistence Regional Advisory Councils who supported the proposal in recognition that methods change over time and because it supported subsistence uses.

In 2000, the Board adopted Proposal P00-53 with modification allowing the use of snowmachines to position a hunter and select individual caribou for harvest in Units 22 and 23. The Board did this to recognize a longstanding customary and traditional practice in the region (FWS 2000). However, the proponent had asked to position a caribou, not a hunter. The Interagency Staff Committee provided a rationale for the modification:

> Following the Regional Council winter meetings, the Deputy Regional Director of the U.S. Fish and Wildlife Service (FWS), Alaska Region, met with the Assistant Regional Director for Law Enforcement, the Staff Committee member for FWS, the Refuge Supervisor for Northern Refuges, and the Native Liaison and, after lengthy discussion, agreed to recommend substituting "a hunter" for "caribou" in the proposal language. They agreed that this is consistent with conservation principles and existing agency regulations as long as herding does not occur and shooting from a moving snowmachine is prohibited (FWS 2000:13).

In 2012, Proposal WP12-53 was submitted by the Yukon Delta National Wildlife Refuge, and requested unit specific regulation prohibiting a hunter in Unit 18 from pursuing with a motorized vehicle an ungulate that is "fleeing." The Board adopted the proposal with modification and prohibited the pursuit with a motorized vehicle of an ungulate that was "at or near a full gallop" in Unit 18, providing greater clarity of allowable methods of harvest (FWS 2012).

At its March 2014 meeting, the Alaska Board of Game adopted Proposal 177, which allows a hunter to use a snowmachine in Units 22, 23 and 26A to position a caribou, wolf, or wolverine for harvest, as long as these animals were shot from a stationary snowmachine (see *5 AAC 92.080(4)(B)(i)* at **Appendix 1**). The purpose of the proposal was to allow the use of snowmachines to track these animals.

In 2016, Proposal WP16-48, submitted by the Native Village of Kotzebue, requested that Federally qualified subsistence users be allowed to use snowmachines to position a caribou, wolf, or wolverine for harvest in Unit 23. The Board adopted the proposal with modification to allow this method of harvest only on those lands managed by the Bureau of Land Management. The Board recognized uses of snowmachines to position animals as customary and traditional practice. However, positioning animals by snowmachine is prohibited on National Park Service and U.S. Fish and Wildlife Service lands under agency-specific regulations. Bureau of Land Management regulatory language does not specifically prohibit the use of snowmachines to position animals for hunting and this harvest method is allowed on some State managed lands.

In the spring of 2017, Kenneth Nukwak of Manokotak submitted Proposal WP18-24 requesting that Federally qualified subsistence users be allowed to use a snowmachine to position caribou, wolves, and wolverines for harvest in Unit 17, provided the animals would not shot from a moving vehicle. During the fall 2017 meeting cycle, the Bristol Bay Subsistence Regional Advisory Council voted to oppose Proposal WP18-24, noting a lack of clear definitions for positioning and chasing of an animal.

At its February 2018 meeting in Dillingham, the Alaska Board of Game adopted Proposal 148, also submitted by Kenneth Nukwak of Manokotak, with modification. The original proposal requested that Federally qualified subsistence users be allowed to use a snowmachine to position caribou, wolves, and wolverines for harvest in Unit 17, provided the animals would not be shot from a moving vehicle. The modified regulation was limited to caribou and stated that a snowmachine may be used in Unit 17 to assist in the taking of a caribou, and caribou may be shot from a stationary snowmachine, with further clarification describing exactly how the snowmachine may be used for assistance (see *5 AAC 92.080(4)(B)(viii)* at **Appendix 1**).

At its winter meeting in March of 2018, the Bristol Bay Subsistence Regional Advisory Council voted to request Proposal WP18-24 be removed from the consensus agenda at the next Board meeting. Reasoning for this included providing an opportunity for the Board to deliberate the proposal on record, in light of Board of Game deliberation, modification, and adoption of the same proposal on State lands in Unit 17. During the April 2018 Board meeting, Proposal WP18-24 was taken off the consensus agenda. Some public testimony was received in support of the proposal. The Board deliberated the proposal on record and rejected it.

Biological Background

Wolves and wolverines are present throughout Units 9 and 17. As with other furbearers in Alaska, there is scant objective data on abundance of these animals. Rather, relative abundance has typically been estimated using the results of trapper questionnaires, as well as incidental observation by biologists, hunters, trappers, guides and others.

Wolves

Historically, wolf density has varied in response to harvest pressure, prey availability, and disease. In Unit 9, wolf densities were low in the early 1980s following the end of the Federal wolf control program. Abundance appears to have increased during the 1990s. Currently, the population is believed to be relatively stable, and monitoring efforts in Units 9C and 9E indicate that the population is 250 – 550 wolves, or 16-18 wolves/1,000 mi^2 (Crowley and Peterson 2018). Wolf dynamics in Unit 17 have been similar to those in Unit 9, with abundance increasing during the mid-1980s and early 1990s (Barten 2018) and recent observations suggesting that the population is relatively stable (Spivey 2019).

Wolverines

Compared to other furbearers, wolverines occur at low densities (Copeland and Whitman 2003). Though wolverine abundance remains unquantified due to the impracticality of formal assessment (Crowley 2013), low densities appear to be confirmed by local trappers, who report that wolverines in Units 9 and 17 are scarce but stable (Spivey 2019).

Cultural Knowledge and Traditional Practices

During his study years of 1964 and 1965, VanStone (1967:134) documented winter travel along the Nushagak River as occurring almost exclusively by dog team. During the winter months dog teams were used to harvest caribou, access trap lines, and provide for the transportation of supplies and people throughout the region. Hunters used traditional methods to harvest wildlife. These methods included a hunter moving animals towards another hunter's position (Nelson 1983 [1899] and Oswalt 1990). At the time of his study, VanStone was only aware of a few Bristol Bay residents that possessed snowmachines. Approximately 10 years later, when the Alaska Department of Fish and Game (ADF&G) first began conducting research on subsistence harvest activities, dog teams were barely mentioned. Instead, reports noted that the communities of Nushagak Bay had mostly transitioned to the use of boats, aircrafts, and snowmachines as a preferred means of travel and for accessing animals for harvest (Coiley-Kenner et al. 2003; Evans et al. 2013; Fall et al. 1986; Holen et al. 2012; Holen et al. 2005; Kreig et al. 2009; Schinchnes and Chythlook 1988; Seitz 1996; Wolfe et al. 1984; Wright et al. 1985).

In the past, prior to the use of snowmachines, people in the region were more nomadic. Residents of Southwest Alaska practiced an annual round of harvest activities that allowed them to effectively position themselves in proximity to important resources that supported their families through extended travel to seasonal subsistence camps. In La Vine and Lisac (2003), elders describe a harvest year that began at fish camp in the early summer, moved up the river to hunting and trapping camps for the fall and winter, traveled through mountain passes and down rivers to bays and estuaries for the spring harvest of migratory waterfowl and eggs, finally returning to fish camp once again in early summer (La Vine and Lisac 2003). A trip such as this required travel by boat, sled, and foot and took the family hundreds of miles and 12 months to complete. As village life solidified around schools and economic opportunities, technological advances like boats with outboard motors and snowmachines allowed people to travel further over shorter periods of time in order to access resources they once had to follow over seasons instead of hours.

Wolves and Wolverine

Across Alaska, both wolves and wolverines are highly prized for their fur, which is used to trim locally made parkas and other items of clothing or handicrafts. While not as prominent an activity as in the past, rural residents still participate in trapping as a source of income in the Bristol Bay region, particularly for wolverine, which continues to fetch a high price for quality fur (Woolington 2013). Snowmachines were the primary means of transportation used by hunters and trappers for taking wolves and furbearers in Unit 17 from 2008 through 2012 (Woolington 2012 and 2013). Most wolves were harvested by firearm between the regulatory years of 1992 and 2010, while wolverines were more frequently taken by trap or snare.

The Division of Subsistence at ADF&G conducts household subsistence harvest surveys periodically throughout Alaska. Though this survey data is only available for some communities in some years, it is an additional source for documenting patterns of use in rural Alaska. The most recent surveys conducted in the Bristol Bay region describe the harvest and use of wolves and wolverines as varied between communities and study years (Evans et al. 2013; Holen et al. 2012; Holen et al. 2011; Holen et al. 2005; Kreig et al. 2009). A common pattern described by most reports is that a smaller percentage of households in each community report harvest or attempted harvest and use of furbearers than those reporting harvest and use of salmon or large land mammals like moose and caribou. In most cases only a few households are responsible for the majority of the harvest and use of furbearers, likely in association with keeping a trap line.

Harvest History

Wolves

Harvest of wolves is influenced by weather and travel conditions, which can result in variable harvest from year to year. Alaska Department of Fish and Game sealing records indicate that from 2010 to 2014, the most recent five-year period for which unit-specific sealing data is available, reported harvest ranged from 44 to 142 wolves in Unit 9. On average 64 wolves were harvested annually (Crowley and Peterson 2018).

Reported harvest was also variable in Unit 17, where between 6 and 105 wolves were harvest annually from 2010 to 2014. During that period, annual harvest averaged 47 wolves. In Unit 17, 70% of harvested wolves were shot, 18% were trapped or snared, and 69% of hunters and trappers used snowmachines to harvest wolves (Barten 2018).

Wolverines

Like wolf harvest, wolverine harvest can vary from year to year, reflecting trapper effort that varies with travel conditions. For 2007 – 2016, the most recent ten-year period for which unit-specific sealing data is available, reported harvest ranged from 9 to 36 wolverines in Unit 9. On average, annual reported harvest was 25 wolverines, 89% of which were trapped or snared, and 10% of which were shot.

Snowmachines were used in 28% of wolverine harvest during this period. (Crowley 2013; Rinaldi 2019, pers. comm.).

In Unit 17, sealing records indicate that reported harvest ranged from 8 to 63 wolverines annually during 2007 – 2016, averaging 37 wolverines annually. During this time period, 79% of wolverines were trapped or snared and 17% were shot. Snowmachines were used 46% of the time (Woolington 2013; Rinaldi 2019, pers. comm.).

Other Relevant Proposals

Proposal WP20-27 was also submitted by the Bristol Bay Regional Advisory Council, and it requests a unit-specific regulation for Unit 17 allowing use of a snowmachine to assist in the taking of a caribou and allowing caribou to be shot from a stationary snowmachine, using the regulatory language adopted by the Alaska Board of Game in February 2018.

Effects of the Proposal

If adopted, Proposal WP20-26 would allow hunters to use a snowmachine to position wolves and wolverines for selection and harvest, as long as they were not shot from a moving snowmachine. The most recent available reports suggest that, in the Bristol Bay region, the majority of wolves are harvested by firearm, while the majority of wolverine are harvested by trapping. The proposed regulation may not result in an increase in harvest of wolves and wolverines by trap or snare. However, such regulatory changes could increase the take of wolves and wolverines by firearm, and may result in more opportunistic harvest. Currently the wolf population is believed to be stable. Less is known about the resident wolverine population and this change in regulation could result in increased biological vulnerability.

Bureau of Land Management lands in Units 9B, 9C, 17B, and 17C flank portions of the Nushagak and Kvichak rivers, and if the proposal is adopted, then it may provide most benefit to those communities situated nearest including Koliginek, New Stuyahok, Ekwok, Igiugig, Levelock, King Salmon, Naknek, and South Naknek. Regulations for the use of snowmachines when harvesting wolves or wolverines would be different on State managed lands, however this is already the case and should the proposal be adopted, it does not add regulatory complexity that does not already exist. Specifically, in State regulations, a snowmachine may be used to position a hunter to select an individual wolf for harvest, and wolves may be shot from a stationary snowmachine; in Federal regulations, a snowmachine could be used to position a wolf or wolverine for harvest, and either could be shot from a stationary snowmachine.

OSM PRELIMINARY CONCLUSION

Support Proposal WP20-26.

Justification

Hunters using snowmachines to position wolves and wolverines for harvest is a traditional practice in the Bristol Bay area. While methods and means for taking wildlife in ethnographic literature describe hunters employing traditional strategies that might affect game behavior, until the 1960s hunters were largely on sled and foot (Nelson 1983 [1899]; Oswalt 1990; VanStone 1967). As means for travel, access, and harvest continue to change over time, hunters persist in using traditional methods purposefully meant to alter the behavior of wildlife in order to position them for harvest because these methods are efficient. Additionally, the Board has adopted a similar regulation in Unit 23, in recognition of the snowmachine as a customary and traditional harvest method. The proposed regulation change might increase opportunity through an enhanced method for the harvest of wolverines and could result in more harvest. Impacts to wolverine populations are unknown at this time and are difficult to track.

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APPENDIX 1

5 AAC 92.080. Unlawful methods of taking game; exceptions

The following methods of taking game are prohibited:

. . .

(4) unless otherwise provided in this chapter, from a motor-driven boat or a motorized land vehicle, unless the motor has been completely shut off and the progress from the motor's power has ceased, except that a

. . .

(B) motorized land vehicle may be used as follows:

i) In Units 22, 23, and 26(A), a snowmachine may be used to position a caribou, wolf, or wolverine, for harvest, and caribou, wolves and wolverines may be shot from a stationary snowmachine.

(ii) notwithstanding any other provision in this section, in the wolf control implementation areas specified in 5 AAC 92.111 - 5 AAC 92.113, 5 AAC 92.118, and 5 AAC 92.121 - 5 AAC 92.124, a snowmachine may be used to position a hunter to select an individual wolf for harvest, and wolves may be shot from a stationary snowmachine;

(iii) notwithstanding any other provision in this section, in Units 9(B), 9(C), 9(E), 17, 18, 19, 21, 22, 24, 25(C) and 25(D), except on any National Park Service or National Wildlife Refuge lands not approved by the federal agencies, a snowmachine may be used to position a hunter to select an individual wolf for harvest, and wolves may be shot from a stationary snowmachine;

(iv) notwithstanding any other provision in this section, in the bear control implementation areas specified in 5 AAC 92.111 - 5 AAC 92.113, 5 AAC 92.118, and 5 AAC 92.121 - 5 AAC 92.124, a snowmachine may be used to position a hunter to select an individual bear for harvest, and bears may be shot from a stationary snowmachine;

(v) notwithstanding any other provision in this section, in Units 9(B), 9(C), 9(E), 17, 22 and 25(C), except on any National Park Service or National Wildlife Refuge lands not approved by the federal agencies, an ATV may be used to position a hunter to select an individual wolf for harvest, and wolves may be shot from a stationary ATV;

(vi) under authority of a permit issued by the department;

(vii) in Unit 18, a snowmachine may be used to position a wolf or wolverine for harvest, and wolves or wolverines may be shot from a stationary snowmachine;

(viii) in Unit 17, a snowmachine may be used to assist in the taking of a caribou and caribou may be shot from a stationary snowmachine. "Assist in the taking of a caribou" means a snowmachine may be used to approach within 300 yards of a caribou at speeds under 15 miles per hour, in a manner that does not involve repeated approaches or that causes a caribou to run. A snowmachine may not be used to contact an animal or to pursue a fleeing caribou.

(5) except as otherwise specified, with the use of a motorized vehicle to harass game or for the purpose of driving, herding, or molesting game;

(6) with the use or aid of a machine gun, set gun, or a shotgun larger than 10 gauge;

(7) with the aid of

(A) a pit;

(B) a fire;

(C) artificial light, except that artificial light may be used.

June 25, 2019

TO: Federal Board of Subsisence Management, (Att: Theo Mutskowitz)

FROM: Alaskans FOR Wildlife and any Cooperating Entities

RE: Comments on Subsistence Proposals

Please consider these comments on numbered proposals. Comments are offered from a public perspective that reflects several major considerations which we earnestly wish you and the board to keep clearly in mind as you make decisions on these and all proposals offered, namely,

1) The lands in question are publically owned lands belonging to all US citizens who in theory and in law all have interest in how wildlife on these lands are managed, and
2) Article 8 of our Alaska Constitution clearly sets forth that ALL (emphasis) Alaskans are stakeholders, all essentially owners, with respect to its natural resources and how they are managed .

WP-20 Wolf Trapping lifting harvest restrictions and extending sealing time.

OPPOSE

-2-

This proposal leads to spreading unrestricted wolf take everywhere. Given especially the substantial science on the value of apex predators plus the high interest in sustaining wolf populations on American public lands including here in Alaska as essential to maintenance of ecosystem biodiversity, we maintain that enactment of this proposal would result in another chapter in the unscientific overall continued war on wolves. This proposal to lift harvest limits and to extend sealing limits also already excessive in length are not scientifically justified nor justified as a pubic matter given the overall value of wolves to maintenance of biodiversity. It must not pass.

WP20-17 – Removing harvest quotas and sealing requirements for hunting wolves, OPPOSE.
We oppose this proposal for the same reasons offered to oppose the previous proposal, WP20-16.
The values of wolves as apex predator and its place in American culture must have bearing upon this consideration. No science and no national or even Alaskan public cultural norms can possibly support this permissively reckless proposal to expand wolf take without bounds. It must not pass.

-3-

WP20-26 Permitting the use of snowmachines to "position" wildlife for harvest. OPPOSE

This proposal would expand this practice apparently from other land management units. In essence "positioning" is another term for what in reality will result in chasing, and harassing wildlife to exhaustion, prohibitions in the regulation notwithstanding, due to impossible enforcement limitations. As an example, when asked to explain existing regulations for snowmachine use in trapping and hunting, an Alaska wildlife trooper explained he does not even understand the regulation.

Expanded snowmachine use, "positioning," will amount to a continued enforcement challenge. Widespread abuse will surely result and will continue to give subsistence the reputation of abuse when it really needs public support: we feel that as we now face mass extinctions of wildlife species; there is new public and growing focus on the crisis. This is an extremely unwise plunge to the bottom and we caution a futuristic consideration.

WP20-08 Proposal to require traps and snares to be marked with name and state identification number.

-4-

SUPPORT This proposal is topical, even in urban municipalities of Alaska as conflicts in public use areas resulting in injuries to hikers, pets and other outdoor public land users rise .

Keeping in mind even the use of more remote public lands grows as outdoor users of their lands increase, the potential for conflicts including serious injuries resulting from hidden owner-unidentified traps will increase. Organized trappers have strongly opposed such requirements as proposed here in past requests for change considered by the Alaska Board of Game. We witness the public land users (including of federal lands) would most certainly strongly favor this accountability. We strongly favor this proposal.

In closing, please carefully consider these comments as you go forward with the process over the next year or so. WE thank you for your consideration of these comments.

Sincerely,
Jim Kowalsky,
Chair, Alaskans FOR Wildlife
PO Box 81957
Fairbanks, Alaska 99708

WP20–27 Executive Summary	
General Description	WP20-27 requests a unit-specific regulation for Unit 17 allowing use of a snowmachine to assist in the taking of a caribou and allowing caribou to be shot from a stationary snowmachine, using the regulatory language adopted by the Alaska Board of Game in February 2018. *Submitted by: Bristol Bay Subsistence Regional Advisory Council.*
Proposed Regulation	**§_____.26(n)(17)(iii) Unit 17—Unit-specific regulations** **. . .** **(D) In Unit 17, a snowmachine may be used to assist in the taking of a caribou and caribou may be shot from a stationary snowmachine. "Assist in the taking of a caribou" means a snowmachine may be used to approach within 300 yards of a caribou at speeds under 15 miles per hour, in a manner that does not involve repeated approaches or that causes a caribou to run. A snowmachine may not be used to contact an animal or to pursue a fleeing caribou.**
OSM Preliminary Conclusion	**Support**
Bristol Bay Subsistence Regional Advisory Council Recommendation	
Yukon-Kuskokwim Delta Subsistence Regional Advisory Council Recommendation	
Interagency Staff Committee Comments	
ADF&G Comments	
Written Public Comments	

DRAFT
STAFF ANALYSIS
WP20-27

ISSUES

Wildlife Proposal WP20-27, submitted by the Bristol Bay Subsistence Regional Advisory Council, requests a unit-specific regulation for Unit 17 allowing use of a snowmachine to assist in the taking of a caribou and allowing caribou to be shot from a stationary snowmachine, using the regulatory language adopted by the Alaska Board of Game in February 2018.

DISCUSSION

The proponent states that it submitted the proposal using the State's regulatory language (see *5 AAC 92.080(4)(B)(viii*), below) at the recommendation of a working group convened for this purpose. There was consensus among working group members that existing language found in State regulations was a good starting point. The working group consisted of representatives from the public, the Bristol Bay Regional Advisory Council, the Bristol Bay Native Association, the Togiak National Wildlife Refuge, the Alaska Department of Fish and Game, the Office of Subsistence Management, and State and Federal law enforcement offices. The proponent states that keeping State and Federal hunting regulations aligned and simple will be more understandable for all users.

Existing Federal Regulation

§____.4 Definitions

Take or taking as used with respect to fish or wildlife, means to pursue, hunt, shoot, trap, net, capture, collect, kill, harm, or attempt to engage in any such conduct.

. . .

§____.26 Subsistence taking of wildlife

. . .

(b) Except for special provisions found at paragraphs (n)(1) through (26) of this section, the following methods and means of taking wildlife for subsistence uses are prohibited:

. . .

(4) Taking wildlife from a motorized land or air vehicle when that vehicle is in motion, or from a motor-driven boat when the boat's progress from the motor's power has not ceased.

(5) Using a motorized vehicle to drive, herd, or molest wildlife.

Proposed Federal Regulation

§____.26 Subsistence taking of wildlife

. . .

(b) Except for special provisions found at paragraphs (n)(1) through (26) of this section, the following methods and means of taking wildlife for subsistence uses are prohibited:

. . .

(4) Taking wildlife from a motorized land or air vehicle when that vehicle is in motion, or from a motor-driven boat when the boat's progress from the motor's power has not ceased.

(5) Using a motorized vehicle to drive, herd, or molest wildlife.

§_____.26(n)(17)(iii) Unit 17—Unit-specific regulations

. . .

(D) In Unit 17, a snowmachine may be used to assist in the taking of a caribou and caribou may be shot from a stationary snowmachine. "Assist in the taking of a caribou" means a snowmachine may be used to approach within 300 yards of a caribou at speeds under 15 miles per hour, in a manner that does not involve repeated approaches or that causes a caribou to run. A snowmachine may not be used to contact an animal or to pursue a fleeing caribou.

Existing State Regulations

AS 16.05.940. Definitions.

. . .

(34) "take" means taking, pursuing, hunting, fishing, trapping, or in any manner disturbing, capturing, or killing or attempting to take, pursue, hunt, fish, trap, or in any manner capture or kill fish or game.

5 AAC 92.080. Unlawful methods of taking game; exceptions

The following methods of taking game are prohibited:

. . .

(4) unless otherwise provided in this chapter, from a motor-driven boat or a motorized land vehicle, unless the motor has been completely shut off and the progress from the motor's power has ceased, except that a

. . .

(B) motorized land vehicle may be used as follows:

. . .

(viii) in Unit 17, a snowmachine may be used to assist in the taking of a caribou and caribou may be shot from a stationary snowmachine. "Assist in the taking of a caribou" means a snowmachine may be used to approach within 300 yards of a caribou at speeds under 15 miles per hour, in a manner that does not involve repeated approaches or that causes a caribou to run. A snowmachine may not be used to contact an animal or to pursue a fleeing caribou.

(5) except as otherwise specified, with the use of a motorized vehicle to harass game or for the purpose of driving, herding, or molesting game.

5 AAC 92.990. Definitions

(a) In addition to the definitions in AS 16.05.940 , in 5 AAC 84 – 5 AAC 92, unless the context requires otherwise,

. . .

(70) "harass" means to repeatedly approach an animal in a manner which results in the animal altering its behaviour;

NOTE: The complete text of *5 AAC 92.080(4)(B)* is in **Appendix 1.**

Extent of Federal Public Lands

Unit 17 is comprised of approximately 28% Federal public lands and consists of 21% U.S. Fish and Wildlife Service, 4% Bureau of Land Management, and 3% National Park Service managed lands (see **Unit 17 Map**). U.S. Fish and Wildlife Service managed lands are within Togiak National Wildlife Refuge, and National Park Service managed lands are within Lake Clark National Park and Preserve.

Customary and Traditional Use Determination

The customary and traditional use determinations for caribou in Unit 17 are the following:

Residents of Units 9B, 17, Eek, Goodnews Bay, Napakiak, Lime Village, Platinum, Quinhagak, Stony River, and Tuntutuliak have a customary and traditional use determination for caribou in Unit 17A, that portion west of the Izavieknik River, Upper Togiak Lake, Togiak Lake, and the main course of the Togiak River.

Residents of Units 9B, 17, Akiachak, Akiak, Lime Village, Stony River, and Tuluksak have a customary and traditional use determination for caribou in Unit 17A, that portion north of Togiak Lake that includes Izavieknik River drainages.

Residents of Units 9B, 17, Kwethluk, Lime Village and Stony River have a customary and traditional use determination for caribou in Units 17A and 17B, those portions north and west of a line beginning from the Unit 18 boundary at the northwest end of Nenevok Lake, to the southern point of upper Togiak Lake, and northeast to the northern point of Nuyakuk Lake, northeast to the point where the Unit 17 boundary intersects the Shotgun Hills.

Residents of Units 9B, 17, Akiachak, Akiak, Bethel, Eek, Goodnews Bay, Napakiak, Platinum, Quinhagak, Lime Village, Stony River, Tuluksak, and Tuntutuliak have a customary and traditional use determination for caribou in Unit 17B, that portion of Togiak National Wildlife Refuge within Unit 17B.

Residents of Units 9B, 9C, 9E, 17, Lime Village, and Stony River have a customary and traditional use determination for caribou in Unit 17 remainder.

Regulatory History

In 1995, Proposal P95-52 requested that snowmachines and motor-driven boats be allowed for the taking of caribou and moose in Unit 25 during established seasons, except shooting from a snowmachine in motion was prohibited. There was no existing regulation on the use of motorized vehicles in Unit 25 prior to this. The Federal Subsistence Board (Board) adopted the recommendation of the Eastern Interior and Southcentral Alaska Councils who supported the proposal in recognition that methods change over time and because it supported subsistence uses.

In 2000, the Board adopted Proposal P00-53 with modification allowing the use of snowmachines to position a hunter and select individual caribou for harvest in Units 22 and 23. The Board did this to recognize a longstanding customary and traditional practice in the region (FWS 2000). However, the proponent had asked to position a caribou, not a hunter. The Interagency Staff Committee provided a rationale for the modification:

> Following the Regional Council winter meetings, the Deputy Regional Director of the U.S. Fish and Wildlife Service (FWS), Alaska Region, met with the Assistant Regional Director for Law Enforcement, the Staff Committee member for FWS, the Refuge Supervisor for Northern Refuges, and the Native Liaison and, after lengthy discussion, agreed to recommend substituting "a hunter" for "caribou" in the proposal language. They agreed that this is consistent with conservation principles and existing agency regulations as long as herding does not occur and shooting from a moving snowmachine is prohibited (FWS 2000:13).

In 2012, Proposal WP12-53 was submitted by the Yukon Delta National Wildlife Refuge, and requested a unit specific regulation prohibiting a hunter in Unit 18 from pursuing with a motorized vehicle an ungulate that is "fleeing." The Board adopted the proposal with modification and prohibited the pursuit

with a motorized vehicle of an ungulate that was "at or near a full gallop" in Unit 18, providing greater clarity of allowable methods of harvest (FWS 2012).

At its March 2014 meeting, the Alaska Board of Game adopted Proposal 177, which allows a hunter to use a snowmachine in Units 22, 23 and 26A to position a caribou, wolf, or wolverine for harvest, as long as these animals were shot from a stationary snowmachine (see *5 AAC 92.080(4)(B)(i)* at **Appendix 1**). The purpose of the proposal was to allow the use of snowmachines to track these animals.

In 2016, Proposal WP16-48, submitted by the Native Village of Kotzebue, requested that Federally qualified subsistence users be allowed to use snowmachines to position a caribou, wolf, or wolverine for harvest in Unit 23. The Board adopted the proposal with modification to allow this method of harvest only on those lands managed by the Bureau of Land Management. The Board recognized uses of snowmachines to position animals as customary and traditional practice. However, positioning animals by snowmachine is prohibited on National Park Service and U.S. Fish and Wildlife Service lands under agency-specific regulations. Bureau of Land Management regulatory language does not specifically prohibit the use of snowmachines to position animals for hunting and this harvest method is allowed on some State managed lands.

In the spring of 2017, Kenneth Nukwak of Manokotak submitted Proposal WP18-24 requesting that Federally qualified subsistence users be allowed to use a snowmachine to position caribou, wolves, and wolverines for harvest in Unit 17, provided the animals would not shot from a moving vehicle. During the fall 2017 meeting cycle, the Bristol Bay Subsistence Regional Advisory Council voted to oppose Proposal WP18-24, noting a lack of clear definitions for positioning and chasing of an animal.

At its February 2018 meeting in Dillingham, the Alaska Board of Game adopted Proposal 148, also submitted by Kenneth Nukwak of Manokotak, with modification. The original proposal requested that Federally qualified subsistence users be allowed to use a snowmachine to position caribou, wolves, and wolverines for harvest in Unit 17, provided the animals would not be shot from a moving vehicle. The modified regulation was limited to caribou and stated that a snowmachine may be used in Unit 17 to assist in the taking of a caribou, and caribou may be shot from a stationary snowmachine, with further clarification describing exactly how the snowmachine may be used for assistance (see *5 AAC 92.080(4)(B)(viii)* at **Appendix 1**).

At its winter meeting in March of 2018, the Bristol Bay Council voted to request Proposal WP18-24 be removed from the consensus agenda at the next Board meeting in Anchorage the following month. Reasoning for this included providing an opportunity for the Board to deliberate the proposal on record, in light of Board of Game deliberation, modification, and adoption of the same proposal on State lands in Unit 17. During the April 2018 Board meeting, Proposal WP18-24 was taken off the consensus agenda. Some public testimony was received in support of the proposal. The Board deliberated the proposal on record and rejected it.

Biological Background

Two distinct caribou populations are present in Unit 17. The Nushagak Peninsula Caribou Herd (NPCH) primarily occupies the ~425 mi^2 Nushagak Peninsula, which is the portion of Units 17A and 17C south of the Igushik River, the Tuklung River, and the Tuklung Hills. The Mulchatna Caribou Herd (MCH) ranges across ~60,000 square miles, primarily within Units 9B, 9C, 17A, 17B, 17C, 18, 19A and 19B (Woolington 2013).

NAPCH

The NPCH has experienced significant fluctuations in size. Following reintroduction in 1988, the population grew at a mean annual rate of 38% for the first 6 years. This unusual growth is attributed to the high proportion of females in the original translocation, high calf production and survival, the presence of previously unexploited habitat, and low predation and harvest rates. The population peaked in the late 1990s at approximately 1,300 caribou. Subsequently, calf recruitment and adult female survival decreased and the population fell below 500 caribou by 2006 (Aderman 2015).

Between 2007 and 2015, the population increased due to improved fall calf recruitment and adult female survival (Aderman 2015), reaching over 1,400 caribou. Since 2015, the minimum population size has declined nearly every year. This decline is due in part to the deliberately high harvest in recent years, particularly in RY2016/17. The most recent population survey occurred in July 2019, when the population was estimated to be 822 caribou, with a minimum count of 710. The population currently approximates the Nushagak Peninsula Caribou Management Plan's population objective, which is to maintain a population of 400–900 caribou and an optimum of 750 caribou (Aderman 2015). The most recent composition surveys were conducted in October 2018. These surveys estimated 25 bulls:100 cows, the lowest bull cow ratio since introduction, and 34 calves:100 cows, among the lowest on record (Aderman 2019, pers. comm.).

MCH

Like the NPCH, the MCH has experienced dramatic changes in population size, as well as in distribution. In the early 1980s, the population was estimated to include approximately 20,000 caribou. Its winter range included the north and west side of Iliamna Lake north of the Kvichak River, where it intermingled with the Northern Alaska Peninsula Caribou Herd. By the mid-1990s, the herd had grown to its peak size of approximately 200,000 caribou and had begun wintering in southern Unit 18 and southwestern Unit 19B. Subsequently, the herd began a period of decline that persisted until recently (Barten 2015).

In 2013, population estimate for the MCH was 18,308 caribou, the lowest estimate in over 30 years and well below the State's population objective of 30,000 – 80,000 caribou. Since then, the population appears to have grown. The most recent valid estimate, in 2016, was 27,242 caribou (Barten 2017).

The MCH experienced a steady increase in the bull:cow ratio between 2010 and 2016. In 2016, the ratio was 39 bulls:100 cows, which is the highest estimate since the late 1990s. In 2017, the bull:cow ratio declined to 32 bulls:100 cows, just below the State's management objective of 35 bulls:100 cows.

Calf:cow ratios have been variable, which is typical of caribou herds occupying interior and southwest Alaska. In 2017, the calf:cow ratio was 23 calves:100 cows, within the range of variability observed in recent years (Barten 2017, ADF&G 2018).

Cultural Knowledge and Traditional Practices

During his study years of 1964 and 1965, VanStone (1967:134) documented winter travel along the Nushagak River as occurring almost exclusively by dog team. During the winter months dog teams were used to harvest caribou, access trap lines, and provide for the transportation of supplies and people throughout the region. Hunters used traditional methods to harvest wildlife. These methods included a hunter moving animals towards another hunter's position. At the time of his study, VanStone was only aware of a few Bristol Bay residents that possessed snowmachines. Approximately 10 years later, when the Alaska Department of Fish and Game (ADF&G) first began conducting research on subsistence harvest activities, dog teams were barely mentioned. Instead, reports noted that the communities of Nushagak Bay were using mostly boat, aircraft, and snowmachine to access animals for harvest (Coiley-Kenner et al. 2003; Evans et al. 2013; Fall et al. 1986; Holen et al. 2012; Holen et al. 2005; Kreig et al. 2009; Schinchnes and Chythlook 1988; Seitz 1996; Wolfe et al. 1984; Wright et al. 1985).

In the past, prior to the use of snowmachines, people in the region were more nomadic. Residents of Southwest Alaska practiced an annual round of harvest activities that allowed them to effectively position themselves in proximity to important resources that supported their families through extended travel to seasonal subsistence camps. In a 2003 report, elders describe a harvest year that began at fish camp in the early summer, moved up the river to hunting and trapping camps for the fall and winter, traveled through mountain passes and down rivers to bays and estuaries for the spring harvest of migratory waterfowl and eggs, finally returning to fish camp once again in time for the salmon runs of early summer (La Vine and Lisac 2003). A trip such as this required travel by boat, sled, and foot and took the family hundreds of miles and 12 months to complete. As village life solidified around schools and economic opportunities, technological advances like boats with outboard motors and snowmachines allowed people to travel further over shorter periods of time in order to access the resources they once had to follow over seasons instead of hours.

Similarly, in north western Alaska where caribou harvest is an essential part of the subsistence way of life, Alaska Native people have also transitioned from dog team to snowmachine as a necessary continuance of their subsistence practice (Anderson et al. 1998). Some of the practice described in the following provides greater detail on how hunters might position themselves in order to strategically harvest an animal, but it also describes practices that can be identified as positioning an animal. In winter, there were advantages to using dog teams, and now snowmachines, for hunting caribou. When caribou were not present near a village or hunt camp, hunters needed to be mobile and travel long distances to locate bands of caribou. Sleds and snowmachines are now used together and allow transport of more hunters, gear, meat, and hides.

Discussion from the analysis of Proposal WP16-48 is relevant here, even if it describes characteristics or terms for hunting from more northern communities, as it can be a starting point for potential Council

discussions and public testimony on similar practices within Unit 17. In the context of caribou hunting, the Iñupiaq word *inillak* means "the *hunter positions himself* close to where the caribou would pass or cross depending on the way the wind is blowing . . . to the Iñupiat, *inillak* is quite different from herding and it is used specifically in caribou hunting. Herding means to gather animals such as reindeer into an enclosed area" (FWS 2000:19). Iñupiaq hunters position both themselves and caribou during a hunt. During the discussions in 2000, Mike Patkotak from the North Slope Subsistence Regional Advisory Council member said, "When you are *positioning caribou*, you're out in the open; you're not putting them into an enclosed corral. . . . You're not trapping them into an enclosed area." (FWS 2000:19).

Whether using dog team, snowmachine, or stalking, it is customary for "a hunter to go on one side of the herd and *unu* them towards the hunter waiting on the other side. This is also called *unuraq*, driving the caribou. This gives them a better position to be successful in their harvesting of the caribou that they want" (FWS 2000:22). The Iñupiaq word *unu* means to "cooperatively push or move the caribou. One or more hunters wait on one section of the hunting area and young runners go around behind the herd to make them head in the shooters' direction" (FWS 2000:19). This remains a common practice in Unit 23, and the current preferred method of positioning both hunters and animals in winter is by snowmachine.

In Proposal WP12-53, contemporary practice of snowmachine use in Unit 18 was defined as follows:

> Hunters from some lower Yukon River villages described hunting in the Andreafsky Mountains in the 1980s. It was unclear if the group was hunting caribou or reindeer from the nearby herd at Stebbins. Caribou/reindeer roamed in small groups, difficult to approach by snowmachine. Several hunters attempted to herd a group to locations where shots could be taken, such as up a cul-de-sac or toward a heavy bush line. In this description, the high speed chase was considered "a relatively risky, dare-devil technique" (Wolfe and Pete 1984: 9). Kwethluk hunters in the 1980s hunting with snowmachines reported hunting in upper Kwethluk and Kisaralik River valleys. "The high hills and low mountains scattered throughout the area provided lookouts where hunters can watch for caribou" (Coffing 1991:157) (FWS 2012).

Recent testimony from the Bristol Bay Regional Advisory Council and the Federal Subsistence Board described the significance of snowmachine use for the subsistence way of life in Bristol Bay and across the State. During debate on Proposal WP18-24, Council members and their constituents in the Bristol Bay region described historical practices of hunting caribou by "herding" them on foot or from dogsleds, often working in teams to approach caribou from multiple positions at once. Those testifying emphasized that it is fundamentally impossible to hunt for caribou in the open, flat terrain that characterizes much of southwestern Alaska without continually moving and herding caribou, which easily sense humans and do not remain stationary. As described by Kenneth Nukwak of Manokotak at the April 12, 2019 Federal Subsistence Board Meeting:

> The caribou are always running off as soon as they see a snowmachine, they see us as predators already. . . that's within their intrinsic nature, to run off, as soon as they see you within. . . a mile and a half, they see you on a sunny day, the leaders of the herd of caribou are already looking at your direction. If you look at them with your binoculars

> they're already looking at you and the first thing they do, never fails, they're running off (FSB 2019:320).

Hunters explained that it is necessary to "nudge" caribou into the right spot so that they can be harvested, but hunters now fear being criminalized for this traditional tactic. Testimony indicated that harvesting caribou has always depended on the most efficient methods available. Use of snowmachines is the most efficient method available to subsistence hunters today and is part of a historical continuum. In the words of one Bristol Bay Council member:

> We went from spears and traps to bow and arrows to rifles. From walking to now snowmachines. . . . It's still about harvesting in the most efficient way possible. Now that practice of gathering and moving herd that's past practices. It's been well documented and used. Of course a lot of that was when you were on foot or hunting with dogs. That idea, when viewed from the outside, it looks like we're harassing these animals. To us it's not harassment, it's about harvesting in the most efficient way that we can" (BBSRAC 2019:109).

Harvest History

NPCH

Except for regulatory years 2015/16 – 2017/18, caribou hunting on the Nushagak Peninsula has been limited to Federally qualified subsistence users. Typically, annual harvest of the NPCH has increased as the population has grown and harvest limits have increased. Prior to the 2016 regulatory year, annual reported harvest ranged from none taken when the population was small and harvest was heavily regulated, to over 125 when caribou were abundant and regulations were liberalized. Overall, harvest has averaged 62 caribou annually since 1994, the first year harvest was authorized (Aderman 2015, Aderman 2017, pers. comm.).

Historically, most of the reported harvest has occurred in February and March, due to good hunter access to the herd via snowmachine (Aderman and Lowe 2012). In recent years, total reported harvest has varied significantly due to variable winter weather and travel conditions. For instance, in 2015/16, when the population was at its largest but travel conditions were poor, only 64 caribou were reported harvested. The next year, when travel conditions were good, 378 caribou were reported harvested (Aderman 2017, pers. comm.). Only 14 caribou were reported harvested during the 2018/19 season due to early breakup (Aderman 2019, pers. comm.).

MCH

Like the NPCH, harvest of the MCH is affected by caribou abundance, environmental conditions, and harvest restrictions. Reported harvest of the MCH has decreased significantly since the early 2000s, when the herd was very large. Total reported caribou harvest declined from over 4,000 caribou in 2000 to less than 200 caribou in 2018. Harvest among all user groups declined during this period, but the decline was especially pronounced among non-local residents and nonresidents, owing to reduction of

State harvest limits in 2006 and elimination of the nonresident season in 2009 (ADF&G 2017; Barten 2017, pers. comm.).

Since 2009, harvest has averaged 312 caribou annually, 84% of which were taken by Federally qualified subsistence users. However, underreporting is known to occur and it is likely that reported harvest underestimates total harvest by local users. Among Federally qualified subsistence users, 58% of the total reported harvest was taken Jan. – Mar. and 28% of the total reported harvest was taken in Unit 17 since 2009 (ADF&G 2017, 2019).

Other Relevant Proposals

Proposal WP20-26 was also submitted by the Bristol Bay Council and would allow a hunter on a snowmachine in Unit 17 to position wolves and wolverines for harvest as long as a they were not shot from a moving snow machine.

Effects of the Proposal

If adopted, Proposal WP20-27 will provide regulatory language describing snowmachine use for the purposes of hunting caribou in Unit 17. It will also align state and Federal regulations on snowmachine use while hunting caribou in Unit 17. The proposed regulation is not expected to result in significant population changes for caribou as snowmachines are already extensively used in Unit 17 to access hunting grounds, and harvest numbers will continue to be managed by seasons and limits within regulation.

Adopting Proposal WP20-27 will not alter current prohibitions for snowmachine use on Federal lands. Currently, Federal regulations prohibit hunters taking caribou from a snowmachine in motion (*§__.26 (b)(4)*, above), and Federal regulations prohibit using a snowmachine to pursue (*§__.4*, above), or drive, herd, or molest wildlife (*§__.26 (b)(5)*, above). The proposed regulation provides clarification on how the hunter may use a snowmachine to assist in the taking of a caribou while remaining in compliance with existing regulations.

OSM PRELIMINARY CONCLUSION

Support Proposal WP20-27.

Justification

The use of snowmachines for subsistence purposes is a traditional practice in the Bristol Bay area and statewide. Public testimony and discussion at Council and Board meetings affirms the significance of snowmachine use to the subsistence way of life while seeking guidance on issues of compliance. The proposed regulatory language will provide clarity to the hunter on ensuring compliance while using a snowmachine to harvest caribou on Federal lands. Because it mirrors a recent addition to State regulation, it will reduce complexity between Federal and State regulations, and decrease the potential for

inadvertent noncompliance by Federally qualified subsistence users. This approach was agreed upon by a diverse group of stakeholders.

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APPENDIX 1

5 AAC 92.080. Unlawful methods of taking game; exceptions

The following methods of taking game are prohibited:

. . .

(4) unless otherwise provided in this chapter, from a motor-driven boat or a motorized land vehicle, unless the motor has been completely shut off and the progress from the motor's power has ceased, except that a

. . .

(B) motorized land vehicle may be used as follows:

i) In Units 22, 23, and 26(A), a snowmachine may be used to position a caribou, wolf, or wolverine, for harvest, and caribou, wolves and wolverines may be shot from a stationary snowmachine.

(ii) notwithstanding any other provision in this section, in the wolf control implementation areas specified in 5 AAC 92.111 - 5 AAC 92.113, 5 AAC 92.118, and 5 AAC 92.121 - 5 AAC 92.124, a snowmachine may be used to position a hunter to select an individual wolf for harvest, and wolves may be shot from a stationary snowmachine;

(iii) notwithstanding any other provision in this section, in Units 9(B), 9(C), 9(E), 17, 18, 19, 21, 22, 24, 25(C) and 25(D), except on any National Park Service or National Wildlife Refuge lands not approved by the federal agencies, a snowmachine may be used to position a hunter to select an individual wolf for harvest, and wolves may be shot from a stationary snowmachine;

(iv) notwithstanding any other provision in this section, in the bear control implementation areas specified in 5 AAC 92.111 - 5 AAC 92.113, 5 AAC 92.118, and 5 AAC 92.121 - 5 AAC 92.124, a snowmachine may be used to position a hunter to select an individual bear for harvest, and bears may be shot from a stationary snowmachine;

(v) notwithstanding any other provision in this section, in Units 9(B), 9(C), 9(E), 17, 22 and 25(C), except on any National Park Service or National Wildlife Refuge lands not approved by the federal agencies, an ATV may be used to position a hunter to select an individual wolf for harvest, and wolves may be shot from a stationary ATV;

(vi) under authority of a permit issued by the department;

(vii) in Unit 18, a snowmachine may be used to position a wolf or wolverine for harvest, and wolves or wolverines may be shot from a stationary snowmachine;

(viii) in Unit 17, a snowmachine may be used to assist in the taking of a caribou and caribou may be shot from a stationary snowmachine. "Assist in the taking of a caribou" means a snowmachine may be used to approach within 300 yards of a caribou at speeds under 15 miles per hour, in a manner that does not involve repeated approaches or that causes a caribou to run. A snowmachine may not be used to contact an animal or to pursue a fleeing caribou.

(5) except as otherwise specified, with the use of a motorized vehicle to harass game or for the purpose of driving, herding, or molesting game;

(6) with the use or aid of a machine gun, set gun, or a shotgun larger than 10 gauge;

(7) with the aid of

(A) a pit;

(B) a fire;

(C) artificial light, except that artificial light may be used.

WP20–28/29 Executive Summary	
General Description	WP20-28 requests that the bull moose season in Unit 17A be extended by 5 days, from Aug. 25 – Sep. 20 to Aug. 25 – Sep. 25. WP20-29 requests the addition of an Aug. 25 – Sep. 25 antlerless moose season in Unit 17A. *Submitted by: Togiak National Wildlife Refuge.*
Proposed Regulation	**Unit 17—Moose** *Unit 17A—1 bull by State registration permit* — *Aug. 25 – Sep. ~~20~~ **25*** ***OR*** ***1 antlerless moose by State registration permit*** — ***Aug. 25 – Sep. 25*** ***OR*** Up to 2 moose; one antlered bull by State registration permit, one antlerless moose by State registration permit — Up to a 31-day season may be announced between Dec. 1-last day of Feb.
OSM Preliminary Conclusion	**Support**
Bristol Bay Subsistence Regional Advisory Council Recommendation	
Yukon-Kuskokwim Delta Subsistence Regional Advisory Council Recommendation	
Interagency Staff Committee Comments	
ADF&G Comments	
Written Public Comments	**None**

DRAFT STAFF ANALYSIS
WP20-28/29

ISSUES

Wildlife Proposals WP20-28 and WP20-29 were submitted by the Togiak National Wildlife Refuge (Refuge). WP20-28 requests that the bull moose season in Unit 17A be extended by 5 days, from Aug. 25 – Sep. 20 to Aug. 25 – Sep. 25. WP20-29 requests the addition of an Aug. 25 – Sep. 25 antlerless moose season in Unit 17A.

DISCUSSION

The Refuge notes that the moose population in Unit 17A is well above established population objectives, with high bull:cow ratios. The intent of this proposal is to reduce the moose population in this area, ensuring it remains productive and guarding against over browsing of the habitat. The Refuge notes that they supported a recent decision by the Alaska Board of Game (BOG), which implemented these changes in State regulation. It was clarified with the Refuge that the intent of the proposal is to impose a fall harvest limit of either one bull or one antlerless moose, with the opportunity for a second moose during the existing may be announced winter season.

Existing Federal Regulation

Unit 17—Moose

Unit 17A—1 bull by State registration permit	*Aug. 25 – Sep. 20*
Unit 17A—up to 2 moose; one antlered bull by State registration permit, one antlerless moose by State registration permit	*Up to a 31-day season may be announced between Dec. 1-last day of Feb.*

Proposed Federal Regulation

Unit 17—Moose

Unit 17A—1 bull by State registration permit	*Aug. 25 – Sep. ~~20~~ **25***

OR

1 antlerless moose by State registration permit		***Aug. 25 – Sep. 25***
OR		
Up to 2 moose; one antlered bull by State registration permit, one antlerless moose by State registration permit		*Up to a 31-day season may be announced between Dec. 1-last day of Feb.*

Existing State Regulation

Unit 17A—Moose

Residents: *One bull by permit available in person in Dillingham and Togiak beginning Aug. 11.*	*RM573*	*Aug. 25 – Sep. 25*
OR		
One antlerless moose by permit available in person in Dillingham and Togiak beginning Aug. 11.	*RM571*	*Aug. 25 – Sep. 25*
OR		
Two moose total, only one may be an antlered bull (RM575), only one may be an antlerless moose (RM576), by permit available in person in Dillingham and Togiak (up to a 31-day season may be announced Dec. 1 – Feb. 28)	*RM575/ RM576*	*May be announced*
Non-residents: *One bull with 50-inch antlers or antlers with 4 or more brow tines on at least one side by permit. No aircraft use on, or within 2 miles of specific rivers and lakes. Nonresident orientation required.*	*DM570*	*Sep. 5 – Sep. 15*

Extent of Federal Public Lands/Waters

Unit 17A is comprised of approximately 87% Federal public lands, all of which are managed by U.S. Fish and Wildlife Service (See Unit Map).

Customary and Traditional Use Determinations

Rural residents of Unit 17, Goodnews Bay, Kwethluk, and Platinum have a customary and traditional use determination in the portion of Unit 17A north and west of a line beginning from the Unit 18 boundary at the northwestern end of Nenevok Lake, to the southern point of upper Togiak Lake, and to the Unit 17A boundary to the northeast towards the northern point of Nuyakuk Lake.

Rural residents of Unit 17, Akiak, Akiachak, Goodnews Bay, and Platinum have a customary and traditional use determination in the portion of Unit 17A north of Togiak Lake that includes Izavieknik River drainages.

Rural residents of Unit 17, Goodnews Bay and Platinum have a customary and traditional use determination in Unit 17A remainder.

Regulatory History

In 2001, a Federal season for moose was established in Unit 17A, as a result of the Federal Subsistence Board's (Board) action on Wildlife Proposal WP01-20. Submitted by the Refuge, WP01-20 requested the establishment of an Aug. 20 – Sep. 15 season, limited to one bull by State registration permit. The proponent noted that the moose population had increased sufficiently in the previous several years, and that harvest had been allowed since 1997 in State regulation. The Board adopted the proposal with modification to establish an Aug. 25 – Sep. 20 season, consistent with recent adjustments in the State season.

In 2002, Emergency Special Action WSA02-11 was submitted by the Togiak Traditional Council, requesting a winter moose hunt in a portion of Unit 17A. The proponent requested that, in the portion of 17A east of the west shore of Nenevok Lake, west bank of Kemuk River, and west bank of Togiak River south from the confluence of Togiak and Kemuk Rivers, a 14-day season be announced by the Refuge manager between December 1 and January 31 with a harvest limit of one antlered bull. This request was consistent with management guidelines developed jointly by the Refuge and the Alaska Department of Fish and Game (ADF&G), which indicated that a winter hunt could be considered when the population exceeded 600 moose. The Board adopted WSA02-11 with modification to require a State registration permit, to reduce regulatory complexity.

State Proposal 52A was developed in concert with WSA02-11. The Alaska Board of Game (BOG) adopted proposal 52A in late 2002, which resulted in the establishment of a 14 day winter season, to be announced between December 1 and January 31 with a harvest limit of one antlered bull. Unlike the Federal season, the new state season was implemented throughout Unit 17A.

Wildlife Proposal WP03-24, submitted by the Bristol Bay Native Association, requested that the winter season described in WSA02-11 be adopted into regulation. It requested that a Federal registration permit be required. At the recommendation of the Bristol Bay Subsistence Regional Advisory Council (Council), the Board deferred this proposal to allow time for review by the Unit 17A Moose Planning Working Group. The deferred proposal became Wildlife Proposal WP04-46 during the 2004 regulatory

cycle. The Board adopted the proposal with modification to authorize a may be announced season up to 14 days long and to require a State registration permit. These modifications were consistent with the recommendations of the Unit 17A Moose Planning Working Group and the Council.

Prior to 2012, the winter season was open in State regulation throughout Unit 17A, but open in Federal regulation only in the portion of 17A east of the west shore of Nenevok Lake, west bank of Kemuk River, and west bank of Togiak River south from the confluence of Togiak and Kemuk Rivers. Wildlife Proposal WP12-40, submitted by the Refuge, requested that the Federal season be expanded geographically to include all of Unit 17A. The Refuge noted that the proposed change would not threaten the conservation status of the population, would provide additional subsistence opportunity, and would reduce regulatory complexity by aligning State and Federal regulation. The Board adopted WP12-40 as part of the consensus agenda.

In early 2013, the Board considered Emergency Special Action WSA12-11. Submitted by the Togiak Traditional Council, WSA12-11 requested that the winter moose season in Unit 17A be extended. The proponent reported that poor winter travel conditions, combined with the long travel distances required to access moose, had resulted in limited opportunity during the previously announced Dec. 18 – Dec. 31 season. As authorized by the Board, the Office of Subsistence Management, with unanimous consent of the Interagency Staff Committee, approved the request and reopened the Federal season Jan. 9 – Jan. 22. ADF&G issued an emergency order to reopen the State season during the same period.

In February 2013, the BOG amended and adopted Proposal 48B. As a result of this action, the State's winter may be announced season was lengthened to up to 31 days. In addition, the harvest limit for the winter season was increased to up to 2 moose.

Following the BOG's action, Emergency Special Action WSA13-01 was submitted by the Council. WSA13-01 requested that the Federal may be announced season be extended to up to 31 days and that the harvest limit for the winter season be increased to up to 2 moose. The Council noted that the requested change would result in additional opportunity for Federally qualified subsistence users, may help slow population growth, was consistent with the Unit 17A Moose Management Plan, and would reduce regulatory complexity by aligning State and Federal seasons and harvest limits. As authorized by the Board, the Office of Subsistence Management, with unanimous consent of the Interagency Staff Committee, approved the request.

The temporary changes implemented by WSA13-01 were proposed for permanent regulations in Wildlife Proposal WP14-21. The Council, who submitted the proposal, noted that these regulations could help prevent continued population growth and overuse of the habitat, while providing additional subsistence opportunity. The Board adopted WP14-21 with modification to delegate authority to the Refuge manager to open and close the season and set the harvest limit, including sex restrictions, via a delegation of authority letter.

In February 2015, the BOG considered Proposal 49, which requested extending the window of opportunity for announcing the winter hunt from Dec. 1 – Jan. 31 to Dec. 1 – Feb 28. ADF&G, the proponent, noted that changing weather patterns and marginal snow conditions had prevented access to

moose in recent years. They argued that extending the window of opportunity would provide flexibility to managers to open the season during years when travel conditions weren't adequate until later in the winter. ADF&G also requested a change in the harvest limit, from up to two moose, to one antlered bull and one antlerless moose. The latter request was aimed at protecting cows from overharvest, preventing disturbance of moose by hunters trying to distinguish antlerless bulls from cows, and shifting the harvest pressure from large breeding bulls to younger bulls that carry their antlers later into winter. The BOG adopted Proposal 49.

These changes in State regulation prompted requests for the same changes in Federal regulation. Wildlife Proposals WP16-27 and WP16-28 were submitted by the Togiak Fish and Game Advisory Committee and the Nushagak Fish and Game Advisory Committee, respectively. Both proposals requested that Federal regulations for the Unit 17A winter moose hunt mirror the recently adopted State regulations. The Board took no action on WP16-28 and adopted WP16-27 with modification to make minor changes to the regulatory language.

The BOG liberalized the fall moose season in Unit 17A at their February 2018 meeting. Proposal 137, submitted by the Togiak Fish and Game Advisory Council, requested that the fall season for residents begin and end five days later, a change from Aug. 25 – Sep. 20 to Aug. 30 – Sep. 25. Proposal 138, submitted by the Traditional Council of Togiak, requested that the resident season be extended by five days, a change from Aug. 25 – Sep. 20 to Aug. 25 – Sep. 25. The proponents of both proposals stated that moose movement was more conducive to hunting later in September. ADF&G, in their comments to the BOG, noted that moose abundance exceeded objectives and that bull:cow ratios appeared to be sufficient to allow additional bull harvest. They also noted that the proposed actions would be consistent with the management plan and might substantially increase bull harvest. The BOG took no action on proposal 137 and amended and adopted proposal 138. As a result of the BOG's decisions, the State season is currently Aug. 25 – Sep. 25 and the harvest limit is one bull or one antlerless moose by registration permit.

Biological Background

Moose are relative newcomers to the Bristol Bay region and, until recently, Unit 17 supported only a small population with limited distribution. Moose populations in the region have grown substantially in the past 30 years, however, and have continued to expand their range westward into western Unit 17A. They are now common wherever there is suitable habitat (Barten 2018).

Moose management within Unit 17A is guided by the Moose Management Plan for Game Management Unit 17A (management plan). The management plan was developed by the Unit 17A Moose Management Group, consisting of the Bristol Bay Subsistence Regional Advisory Council, the Nushagak and Togiak Fish and Game Advisory Committees, the Togiak National Wildlife Refuge, and ADF&G. The management plan outlines a series of management goals and objectives. Population and harvest objectives relevant to this proposal included maintaining a population of 800 – 1,200 moose, allowing a limited winter hunt for antlerless moose when the population is stable or increasing and above 600 moose, and allowing harvest of up to 2 moose when the population exceeds 1,200 moose (Unit 17A Moose

Management Group 2013). ADF&G identifies a target population size of 1,100 – 1,750 moose (Barten 2018), which is somewhat higher than the population objective laid out in the management plan.

Assessment of the Unit 17A moose population is a cooperative undertaking by the Refuge and ADF&G. The first major survey of Unit 17A, conducted in 1981, yielded three moose. In 1994, 84 moose were observed. The population appears to have increased relatively steadily since (Aderman 2014) (**Figure 1**). Growth is attributed continuing immigration from Unit 17C, regulatory changes, commitment from Unit 17A communities to support population growth, availability of Mulchatna caribou as an alternate resource, and good productivity and recruitment due to good forage conditions, mild weather, and low predation (Unit 17A Moose Management Group 2013). At last count, in March 2017, an estimated 2,370 moose (90% CI = 1,805 – 2,934 moose) were present in Unit 17A (Aderman 2017, pers. comm.). This represents a 9% annual growth rate since 2011, and is above the population objectives established by the Unit 17A Moose Management Group and ADF&G.

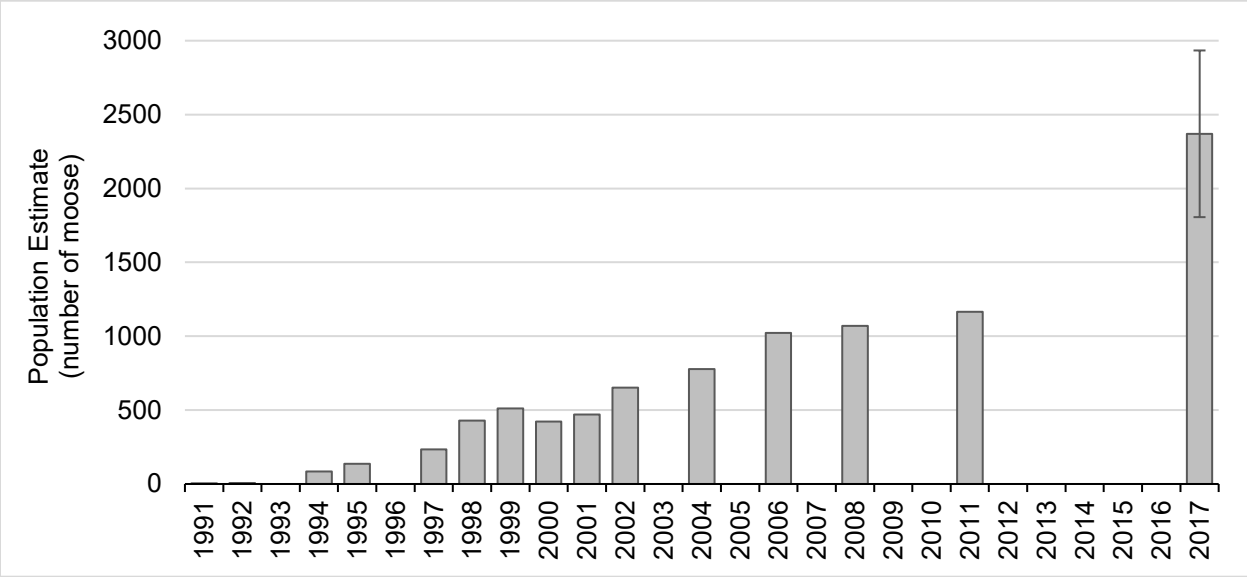

Figure 1. Unit 17A moose population estimates, 1991 – 2017. Prior to 2017, estimates are minimum counts. In 2017, GPSE methodology was used. Error bars represent the 90% confidence interval (Aderman 2014, Aderman 2017, pers. comm.)

Estimates of productivity are high in Unit 17A. Between 1998 and 2013, radio collared cows produced an average of 128 calves:100 cows. During this time period, twin births accounted for 64% of total births (Aderman 2014). Between 1998 and 2016, spring recruitment averaged 60 calves:100 cows and has remained relatively stable (Aderman 2019, pers. comm).

Estimating bull:cow ratios in Unit 17A has been difficult, due to lack of adequate survey methods. Typically, moose surveys occur during the fall. However, when there is no snow cover during that time of year, as often happens in the Bristol Bay region, moose are difficult to spot. Consequently, moose surveys in Unit 17A have occurred in the spring, after bulls have dropped their antlers. This has largely precluded estimation of bull:cow ratios (Barten 2018). However, in 2016 and 2017, favorable fall

conditions allowed estimation of bull:cow ratios. There were 64 bulls:100 cows and 77 bulls:100 cows observed in October of 2016 and 2017, respectively (Aderman 2019, pers. comm.)

Cultural Knowledge and Traditional Practices

Two Central-Yup'ik groups, the Kiatagmiut and the Aglurmiut, traditionally inhabited and hunted in subunit 17C (Fall et al. 1986; VanStone 1984). In historic times, the region supported a limited number of moose and, as such, the species accounted for a small portion of these groups' overall diet (Hensel 1996). Moose were hunted opportunistically and were valued as a source of food, as well as for clothing purposes (Holen et al. 2005; VanStone 1984). The occurrence of moose hunting and use among the Kiatagmiut and Aglurmiut is limited in published literature. However, Hensel (1996) noted that moose were treated with respect and, as the population increased, the species became more important. Holen et al. (2005) stated that moose populations did not increase dramatically until the 1980s and 1990s.

The Russians constructed Fort Alexander in the vicinity of Nushagak Bay in 1820 (Michael 1967). It was the establishment of this fort that enabled the Russians and other Europeans to branch out into the interior parts of Southwestern Alaska. Inland movement brought about more contact between the Russians, Europeans, and Central-Yup'ik groups, which proved to bring about major changes to the Native way of life (Michael 1967; VanStone 1984). The fur trade was the first major disruptor; it altered the subsistence cycle and placed great emphasis on fur trapping, which meant that more time was spent in the pursuit of animals that had little food value. Over time, the Central-Yup'ik groups became increasingly reliant on the trading posts for basic needs (VanStone 1984). The arrival of the Russian explorers and traders was followed by missions, schools, canneries, trappers, and prospectors (VanStone 1984).

ADF&G has conducted several comprehensive subsistence surveys in the Bristol Bay region (Evans et al. 2009; Fall et al. 2006; Krieg et al. 2009; Holen et al. 2012). Over numerous study years it was noted that large mammals made up approximately 15% to 25% of the total harvest of the communities surveyed (Evans et al. 2013; Holen et al. 2012). Those participating communities in the area had a per capita moose harvest that ranged from 24 lbs./person to 188 lbs./person (Coiley-Kenner et al. 2003; Evans et al. 2009; Fall et al. 2006; Krieg et al. 2009; Holen et al. 2012).

Harvest History

Moose harvest in Unit 17A is allowed under both State and Federal regulation. A state permit is required for all hunters, regardless of which regulatory framework they adhere to. Quotas for both antlered and antlerless moose are used to prevent overharvest.

Overall, harvest has increased since 2001, the year a Federal season was established. That year, a total of 7 moose were reported harvested in Unit 17A. Reported harvest peaked in 2016, with 85 moose. Since 2001, 36% of harvest has occurred during winter (December – March), with the remainder occurring during fall hunts (**Figure 2**). Harvest is dominated by local users, defined here as Federally qualified subsistence users. Since 2013, the year the State's nonresident season was established, 83% of reported

harvest can be attributed to local users. Non-local residents of Alaska account for 9 % of the reported harvest, while nonresidents account for 7% of the reported harvest during this period (ADF&G 2019).

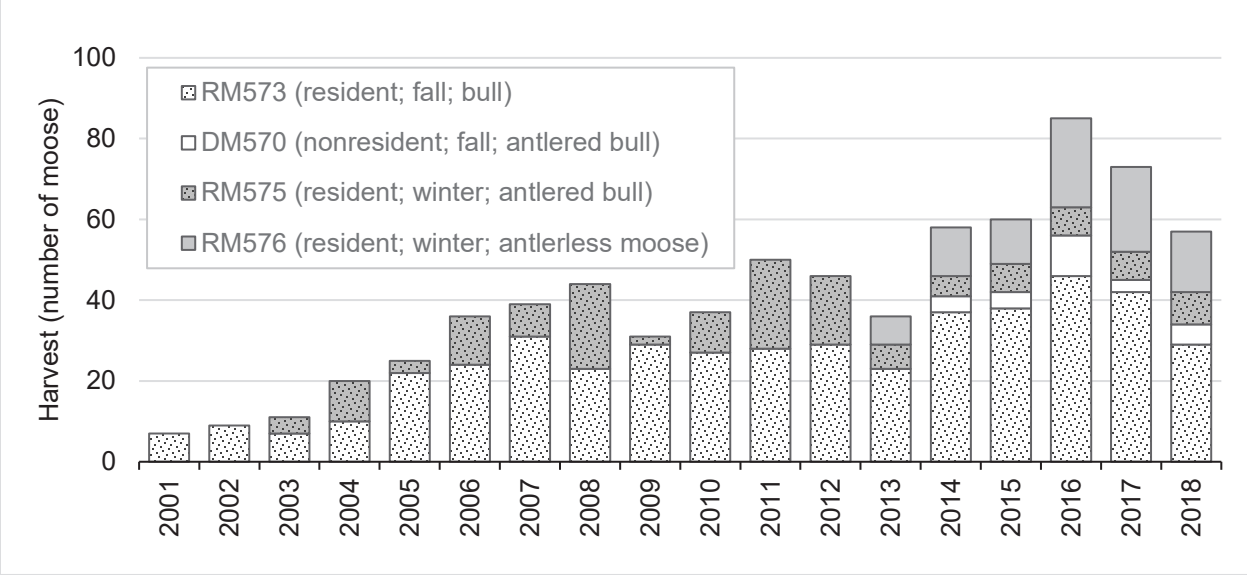

Figure 2. Reported moose harvest in Unit 17A, 2001 – 2018, by permit. White bars indicate fall harvest and grey bars indicate winter harvest (ADF&G 2019).

Effects of the Proposal

If Wildlife Proposal WP20-28 is adopted, the existing bull moose season in Unit 17A will be extended by 5 days, ending on September 25 instead of September 20. If Wildlife Proposal WP20-29 is adopted, an antlerless moose season will be implemented, concurrent with the Aug. 25 – Sep. 25 bull season. These changes will be consistent with changes recently made in State regulation, and all moose hunts in Unit 17A will require a State registration permit. Collectively, these changes may result in additional harvest, providing long-term benefits to a moose population that is currently well above established population objectives.

OSM PRELIMINARY CONCLUSION

Support Proposal WP20-28/29.

Justification

The Unit 17A moose population has grown to nearly double the upper limit of the population objective established by the Unit 17A Moose Management Group. It is also well above the target population size identified by ADF&G. Recent composition estimates reveal high bull:cow ratios, and there are no concerns related to productivity or calf recruitment. Consequently, encouraging additional harvest of this population does not pose a conservation concern, and may be useful for checking population growth and ensuring that the moose population does not over browse available habitat. Because harvest of this population is managed by quota, this additional opportunity poses little risk of overharvest. Adding an

additional antlerless hunt also increases flexibility for managers, in terms of maintaining appropriate sex ratios.

Collectively, these two proposals will result in increased subsistence opportunity for Federally qualified subsistence users. In the long term, preventing unchecked population growth by increasing harvest also ensures long-term subsistence use of moose in this area.

These changes, which mirror recent changes in State regulation, will result in reduced regulatory complexity by aligning seasons and harvest limits in State and Federal regulation. This will reduce confusion for Federally qualified subsistence users, who are eligible to hunt under both regulatory frameworks. Requiring a State registration permit is consistent with existing management practices for moose throughout Unit 17 and will ensure that harvest records continue to be consolidated in a single system, improving harvest management. Requiring a State permit will also benefit Federally qualified subsistence users, who, for a given hunt, will be able to hunt seamlessly across jurisdictions with a single permit.

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WP20–30 Executive Summary	
General Description	Wildlife Proposal WP20-30 requests that the Alaska hare season in Unit 9 be shortened from a year round season to Nov. 1 – Jan. 31, and that the harvest limit be reduced from no limit to 1 per day and 4 annually. *Submitted by: Alaska Peninsula and Becharof National Wildlife Refuges.*
Proposed Regulation	**Unit 9—Hare (Snowshoe ~~and Tundra~~)** *No limit* *July 1 – June 30* **Unit 9—Hare (Tundra)** ***1 per day, 4 total*** ***Nov. 1 – Jan. 31***
OSM Preliminary Conclusion	**Support** WP20-30 **with modification** to replace the term "tundra hare" with the term "Alaska hare" throughout Federal subsistence regulation to reflect contemporary nomenclature and reduce regulatory complexity between State and Federal regulations. See pages 83-84 for modified regulations.
Southeast Alaska Subsistence Regional Advisory Council Recommendation	
Southcentral Alaska Subsistence Regional Advisory Council Recommendation	
Kodiak/Aleutians Subsistence Regional Advisory Council Recommendation	
Bristol Bay Subsistence Regional Advisory Council Recommendation	
Yukon-Kuskokwim Delta Subsistence Regional Advisory Council Recommendation	

WP20–30 Executive Summary	
Western Interior Alaska Subsistence Regional Advisory Council Recommendation	
Seward Peninsula Subsistence Regional Advisory Council Recommendation	
Northwest Arctic Subsistence Regional Advisory Council Recommendation	
Eastern Interior Alaska Subsistence Regional Advisory Council Recommendation	
North Slope Subsistence Regional Advisory Council Recommendation	
Interagency Staff Committee Comments	
ADF&G Comments	
Written Public Comments	**None**

DRAFT STAFF ANALYSIS
WP20-30

ISSUES

Wildlife Proposal WP20-30, submitted by the Alaska Peninsula and Becharof National Wildlife Refuges, requests that the Alaska hare season in Unit 9 be shortened from a year round season to Nov. 1 – Jan. 31, and that the harvest limit be reduced from no limit to 1 per day and 4 annually. The requested changes are consistent with recent changes in the State season and harvest limit.

DISCUSSION

The proponent notes that the Alaska Department of Fish and Game (ADF&G) submitted a similar proposal to the Alaska Board of Game (BOG) for RY 2018/19, in response to low densities and patchy distribution of Alaska hares on the Alaska Peninsula. The proponent states that, although the requested change will reduce subsistence opportunity, it will help ensure the continued viability of Alaska hare populations, and will ultimately provide for continued subsistence use by allowing quicker recovery of the population.

It should be noted that the Alaska hare is sometimes called the tundra hare or the arctic hare (e.g. Anderson 1978; Klein 1995; Murray 2003; ADF&G 2019a). Federal subsistence regulation uses the term tundra hare, but Alaska hare appears to be the dominate term in contemporary usage, including in State regulation. This analysis contains the terms Alaska hare and tundra hare, used synonymously. It should also be noted that the Alaska or tundra hare is a distinct species from the snowshoe hare, despite the inclusion of both species in the same Federal regulation.

Existing Federal Regulation

Unit 9—Hare (Snowshoe and Tundra)

No limit	*July 1 – June 30*

Proposed Federal Regulation

Unit 9—Hare (Snowshoe ~~and Tundra~~)

No limit	*July 1 – June 30*

Unit 9—Hare (Tundra)

1 per day, 4 total	***Nov. 1 – Jan. 31***

Existing State Regulation

Unit 9—Snowshoe Hare

No limit	*No closed season*

Unit 9—Alaska Hare

One per day, four total	*Nov. 1 – Jan. 31*

Extent of Federal Public Lands/Waters

Federal public lands comprise approximately 53% of Unit 9 and consist of 28% National Park Service managed lands, 22% U.S. Fish and Wildlife Service managed lands and 3% Bureau of Land Management managed lands. **See Unit Map**.

Customary and Traditional Use Determinations

The Federal Subsistence Board (Board) has not made a customary and traditional use determination for hare in Unit 9. Therefore, all Federally qualified subsistence users may harvest this species in this unit.

Regulatory History

Federal subsistence regulations for hare in Unit 9 have not been changed since 1990, when the Federal management of subsistence fish and wildlife resources on Federal public lands began. At that time, a year-round season with no harvest limit was adopted from State regulation.

State regulation included a year-round season with no harvest limit for hare in Unit 9 until RY2018/19, when ADF&G submitted Proposal 135 for the BOG's consideration. Noting very low densities and patchy distribution of Alaska hares on the southern Alaska Peninsula, ADF&G originally requested that the season in a portion of Unit 9 be closed entirely. After discussion with locals and staff, they amended their proposal to reduce the season throughout Unit 9 to Nov. 1 – Jan. 31, with a harvest limit of 1 per day and 4 annually, and require that either the hide or the meat be salvaged (RC55). ADF&G noted that Alaska hares are of interest to residents of Unit 9 and that offering a season, even restricted one, allows

for opportunistic harvest of Alaska hares. They also noted that it provides an opportunity for biologists to gather information from hunters about Alaska hare locations and relative abundance. To this end, ADF&G recommended inclusion of language encouraging voluntary reporting of Alaska hare harvest. This proposal had the support of both active Fish and Game Advisory Committees in the region. The BOG adopted the amended version of the proposal and supported inclusion of the voluntary reporting language. The BOG also adopted a positive finding for customary and traditional use of Alaska hare in Units 9, 10 and 17 (BOG 2019).

Biological Background

Taxonomy of the three species of northern hares remains unresolved, which almost certainly contributes to the confusion around common names. Current taxonomic descriptions rely on geographic distributions, rather than morphologic or molecular distinctions, which remain ambiguous. The arctic hare (*Lepus arcticus*) is widely distributed across tundra habitats of Greenland and northern Canada. The mountain hare (*L. timidus*) occurs in northern Eurasia, from eastern Russia to Scandinavia (Cason 2016). Alaska hares (*L. othus*) are limited to coastal western and southwestern Alaska, ranging from the Baldwin and Seward Peninsulas in the north, to the Alaska Peninsula in the south (Merizon and Carroll 2019).

Alaska hares are among the largest of the *Lepus* genus, weighing approximately 8.5 – 10.5 pounds (Murray 2003). They occupy coastal lowlands, wet meadows, and willow and alder thickets (Merizon and Carroll 2019), and feed on willow buds, leaves, and crowberries (Murray 2003). They are typically solitary, except during breeding season. Alaska hares reproduce a single litter each year, breeding between April and June and giving birth approximately 6.5 weeks later. Litters contain 6.3 leverets on average, which are fully weaned within 5 – 9 weeks (Murray 2003).

The Alaska hare is among the most poorly understood game species in Alaska. Hunter questionnaires have been the only source of information about the species and there has been no long-term population monitoring. There is an effort to better understand this species, however. Beginning in 2017, ADF&G began to evaluate capture techniques. They also embarked on a tour of rural communities throughout the range of the Alaska hare to discuss local observations, historical abundance, and harvest patterns. In 2018, a multi-year study was initiated to evaluate movement and mortality, as well as long-term capture techniques. Anecdotal observations suggest that Alaska hare abundance is well below that observed in the 1950s and 1960s, throughout its range. It is unknown whether the population has been in a long-term decline, or whether it experienced a crash and now exists as a low-density but relatively stable population (Merizon and Carroll 2019).

Cultural Knowledge and Traditional Practices

At least four Alaska indigenous groups, Unangan, Alutiiq, Central-Yup'ik, and Dena'ina Athabaskans, historically inhabited and hunted in Unit 9. Sources document traditional hunting of the regions hare populations by the Dena'ina on a periodical basis (Osgood 1976). Clark (1984) suggests that although

land mammals were of less importance than marine mammals for the Alutiiq, almost all available species were snared, trapped, or hunted.

Russian traders and explorers travelled to the Aleutian Islands and up the Alaska coast in the mid-eighteenth century (McCartney 1984; Clark 1984). Russia claimed sovereignty over Alaska and a 126-year period of exploration fueled by economic interest ensued (McCartney 1984; Morseth 2003; Partnow 2001). These activities brought both Russian and later Europeans into contact with Alaska indigenous groups (Morseth 2003; VanStone 1984). Intermarriages between indigenous people, Russians, and Europeans took place as both Russian and Europeans settled into indigenous territories (Partnow 2001). An influx of European exploration and settlement occurred on the Alaska Peninsula after 1867, when Russia sold Alaska to the United States (Morseth 2003). Today, residents of the region are from diverse backgrounds, and Unit 9 is open to statewide hare harvest and use by all federally qualified subsistence users (Fall et al. 1995; Fall et al. 1998; Holen et al. 2011; Krieg et al. 2009).

The most recent comprehensive subsistence surveys conducted for the Alaska Peninsula by ADF&G shows that hare use ranged from no use in some households to 15% in others (ADF&G 2019b; ADF&G 2019c; ADF&G 2019c; ADF&G 2019e; Fall et al. 1987; Fall et al. 1995; Fall et al. 2006; Holen et al. 2011; Krieg et al. 2009). Sand Point harvested the most hares during the study year 1992, with the per capita harvest of approximately 1.3lb/person while other Alaska Peninsula communities only harvested hares opportunistically (ADF&G 2019b; ADF&G 2019c; ADF&G 2019c; ADF&G 2019e; Fall et al. 1987; Fall et al. 1993a; Fall et al. 1993b; Fall et al. 2006; Krieg et al. 2009).

During each study year, communities within Unit 9 harvested or hunted for small land mammals, which includes hares, throughout the region including areas along Bear, Big, Coffee, Graveyard, King Salmon, Koktuli, Newhalen, Paul's, Pecks, Smelt and Yellow Creeks, the Chulitina River valley, Alagnak, Kvichak, and Naknek Rivers, Kaskanak Flats, Groundhog and Sugarleaf Mountains, portions of Katmai National Preserve, and around the communities of Chignik Bay, Chignik Lagoon, Chignik Lake, Igiugig, Kokhanok, King Salmon, Levelock, Naknek, Newhalen, Perryville (Fall et al. 1995; Fall et al. 2006; Holen et al. 2011; Krieg et al. 2009).

Harvest History

Little is known about the harvest of Alaska hare, which is one of the least accessible small game species. However, it is harvested throughout the communities of western and southwestern Alaska (Merizon and Carroll 2019). Some insights into small game harvest are available in ADF&G's Statewide Small Game Hunter Survey, results for which were compiled for RY2011/12 and RY2013/14.

The most recent results, from RY2013/14, show that half of the hunters responding to the survey reported hunting small game in Units 13, 14 or 20, while only 5% of respondents reported hunting small game in Unit 9. Given that response rates among those surveyed were similar for Unit 9 (24%) and statewide (30%), this indicates that hunting pressure on small game in Unit 9 is relatively low compared to areas located on the road system. Most Alaska resident respondents reported hunting within the geographic region where they reside, but only 3% of respondents reported participating in Federal subsistence small game hunts. Respondents reported that they hunt small game opportunistically while engaging in other

activities, but also target small game specifically. Statewide, ptarmigan and spruce grouse were targeted most frequently. Within Unit 9, respondents reported hunting for Alaska hare for an average of 2.5 days (Merizon et al. 2015).

Effects of the Proposal

If this proposal is adopted, opportunity to harvest Alaska hares under Federal subsistence regulation will be reduced. Given that the State season has already been reduced, this represents an actual reduction of opportunity for Federally qualified subsistence users. This change may result in reduced harvest of Alaska hare, particularly since it includes both a daily and an annual harvest limit. Though neither harvest nor population size are quantified, harvest reduction has the potential to improve the conservation status of the Unit 9 Alaska hare population, which is reported to be well below historical size. Adoption of this proposal will also reduce regulatory complexity by aligning Federal regulation with recently changed State regulation.

OSM PRELIMINARY CONCLUSION

Support Proposal WP20-30 **with modification** to replace the term "tundra hare" with the term "Alaska hare" throughout Federal subsistence regulation to reflect contemporary nomenclature and reduce regulatory complexity between State and Federal regulations.

The modified regulation should read:

§___.25 Subsistence taking of fish, wildlife, and shellfish: general regulations.

*(a) Definitions. The following definitions apply to all regulations contained in this part: Hare or hares collectively refers to all species of hares (commonly called rabbits) in Alaska and includes snowshoe hare and ~~tundra~~ **Alaska** hare.*

Unit 9—Hare (Snowshoe ~~and Tundra~~)

No limit	*July 1 – June 30*

Unit 9—Hare (Alaska)

1 per day, 4 total	***Nov. 1 – Jan. 31***

Unit 17—Hare (Snowshoe and ~~Tundra~~ Alaska)

No limit	*July 1 – June 30*

Unit 18—Hare (Snowshoe and ~~Tundra~~ Alaska)

No limit	*July 1 – June 30*

Unit 21—Hare (Snowshoe and ~~Tundra~~ Alaska)

No limit	*July 1 – June 30*

Unit 22—Hare (Snowshoe and ~~Tundra~~ Alaska)

No limit	*Sep. 1 – Apr. 15*

Unit 23—Hare (Snowshoe and ~~Tundra~~ Alaska)

No limit	*July 1 – June 30*

Unit 26—Hare (Snowshoe and ~~Tundra~~ Alaska)

No limit	*July 1 – June 30*

Justification

Anecdotal information indicates that Alaska hares in Unit 9 are scarcer than they have been in the past. Local managers concur that Alaska hares in this region exist at a low density. Biologically, it is appropriate to restrict harvest in such a situation. Reducing the season from Jul. 10 – Jun. 30 to Nov. 1 – Jan. 31 reduces the season by 75%, yet continues to offer subsistence users the opportunity to harvest Alaska hares during winter when they are engaging in other subsistence or recreational activities. Imposing a harvest limit of 1 per day and 4 annually may have a greater effect on reducing overall harvest and promoting population recovery. Collectively, changes in season and harvest limit offer a balance between imposing conservation measures and allowing for the continuation of subsistence uses in the near term. Any positive effect these changes have on the Alaska hare population will benefit subsistence users in the long term.

Updating the common name from tundra hare to Alaska hare in Federal subsistence regulation will reduce regulatory complexity. If this change is implemented, terminology for Alaska hares will be consistent under State and Federal regulation, which should reduce misunderstanding and confusion among Federally qualified subsistence users who hunt under both State and Federal regulation.

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WP20–31 Executive Summary	
General Description	Wildlife Proposal WP20-31requests that the harvest limit for ptarmigan in Unit 9 be decreased from 20 ptarmigan per day/40 in possession to 10 ptarmigan per day/20 in possession and that the harvest season be shortened from Aug. 10 – Apr. 30 to Aug. 10 – last day of February. *Submitted by: Alaska Peninsula and Becharof National Wildlife Refuges.*
Proposed Regulation	**Unit 9—Ptarmigan (Rock, Willow, and White-tailed)** *~~20~~ **10** ptarmigan per day, ~~40~~ **20** in possession* *Aug. 10 – ~~Apr. 30.~~* ***Last day of February.***
OSM Preliminary Conclusion	**Support**
Southeast Alaska Subsistence Regional Advisory Council Recommendation	
Southcentral Alaska Subsistence Regional Advisory Council Recommendation	
Kodiak/Aleutians Subsistence Regional Advisory Council Recommendation	
Bristol Bay Subsistence Regional Advisory Council Recommendation	

WP20–31 Executive Summary	
Yukon-Kuskokwim Delta Subsistence Regional Advisory Council Recommendation	
Western Interior Alaska Subsistence Regional Advisory Council Recommendation	
Seward Peninsula Subsistence Regional Advisory Council Recommendation	
Northwest Arctic Subsistence Regional Advisory Council Recommendation	
Eastern Interior Alaska Subsistence Regional Advisory Council Recommendation	
North Slope Subsistence Regional Advisory Council Recommendation	
Interagency Staff Committee Comments	
ADF&G Comments	
Written Public Comments	**None**

DRAFT STAFF ANALYSIS
WP20-31

ISSUES

Wildlife Proposal WP20-31, submitted by Alaska Peninsula and Becharof National Wildlife Refuges, requests that the harvest limit for ptarmigan in Unit 9 be decreased from 20 ptarmigan per day/40 in possession to 10 ptarmigan per day/20 in possession and that the harvest season be shortened from Aug. 10 – Apr. 30 to Aug. 10 – last day of February.

DISCUSSION

The proponent states that Refuge staff documented a significant decline in ptarmigan density (~90%) on many transects surveyed between 2013 and 2015. It is mentioned that the Lake Iliamna Fish and Game Advisory Committee also noted very low ptarmigan numbers in the area and submitted a proposal (#134) to the Alaska Board of Game (BOG), requesting a decrease in the allowable harvest. Local hunters in Unit 9 also report that ptarmigan densities are lower than in the past and that this decrease in numbers is widespread. The proponent states that this proposal would align State and Federal regulations, which would lessen user confusion, and would allow the ptarmigan population in the area to recover.

Existing Federal Regulation

Unit 9—Ptarmigan (Rock, Willow, and White-tailed)	
20 ptarmigan per day, 40 in possession	*Aug. 10 – Apr. 30.*

Proposed Federal Regulation

Unit 9—Ptarmigan (Rock, Willow, and White-tailed)	
*~~20~~ **10** ptarmigan per day, ~~40~~ **20** in possession*	*Aug. 10 – ~~Apr. 30.~~* ***Last day of February.***

Existing State Regulation

Unit 9—Ptarmigan (Including willow, rock, and white-tailed ptarmigan)	
Ten per day, Twenty in possession	*Aug 10 –Last day of February*

Extent of Federal Public Lands/Waters

Federal public lands comprise approximately 53% of Unit 9 and consist of 28% National Park Service (NPS) managed lands, 22% U.S. Fish and Wildlife Service (USFWS) managed lands, and 3% Bureau of Land Management (BLM) managed lands (**Figure 1**).

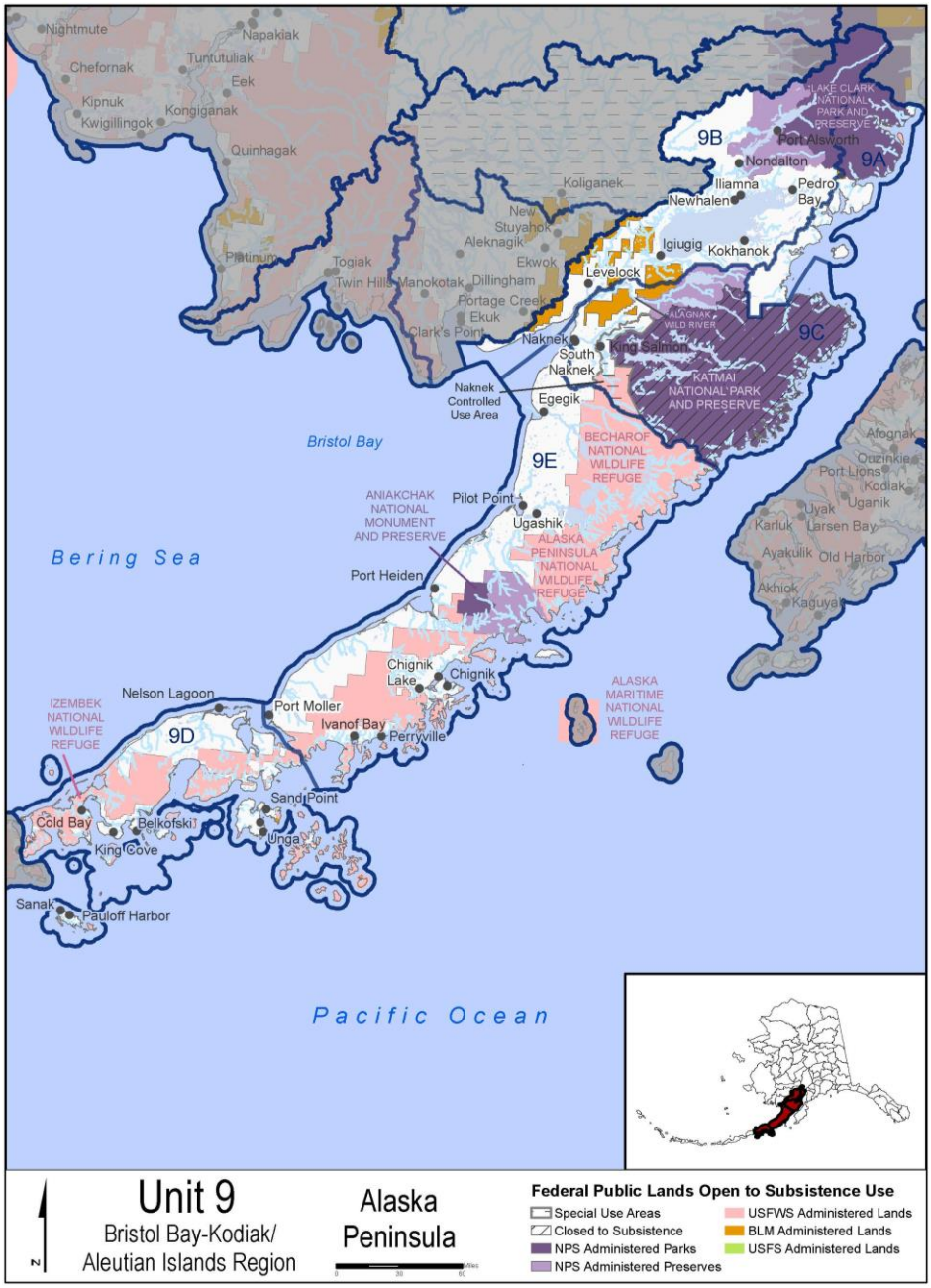

Figure 1. Federal public lands located in Unit 9.

Customary and Traditional Use Determinations

The Federal Subsistence Board (Board) has not made a customary and traditional use determination for ptarmigan in Unit 9. Therefore, all Federally qualified subsistence users may harvest ptarmigan in Unit 9.

Regulatory History

In 1990, the Board adopted subsistence regulations for ptarmigan from State regulations. Federal regulations set the harvest limit at 20 ptarmigan per day and 40 in possession and a season from Aug. 10–Apr. 30.

In February of 2018 the BOG adopted Proposal 134 to shorten the season for ptarmigan and reduce the daily harvest and possession limits in Unit 9. This proposal was adopted due to observed declines in ptarmigan populations in Unit 9 since 2014, and ongoing public concern pertaining to the decline in the region.

Biological Background

There are no current population surveys being conducted for ptarmigan in Unit 9. Ptarmigan abundance may fluctuate along with snowshoe hare populations, as predators use alternative food sources when hare abundance is low (Hannon et al. 1998). Similarly, specialist predator populations, such as gyrfalcons, show slight delayed population fluctuations relative to ptarmigan abundance cycles, and often accelerate the decline in ptarmigan populations during the low phase of the ptarmigan cycle (Nielson 1999). Ptarmigan experience a complete population cycle over approximately a ten-year period, similar to snowshoe hare (Nielson 1999). However, Alaska Department of Fish and Game (ADF&G) staff observations near King Salmon and Dillingham show that ptarmigan populations in this area may be much lower than in the past (Carroll and Merizon 2017, Merizon and Carroll 2018, 2019).

Climate variables may play a large part in the observed decline of ptarmigan populations on the Alaska Peninsula. Part of this decline is thought to be caused by recent cool and wet summers, followed by warmer winters in the area with little or no snow, which would help to provide thermal regulation and camouflage (Carroll and Merizon 2017, Merizon and Carroll 2018, 2019). Cool and wet weather patterns in early summer months can lead to reduced chick survival (Merizon and Carroll, 2018, 2019). This overall change in climate may also have an impact on general flock sizes and movements (Carroll and Merizon 2017). `

Ptarmigan typically have white feathers during the winter season and brown coloration in the summer months. This change in color allows them to blend in with their surroundings in any season, even when congregating in large flocks. By following the snowline, ptarmigan are better able to maintain camouflage through the spring molt. In recent years, snow cover has been minimal in Unit 9, which has led to ptarmigan mismatching their surroundings during winter months, making these populations more susceptible to predation and vulnerable to lack of thermal protection (Merizon 2018, pers. comm.). Behavioral changes have been observed in conjunction with the lack of snow; ptarmigan are more spread out on the landscape, congregate in much smaller flocks, and migrate through areas at a quicker rate (Jones 2017, pers. comm.).

Regulations do not differentiate between willow ptarmigan and rock ptarmigan harvest. Willow and rock ptarmigan are the first and second most abundant ptarmigan species, respectively, in Alaska and can be found throughout the state (Carroll and Merizon 2017, Merizon and Carroll 2019).

The diet of willow ptarmigan is highly specialized, with up to 94% of their diet consisting of the buds and twigs of willows in the winter months (Weeden 1965, West and Meng 1966). In summer months, the average ptarmigan diet becomes more varied as herbaceous vegetation availability increases (Weeden 1965, West and Meng 1966). Availability of food resources is primarily based on the height of plants and the level of snow cover (West and Meng 1966). Ptarmigan often feed during daylight hours and have been found to fill their crop during the minimal daylight in winter and digest during hours when it was dark, whereas in the summer they were found to feed at more regular intervals without needing to fill their crops (West and Meng 1966).

The diet of rock ptarmigan often consists of dwarf birch and willow buds in winter months, but becomes more varied in summer months as they begin to consume new growth vegetation, insects, berries, and seeds (Weeden 1965).

Habitat

Willow ptarmigan are well adapted to live in treeless arctic areas that contain open shrub habitats in summer months and willow/shrub thickets with few scattered trees during the winter season (Weeden 1965). In Alaska, male and female willow ptarmigan are often segregated during the winter season (Weeden 1965). Willow ptarmigan are locally migratory, overwintering in the interior and breeding closer to the coast. Breeding territories are located in transitional shrub habitat in or near stands of willows and occur in most subalpine and alpine habitats across the state (Carroll and Merizon 2017). Male willow ptarmigan begin defending breeding territories in April (Carroll and Merizon 2017, Merizon and Carroll 2019).

Rock ptarmigan typically inhabit more exposed slopes and higher elevation ridges with abundant dwarf birch (Weeden 1965, Carroll and Merizon 2017). Similar to willow ptarmigan, male rock ptarmigan begin defending breeding territories in April (Carroll and Merizon 2017, Merizon and Carroll 2019). These breeding territories occur above tree-line and tend to have a higher proportion of open habitat area with little shrub cover (Weeden 1964, 1965) compared to willow ptarmigan. Similar to willow ptarmigan, male and female rock ptarmigan often separate into different flocks and/or habitat types in the winter, often wintering just below tree-line (Weeden 1964, 1965). Although rock ptarmigan are not typically as migratory as willow ptarmigan, they have been observed migrating 10-50 miles from breeding sites to over-wintering sites in portions of interior Alaska (Weeden 1965).

Cultural Knowledge and Traditional Practices

At least four Alaska indigenous groups, Unangan, Alutiiq, Central-Yup'ik, and Dena'ina Athabaskans, historically inhabited and hunted in Unit 9. Sources document traditional hunting of the regions healthy supply of game birds, including ptarmigan, by the Central-Yup'ik and Dena'ina (Birket-Smith 1959, Osgood 1976). Historical accounts suggest that ptarmigan was an important subsistence resource and that

the bird was hunted mainly in the winter (Birket-Smith 1959; Osgood 1976). The Central-Yup'ik hunted ptarmigan with darts, throwing boards, snares, nets, and bow and arrow. The Dena'ina hunted the bird with the use of snare, rocks, bolas, and bow and arrows (Birket-Smith 1959, Osgood 1976, Townsend 1981).

Russian traders and explorers travelled to the Aleutian Islands and up the Alaska coast in the mid-eighteenth century (McCartney 1984; Clark 1984). Russia claimed sovereignty over Alaska and a 126-year period of exploration fueled by economic interest ensued (McCartney 1984, Partnow 2001, Morseth 2003). These activities brought both Russian and later Europeans into contact with Alaska indigenous groups (VanStone 1984, Morseth 2003). Intermarriages between indigenous people, Russians, and Europeans took place as both Russian and Europeans settled into indigenous territories (Partnow 2001). An influx of European exploration and settlement occurred on the Alaska Peninsula after 1867, when Russia sold Alaska to the United States (Morseth 2003). Today, residents of the region are from diverse backgrounds, and Unit 9 is open to statewide ptarmigan harvest and use by all Federally qualified subsistence users (Fall et al. 1995, 1998, Krieg et al. 2009, Holen et al. 2011).

The most recent comprehensive subsistence surveys conducted for the Alaska Peninsula by ADF&G show that ptarmigan use ranged from no use in some households to 93% in others (Fall et al. 1995, ADF&G 2019a). The per capita ptarmigan harvest from Chignik Bay, Chignik Lagoon, Chignik Lake, Egegik, False Pass, Igiugig, Iliamna, King Cove, King Salmon, Kokhanok, Levelock, Naknek, Nelson Lagoon, Newhalen, Nondalton, Perryville, Pedro Bay, Pilot Point, Port Alsworth, Port Heiden, Sand Point, and Ugashik ranged from 0.3 lbs/person in Pedro Bay to approximately 4 lbs/person in Perryville (Fall et al. 1987, 2006).

During each study year, communities within Unit 9 harvested or hunted for ptarmigan throughout the region including areas along the shores of Iliamna Lake, Kaskanak, King Salmon, and Peck Creeks, Naknek River, the Upper Talawik area, and around the communities of Igiugig, King Salmon, Kokhanok, Levelock, Naknek, Newhalen, Nondalton, and Pedro Bay (Fall et al. 2006, Krieg et al. 2009, Holen et al. 2011).

Harvest History

ADF&G collects hunter-harvested wings, tails, and heads of all species of grouse and ptarmigan to better understand annual harvest composition and annual population productivity (Merizon and Carroll 2019). The collection of these samples helps biologists determine age, sex, and species of harvested birds throughout the state in a very cost efficient manner (Merizon and Carroll 2019). ADF&G provides free wing envelopes to users and encourages them to send in wings from their harvest to help the agency better understand what is happening to grouse and ptarmigan populations throughout the state (Merizon and Carroll 2019). In regulatory year 2016, 19 willow ptarmigan wings were collected from users in Unit 9 (Merizon and Carroll 2019). No wings were collected in Unit 9 during regulatory year 2017 (Merizon and Carroll 2019).

Information pertaining to ptarmigan harvest is collected during the Alaska Subsistence Harvest of Birds and Eggs survey conducted by the Alaska Migratory Bird Co-Management Council annually. Current harvest

estimates for ptarmigan in Unit 9 have limited utility for assessing impacts of management decisions such as season lengths or harvest limits. Harvest estimates from the Alaska Migratory Bird Subsistence Harvest Estimates household survey may have high levels of variation due to (1) annual changes in ptarmigan abundance, (2) hunter access (e.g., snow conditions), (3) annual variation in hunting effort due to the availability of other resources (e.g., salmon, caribou), (4) inadequate sampling coverage (e.g., variable household/village participation, bias toward "high" or active hunting households, political climate influence, unknown under or over reporting), (5) variability of survey methodology over the years, and (6) heterogeneity of harvest patterns within villages (Wentworth 2007, Naves 2015a, 2016). In addition, the harvest seasons defined in the survey were designed for migratory birds and do not align with the current Federal ptarmigan season in Unit 9. Starting in 2016, the sampling design was revised to ensure that the same five regions are surveyed annually, one of which is the Bristol Bay Region (**Figure 2**; Naves and Otis 2017). This is a change from previous years, when sampling effort varied depending on funding and monitoring priorities (Naves and Otis 2017).

Bristol Bay households were surveyed for ptarmigan harvest in 2016 and 2017 using the updated sampling design methodology. The estimated ptarmigan harvest from the 2016 survey was 767 ptarmigan, all of which were harvested during the spring season (**Table 1, Table 2**; Naves 2015a, 2015b, Naves and Otis 2017, Naves and Keating 2018, 2019). In 2017, the harvest for Bristol Bay households was estimated at 1,988 ptarmigan, most of which were taken during winter months (**Table 1, Table 2**; Naves and Keating 2018, 2019). As mentioned above, these surveys were administered differently than previous surveys. Due to the change of methodology, an overall Bristol Bay Region estimate was produced rather than developing harvest estimates for each subregion (**Figure 3**) within the region. It is important to note that not all communities in this region are located in Unit 9, but surveyed households may have harvested ptarmigan from Unit 9.

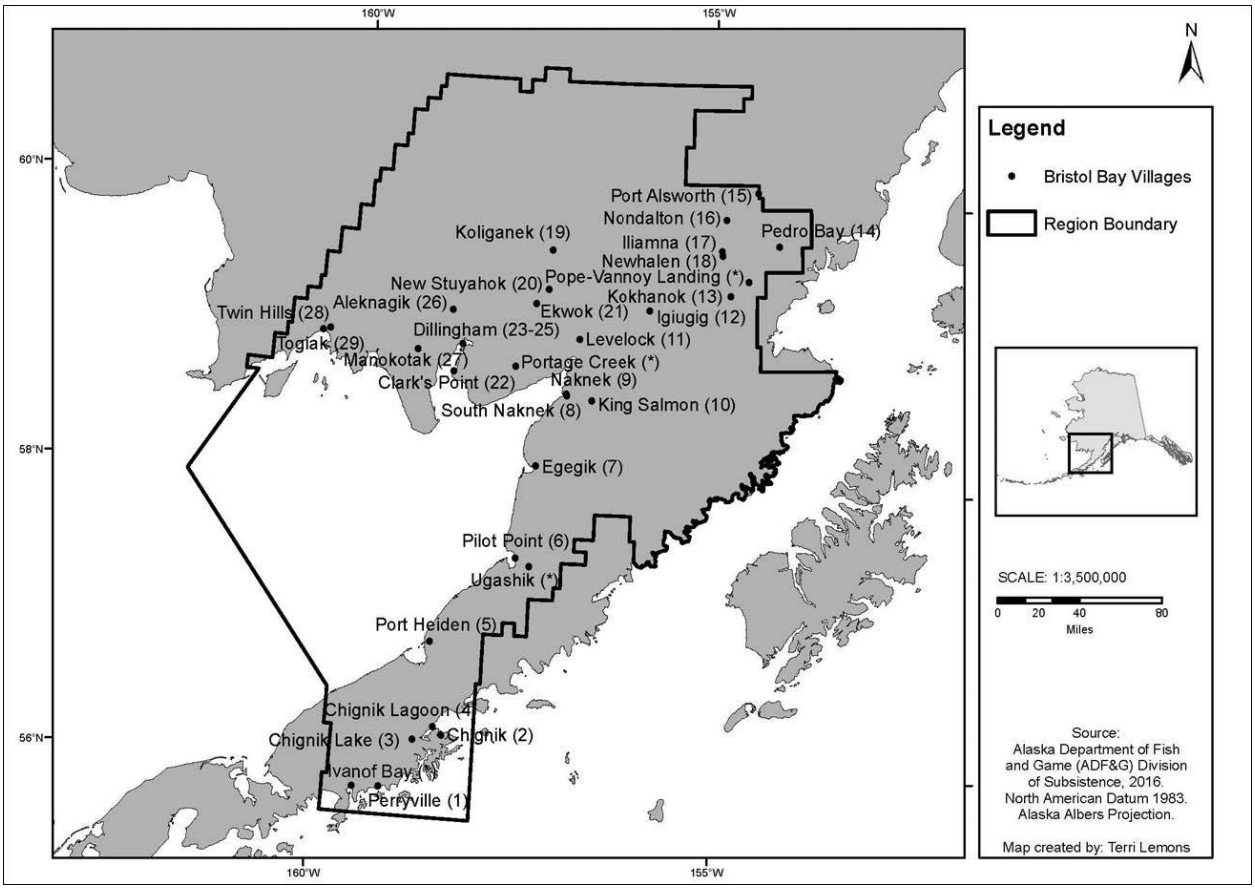

Figure 2. Bristol Bay Region survey area with sequential numbering of communities for systematic random sampling for the Alaska Subsistence Harvest of Birds and Eggs survey. Communities with no number contained fewer than ten households and were excluded from the sample frame. This new sampling methodology was put in place starting with the 2016 harvest survey year. Figure was taken from Naves and Otis 2017.

Table 1. Estimated harvest of ptarmigan in each subregion located in the Bristol Bay Region (Naves 2015a, 2015b, Naves and Otis 2017, Naves and Keating 2018, 2019, ADF&G 2019). Due to changing methodologies and the aspects listed above that could lead to high levels of variation, recent survey results are not directly comparable to older survey results.

Subregion	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
South Alaska Peninsula	127	-	-	245	27	-	-	664	-	-	-	-	-	-
Southwest Bristol Bay	2,862	6,117	7,928	2,033	7,057	-	-	12,128	-	-	-	-	-	-
Dillingham	-	1,663	-	1,263	809	-	-	239	-	-	-	-	-	-
Total Region Estimate	*	**8,269**	*	**3,441**	**7,893**	-	-	**13,031**	-	-	-	-	**767**	**1,988**

- denotes that no surveys were completed; * denotes that less than 75% of region households were represented, so region harvest estimates were not produced.

Table 2. Estimated harvest of ptarmigan in the Bristol Bay Region broken down by season for years where a region-wide estimate was produced (Naves and Keating 2018, 2019, ADF&G 2019). Survey seasons are broken down as follows: spring (April 2—June 30), summer (July 1—August 31), fall (September 1—October 31), and winter (November 1—April 1) (Naves 2015a, 2015b, Naves and Otis 2017, Naves and Keating 2018, 2019).

Year	Spring	Summer	Fall	Winter	Total Estimate
2005	5,604	1,666	999	0	**8,269**
2007	2,542	44	855	0	**3,441**
2008	6,783	226	883	0	**7,893**
2011	11,595	300	927	209	**13,031**
2016	767	0	0	0	**767**
2017	222	276	316	1,175	**1,988**

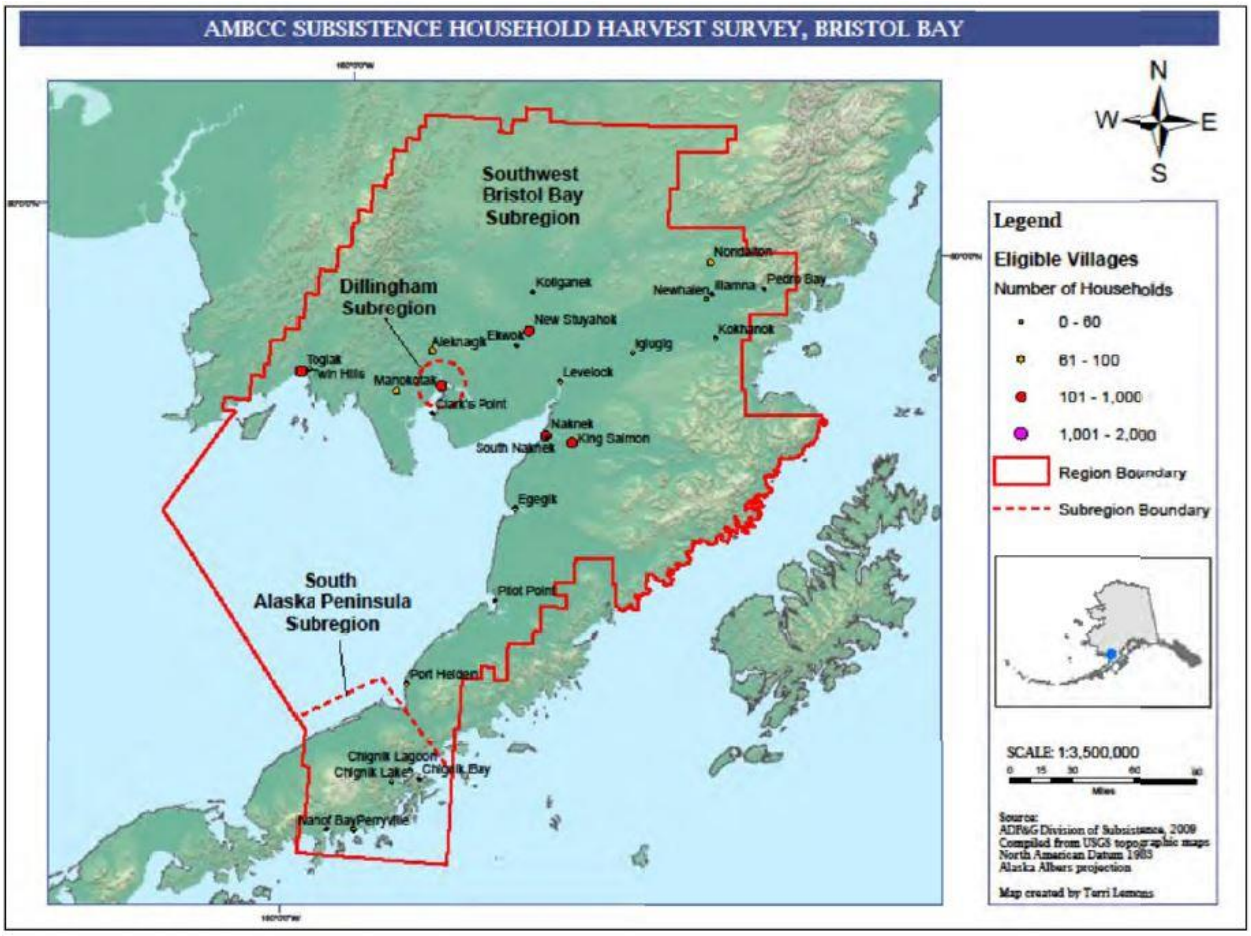

Figure 3. Subregions within the Bristol Bay Region of the Alaska Subsistence Harvest of Birds and Eggs survey. These subregions were used for harvest surveys prior to 2016. Figure was taken from Naves 2014.

Sandercock et al. (2011) found that in Norway, harvest levels of willow ptarmigan above 15% could be additive to natural mortality rather than compensatory and that a harvest above 30% of the post breeding population could be "superadditive" (harvest could cause additional natural mortality). It is important to

consider these findings when determining harvest limits for willow ptarmigan. Due to uncertainties in abundance and harvest, it is difficult to understand how ptarmigan harvest impacts the overall population in Unit 9.

Effects of the Proposal

If adopted, this proposal would reduce subsistence opportunity for Federally qualified subsistence users who harvest ptarmigan in Unit 9. This proposal may result in decreased harvest, which could help to protect ptarmigan populations during this time of observed population declines in the area. If adopted, this may provide the protections needed to ensure that this resource is available into the future. The change of both the harvest limits and harvest season would also align State and Federal regulations, which would reduce regulatory complexity for users.

It is unknown what effect current harvest is having on the ptarmigan population on the Alaska Peninsula. Although the general consensus of biologists in the region is that the ptarmigan population is declining due to climatic change, it is uncertain what the cumulative effects caused by additional mortality due to harvest may be. Without an estimate of ptarmigan populations in Unit 9, it is not possible to know the impacts caused by current harvest levels.

OSM PRELIMINARY CONCLUSION

Support Proposal WP20-31.

Justification

Local residents and biologists indicate that ptarmigan numbers are declining in Unit 9. Although it is expected that this decrease is likely caused by climatic changes impacting levels of natural predation over the last few years, human harvest could have an additive or superadditive effect on the already declining population. It may be important to limit harvest until ptarmigan numbers rebound to maintain this resource for local users.

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WP20–08 Executive Summary	
General Description	Proposal WP20–08 requests implementing a statewide requirement that traps and snares be marked with either the trapper's name or State identification number. *Submitted by: East Prince of Wales Advisory Committee.*
Proposed Regulation	**Statewide— Trapping (General Provisions)** ***Traps or snares must be marked with trapper's name or state identification number (Alaska driver's license number or State identification card number).***
OSM Preliminary Conclusion	**Oppose**
Southeast Alaska Subsistence Regional Advisory Council Recommendation	
Southcentral Alaska Subsistence Regional Advisory Council Recommendation	
Kodiak/Aleutians Subsistence Regional Advisory Council Recommendation	
Bristol Bay Subsistence Regional Advisory Council Recommendation	
Yukon-Kuskokwim Delta Subsistence Regional Advisory Council Recommendation	
Western Interior Alaska Subsistence Regional Advisory Council Recommendation	
Seward Peninsula Subsistence Regional Advisory Council Recommendation	

WP20–08 Executive Summary	
Northwest Arctic Subsistence Regional Advisory Council Recommendation	
Eastern Interior Alaska Subsistence Regional Advisory Council Recommendation	
North Slope Subsistence Regional Advisory Council Recommendation	
Interagency Staff Committee Comments	
ADF&G Comments	
Written Public Comments	**1 Support, 1 Oppose**

DRAFT STAFF ANALYSIS
WP20-08

ISSUES

Wildlife Proposal WP20-08, submitted by the East Prince of Wales Fish and Game Advisory Committee, requests implementing a statewide requirement that traps and snares be marked with either the trapper's name or State identification number.

DISCUSSION

The proponent believes that current regulations do not allow for accountability if a trapper leaves their traps out and set after the close of the season, or chooses to use illegal baits (i.e., whole chunks of deer meat or whole migratory birds). The proponent believes requiring trap identification (Alaska issued driver's license number or personal identification number) would make enforcement easier and may prevent these issues. Clarification with the proponent indicated that the proposed marking requirement is to apply Statewide.

Existing Federal Regulation

There are no statewide trap marking requirements under Federal regulations.

Proposed Federal Regulation

Statewide— Trapping (General Provisions)

Traps or snares must be marked with trapper's name or state identification number (Alaska driver's license number or State identification card number).

Existing State Regulation

There are no statewide trap marking requirements under State regulations.

Extent of Federal Public Lands/Waters

Alaska is comprised of 65% Federal public lands and consist of 23% Bureau of Land Management (BLM) managed lands, 21% U.S. Fish and Wildlife Service (USFWS) managed lands, 15% National Park Service (NPS) managed lands, and 6% U.S. Forest Service (USFS) managed lands.

Customary and Traditional Use Determinations

Customary and traditional use determinations for specific areas and species are found in subpart C of 50 CFR 100, §___.24(a)(1) and 36 CFR 242 §___.24(a)(1).

Regulatory History

The Alaska Board of Game (BOG) adopted a marking requirement for traps and snares in Units 1–5 in 2006. Federal regulations were aligned with the State requirements in Units 1–5 when the Federal Subsistence Board (Board) adopted Proposal WP12-14 in 2012. The rationale of the Board was that the BOG adopted trap marking requirements for Units 1-5 in 2006 in response to concerns by Alaska Wildlife Troopers, the Alaska Department of Fish and Game (ADF&G), and members of the public, that trapping as a whole would benefit from having some way of identifying ownership of traps and snares. This was prompted by incidences of traps being placed in areas where trapping was not allowed, pets being caught in traps, and unattended snares still capable of capturing a passing deer, bear, or wolf, being found following the close of season (FSB 2012).

The Southeast Alaska Subsistence Regional Advisory Council (Council) expressed concern that there was a lack of evidence why traps should be marked in either State or Federal regulations, and stated that regulations should be adopted for a good reason and not because of "*one bear caught in a snare, set by an unknown person for an unknown reason*". However, the Council supported the proposal, stating the benefit of aligning Federal and State regulations, and reducing the uncertainty about whether current regulations required traps to be marked (SEASRAC 2011).

In 2014, the Board considered Proposal WP14-01, requesting new statewide Federal provisions requiring trapper identification tags on all traps and snares, the establishment of a maximum allowable time limit for checking traps, and establishment of a harvest/trapping report form to collect data on non-target species captured in traps and snares. The proposal analysis indicated statewide application would be unmanageable, would require substantial law enforcement and public education efforts, and could cause subsistence users to avoid the regulation by trapping under State regulations. The proposal was unanimously opposed by all ten Federal Subsistence Regional Advisory Councils, ADF&G, and the public as reflected in written public comments. The Board rejected the proposal as part of its consensus agenda (FSB 2014).

In March 2016, the BOG removed trap marking requirements in response to Proposal 78. The BOG determined that trappers are generally responsible and that the 2006 regulation was not addressing the reasons why it was implemented, noting that marking traps does not prevent illegal trapping activity or prevent dogs from getting trapped.

In 2018, the Board considered Proposal WP18-13, requesting removal of the trap marking requirement in Units 1-5. The proposal was submitted to remove an unnecessary and burdensome requirement on Federally qualified subsistence users and to realign State and Federal regulations. While ADF&G was neutral on the proposal, it was unanimously supported by the Council (SEASRAC 2017). The proposal was adopted by the Board as part of its consensus agenda (FSB 2018).

Current Events Involving the Species

Wildlife proposal WP20-20 has been submitted requesting that trap sites be marked with brightly colored surveyor's tape in plain view on a nearby tree or overhanging branch in Unit 7.

Effects of the Proposal

The proposal will not result in any positive or negative effects to furbearer or other non-furbearer wildlife populations.

If the proposal is adopted, Federally qualified subsistence users trapping under Federal regulations throughout the State will be required to mark traps and snares with identification tags. The proposed requirement could potentially benefit law enforcement by allowing easier identification of traps and snares set in the field. However, differences in land ownership, population concentrations, terrain, and habitats would limit the effectiveness of the proposed statewide regulation. Individual traplines can span across Federal and State managed lands and, therefore, could have different regulatory requirements along the line. Alternatively, Federally qualified subsistence users could simply choose to trap under State regulations and avoid the proposed requirement, as both Federal and State trapping regulations are applicable on most Federal public lands, as long as the State regulations are not inconsistent with or superseded by Federal regulations, or unless Federal lands are closed to non-Federally qualified users.

Within portions of Unit 15, over 60 percent which lies within Kenai National Wildlife Refuge, and those portions of Unit 7 that are contained within Kenai NWR, a trapping permit is required and a stipulation of Kenai NWR's permit includes the marking of traps and snares. Also, under State regulations, all snares within a quarter mile of a public road in Units 12 and 20E are required to be marked. Federally qualified subsistence users trapping on Federal public lands outside of these specific areas would be required to mark traps and snares with identification tags that include the trapper's name and license number. However, Federally qualified subsistence users trapping on Federal public lands would not be required to mark traps and snares under State regulations.

The requirement to mark traps and snares would also result in additional burden and cost for Federally qualified subsistence users trapping under Federal subsistence regulations. Copper tags stamped with a trapper's identification information, including fasteners, cost approximately $26 per 100 tags (including shipping) or less (approximately $15–$20) for "write-your own" tags (FWS 2012). In addition, trappers often trade or borrow equipment from family members or friends, and changes of identification tags on large numbers of traps or snares would require significant effort (FWS 2014).

Re-implementation of a mandatory requirement to mark traps under Federal regulations creates unnecessary divergence of State and Federal regulations, which may create confusion for Federally qualified subsistence users. Although adoption of the proposal could allow law enforcement to more easily identify trappers that have traps deployed outside the open season or have otherwise violated regulations, mandatory trap marking does not necessarily prevent illegal trapping activity or prevent dogs from getting trapped. Also, adoption of this proposal will not affect State regulations, which would allow Federally qualified subsistence users to operate traps under State regulations to avoid this requirement.

OSM PRELIMINARY CONCLUSION

Oppose Proposal WP20-08.

Justification

Requiring Federally qualified subsistence users to mark traps is an unnecessary burden, as mandatory marking does not prevent illegal trapping activity. With State regulations being less restrictive, Federally qualified subsistence users could avoid the requirement by trapping under those regulations, essentially rendering a Federal marking requirement unenforceable. There is no anticipated conservation concern to furbearers with opposing this proposal, as there is no established correlation between furbearer harvest levels and trap marking requirements. Adoption of this proposal also creates unnecessary divergence between State and Federal regulations.

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WRITTEN PUBLIC COMMENTS

Ketchikan Advisory Committee
June 6th, 2019
ADF&G Conference Room

I. **Call to Order**: 5:40pm by Matt Allen, Secretary

II. **Roll Call:** 8 voting members present, 1 via phone
Members Present: Allen, Crittenden, Dale, James, Westlund, Roth, Shaw, Bezneck, Fox, Scoblic (Phone)
Members Absent (Excused): Doherty, McQuarrie, Skan, Franulovich, Miller
Members Absent (Unexcused):
Number Needed for Quorum on AC: 8
List of User Groups and Public Present: Public, Sportfish Charter, ADFG (Sport Fish, Wildlife)
Motion: Bezneck, motion to make Allen meeting Chair, Roth, second. 9-0 in favor. Allen sits as meeting Chair

III. **Approval of Agenda:**
Allen, motion to amend agenda to include discussion of Federal Subsistence Proposals 10, 11, 13,14. Westlund seconded. Motion passed unanimously (9-0). Westlund, moved to approve agenda, Dale seconded. Motion passed unanimously (9-0)

IV. **Approval of Previous Meeting Minutes:**
Previous meeting minutes incomplete at this time

V. **Fish and Game Staff Present:**
Kelly Reppert, Ross Dorendorf, Tessa Hasbrouck

VI. **Guests Present: Jim Moody, Nick Hashagan, Martin Caplan, Tony Azure**

VII. **Chairman Report: Allen** read co-chair letter from Scoblic/Doherty

VIII. **ADF&G Sportfish Report: Reppert**, report regarding catch and release chinook fishing. Discussion and comment followed report.

IX. **Old Business:**
Federal Subsistence Proposals 2020-2022, WP20-01-08, WP20-10-15

X. **New Business:**
Catch and Release of chinook by Charter fishermen
Set next meeting date, September 12th, 2019, 5:30pm ADFG Conference Room

Federal Subsistence Management Program 2020-2022 Wildlife Proposal Comments			
Proposal Number	**Proposal Description**		
Support, Support as Amended, Oppose, No Action	**Number Support**	**Number Oppose /Abstain**	**Comments, Discussion (list Pros and Cons), Amendments to Proposal, Voting Notes**
WP20-01	Southeast, Moose, Unit 1C, Eliminate Unit 1C – Berners Bay moose hunt		
Support	8	0/1 abstain	A biological concern does not currently exist necessitating a subsistence priority. Majority of traditional use comes from Juneau area. A fair system is currently in place to provide for opportunity
WP20-02	Southeast, Deer, Unit 2, Remove harvest limits to non-federally qualified users		
Support	9	0	We support State managers in their assessment of the deer population and the opportunity it can support.
WP20-03	Southeast, Deer, Unit 2, Eliminate doe harvest		
Oppose	1	8	Though the AC does not agree with doe harvest, we do not support this proposal because it would have minimal impact.
WP20-04	Southeast, Deer, Unit 2, Revise harvest limit		
Oppose	3	6	Some AC members support cessation of doe harvest if only for a short period of time.
WP20-05	Southeast, Deer, Unit 2, Establish a registration permit for does		
Support	7	1/1	AC supports the proposal as it may lead to better data for management.
WP20-06	Southeast, Deer, Unit 2, Revise season		
Support	9	0	AC supports removal of January hunt due to small amount of harvest, reduced quality of meat and difficulty in distinguishing bucks and does.
WP20-07	Southeast, Deer, Unit 2, Revise harvest limit		
Support	9	0	
WP20-08	Statewide, All Trapping Species, Require traps or snares to be marked with name or State Identification number		
Oppose	1	8	Though some type of compromise should be reached in regards to labelling of traps/snares a one size fits all regulation could be overly burdensome in some areas
WP20-09	Southeast, Beaver, Units 1-4, Revise trapping season		
No Action			
WP20-10	Statewide, Black Bear, Units 1-5, Revise Customary and Traditional Use Determination		

Oppose	2	6	Hunting of Black Bear is not customary and traditional in all units residing in Southeast
WP20-11	Statewide, Brown Bear, Units 1-5, Revise Customary and Traditional Use Determination		
	3	4	Hunting of Brown Bear is not customary and traditional in all units residing in Southeast.
WP20-12	Southeast, Deer, Unit 3, Revise hunt areas, season dates, and harvest limits		
WP20-13	Statewide, Elk, Unit 3, Establish Customary and Traditional Use Determination		
	0	9	This is a population introduced by the State in 1986, due to this fact we do not believe this population is traditional and customary for any Unit in Southeast Alaska. The authors of this proposal do not demonstrate how this particular species in this area has been used to meet the definition as customary and traditional.
WP20-14	Statewide, Goat, Unit 1-5, Revise Customary and Traditional Use Determination		
	4	4	Hunting of Mountain Goat is not Customary and Traditional in all Units residing in Southeast.
WP20-15	Statewide, Moose, Unit 1-5, Revise Customary and Traditional Use Determination		
	0	8	Hunting of Moose is not customary and traditional in all units residing in Southeast.
WP20-16	Statewide, Wolf, Unit 2, Eliminate harvest limit/quota and revise sealing requirement		
No Action			
WP20-17	Statewide, Wolf, Unit 2, Eliminate harvest limit/quota and revise sealing requirement		
No Action			

Adjournment:

Minutes Recorded By: _____
Minutes Approved By: _____
Date: _____

June 25, 2019
TO: Federal Board of Subsisence Management, (Att: Theo Mutskowitz)
FROM: Alaskans FOR Wildlife and any Cooperating Entities
RE: Comments on Subsistence Proposals

Please consider these comments on numbered proposals. Comments are offered from a public perspective that reflects several major considerations which we earnestly wish you and the board to keep clearly in mind as you make decisions on these and all proposals offered, namely,

1) The lands in question are publically owned lands belonging to all US citizens who in theory and in law all have interest in how wildlife on these lands are managed, and
2) Article 8 of our Alaska Constitution clearly sets forth that ALL (emphasis) Alaskans are stakeholders, all essentially owners, with respect to its natural resources and how they are managed .

WP-20 Wolf Trapping lifting harvest restrictions and extending sealing time.
OPPOSE

-2-

This proposal leads to spreading unrestricted wolf take everywhere. Given especially the substantial science on the value of apex predators plus the high interest in sustaining wolf populations on American public lands including here in Alaska as essential to maintenance of ecosystem biodiversity, we maintain that enactment of this proposal would result in another chapter in the unscientific overall continued war on wolves. This proposal to lift harvest limits and to extend sealing limits also already excessive in length are not scientifically justified nor justified as a pubic matter given the overall value of wolves to maintenance of biodiversity. It must not pass.

WP20-17 – Removing harvest quotas and sealing requirements for hunting wolves, OPPOSE.
We oppose this proposal for the same reasons offered to oppose the previous proposal, WP20-16.
The values of wolves as apex predator and its place in American culture must have bearing upon this consideration. No science and no national or even Alaskan public cultural norms can possibly support this permissively reckless proposal to expand wolf take without bounds. It must not pass.

-3-

WP20-26 Permitting the use of snowmachines to "position" wildlife for harvest. OPPOSE

This proposal would expand this practice apparently from other land management units. In essence "positioning" is another term for what in reality will result in chasing, and harassing wildlife to exhaustion, prohibitions in the regulation notwithstanding, due to impossible enforcement limitations. As an example, when asked to explain existing regulations for snowmachine use in trapping and hunting, an Alaska wildlife trooper explained he does not even understand the regulation.

Expanded snowmachine use, "positioning," will amount to a continued enforcement challenge. Widespread abuse will surely result and will continue to give subsistence the reputation of abuse when it really needs public support: we feel that as we now face mass extinctions of wildlife species; there is new public and growing focus on the crisis. This is an extremely unwise plunge to the bottom and we caution a futuristic consideration.

WP20-08 Proposal to require traps and snares to be marked with name and state identification number.

SUPPORT This proposal is topical, even in urban municipalities of Alaska as conflicts in public use areas resulting in injuries to hikers, pets and other outdoor public land users rise .

Keeping in mind even the use of more remote public lands grows as outdoor users of their lands increase, the potential for conflicts including serious injuries resulting from hidden owner-unidentified traps will increase.

Organized trappers have strongly opposed such requirements as proposed here in past requests for change considered by the Alaska Board of Game. We witness the public land users (including of federal lands) would most certainly strongly favor this accountability. We strongly favor this proposal.

In closing, please carefully consider these comments as you go forward with the process over the next year or so. WE thank you for your consideration of these comments.

Sincerely,

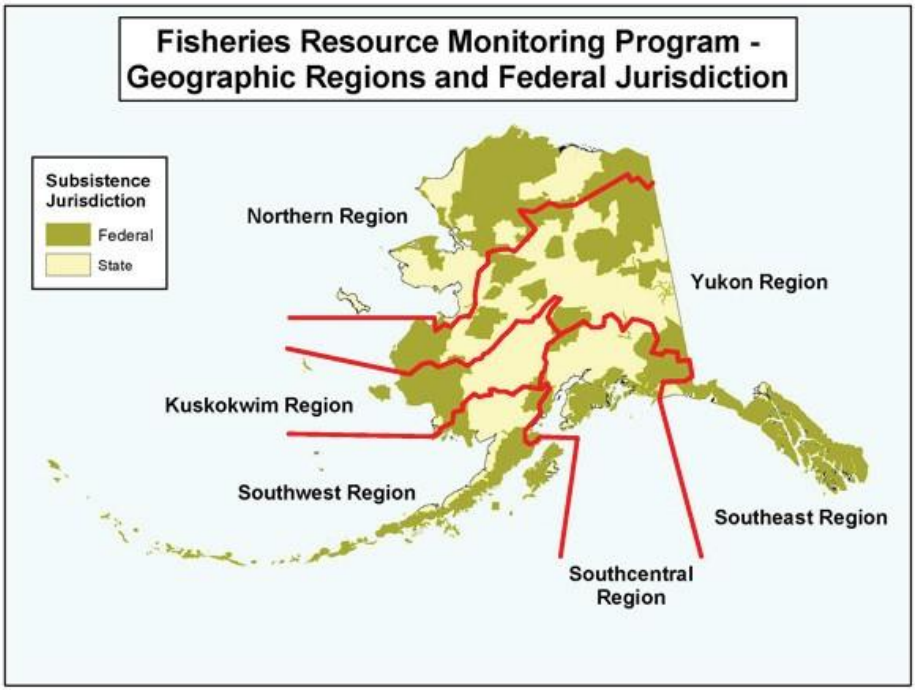
Jim Kowalsky,
Chair, Alaskans FOR Wildlife
PO Box 81957
Fairbanks, Alaska 99708
907-488-2434

FISHERIES RESOURCE MONITORING PROGRAM

BACKGROUND

Section 812 of the Alaska National Interest Lands Conservation Act (ANILCA) directs the Departments of the Interior and Agriculture, cooperating with other Federal agencies, the State of Alaska, and Alaska Native and other rural organizations, to research fish and wildlife subsistence uses on Federal public lands; and to seek data from, consult with, and make use of the knowledge of local residents engaged in subsistence. When the Federal government assumed responsibility for management of subsistence fisheries on Federal public lands and waters in Alaska in 1999, the Secretaries of the Interior and Agriculture made a commitment to increase the quantity and quality of information available to manage subsistence fisheries, to increase quality and quantity of meaningful involvement by Alaska Native and other rural organizations, and to increase collaboration among Federal, State, Alaska Native, and rural organizations. The Fisheries Resource Monitoring Program (Monitoring Program) is a collaborative, interagency, interdisciplinary approach to enhance fisheries research and data in Alaska and effectively communicate information needed for subsistence fisheries management on Federal public lands and waters.

Every two years, the Office of Subsistence Management announces a funding opportunity for investigation plans addressing subsistence fisheries on Federal public lands. The 2020 Notice of Funding Opportunity focused on priority information needs developed by the Subsistence Regional Advisory Councils with input from strategic plans and subject matter specialists. The Monitoring Program is administered through regions to align with stock, harvest, and community issues common to a geographic area. The six Monitoring Program regions are shown below.



Strategic plans sponsored by the Monitoring Program have been developed by workgroups of fisheries managers, researchers, Subsistence Regional Advisory Councils, and by other stakeholders for three of the six regions: Southeast, Southcentral (excluding Cook Inlet Area), and Southwest Alaska, and for Yukon and Kuskokwim drainages whitefish (available for viewing at the Monitoring Program webpage at https://www.doi.gov/subsistence/frmp/plans). These plans identify prioritized information needs for each major subsistence fishery. Individual copies of plans are available from the Office of Subsistence Management by calling (907) 786-3888 or toll Free: (800) 478-1456 or by email subsistence@fws.gov. An independent strategic plan was completed for the Kuskokwim Region for salmon in 2006 and can be viewed at the Alaska-Yukon-Kuskokwim Sustainable Salmon Initiative website at https://www.aykssi.org/salmon-research-plans/.

Investigation plans are reviewed and evaluated by Office of Subsistence Management and U.S. Forest Service staff, and then scored by the Technical Review Committee. The Technical Review Committee's function is to provide evaluation, technical oversight, and strategic direction to the Monitoring Program. Each investigation plan is scored on the following five criteria: strategic priority, technical and scientific merit, investigator ability and resources, partnership and capacity building, and cost/benefit.

Project executive summaries are assembled into a draft 2020 Fisheries Resources Monitoring Plan. The draft plan is distributed for public review and comment through Subsistence Regional Advisory Council meetings, beginning in September 2019. The Federal Subsistence Board will review the draft plan and will accept written and oral comments at its January 2020 meeting. The Federal Subsistence Board forwards its comments to the Assistant Regional Director of the Office of Subsistence Management. Final funding approval lies with the Assistant Regional Director of the Office of Subsistence Management. Investigators are subsequently notified in writing of the status of their proposals.

HISTORICAL OVERVIEW

The Monitoring Program was first implemented in 2000 with an initial allocation of $5 million. Since 2000, a total of $117 million has been allocated for the Monitoring Program to fund a total of 452 projects (**Figure 1** and **Figure 2**).

During each two-year funding cycle, the Monitoring Program budget funds ongoing multi-year projects (2, 3, or 4 years) as well as new projects. Budget guidelines are established by geographic region (**Table 1**). The regional guidelines were developed using six criteria that included level of risk to species, level of threat to conservation units, amount of subsistence needs not being met, amount of information available to support subsistence management, importance of a species to subsistence harvest, and level of user concerns regarding subsistence harvest. Budget guidelines provide an initial target for planning; however, they are not final allocations and are adjusted annually as needed (**Figure 3)**.

Figure 1. Monitoring Program Funds Distributed, by Organization Type, Since 2000

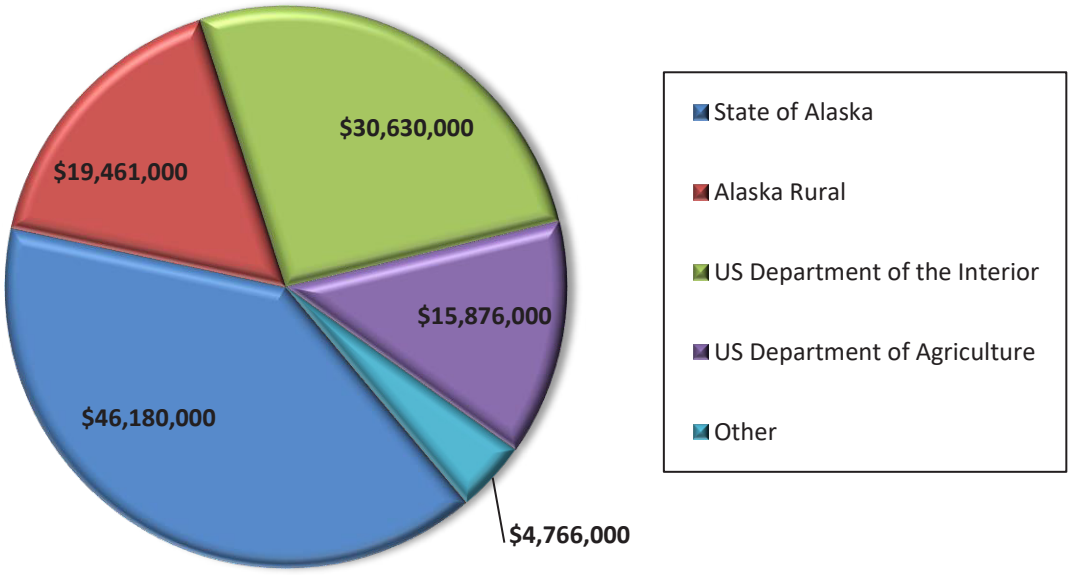


Figure 2. Number of Monitoring Program Projects Funded, by Organization Type, since 2000

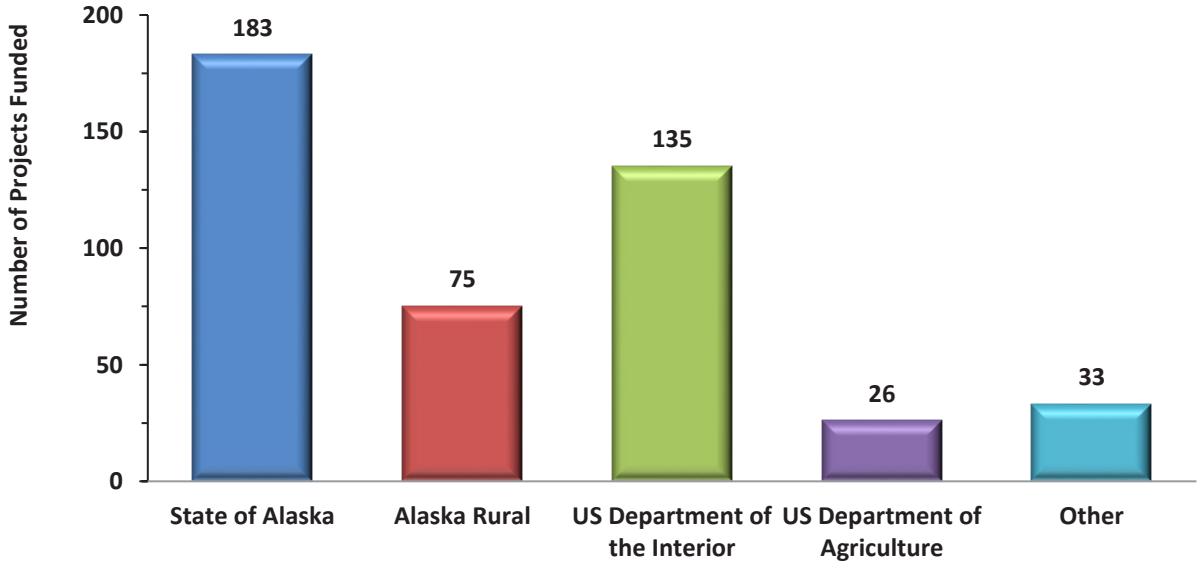
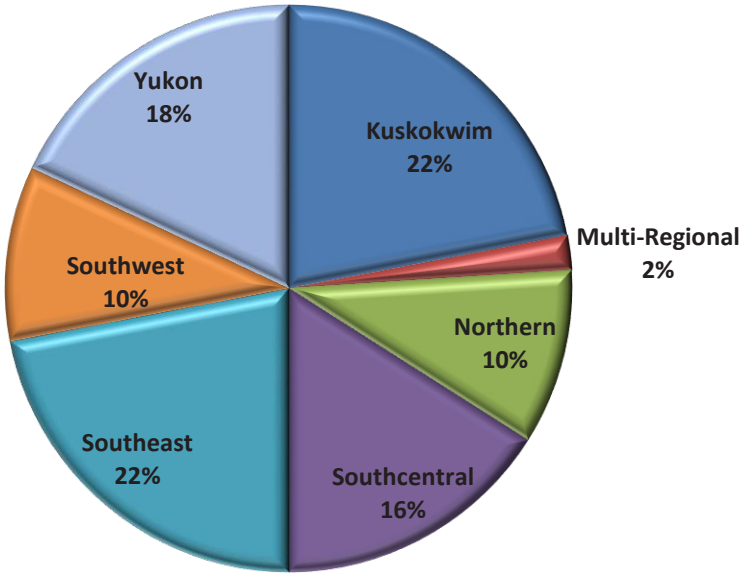


Table 1. Regional allocation guideline for Fisheries Resource Monitoring Program Funds.

Region	U.S. Department of the Interior Funds	U.S. Department of Agriculture Funds
Northern Alaska	17%	0%
Yukon Drainage	29%	0%
Kuskokwim Drainage	29%	0%
Southwest Alaska	15%	0%
Southcentral Alaska	5%	33%
Southeast Alaska	0%	67%
Multi-Regional	5%	0%

Figure 3. Percentages of Monitoring Program Funding Distributed to Each Region since 2000



The following three broad categories of information that are solicited for the Monitoring Program: (1) harvest monitoring, (2) traditional ecological knowledge, and (3) stock status and trends. Projects that combine these approaches are encouraged. Definitions of these three categories of information are listed below.

Harvest monitoring studies provide information on numbers and species of fish harvested, locations of harvests, and gear types used. Methods used to gather information on subsistence harvest patterns may

include harvest calendars, mail-in questionnaires, household interviews, subsistence permit reports, and telephone interviews.

Traditional ecological knowledge studies are investigations of local knowledge directed at collecting and analyzing information on a variety of topics, including: the sociocultural aspects of subsistence, fish ecology, species identification, local names, life history, taxonomy, seasonal movements, harvests, spawning and rearing areas, population trends, environmental observations, and traditional management systems. Methods used to document traditional ecological knowledge include ethnographic fieldwork, key respondent interviews with local experts, place name mapping, and open-ended surveys.

Stock status and trends studies provide information on abundance and run timing; age, size, and sex composition; migration and geographic distribution; survival of juveniles or adults; stock production; genetic stock identification; and mixed stock analyses. Methods used to gather information on stock status and trends include aerial and ground surveys, test fishing, towers, weirs, sonar, video, genetics, mark-recapture, and telemetry.

PROJECT EVALUATION PROCESS

In the current climate of increasing conservation concerns and subsistence needs, it is imperative that the Monitoring Program prioritizes high quality projects that address critical subsistence questions. Projects are selected for funding through an evaluation and review process that is designed to advance projects that are strategically important for the Federal Subsistence Management Program, are technically sound, administratively competent, promote partnerships and capacity building, and are cost effective. Projects are evaluated by a panel called the Technical Review Committee. This committee is a standing interagency committee of senior technical experts that is foundational to the credibility and scientific integrity of the evaluation process for projects funded by the Monitoring Program. The Technical Review Committee reviews, evaluates, and makes recommendations about proposed projects, consistent with the mission of the Monitoring Program. Fisheries and Anthropology staff from the Office of Subsistence Management provide support for the Technical Review Committee. Recommendations from the Technical Review Committee provide the basis for further comments from Subsistence Regional Advisory Councils, the public, the Interagency Staff Committee, and the Federal Subsistence Board, with final approval of the Monitoring Plan by the Assistant Regional Director of the Office of Subsistence Management.

To be considered for funding under the Monitoring Program, a proposed project must have a nexus to Federal subsistence fishery management. Proposed projects must have a direct association to a Federal subsistence fishery, and the subsistence fishery or fish stocks in question must occur in or pass through waters within or adjacent to Federal public lands in Alaska (National Wildlife Refuges, National Forests, National Parks and Preserves, National Conservation Areas, National Wild and Scenic River Systems, National Petroleum Reserves, and National Recreation Areas). A complete project package must be submitted on time and must address the following five specific criteria to be considered a high quality project.

1. ***Strategic Priorities***—Studies should be responsive to information needs identified in the 2020 Priority Information Needs available at the Monitoring Program webpage at https://www.doi.gov/subsistence/frmp/funding. All projects must have a direct linkage to Federal public lands and/or waters to be eligible for funding under the Monitoring Program. To assist in evaluation of submittals for projects previously funded under the Monitoring Program, investigators must summarize project findings in their investigation plans. This summary should clearly and concisely document project performance, key findings, and uses of collected information for Federal subsistence management. Projects should address the following topics to demonstrate links to strategic priorities:

    - Federal jurisdiction—The extent of Federal public waters in or nearby the project area
    - Direct subsistence fisheries management implications
    - Conservation mandate—Threat or risk to conservation of species and populations that support subsistence fisheries
    - Potential impacts on the subsistence priority—Risk that subsistence harvest users' goals will not be met
    - Data gaps—Amount of information available to support subsistence management and how a project answers specific questions related to these gaps
    - Role of the resource—Contribution of a species to a subsistence harvest (number of villages affected, pounds of fish harvested, miles of river) and qualitative significance (cultural value, unique seasonal role)
    - Local concern—Level of user concerns over subsistence harvests (upstream vs. downstream allocation, effects of recreational use, changes in fish abundance and population characteristics)

2. ***Technical-Scientific Merit***—Technical quality of the study design must meet accepted standards for information collection, compilation, analysis, and reporting. To demonstrate technical and scientific merit, applicants should describe how projects will:

    - Advance science
    - Answer immediate subsistence management or conservation concerns
    - Have rigorous sampling and/or research designs
    - Have specific, measurable, realistic, clearly stated, and achievable (attainable within the proposed project period) objectives
    - Incorporate traditional knowledge and methods

    Data collection, compilation, analysis, and reporting procedures should be clearly stated. Analytical procedures should be understandable to the non-scientific community. To assist in evaluation of submittals for continuing projects previously funded under the Monitoring

Program, summarize project findings and justify continuation of the project, placing the proposed work in context with the ongoing work being accomplished.

3. ***Investigator Ability and Resources***—Investigators must show they are capable of successfully completing the proposed project by providing information on the ability (training, education, experience, and letters of support) and resources (technical and administrative) they possess to conduct the work. Investigators that have received funding in the past, via the Monitoring Program or other sources, are evaluated and scored on their past performance, including fulfillment of meeting deliverable and financial accountability deadlines. A record of failure to submit reports or delinquent submittal of reports will be taken into account when rating investigator ability and resources.

4. ***Partnership and Capacity Building***—Investigators must demonstrate that capacity building has already reached the communication or partnership development stage during proposal development and, ideally, include a strategy to develop capacity building to higher levels, recognizing, however, that in some situations higher level involvement may not be desired or feasible by local organizations.

   Investigators are requested to include a strategy for integrating local capacity development in their study plans or research designs. Investigators should inform communities and regional organizations in the area where work is to be conducted about their project plans, and should also consult and communicate with local communities to ensure that local knowledge is utilized and concerns are addressed. Investigators and their organizations should demonstrate their ability to maintain effective local relationships and commitment to capacity building. This includes a plan to facilitate and develop partnerships so that investigators, communities, and regional organizations can pursue and achieve the most meaningful level of involvement. Proposals demonstrating multiple, highly collaborative efforts with rural community members or Alaska Native Organizations are encouraged.

   Successful capacity building requires developing trust and dialogue among investigators, local communities, and regional organizations. Investigators need to be flexible in modifying their work plan in response to local knowledge, issues, and concerns, and must also understand that capacity building is a reciprocal process in which all participants share and gain valuable knowledge. The reciprocal nature of the capacity building component(s) should be clearly demonstrated in proposals. Investigators are encouraged to develop the highest level of community and regional collaboration that is practical including joining as co-investigators.

   Capacity can be built by increasing the technical capabilities of rural communities and Alaska Native organizations. This can be accomplished via several methods, including increased technical experience for individuals and the acquisition of necessary gear and equipment. Increased technical experience would include all areas of project management including logistics, financial accountability, implementation, and administration. Other examples may include internships or providing opportunities within the project for outreach, modeling, sampling design,

or project specific training. Another would be the acquisition of equipment that could be transferred to rural communities and tribal organizations upon the conclusion of the project.

A "meaningful partner" is a partner that is actively engaged in one or more aspects of project design, logistics, implementation and reporting requirements. Someone who simply agrees with the concept or provides a cursory look at the proposal is not a meaningful partner.

5. ***Cost/Benefit—***This criterion evaluates the reasonableness (what a prudent person would pay) of the funding requested to provide benefits to the Federal Subsistence Management Program. Benefits could be tangible or intangible. Examples of tangible outcomes include data sets that directly inform management decisions or fill knowledge gaps and opportunities for youth or local resident involvement in monitoring, research and/or resource management efforts. Examples of possible intangible goals and objectives include enhanced relationships and communications between managers and communities, partnerships and collaborations on critical resource issues, and potential for increased capacity within both communities and agencies.

   Applicants should be aware that the Government shall perform a "best value analysis" and the selection for award shall be made to the applicant whose proposal is most advantageous to the Government. The Office of Subsistence Management strives to maximize program efficiency by encouraging cost sharing, partnerships, and collaboration.

POLICY AND FUNDING GUIDELINES

Several policies have been developed to aid in implementing funding. These policies include:

- Projects of up to four years in duration may be considered
- Proposals requesting Monitoring Program funding that exceeds $215,000.00 in any one year are not eligible for funding
- Studies must not duplicate existing projects
- Long term projects will be considered on a case by case basis

Activities that are not eligible for funding include:

- Habitat protection, mitigation, restoration, and enhancement
- Hatchery propagation, restoration, enhancement, and supplementation
- Contaminant assessment, evaluation, and monitoring
- Projects where the primary or only objective is outreach and education (for example, science camps, technician training, and intern programs), rather than information collection

The rationale behind these policy and funding guidelines is to ensure that existing responsibilities and efforts by government agencies are not duplicated under the Monitoring Program. Land management or regulatory agencies already have direct responsibility, as well as specific programs, to address these activities. However, the Monitoring Program may fund research to determine how these activities affect Federal subsistence fisheries or fishery resources.

The Monitoring Program may fund assessments of key Federal subsistence fishery stocks in decline or that may decline due to climatological, environmental, habitat displacement, or other drivers; however, applicants must show how this knowledge would contribute to Federal subsistence fisheries management. Similarly, the Monitoring Program may legitimately fund projects that assess whether migratory barriers (e.g., falls, beaver dams) significantly affect spawning success or distribution; however, it would be inappropriate to fund projects to build fish passes, remove beaver dams, or otherwise alter or enhance habitat.

2020 FISHERIES RESOURCE MONITORING PLAN

For 2020, a total of 28 investigation plans were received and all are considered eligible for funding. For 2020, the Department of the Interior, through the U.S. Fish and Wildlife Service, will provide an anticipated $1.5 million in funding statewide for new projects. The U.S. Department of Agriculture, through the U.S. Forest Service, has historically provided some funding. The amount of U.S. Department of Agriculture funding available for 2020 projects is uncertain.

FISHERIES RESOURCE MONITORING PROGRAM SOUTHWEST ALASKA REGION OVERVIEW

Since the inception of the Fisheries Resource Monitoring Program (Monitoring Program) in 2000, a total of 55 projects have been undertaken in the Southwest Alaska Region costing $10.2 million (**Figure 1**). Of these, the State of Alaska received funds to conduct 24 projects, the Department of the Interior had 27 projects funded, other organizations had 3 projects funded, and an Alaska rural organization had one project funded (**Figure 2**). See **Appendix 1** for more information on Southwest Alaska Region projects completed since 2000.

Figure 1. Monitoring Program Funds Distributed, by Organization Type, in the Southwest Alaska Region since 2000

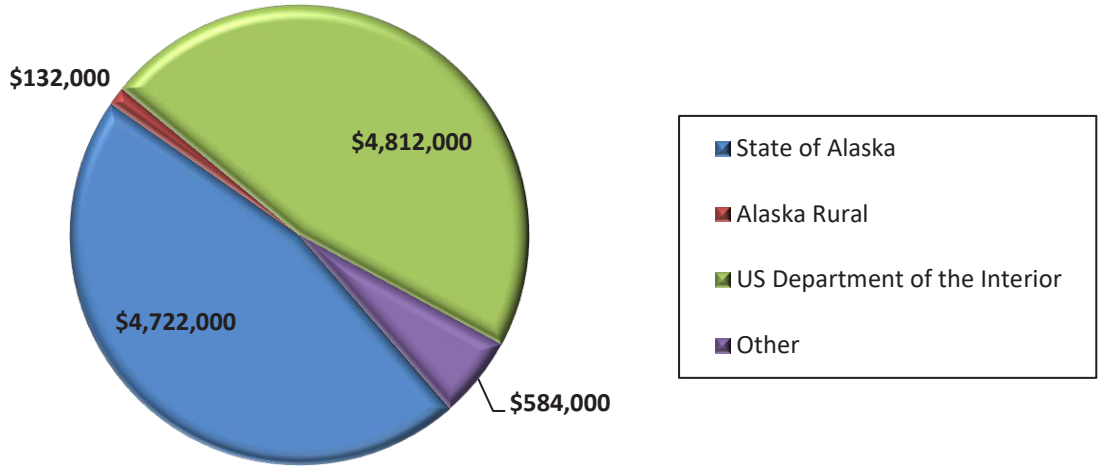
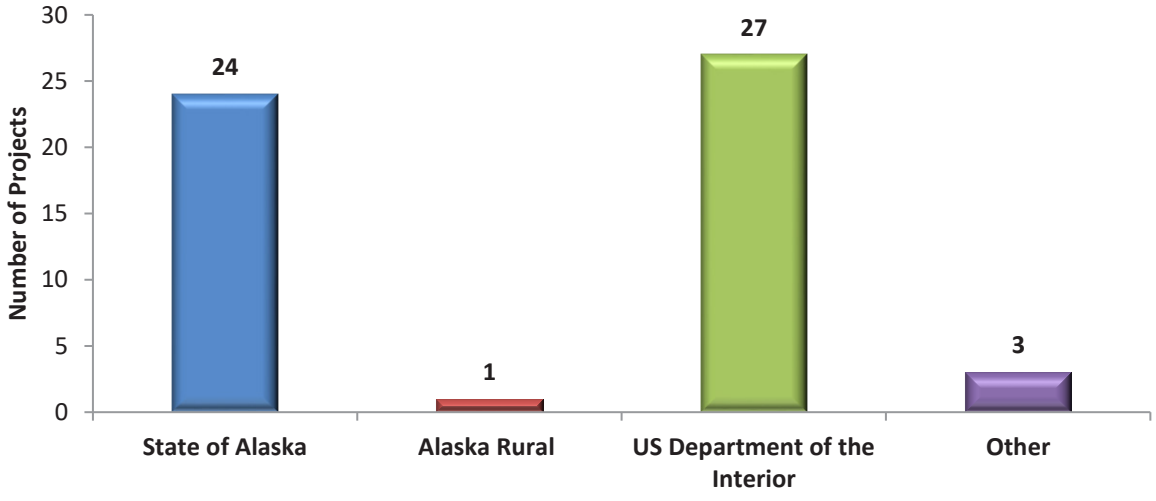


Figure 2. Number of Monitoring Program Projects Funded, by Organization Type, in the Southwest Alaska Region since 2000



PRIORITY INFORMATION NEEDS

The 2020 Notice of Funding Opportunity for the Southwest Alaska Region identified the following seven priority information needs:

- Reliable estimates of the harvest and use of fish used for subsistence. Of particular interest are harvest trends in the communities of Kodiak, Manokotak, Nondalton, Ouzinkie, Port Alsworth, and Port Lions.
- Local observations of change in fish populations (quality, run timing, sex ratios, age composition, etc.) in the Southwest Alaska Region, and associated effects on subsistence uses.
- Comparative ecological evaluation of lake rearing habitats of Sockeye Salmon stocks in southwest Kodiak Island, including Olga Lakes and Akalura Lake watersheds, and the assessment of (1) declines of salmon stocks and associated subsistence harvest opportunities, and (2) effects of climate change on salmon production in these lake systems.
- Reliable estimates of abundance of salmon populations in the Kodiak Archipelago and Aleutian Islands areas important for subsistence use and assessment of changes in these populations. Specific areas of concern are McLees Lake, Mortensen's Lagoon, and Kodiak Archipelago stocks.
- Annual estimates of Sockeye Salmon escapement in the Lake Clark watershed.
- Reliable estimates of Chinook Salmon escapement and evaluation of "quality of escapement" measures (for example, potential egg deposition, sex and size composition of spawners, spawning habitat quality and utilization) for determining the reproductive potential of spawning stocks in Big Creek, Naknek River, Alagnak River, Meshik River, and Togiak River.
- Evaluation of Chinook and Sockeye salmon populations in the Chignik River area to understand the decline in salmon stocks and associated subsistence harvest opportunities, such as reliable estimates of escapement, quality of escapement, and environmental impacts.

AVAILABLE FUNDS

Federal Subsistence Board guidelines direct initial distribution of funds among regions. Regional budget guidelines provide an initial target for planning. For 2020, the Department of the Interior, through the U.S. Fish and Wildlife Service, will provide an anticipated $1.5 million in funding statewide for new projects. The U.S. Department of Agriculture, through the U.S. Forest Service, has historically provided some funding. The amount of U.S. Department of Agriculture funding available for 2020 projects is uncertain.

ROLE OF TECHNICAL REVIEW COMMITTEE

The mission of the Monitoring Program is to identify and provide information needed to sustain subsistence fisheries on Federal public lands for rural Alaskans through a multidisciplinary and collaborative program. It is the responsibility of the Technical Review Committee to develop the strongest possible funding plan for each region and across the entire state.

For the 2020 Monitoring Program, two proposals were submitted for the Southwest Alaska Region. The Technical Review Committee evaluated and scored each proposal on Strategic Priority, Technical and Scientific Merit, Investigator Ability and Resources, Partnership and Capacity Building, and Cost/Benefit (**Table 1**). These scores remains confidential. An executive summary for each proposal submitted to the 2020 Monitoring Program for the Southwest Alaska Region is in **Appendix 2**.

Table 1. Projects submitted for the Southwest Alaska Region, 2020 Monitoring Program, including total funds requested and average annual funding requests.

Project Number	Title	Total Project Request	Average Annual Request
20-400	McLees Lake Sockeye Escapement	$ 220,559	$ 55,140
20-450	Kodiak Road System Subsistence Fisheries Harvest Assessment	$366,230	$122,077
Total		$586,789	$177,217

TECHNICAL REVIEW COMMITTEE JUSTIFICATIONS FOR PROPOSAL SCORES

Project Number: 20-400
Project Title: Estimation of Sockeye Salmon Escapement into McLees Lake, Unalaska Island

TRC Justification: This proposal is to operate the weir at the outlet of McLees Lake on Unalaska Island for the 2020, 2021, 2022, and 2023 seasons. McLees Lake is located within the Alaska Maritime National Wildlife Refuge, and Sockeye Salmon from this stock make up a large component (60–90%) of the annual Sockeye Salmon harvest by rural residents of Unalaska Village. The project directly addresses a Priority Information Need for the Southwest Alaska Region, and has direct management implications for subsistence harvests of Sockeye Salmon. Each of the five objectives of the project are clear, measurable, and achievable and use proven science and logistics that have been in place for years. The Alaska Department of Fish and Game is the lead on this project and is partnering with the Qawalangin Tribe of Unalaska. The Alaska Department of Fish and Game will seek recommendations and consultation from the Qawalangin Tribe for hiring technicians with an emphasis on local hires. The Alaska Department of Fish and Game project and crew leaders will act as mentors to the technicians. The Qawalangin Tribe was recently awarded a Partners for Fisheries Monitoring Program award that they plan to use to hire a fisheries biologist and a technician to work on this project, if it is funded. The Partners Program funded biologist position will strengthen the Tribe's ability to participate in the assessment of the McLees Lake subsistence fishery. It will reinforce trust and partnership with the community of Unalaska and other stakeholders through consultation and the exchange of information. The cost to the Monitoring Program for the project is reasonable for the work being proposed.

Project Number: 20-450
Project Title: Kodiak Road System Subsistence Fisheries Harvest Assessment

TRC Justification: This project proposes to update community harvest data by residents of the Kodiak Road System for all subsistence resources, with a focus on salmon and nonsalmon species, through the administration of a comprehensive subsistence survey, resource mapping, and key respondent interviews. A Federal nexus is provided by Federal public waters of Womens Bay and surrounding Afognak Island. The proposed research addresses two 2020 Priority Information Needs. Investigators intend to build upon recently conducted or on-going projects funded by the Monitoring Program or other similar efforts. The investigation plan is well written and project objectives are clear, measurable, and achievable. Research methods are standard for the Division of Subsistence, with recognized results; the cost of the project is high but reasonable for the work proposed; and the timeline is realistic, giving ample opportunity for investigators to address each stage of research. The budget and investigator capacity is strong. The Sun'aq Tribe of Kodiak is a co-investigator and will participate in survey development and review, explore education and outreach opportunities, and participate in the drafting and review of the final report, among other responsibilities. The project proposes to hire six local research assistants, one Sun'aq Tribe of Kodiak intern, and one graduate student intern with Alaska Department of Fish and Game. There are four letters of support from local organizations, tribes, and agencies.

APPENDIX 1
PROJECTS FUNDED IN THE SOUTHWEST ALASKA REGION SINCE 2000

Project Number	Project Title	Investigators
	Bristol Bay Salmon Projects	
00-010	Togiak River Salmon Weir	USFWS
00-031	Alagnak River Sockeye Salmon Escapement	AFD&G, NPS, BBNA
00-033	Alagnak River Angler Effort Index	ADF&G, NPS, BBNA
00-042	Lake Clark Sockeye Salmon Assessment	USGS
01-047	Togiak River Subsistence Harvest Monitoring	BBNA, ADF&G, USFWS
01-075	Nondalton Sockeye Salmon and Freshwater Fish TEK	NPS, NTC, USGS
01-095	Lake Clark Sockeye Salmon Escapement	USGS, NTC
01-109	Traditional Ecological Knowledge of Alaska Peninsula/Becharof NWR	ADF&G, BBNA
01-173	Alagnak River Harvest Salmon Escapement Estimation	ADF&G
01-204	Ugashik Lakes Coho Salmon Escapement Estimation	USFWS
03-046	Fisheries Biotechnician Training Program	NPS
04-411	Lake Clark Sockeye Salmon Run Timing	USFWS, BBNA
04-454	Bristol Bay Sharing, Bartering, and Traded of Subsistence Resources	ADF&G, BBNA
05-402	Lake Clark Sockeye Salmon Escapement	NPS, USGS
08-402	Togiak River Chinook Salmon Radio Telemetry	USFWS, BBNA, ADF&G

Project Number	Project Title	Investigators
08-405	Lake Clark Sockeye Salmon Assessment	NPS, USS&E, BBNA
10-402	Togiak River Chinook Salmon Adult Assessment	USFWS, BBNA, ADF&G
16-451[a]	Bristol Bay Subsistence Salmon Networks	ADF&G, BBNA, OSU
16-453[a]	Togiak River Chinook Salmon Subsistence Harvest Assessment	ADF&G, BBNA
	Chignik Salmon Projects	
02-098	Kametalook River Coho Salmon Escapement & Carrying Capacity	USFWS, BBNA
02-099	Clark River Estimation of Sockeye and Coho Salmon Escapement	USFWS, BBNA
03-043	Perryville Coho Salmon Escapement	USFWS
05-405	Perryville-Chignik Coho and Sockeye Salmon Aerial Surveys	USFWS
07-404	Perryville-Clark River Coho and Sockeye Salmon Aerial Surveys	USFWS
	Bristol Bay-Chignik Freshwater Species Projects	
00-011	Togiak River Dolly Varden Genetic Baseline Development	USFWS
00-012	Bristol Bay Traditional Knowledge of Fish	ADF&G
02-034	Kvichak River Resident Species Subsistence Fisheries	ADF&G, BBNA
04-401	Ungalikthlik and Negukthlik Rivers Rainbow Trout Assessment	USFWS
04-415	Tazimina Rainbow Trout Assessment	ADF&G
05-403	Lake Clark Whitefish Assessment	ADF&G
07-408	Togiak River Rainbow Smelt Assessment	USFWS, BBNA
07-452	Kvichak Watershed Subsistence Fishing Ethnography	ADF&G, BBNA, NPS
12-452	Whitefish Trends in Lake Clark and Iliamna Lake	ADF&G, BBNA, NPS, NTC
	Kodiak-Aleutians Projects	
00-032	Buskin River Sockeye Salmon Stock Assessment	ADF&G
01-059	McLees Lake Sockeye Salmon Escapement	USFWS
01-206	Mortenson Creek Sockeye and Coho Salmon Escapement	USFWS
02-032	Lower Alaska Peninsula/Aleutians Subsistence Fish Harvest Assessment	ADF&G, APIP, ISU
03-047	Afognak Lake Sockeye Smolt Enumerations Feasibility	ADF&G
04-402	Mortenson Creek Sockeye and Coho Escapement	USFWS
04-403	McLees Lake Sockeye Salmon Escapement	USFWS
04-412	Afognak Lake Sockeye Salmon Stock Assessment	ADF&G
04-414	Buskin River Sockeye Salmon Stock Assessment	ADF&G
04-457	Kodiak Subsistence Fisheries Harvest and TEK	ADF&G, KANA
07-401	Afognak Lake Sockeye Salmon Smolt Assessment	ADF&G
07-402	Buskin River Sockeye Salmon Weir	ADF&G
07-405	McLees Lake Sockeye Salmon Weir	USFWS, ADF&G, QT
10-401	Afognak Lake Sockeye Salmon Smolt and Adult Assessment	ADF&G
10-403	Buskin River Sockeye Salmon Adult Assessment	ADF&G
10-404	Buskin River Sockeye Salmon Smolt Assessment Feasibility	ADF&G
10-406	McLees Lake Sockeye Salmon Weir	USFWS, ADF&G, QT

Project Number	Project Title	Investigators
12-450	Aleutian Islands Salmon and Other Subsistence Harvests	ISU
12-453	Kodiak Salmon Fishery Changing Patterns	ADF&G
14-401	Buskin River Sockeye Salmon Stock Assessment	ADF&G
14-402	Afognak Lake Sockeye Salmon Stock Assessment	ADF&G
16-452[b]	Western Gulf of Alaska Salmon and Other Harvests	ISU
18-400[b]	Buskin River Sockeye Salmon Stock Assessment and Monitoring	ADF&G
18-450[b]	Unalaska Fish Harvest Practices	ADF&G
18-451[b]	Subsistence Harvest Trends of Salmon and Nonsalmon Fish in 4 Southern Kodiak Island Communities	ADF&G

[a] = Final report in preparation.
[b] = On-going projects during 2019.
Abbreviations used for investigators are: **ADF&G** = Alaska Department of Fish and Game, **APIA** = Aleutian-Pribilof Islands Association, **BBNA** = Bristol Bay Native Association, **ISU** = Idaho State University, **KANA** = Kodiak Area Native Association, **NPS** = National Park Service, **NTC** = Nondalton Tribal Council, **OSU** = Oregon State University, **QT** = Qawalangin Tribe, **USFWS** = U.S. Fish and Wildlife Service, **USGS** = U.S. Geological Survey, **USS&E** = U.S. Science and Education, and **UW** = University of Washington.

APPENDIX 2
EXECUTIVE SUMMARIES

The following executive summaries were written by the principal investigator for each proposal and were submitted to the Office of Subsistence Management as part of the proposal package. They may not reflect the opinions of the Office of Subsistence Management or the Technical Review Committee. Executive summaries may have been altered for length.

Project Number:	20-400			
Title:	Estimation of Sockeye Salmon Escapement into McLees Lake, Unalaska Island			
Geographic Region:	Southwest			
Data Type:	Stock Status and Trends			
Principal Investigator:	Cassandra Whiteside, Alaska Department of Fish and Game, Kodiak			
Co-investigators:	Lisa Fox, Alaska Department of Fish and Game, Kodiak Chris Price, Qawalangin Tribe of Unalaska, Unalaska			
Project Cost:	**2020:** $84,959	**2021:** $55,452	**2022: $**55,452	**2023:** $24,696
Total Cost:	$220,559			

Issue: This project directly addresses the priority information need identified by the Federal Subsistence Regional Advisory Council to provide reliable abundance estimates of the McLees Lake sockeye salmon *Oncorhynchus nerka* population on the Aleutian Island of Unalaska. In order to facilitate the effective

management of the McLees Lake subsistence fishery, which is typically a set gillnet fishery that occurs in June and July in Reese Bay, the Alaska Department of Fish and Game (ADF&G) will continue operation of the McLees Lake weir to collect timely escapement information, physical stock metrics, and pertinent limnological data. Timely escapement information from this project allows optimal subsistence fishing opportunity and maintains the sustainability of the sockeye salmon resource at McLees Lake. Monitoring daily sockeye salmon escapements provides a necessary in-season management tool for regulating subsistence fishing opportunity as well as an assessment of sockeye salmon production and run timing. Stock metrics collected from escaping adults are used to quantify the dominate age classes, sex ratios, and length averages. Limnological data will directly quantify the quality of spawning and rearing habitat of McLees Lake and enable the development of habitat-based models for estimating carrying capacity and the effects of climate change upon McLees Lake. By utilizing both abundance and habitat data, a more complete understanding of McLees Lake sockeye salmon production will be gained to maintain the health of this stock and help to ensure future subsistence fishing opportunities.

Objectives:

1. Enumerate the daily passage of sockeye salmon through the weir;
2. Describe the run-timing, or proportional daily passage, of sockeye salmon through the weir;
3. Estimate the weekly sex and age composition of sockeye salmon such that simultaneous 90% confidence intervals have a maximum width of 0.20;
4. Estimate the mean length of sockeye salmon by sex and age; and
5. Estimate the production thresholds for rearing juvenile sockeye salmon

Methods: ADF&G will operate this project consistent with the methods used by the U.S. Fish and Wildlife Service from 2001–2011, as outlined in Hildreth and Finkle (2010). A rigid picket weir will be constructed at the outlet of McLees Lake, approximately 100m upstream from Reese Bay. The weir will be operated from approximately June 1 to August 1 during each year of the project. A trap and holding area will be installed on the upstream side of the weir to facilitate sampling fish and passing adult salmon through the weir. Sampling will consist of identifying species, measuring length, determining sex, collecting scales, and then releasing the fish upstream of the weir. All scales collected will be read to determine age using European notation (Koo 1962) where a decimal separates the number of winters spent in fresh water (after emergence) from the number of winters spent in salt water. Limnological and zooplankton sampling will be conducted in accordance with ADF&G standard procedures (Hopkins 2017) and further analyzed by the ADF&G Kodiak Island Limnology Lab (KILL).

Daily sockeye salmon escapement estimates will be available for in-season management. Additionally, escapement and limnological data will be utilized post-season to review and update sustainable escapement goals, as needed. Daily escapement information will be available to the public. Project findings will be published and reported to the Office of Subsistence Management Fisheries Resource Monitoring Program annually. Data will be archived per ADF&G standards.

Partnerships/Capacity Building: This project will continue the development of partnerships between the U.S. Fish and Wildlife Service, ADF&G, and the Qawalangin Tribe of Unalaska. McLees Lake sockeye salmon are heavily harvested by Unalaska subsistence users and are vital to the Qawalangin Tribe's culture and food security. The Qawalangin Tribe will hire a full-time biologist and a seasonal local-hire technician to support McLees Lake weir operations, funded by the Partners for Fisheries

Monitoring Program, F19AS00022. The Partners biologist position will directly strengthen the tribe's ability to participate in the assessment of the McLees Lake subsistence fishery and will reinforce trust and partnerships with the community of Unalaska and more than a dozen other stakeholders through consultation and the exchange of information.

Additional capacity building will occur with the Qawalangin Tribe by their direct participation in the hiring of the field technicians and ongoing consultation to develop educational opportunity. The Qawalangin Tribe will create educational outreach, youth engagement and technical support programs through internships fostering resource stewardship. The ADF&G project and crew leader will act as mentors with the purpose of training the technicians to advance their careers and knowledge in fisheries management.

Project Number:	20-450			
Title:	Subsistence harvest trends of salmon and nonsalmon fish in Kodiak City and road-connected areas			
Geographic Region:	Southwest			
Data Types:	Harvest Monitoring and Traditional Ecological Knowledge			
Principal Investigator:	Amy Wiita, PhD. Alaska Department of Fish and Game Division of Subsistence, Anchorage			
Co-investigator:	Thomas Lance, Sun'aq Tribe of Kodiak, Kodiak			
Project Cost:	**2018:** $195,938	**2019:** $103,730	**2020: $**66,562	**2021:** $0
Total Cost:	$366,230			

Issue: This project responds to two information needs identified in the Priority Information Needs document prepared by the Office of Subsistence Management and the Kodiak/Aleutians Regional Advisory Council by providing "reliable estimates of the harvest and use of fish used for subsistence" in Kodiak, and documenting "local observations of change in fish populations (quality, run timing, sex ratios, age composition, etc.) in the Southwest Alaska Region, and associated effects on subsistence uses."

We will address these key issues through face-to-face household harvest surveys, resource mapping, and key respondent interviews. Comprehensive household harvest surveys and resource mapping will fill a critical data gap by providing updated harvest and use data for salmon and non-salmon fish and other subsistence resources important to residents of the Kodiak road system. Interviews will document the extensive scope of knowledge among Kodiak residents, tribal members, and others on changes related to environmental factors, abundance of fish and fish populations, and activities that rely on subsistence resources. With limited funding for on-the-ground habitat assessment, the complementary suite of knowledge among subsistence resource users is especially important. By combining these methods, we will provide a comprehensive view of subsistence fish harvest and changes in accessibility, abundance, use, and sharing of subsistence resources among residents of the Kodiak Road System.

The division's previous experience in the Kodiak city area provides us with a foundation to build upon to provide detailed subsistence harvest and use information to include harvest estimates and augment existing available data.

Objectives:

(1) Produce reliable estimates of fish harvested and used for subsistence in Kodiak City and road-connected communities.
(2) Create comprehensive spatial maps of subsistence harvest areas.
(3) Document local observations of changes in fish populations and subsistence harvesting trends.

Methods: This project will be guided by the research principles adopted by the Alaska Federation of Natives in its Guidelines for Research[1] and by the National Academy of Science's "Principles for Conducting Research in the Arctic,"[2] as well as the Alaska confidentiality statute (AS 16.05.815). These principles stress community approval of research design, informed consent, anonymous participation, community review of draft findings, and providing findings to each study community upon completion of the research.

Household harvest surveys with a stratified sample of households will be used to produce reliable estimates of fish used for subsistence in Kodiak City and road-connected areas (Objective 1). 110 households will be randomly selected for a survey within Kodiak City, 30 households in Kodiak Station, and 110 total households in Chiniak, Women's Bay, and all remaining road system residents. Local research assistants (LRAs) will be hired and trained. Surveys will be conducted in teams of ADF&G staff and LRAs. The survey will be face-to-face, anonymous, voluntary, and confidential.

Comprehensive spatial maps will display general harvest areas by species (Objective 2). Search and harvest areas for each resource category will be documented. Points, lines and polygons reported by the respondent will be recorded by the researcher and will include information such as the species sought, the month of harvest, methods of access to the site, and gear used. There is no individual identifying information attached to the final maps, and individual data points are combined to display general harvest areas, so that specific harvest locations are not revealed.

Key respondent interviews will be used to document local observations of changes in fish populations and subsistence harvesting trends (Objective 3). ADF&G researchers will conduct up to 11 key respondent interviews, which will provide context for the quantitative results of the surveys through documentation of local observations of changes in fish populations and subsistence harvesting trends as well as the broader role of salmon in changing subsistence resource harvests. The interviews will be flexible, semi-structured and open-ended, guided by an interview protocol, which will be developed in consultation with the community and Sun'aq Tribe. Key respondents will be identified in collaboration with the tribal governments and other relevant stakeholders.

Partnership and Capacity Building: The Division of Subsistence will partner with the Natural Resources Department of the Sun'aq Tribe of Kodiak (STK). STK can greatly enhance the research capacity of the project by adding a deeper understanding of Kodiak issues, seeking to integrate tribal

[1] Alaska Federation of Natives. 2013. "Alaska Federation of Natives Guidelines for Research." Alaska Native Knowledge Network. Accessed March 3, 2019. http://www.ankn.uaf.edu/IKS/afnguide.html.

[2] Interagency Arctic Research Policy Committee. 2018. Principles for Conducting Research in the Arctic. Washington D.C. Accessed March 3, 2019.
(https://www.iarpccollaborations.org/uploads/cms/documents/principles_for_conducting_research_in_the_arctic_final_2018.pdf)

members into the research, and providing logistical support. Specifically, the Sun'aq Tribe will: 1) participate in survey development and review; 2) assist with communications about public meetings and participate in public presentations; 3) recommend local research assistants, who will be trained in survey administration and mapping, as well as more broadly in the role of ADF&G, STK, and USFWS in managing the land and natural resources used by Kodiak residents; 4) provide logistical support; 5) explore educational and outreach opportunities for sharing subsistence information and data findings; and 6) participate in final report drafting and review.

This project will also benefit from partnership with the Kodiak National Wildlife Refuge, who will provide public meeting space and lodging for Division of Subsistence researchers when available.

ANNUAL REPORTS

Background

ANILCA established the Annual Reports as the way to bring regional subsistence uses and needs to the Secretaries' attention. The Secretaries delegated this responsibility to the Board. Section 805(c) deference includes matters brought forward in the Annual Report.

The Annual Report provides the Councils an opportunity to address the directors of each of the four Department of Interior agencies and the Department of Agriculture Forest Service in their capacity as members of the Federal Subsistence Board. The Board is required to discuss and reply to each issue in every Annual Report and to take action when within the Board's authority. In many cases, if the issue is outside of the Board's authority, the Board will provide information to the Council on how to contact personnel at the correct agency. As agency directors, the Board members have authority to implement most of the actions which would effect the changes recommended by the Councils, even those not covered in Section 805(c). The Councils are strongly encouraged to take advantage of this opportunity.

Report Content

Both Title VIII Section 805 and 50 CFR §100.11 (Subpart B of the regulations) describe what may be contained in an Annual Report from the councils to the Board. This description includes issues that are not generally addressed by the normal regulatory process:

- an identification of current and anticipated subsistence uses of fish and wildlife populations within the region;
- an evaluation of current and anticipated subsistence needs for fish and wildlife populations from the public lands within the region;
- a recommended strategy for the management of fish and wildlife populations within the region to accommodate such subsistence uses and needs related to the public lands; and
- recommendations concerning policies, standards, guidelines, and regulations to implement the strategy.

Please avoid filler or fluff language that does not specifically raise an issue of concern or information to the Board.

Report Clarity

In order for the Board to adequately respond to each Council's annual report, it is important for the annual report itself to state issues clearly.

- If addressing an existing Board policy, Councils should please state whether there is something unclear about the policy, if there is uncertainty about the reason for the policy, or if the Council needs information on how the policy is applied.
- Council members should discuss in detail at Council meetings the issues for the annual report and assist the Council Coordinator in understanding and stating the issues clearly.

- Council Coordinators and OSM staff should assist the Council members during the meeting in ensuring that the issue is stated clearly.

Thus, if the Councils can be clear about their issues of concern and ensure that the Council Coordinator is relaying them sufficiently, then the Board and OSM staff will endeavor to provide as concise and responsive of a reply as is possible.

Report Format

While no particular format is necessary for the Annual Reports, the report must clearly state the following for each item the Council wants the Board to address:

1. Numbering of the issues,
2. A description of each issue,
3. Whether the Council seeks Board action on the matter and, if so, what action the Council recommends, and
4. As much evidence or explanation as necessary to support the Council's request or statements relating to the item of interest.

Federal Subsistence Board

1011 East Tudor Road, MS 121
Anchorage, Alaska 99503 - 6199

FISH and WILDLIFE SERVICE
BUREAU of LAND MANAGEMENT
NATIONAL PARK SERVICE
BUREAU of INDIAN AFFAIRS

FOREST SERVICE

SEP 13 2019

OSM 19057.KW

Molly Chythlook, Chair
Bristol Bay Subsistence Regional Advisory Council
c/o Office of Subsistence Management
1101 East Tudor Road, MS 121
Anchorage, Alaska 99503-6199

Dear Chairwoman Chythlook:

This letter responds to the Bristol Bay Subsistence Regional Advisory Council's (Council) fiscal year 2018 Annual Report. The Secretaries of the Interior and Agriculture have delegated to the Federal Subsistence Board (Board) the responsibility to respond to these reports. The Board appreciates your effort in developing the Annual Report. Annual Reports allow the Board to become aware of the issues outside of the regulatory process that affect subsistence users in your region. We value this opportunity to review the issues concerning your region.

1. Low Level Aircraft Flights

Residents in the Lake Iliamna and Lake Clark region have expressed concerns about aircraft flying at low levels and disrupting wildlife and user groups in the area. The Chulitna River drainage in particular is an important habitat for moose and other resources central to the subsistence practices of rural residents. The area is primarily accessed by boat or snowmachine in the winter. Low level flights are disruptive for all users for a successful harvest. Local residents have approached the Lake Clark Subsistence Resource Commission (SRC) and brought these concerns to its attention. Transporters also access to remote lakes to drop hunters at hunting camps, which have been used by local residents for generations. This results in user conflict, trespass on private property, and local concerns about competition for limited resources.

Glen Alsworth, Jr., a pilot and tour operator and member of the Lake Clark SRC, initiated an educational outreach effort by writing to area pilots and asked that they avoid the river corridor and keep flights above 1,000 feet in altitude during the moose season (see enclosed). Additional

outreach efforts could include notifying other pilots about avoiding the river corridor and flying at low level directly over Long and Nikabuna Lakes within the Chulitna River drainage. These outreach efforts could be coordinated through the SRC and local communities.

Additionally, local communities are communicating with the National Park Service to address the issue of increased air traffic and low level flights over sensitive areas. The Council encourages continued efforts by local communities, and also encourages the National Park Service to actively work with communities to begin management planning for air traffic in subsistence use corridors through the use of concessions permits or other management tools.

Response:

With regard to the issue of low-flying aircraft disrupting wildlife and user groups in the area of Lake Clark National Park (NP), in general, the National Park Service (NPS) does not have jurisdiction in the airspace over National Parks in Alaska. The controlling authority for airspace in the United States is the Federal Aviation Administration (FAA). Over remote locations such as those found at Lake Clark NP and other National Parks in Alaska, FAA regulations prohibit operation of an aircraft below an altitude of 500 feet above the ground surface except over open water or sparsely populated areas. In that case, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure (14 CFR 91.119).

The NPS recommends that individuals work with the FAA if there is a safety concern related to operation of aircraft below these minimum altitudes. However, with regard to air taxi operators approved to conduct flight services in National Parks, the NPS does have the authority to regulate aircraft operations for commercial services it authorizes under the Commercial Use Authorization (CUA) program and concessions permitting. Local communities and individuals concerned with increased air traffic and low level flights over sensitive areas should continue to work with the park superintendent to address flights over specific areas and during specific times of the year. The Lake Clark Subsistence Resource Commission did send a letter through the Lake Clark National Park staff to all commercial operators and pilots in the area asking for them to avoid subsistence corridors during hunting seasons at low levels. The NPS will review concession permits renewals with these complaints in mind and also develop language for their website to communicate this request.

However, the Board and the various agencies involved are not the only way to address the concerns of low-flying aircraft. Everyone who lives in the region can play a role. If you see low-flying aircraft disturbing wildlife on Federal public lands in the region, you may file a complaint with law enforcement.

Law enforcement will then use the complaint to investigate an incident and determine if criminal activity occurred. Providing evidence in a complaint helps when doing an investigation.

Effective complaints are precise, provable, and prompt. Take good notes before you file a complaint - preferably as close as possible to the incident. A complaint should include the following information:

1. The date and time when the incident happened.
2. The location description where the incident happened. A useful description includes a map; coordinates; land or water features; place names; distance from camp site; and photos.
3. A description of what happened during the incident. When aircraft is involved, provide a clear photo or video of the aircraft and tail number. You can use a smart phone camera or a digital camera.
4. Report your complaint to law enforcement using the contacts provided below. Information shared on Facebook does not qualify as a complaint.

Lake Clark National Park and Preserve
240 W. 5th Ave., Suite 236
Anchorage, Alaska 99501
(907) 644-3626

1 Park Place
Port Alsworth, Alaska 99653
(907) 781-2218

Katmai National Park and Preserve
P.O. Box 7
King Salmon, Alaska 99613
(907) 246-3305

2. Historical Migratory Bird Management

The Alaska Migratory Bird Co-Management Council co-chair brought to the Council's attention a recent apology letter signed on September 13, 2018 by the Regional Director of the U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game Commissioner stating the need to "reconcile the past and acknowledge that those regulations harmed hunters and their families. We seek to continue rebuilding relationships with Alaska's Indigenous peoples who were affected by the unintended consequences of past harvest regulations ... "

The Council urges the Federal Subsistence Board to acknowledge the letter signed by the U.S. Fish and Wildlife Service and Alaska Department of Fish and Game in its next scheduled public meeting.

Response:

As indicated by the Council, the apology was made official at the bi-annual gathering of the Annual Migratory Bird Co-management Council (AMBCC) meeting on September 13, 2018. The U. S. Fish and Wildlife Service (USFWS) Alaska Regional Director, Greg Siekaniec, acted on this request during the recent Federal Subsistence Board (Board) meeting April 15-18, 2019. Mr. Siekaniec introduced the video that highlights the hardship placed on Indigenous peoples who were affected by past harvest regulations and provided copies of the signed apology letter to all attending. The Board meeting was an excellent opportunity to reach a large and important audience. The USFWS and the

Alaska Department of Fish and Game (ADF&G) continue outreach regarding the apology and have presented the video and letter at more than 12 other meetings including Regional Advisory Councils, tribal village meetings, Subsistence Resource Commissions, etc. (see following list). Reconciliation does not happen overnight, and the USFWS and ADF&G acknowledge that they are on a long journey to continue to reach as many people as possible with this apology. Regrettably, we have made mistakes and are working towards reconciling those, so that together, we can heal. Below highlights some of the meetings where the apology was acknowledged. This list will continue to grow as we find opportunities to present the apology letter and video. If the Council is aware of a future opportunity to present this important apology, please contact Crystal Leonetti, the USFWS Alaska Native Affairs Specialist, at 907-786-3868 or 907-230-8419 or crystal_leonetti@fws.gov.

Migratory Bird Apology Events

9/13/18 - **Alaska Migratory Bird Co-Management Council** - Official Apology Ceremony, Anchorage, USFWS Regional Director Greg Seikaniec, ADF&G Commissioner Sam Cotton

10/3/18 - **Association of Village Council Presidents** annual meeting, Bethel, Deputy Yukon Delta Refuge Manager Ray Born, Refuge Information Technician Chris Tulik, ADF&G Director Bruce Dale

10/9/18 - **Native Village of Selawik** council meeting, Selawik, Selawik Refuge Manager Susan Georgette

10/10/18 - **Cape Krusenstern Subsistence Resource Commission**, Kotzebue, Refuge Manager Susan Georgette, ADF&G Wildlife Biologist Alex Hansen

10/12/18 - **Kobuk Valley Subsistence Resource Commission**, Kotzebue, Refuge Manager Susan Georgette, ADF&G Wildlife Biologist Alex Hansen

10/23/18 - **Northwest Arctic Borough Assembly**, Kotzebue, Refuge Manager Susan Georgette, ADF&G Wildlife Biologist Alex Hansen

10/24/18 - **Northwest Arctic RAC** meeting, Kotzebue, Refuge Manager, Susan Georgette, ADF&G Regional Supervisor Tony Gorn

11/9/18 - **Maniilaq Tribal Government Committee**, Kotzebue, Refuge Manager Susan Georgette, ADF&G Wildlife Biologist Alex Hansen

3/6/19 – **Eastern Interior RAC**, Fairbanks, Acting Yukon Flats Refuge Manager Nathan Hawkaluk and Refuge Subsistence Specialist Vince Mathews

3/11/19 - **YK Delta RAC** meeting, Bethel, Acting Yukon Delta Refuge Manager Ray Born, ADF&G Biologist

Chairwoman Chythlook 5

3/26/2019 - **Western Interior RAC** meeting, Fairbanks, Refuge Subsistence Specialist for Kanuti, Arctic, Yukon Flats Vince Mathews, Kanuti Acting Refuge Manager Tina Moran, Koyukuk/Nowitna Innoko Deputy Refuge Manager Bob Rebarchik

4/4/19 - **North Slope RAC** meeting, Utqiagvik, Arctic Refuge Manager Steve Berendzen, ADF&G Management Coordinator Phil Perry

4/18/19 – **Federal Subsistence Board** public meeting, Anchorage, Regional Director Greg Siekaniec

3. <u>All Council Meeting</u>

The Council supports conducting another All Council meeting in Anchorage. It would be beneficial to All Council members attending training sessions.

The Council suggests that the following items be on the agenda or part of the program at the next all-Council meeting:

- *Regulations, and interpretation of them, related to the use of snowmobiles for hunting*
- *Closing session with all Councils to develop resolutions to submit to the Board*
- *Discussion during the closing session for all Councils to develop consensus on management plans or other issues affecting all Councils*

Response:

The Board acknowledges the Council's support for another All-Council Meeting in Anchorage and notes that other Councils have endorsed this meeting as well. The Board agrees with the Council that having another All-Council meeting would be beneficial to all members, as it would provide an opportunity to learn about other regions' concerns, participate in Federal Subsistence Management Program specific training and collaborate with other regions in finding joint solutions for fish and wildlife management issues.

The Board notes that there maybe the potential to hold the next All-Council Meeting during the winter 2021 meeting cycle, but the final decision is subject to available funding. The prior All-Council Meeting costs were approximately 30 percent higher than the combined costs of all individual Council meetings in one winter cycle.

The Board appreciates the Council's contribution towards an agenda for the future All-Council Meeting and praises the Council's intent to work jointly with other Councils on developing consensus on management plans and other issues. When the next All-Council meeting is scheduled, the Office of Subsistence Management will consult with all Councils' chairs when developing an agenda and will share this agenda with each Council.

4. Sea Gull Population

Rural communities rely on various subsistence resources throughout the seasonal cycles of subsistence harvest. Local observations report that there are fewer sea gulls present in the Lake Iliamna area. Sea gulls are one of many subsistence resources available in the region. The Council would like to know if the local sea gull population decline is limited to a specific geographic area or is it occurring statewide. Therefore, the Council requests a briefing from the Migratory Bird Program on the population status of sea gulls in the Iliamna Lake area.

Response:

In general, there is very little monitoring of any gull species in Alaska, with exception of Black-legged Kittiwakes, often lumped with gulls. It would be helpful to know what species of gull the local Iliamna Lake contacts are referencing. If local residents have pictures of the birds, the U.S. Fish and Wildlife Service (USFWS) Migratory Bird Program would attempt to identify species from photos. If they have pictures of eggs and can provide a scale reference next to the egg for sizing (a ruler or some kind of size indicator) that may also allow the Migratory Bird Program to identify the species. Please contact Kathy Kuletz at kathy_kuletz@fws.gov or 907-786-3453, if you want to discuss trying to identify the gull species near Iliamna Lake area. The Council may wish to request that a Migratory Bird Program biologist attends the next Council meeting to talk about the trends in sea gull populations.

The Migratory Bird Program does not have colony or nesting data for the Iliamna region, and, thus, location and approximate numbers of gulls would be welcome additions to their Colony Register. We are enclosing a summary of available information on gull populations and four reports on seabird populations for your information.

5. RAC Chairs Meeting

The Council requests the Board to consider a joint Regional Advisory Council Chairs meeting in advance of a regulatory Board meeting. The joint meeting of the ten Regional Advisory Chairs will allow for a forum to discuss concerns they may share with other regions on administrative and resource management issues. The Council requests that the ten Council Chairs are consulted in advance on the agenda items for a joint Chairs meeting.

Response:

The Board is always open to and welcomes the idea of holding a joint Regional Advisory Council Chairs meeting prior to or after a scheduled Board regulatory meeting. For the past several regulatory cycles the Council Coordination Division at the Office of Subsistence Management reached out to all Council Chairs to inquire if they would be interested in organizing such a meeting and what their proposed topics of discussion would be.
Unfortunately, very few Chairs were available and interested in participating in the proposed meeting. In fact, a few Council Chairs or their representatives relayed that their busy schedules

would not allow them to even attend the entire Board meeting. The Council Coordination Division will continue to reach out to all ten Councils Chairs prior to the scheduled regulatory meetings regarding the organization of an all Chairs meeting. However, the Board recommends that the Bristol Bay Subsistence Regional Advisory Council prepare a letter encouraging other Councils to send their Chair or a representative to such a meeting along with suggested agenda topics for the meeting.

As a reminder, in its fiscal year 2018 annual report reply, the Board informed the Council that, if an all Chairs meeting is to take place prior to the Board meeting,--the Chairs need to remember that the Federal Advisory Committee Act prohibits a "discussion of topics on which the Councils would or could be giving advice or making recommendations to the Board for its consideration in the rulemaking process."

6. Positioning of Animals

Rural residents are dependent on winter and summer transportation modes to gather, harvest, and hunt subsistence resources. In recent history, snowmachines replaced dog sleds to seek and harvest moose, caribou, wolves, and other land mammals. This is necessary to provide for the Federally qualified subsistence users families and communities, and to assure that subsistence needs are met.

Hunters are now using snowmachines to hunt for moose and caribou to meet their subsistence needs. The use of snowmachines to position animals for the purpose of taking has replaced the dog teams of past, and this method of positioning of animals has been used throughout the region. Agency specific regulations allow for the use of snowmachines traditionally employed by local rural residents engaged in subsistence use if they are operated "in such a manner as to prevent the herding ... of wildlife for hunting or other purposes." As a result, the lack of specific regulatory language for Federal public lands in Alaska has caused some conflict among subsistence users and land managing agencies.

Currently, no provisions exist to allow for the positioning of animals for Unit 17. The Council is seeking to resolve this issue through regulatory means and requests the Board for its support. The Board, through consultation with Federal land management agencies, should review agency specific regulations to align potential action by the Board in adopting Federal subsistence management regulations to allow for positioning of animals for subsistence purposes.

Response:

The Board appreciates your Council tracking this issue and recognizes that the use of motorized vehicles for subsistence purposes has been a topic of discussion in many areas across Alaska. Specifically, the Board is aware that your Council has submitted two wildlife proposals to change regulations on the use of snowmachines to assist with the harvest of animals in the Bristol Bay area. The regulatory process within the Federal Subsistence Management Program is inclusive and provides multiple opportunities for consultation and public comment. Over the coming year, the

Chairwoman Chythlook 8

Board anticipates robust discussion and testimony from the public and agency representatives as your proposals and associated staff analysis are discussed at the Council's fall 2019 meeting and at the Board spring 2020 meeting.

In closing, I want to thank you and your Council for your continued involvement and diligence in matters regarding the Federal Subsistence Management Program. I speak for the entire Board in expressing our appreciation for your efforts and am confident that the subsistence users of the Bristol Bay Region are well represented through your work.

Sincerely,

Anthony Christianson
Chair

Enclosures

cc: Federal Subsistence Board
Thomas Doolittle, Acting Assistant Regional Director, Office of Subsistence Management
Thomas Whitford, Acting Deputy Assistant Regional Director
Office of Subsistence Management
Jennifer Hardin, PhD, Subsistence Policy Coordinator, Office of Subsistence Management
Steven Fadden, Acting Council Coordination Division Supervisor,
Office of Subsistence Management
Chris McKee, Wildlife Division Supervisor, Office of Subsistence Management
Greg Risdahl, Fisheries Division Supervisor, Office of Subsistence Management
George Pappas, State Subsistence Liaison, Office of Subsistence Management
Donald Mike, Council Coordinator, Office of Subsistence Management
Bristol Bay Subsistence Regional Advisory Council
Benjamin Mulligan, Deputy Commissioner, Alaska Department of Fish and Game
Mark Burch, Special Project Coordinator, Alaska Department of Fish and Game
Interagency Staff Committee
Administrative Record

Summary of available information on sea gull populations:
In the Lake Iliamna region, you could have Glaucous Gulls, Glaucous-winged gulls, Mew Gulls, Herring Gull, Black-legged Kittiwake, and perhaps a few other species. Sometimes subsistence users also lump in the terns (Arctic and Aleutian terns) with the gull species.

As noted earlier, there is very little population trend data for most of these species, and none specific to the Iliamna area. Based on limited data from monitored sites, species trends vary across the state, but overall, as with other types of seabirds, many populations show evidence of declines. We can access data (sometimes not very current) from the Seabird Colony Register as to what species have been recorded breeding in the area, although the colony database is mainly coastal, and gulls can also nest in very scattered, non-colonial fashion.

Glaucous Gulls are a more northerly, circumpolar species, but do occur in the Alaska Peninsula area (less likely to be breeding there). There is evidence Glaucous Gulls have been declining across circumpolar regions, attributed to egg harvest, contamination, food changes, and unknown impacts during the winter (changes due to climate change, etc.). The Alaska population may be stable, although this is based on very limited data (mostly, opportunistic observations). The attached Petersen et al (2015) article summarizes information on Glaucous Gulls. Because of its circumpolar distribution, the Glaucous Gulls is considered an indicator (or 'focal') species for monitoring ecosystem health in the Arctic, and it is more actively monitored in the Atlantic Arctic.

Glaucous-winged Gull - probably the most abundant large gull species in your area. The Seabird Colony Register (http://axiom.seabirds.net/maps/js/seabirds) does not show any seabird colonies around Lake Iliamna, but there are several colonies along the adjacent coast with several hundred Glaucous-winged gulls nesting at each of multiple colonies in the area. (The Colony Register is mainly marine oriented, so may not have data reported from large inland lakes). The Alaska Maritime National Wildlife Refuge (NWR) has trend data on Glaucous-winged gulls for four colonies (Buldir, Aiktak, Chowiet, St. Lazaria islands), and in their 2018 report population trends indicate substantial declines in the SE Bering Sea, stable populations in northern Gulf of Alaska, and substantial increases in southeast Alaska. (Alaska Maritime NWR 2019). In Prince William Sound boat-based surveys (1989-2016), Glaucous-winged gulls population estimates have been variable, but were below the long-term average in 2016 (2018 data not yet available).

Mew Gulls are a common and widespread mid-sized gull, often breeding in small groups and although mostly marine, they can nest near coastal lakes. The only trend data is in Prince William Sound, where they have shown a slow decline since 1989. At colonies monitored (for Black-legged Kittiwake), the MEGU appeared to have complete breeding failure in 2016.

Herring Gulls are a large gull that is not abundant in Alaska, but may be in the Iliamna area. They tend to aggregate near human communities, for food and nesting. No population or trends data.

Black-legged Kittiwakes could occur in the area, but are typically coastal/marine, and the Colony Register does not indicate that they nest along the adjacent coast. Trends at colonies monitored by AMNWR indicate Black-legged Kittiwake are doing well in most regions except SE Bering

Sea. In Prince William Sound, the Black-legged Kittiwake population has been generally declining, and experienced breeding failures in 2016-2018. At the circumpolar scale, there is concern about overall declining trends of this species, and the Circumpolar Seabird Group (An Arctic Council/Conservation of Arctic Flora and Fauna Expert Network) is nearing completion of a Black-legged Kittiwake Conservation Plan, which will summarize what is known world wide and suggest management and conservation actions.

Arctic Tern, Aleutian Tern are two species of concern for USFWS, as there is evidence they have been declining throughout Alaska, although again, good data is sparse (and it is difficult to tell these two species apart). In addition, terns move colony locations more than most other seabirds, so it can be difficult to get population trends unless you consider a relatively large area as a unit. Both species are sensitive to disturbance. Information on Aleutian tern trends is in Renner et al. 2015 (enclosed). The Pacific Seabird Group (with many USFWS members) has an Aleutian Tern Technical Committee, which is reviewing trends data, risk assessments, and developing a conservation plan.

Gulls, kittiwakes, and terns are important subsistence foods (mainly, eggs), as documented in Naves (2018; attached). Gull eggs comprise almost half of all egg harvest, though it varies among regions and communities. Throughout circumpolar countries, egg harvest is considered to have impacted several species, although in Alaska, the USFWS has only been concerned about potential impact on the two tern species.

To summarize, there are indications of declines in some local populations of several gull, kittiwake, and tern species, but with the exception of kittiwakes, there is little good long-term data. Notably, other seabird species have also shown evidence of decline, and several seabird species experienced poor reproductive success and die offs in the last few years, with lack of food appearing to be the main cause.

ASSESSING THE BREEDING DISTRIBUTION AND POPULATION TRENDS OF THE ALEUTIAN TERN *ONYCHOPRION ALEUTICUS*

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SUMMARY

RENNER, H.M., ROMANO, M.D., RENNER, M., PYARE, S., GOLDSTEIN, M.I. & ARTHUKIN, Y. 2015. Assessing the breeding distribution and population trends of the Aleutian Tern *Onychoprion aleuticus*. *Marine Ornithology* 43: 179–187.

We compiled survey data on 202 Aleutian Tern colonies throughout Alaska and Russia to assess the current status and colony sizes and to evaluate whether there had been changes in recent decades. We fit a Poisson generalized linear mixed model to all available counts of Alaskan colonies since 1960, excluding colonies in which the temporal spread of counts was < 6 years. Russian data were not included in the trend model due to our inability to resolve dates on a number of counts. We estimate that numbers at known colonies in Alaska have declined 8.1% annually since 1960 or 92.9% over three generations (33 years; 95% CI = 83.3%–97%), with large colonies experiencing greater declines than small colonies. Trends at known colonies within discrete geographic regions of Alaska (Aleutian Islands, Bering Sea, Chukchi Sea, Gulf of Alaska and Kodiak Island) were consistently negative. The most recent counts of all known Alaskan colonies summed to 5529 birds. This estimate should be considered a rough minimum because it does not account for colonies that have not been surveyed in recent years — the size of which may have changed — or for the fact that the surveys conducted were neither systematic nor inclusive of all potential habitats. In Russia, the sum of the most recent count of all colonies was 25602 individuals, indicating that Russia may host approximately 80% of the world population. Numbers in some regions in Russia appear to have increased substantially in recent decades, especially on Sakhalin Island and the southern coast of the Koryak Highland. We have no data to identify any population-level stressor that could explain the apparent reduction in numbers in Alaska. However, predation, egging and other anthropogenic disturbances, and degraded habitat may cause population change at local levels. If this overall pattern cannot be explained by other possible but unlikely factors (e.g. establishment of large colonies in new locations within Alaska, or major shifts between Alaska and Russia), then the observed trends in Alaska are, indeed, alarming. Therefore, we urge close monitoring of known colonies within Alaska, studies of dispersal, establishment of management practices to insulate colonies from human disturbance, and more concerted efforts among Alaskan and Russian partners.

Key words: Alaska, Aleutian Tern, colony counts, population change, Russia, world population

INTRODUCTION

The Aleutian Tern *Onychoprion aleuticus* is a poorly known seabird, with nearly all aspects of behavior, diet, migration, distribution and demographics limited largely to anecdotal information (Lee 1992, Hill & Bishop 1999, North 2013, but see Kaverkina 1986a, 1986b, Nechaev & Lobkov 1988, and Babenko 1996 for Russia). The species is known to breed throughout coastal areas of Alaska and the Russian Far East (North 2013) and to winter in Southeast Asia (Lee 1992, Hill & Bishop 1999, Carey *et al*. 2001, Poole *et al.* 2011).

The Alaskan breeding range of Aleutian Terns (Fig. 1) covers approximately 35% of the state's coast (Gotthardt *et al*. 2012). The northernmost documented breeding location is a small colony at Kasegaluk Lagoon on the Chukchi Sea coast, with colonies extending south along Kotzebue Sound, the Seward Peninsula, Norton Sound, the Yukon-Kuskokwim River delta, and into Bristol Bay along the Alaska Peninsula. Colonies range throughout the Aleutian islands and east into the Gulf of Alaska through the Kodiak Archipelago, Kenai Peninsula, Copper River Delta and as far east as Glacier Bay National Park.

In the Russian Far East, the breeding area of Aleutian Terns (Fig. 1) ranges from Sakhalin Island north to the coast of Anadyr Gulf (Nechaev and Lobkov 1988, Kondratyev *et al*. 2000). In the Sea of Okhotsk, the species is most abundant in Sakhalin, Khabarovsk region coast and Western Kamchatka, although small colonies are located in the Magadan area as well. The species is distributed along the eastern side of the Kamchatka Peninsula, on the southern coast of Koryak Highland (to the Apuka River) and in a few small isolated colonies near Anadyr.

Published estimates of Aleutian Terns breeding in Alaska have ranged from 9000 to 12000 birds (Sowls *et al*. 1978, Haney *et al*. 1991, North 2013). However, these estimates are based on counts that are now more than two decades old. Within the last decade, there have been reports of colony declines and disappearances at individual sites in Alaska (e.g. Corcoran 2012). In contrast, breeding populations in the Russian Far East apparently have

increased from 10 000 birds in the 1970s and 1980s (Nechaev 1989) to 22 000–24 000 in the 1990s (Lobkov 2001) and 28 000–30 000 in the 2000s (Lobkov 2006).

Inter-related challenges that have always underpinned an assessment of the Aleutian Tern are its poorly understood breeding behavior, ambiguity in the definition of breeding sites and the general inadequacy of colony abundance data. For instance, nesting microhabitats can range from coastal sandy beaches, sandbars and sand dunes, to inland reticulate and string bogs, wet meadows and tundra, and coastal forest tundra with sparse larch trees (Baird 1986, Nechaev & Lobkov 1988, North 2013). Furthermore, although most Aleutian Tern colonies are <3 km from the coast, they also occur as far as 20 km inland (Nechaev & Lobkov 1988). Additionally, nesting may occur in localized clusters tens to upwards of a hundred kilometers apart, and a clear understanding of whether these clusters function interdependently, spatially or temporally, is lacking (Pyare *et al*. 2013). At the few specific colony locations where annual counts are available (all generated from unmarked individuals), colony size and numbers of breeding pairs may fluctuate from year to year (Nysewander & Barbour 1979, Corcoran 2012, Oehlers 2012). These observations and challenges are not unique and may be analogous to numerous seabird species nesting colonially throughout expansive and remote areas of the North Pacific.

To address the broader relevance of the anecdotal reports of colony decline and disappearance, and to evaluate region-wide breeding colony distribution and population status, we compiled current and past breeding colony information with the specific intent to (1) summarize historic and current colony locations, (2) evaluate Alaskan population trends and (3) review potential causal mechanisms for observed trends. To our knowledge, this represents the first analysis of population trends for this species.

METHODS

We compiled Aleutian Tern population estimates for 202 colonies using a combination of previously gathered and new information (Appendix 1, available on the website). Our primary source of published data for Alaskan colony (n = 110) size and locations was the North Pacific Seabird Colony Database (USFWS 2013).

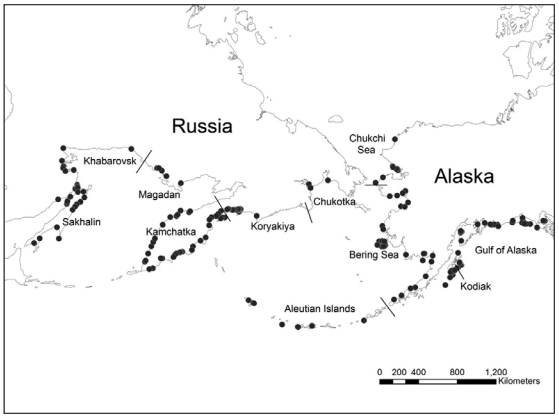

Fig. 1. Map of the current worldwide breeding range of Aleutian Terns. Dots represent known colonies that were still occupied during the most recent survey.

In 2012, we acquired additional colony information from a number of sources, including state and federal wildlife biologists, ornithological researchers, professional bird guides, birdwatchers and online databases, including the Alaska Natural Heritage Program's Biotics data portal (ANHPB 2015) and eBird (Audobon and Cornell Lab of Ornithology 2014). In 2013, we opportunistically surveyed 28 Aleutian Tern colonies across Alaska. These data were collected during the egg or chick period (approximately 10 June to 7 July), normally with replicate counts on multiple days and/or with multiple observers. Most counts were visual counts of birds in the air as the observer(s) stood at the edge of the colony; birds in the large colonies (e.g. Situk River/Black Sand Spit near Yakutat) were counted in groups of 20.

We also compiled counts from 92 Russian colonies, mainly from published sources (Appendix 2, available on the website). Russian data were not included in the trend model because we were unable to resolve dates to the year level on a number of important counts (and the surveys were on average much older), but these data were used for distribution information and minimum population estimates.

Screening of data

Aleutian Terns may nest in dispersed groups, so discrete colonies can sometimes be challenging to delineate. Whenever possible, we deferred to the original data source when determining the limits of a given colony. In a few cases when colonies were within the same general area, we arbitrarily defined birds nesting more than 1 km apart as separate colonies. In some locations, there were insufficient data to determine the spatial distribution of groups of nesting birds; in these cases we lumped nesting birds into broader areas by a common geographic denominator such as a river delta or entire island.

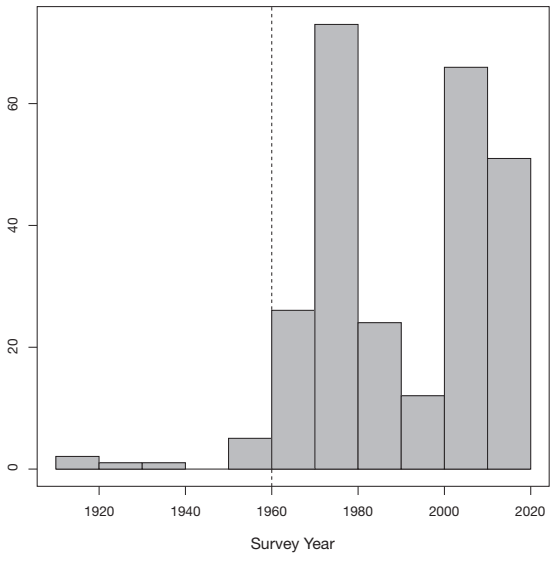

Fig. 2. Histogram showing timing of surveys of Aleutian Tern colonies in Alaska. The trend model included only data after 1960 (the dashed line). Single survey dates were used for each colony in a given year. Y-axis is number of colonies surveyed in each decade.

For counts in which observers reported a range in the number of nesting birds for a colony within the same year, based on separate counts, we used the greater number (i.e. if 25 birds were counted on 18 June 2008 and 35 on 23 June 2008, we used 35), since it was considered the closest to the actual number of birds using the colony that year. If the only estimate we had for one year was based on a single observation and reported as a range, we used the midpoint (i.e. if "150–200 birds" were reported on 19 July 2003, our value used for 2003 was 175).

Statistical analysis

Before fitting a population change model to the Alaskan data, we restricted our dataset in three ways. First, we omitted all colonies for which there was only a single year's count within the included time period 1960–2013 (n = 31) or for which only qualitative information was available (e.g. "present") because we could not determine a trend. Second, we omitted all counts conducted before 1960 (n = 18). Although datasets include observations from as early as 1914, data before 1960 were sparse (Fig. 2), and calculating a constant long-term trend over a time interval of 100 years did not appear to be biologically meaningful for a seabird of this body size. Third, because we observed that year-to-year colony counts often fluctuated widely, we restricted the dataset to colonies with counts spread over an interval of six years or more. A shorter interval would lead to some colonies having extreme trends over a short period of time, which was more likely to represent noise than changes in population. Ultimately, we used data from 64 Alaskan colonies with 261 total observations in the data set, ranging from 1960 to 2013, to model population trends.

We used a Bayesian framework to calculate a long-term population trend of Aleutian Terns in Alaska. We modeled the colony counts using a generalized linear mixed model (GLMM) with a Poisson error distribution and a log-link function. Markov chain Monte Carlo (MCMC) methods do not suffer the same numerical convergence issues found in approaches based on maximum-likelihood, making them suitable for fitting non-Gaussian GLMMs (McCulloch & Searle 2001). Random effects consisted of survey year and intercept, nested within a colony identifier. Survey year was also treated as a fixed effect (trend). We treated the median of each parameter's posterior distribution as the estimate. We specified uninformative priors, following defaults in package MCMCglmm v. 2.21 (Hadfield 2010). Posterior estimates were obtained based on 20 000 iterations, excluding a burn-in of 5 000 iterations. To reduce autocorrelation, the posterior sample was thinned by considering every tenth iteration. We used graphical checks and standard diagnostics to assess mixing of MCMC chains. Model fitting and all other computations were conducted in R 3.1.2 (R Core Team 2014).

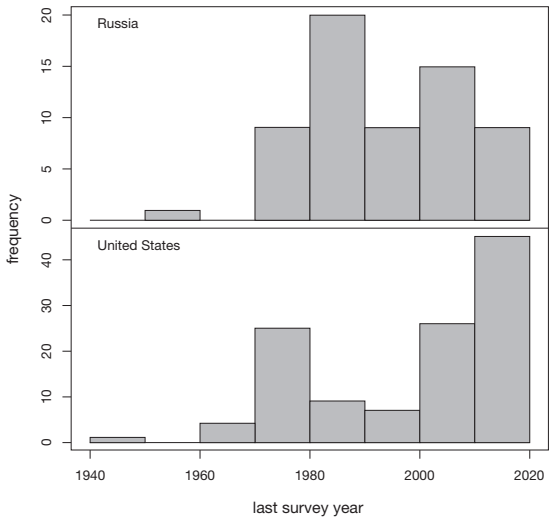

Fig. 3. Histogram showing timing of most recent surveys of Aleutian Tern colonies in Russia (top) and Alaska (bottom). Y-axis is number of colonies with their most recent survey in each decade.

Following the criteria used by the International Union for the Conservation of Nature (IUCN 2013), we transformed the rate of annual change, obtained from the parameter estimates, into the proportional change over three generations. Lacking demographic data for Aleutian Terns, we used a generation length (g) of the congeneric Sooty Tern *Onychoprion fuscatus*, reported at 10.9 years (BirdLife International 2014). We chose this value over the 13.4 years generation length calculated for the largely sympatric, similarly sized Arctic Tern *Sterna paradisaea* (BirdLife International 2014), to be conservative with our estimates.

We transformed the parameter estimate P of the overall year fixed effect into a rate of change over three generations d using:

$$d = e^{P^{3g}} - 1$$

We report 95% credible intervals based on the quantiles of the posterior distributions.

To examine whether the trends were consistent across geographic regions, we divided the Alaska data into five broad geographic areas (Gulf of Alaska, Kodiak Island, Aleutian Islands, Bering Sea and Chukchi Sea). We compared trends across these regions by adding the slope estimates of the random effect to the fixed effect and averaging over regions.

RESULTS

Based on the most recent counts available, we estimated a minimum worldwide breeding population of Aleutian Terns as 31 131 birds across 202 colonies, with 18% (5 529 birds in 110 colonies) in Alaska and 82% (25 602 birds in 92 colonies) in Russia. The most recent counts varied across colonies from 1959 to 2013 in Russia and from 1946 to 2013 in Alaska (Fig. 3). Our trend analysis indicated that colony counts of Aleutian Terns in Alaska declined on average 8.1% per year (95% credible interval 10.7%–5.5%) between 1960 and 2013. Over three generations (33 years) this equates to a 92.9% decline (95% credible interval 83.3% to 97% decline). The trend in Alaska was consistent across geographic regions (Fig. 4). Intercept and slope estimates of the random effects were negatively correlated (r = -0.70), indicating that, in general, larger colonies experienced greater declines than smaller colonies (Fig. 5). (However, the largest colony in Alaska at Situk River is an exception.) Supporting this quantitative trend, we found widespread disappearances of Alaskan colonies (zero birds observed on most recent visit). Twenty-nine of the 110 Alaskan colonies (26%) were not attended during the most recent visit (Table 1); many of these had at one time contained from hundreds to up to 3 000 individuals

(e.g. Amee Island, Kodiak, in 1976). Although 26 colonies were newly reported in Alaska since 1995, they were all small (totaling 834 individuals), and fewer than five of those colonies were presumed to be new (e.g. sites where observers had regularly documented an absence of birds historically). We assume most of the newly documented colonies are not new but were discovered as a result of increased search effort.

For our trend analysis, we did not weight colonies by their relative size, but rather treated each colony equally (i.e. as if they typified a random sample of true colonies). If we assume that the surveyed colonies represent a high percentage of the total population, another approach to the analysis would be to weight colonies by their size, since a change in a large colony will have a greater impact on the total population than a change in a small colony. Had we done so, the estimated decline over three generations (98.3%) would be even more severe than our non-weighted estimate (92.9%). Similarly, the data restrictions we made led to a more conservative estimate of the decline. Reducing the required spread in data at an individual colony from > 5 to > 3 years resulted in a more severe decline. Changing the cut-off from 1960 to 1950 or 1970 had little impact on the parameter estimates.

In Russia, three of 92 colonies (3.3%) had a zero count on the most recent visit. Major colonies at Sakhalin Island and Koryakiya increased during the observation period, although we could not resolve dates on multiple observations sufficiently (i.e. to the year level) to calculate a trend.

Geographic summaries

The largest known Aleutian Tern colonies in Alaska are in the Gulf of Alaska (Table 1), with the single largest on Situk River/Black Sand Spit near Yakutat (Appendix 1, available on the website). While numbers of Aleutian Terns have remained stable in Yakutat since first reported in 1914, numbers in the Copper River Delta (also in the Gulf of Alaska region), have declined from approximately 2400 in the 1980s to three birds in 2013.

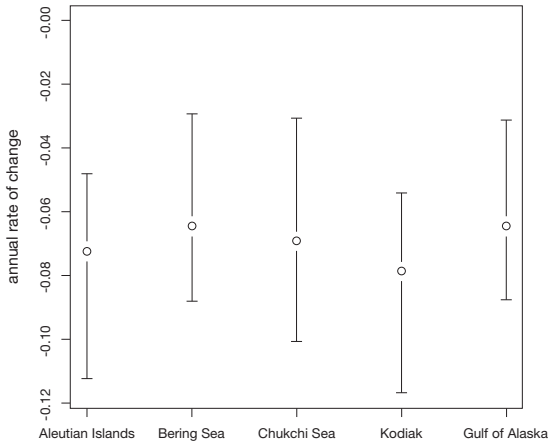

Fig. 4. Mean annual rate of change (in %, error bars are 95% credible intervals) in Aleutian Tern colony size in Alaskan geographic regions.

The Kodiak Archipelago supported over 4000 breeding Aleutian Terns as recently as 1995. However, recent counts for the area yielded only 525 breeding birds (Table 1). Aleutian Terns may have been extirpated from Kodiak between the 1890s and 1940s (Friedmann 1935, Gabrielson & Lincoln 1959), although we have little information on how widespread surveys were during that time. Because of their relative accessibility, the many colonies in this area have had more frequent surveys than much of the rest of Alaska.

The Aleutian Archipelago currently supports a minimum of 296 Aleutian Terns in six known colonies. Historically, this area supported 11 known colonies, but five of them have disappeared, and no new colonies have been discovered in this region since 1995. Colonies have persisted on Adak Island and Attu Island despite the presence of introduced mammals (e.g. Norway rat *Rattus norwegicus*) since World War II.

The Bering and Chukchi Sea regions have historically supported 40 known colonies and 4000 breeding birds, but the most recent count of all known colonies in the region totals only 1556 birds. Few contemporary survey data are available for the north side of the Alaska Peninsula, where there are substantial amounts of potential habitat. An observer in 2014 (Nat Drumheller, pers. comm.) noted large numbers of Aleutian Terns near Port Moller (but did not find a breeding colony); none were seen there in 2013 during a targeted survey. The region hosts large amounts of potential habitat that have not been surveyed for Aleutian Terns in recent years.

DISCUSSION

Our estimate of a minimum population size of 31140 birds in 202 colonies is low compared with other Northern Hemisphere tern

TABLE 1
Summary of Aleutian Tern colony status in Alaska and Russia, by geographic region

Region	No. of colonies (includes inactive)	No. of individuals	No. disappeared[a]	No. new[b]
Aleutian Islands	11	296	5	0
Bering Sea	32	1 248	6	7
Chukchi Sea	8	308	2	0
Gulf of Alaska	29	3 152	4	12
Kodiak	30	525	12	7
Alaska total	**110**	**5 529**	**29**	**26**
Chukotka	3	229	0	0
Koryakiya	15	1 560	0	9
Kamchatka	36	4 514	2	2
Magadan	8	467	1	5
Khabarovsk	14	2 972	0	0
Sakhalin	16	15 860	0	0
Russia total	**92**	**25 602**	**3**	**16**
Worldwide total	**202**	**31 131**	**32**	**42**

[a] Number of colonies with a zero on the most recent count.
[b] Number of colonies first recorded after 1995.

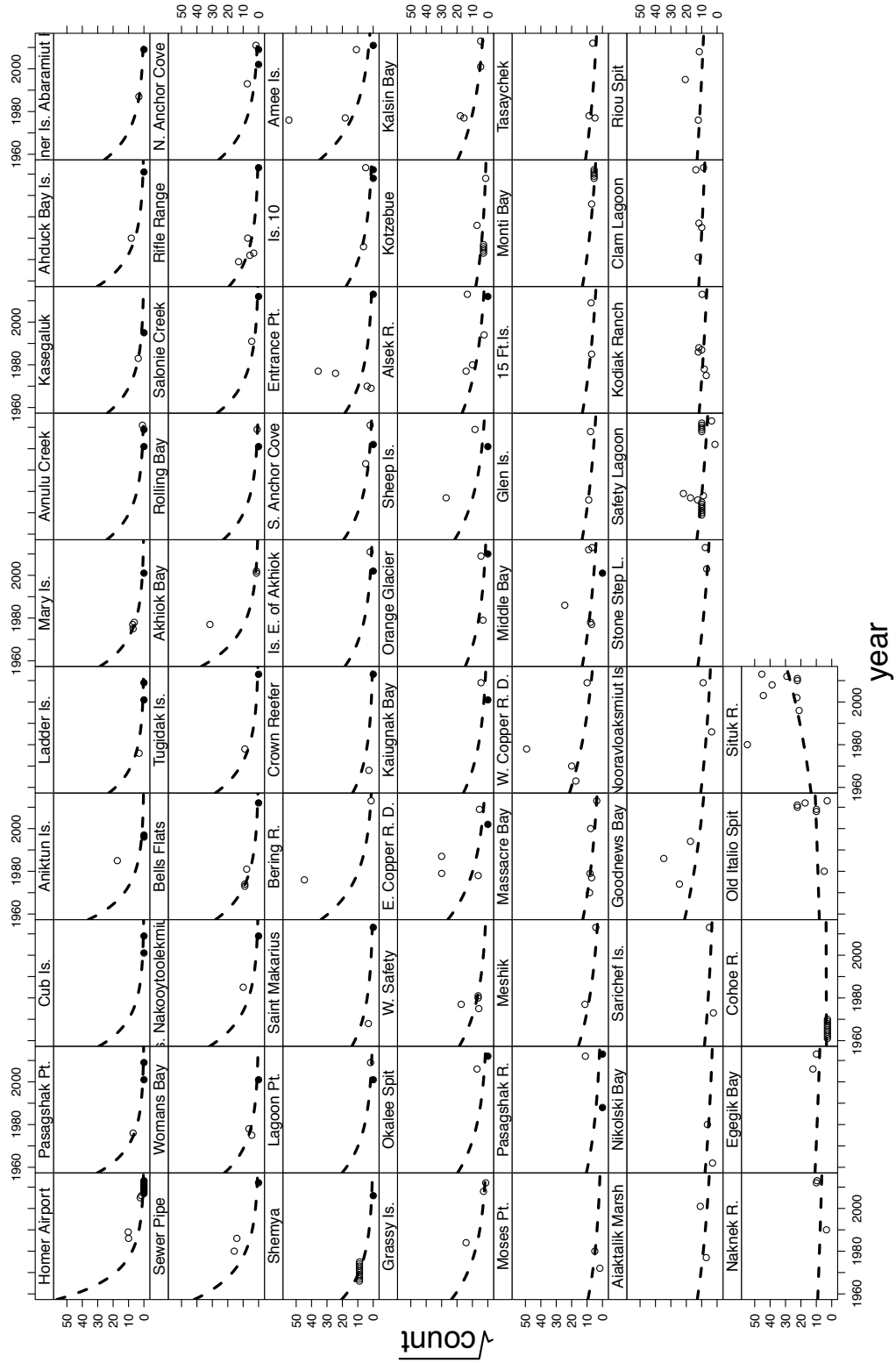

Fig. 5. Modeled trends in Alaskan Aleutian Tern colonies since 1960. For graphical visualization, colony counts were square-root transformed. Colonies were ordered by the size of the mean count.

species (e.g. Common Terns *Sterna hirundo* [1.6–4.6 million], Arctic Tern [>2 million] and Caspian Tern *Hydroprogne caspia* [240000–420000]; IUCN 2014). Globally, this estimate puts Aleutian Tern probably among the 10 (out of 41–43 species) rarest terns by population size (IUCN 2014). Our trend analysis indicates a large-scale change in previously documented populations in Alaska. To put this potential decline in perspective, one of the criteria for categorizing a species as Critically Endangered by the IUCN Red List program (IUCN 2013) is a decline of >80% over three generations (estimated near 33 years for Aleutian Terns), and our Alaskan data indicated a 92.9% decline over that time period. Although we were unable to complete a trend analysis on the available Russian Aleutian Tern colony data, it does not appear that the overall population there is declining. Local populations appear to be increasing in the South Koryakiya and Sakhalin Island regions, and they appear stable in Kamchatka. The northern end of Sakhalin Island may support half the world's population of breeding Aleutian Terns, with the majority found in the Piltun Gulf. Further surveys are needed across Alaska and Russia to confirm whether additional colonies exist.

Our estimates of population size are dependent on a number of underlying assumptions. A few Alaskan areas that we believe may still have nesting Aleutian Terns lack recent surveys; these include Goodnews Bay, Dillingham (Grassy Island), Izembek Lagoon and Port Moller, each of which has previously supported hundreds of birds. Likewise, the Alaskan and Siberian coastlines are vast, and these findings do not account for a significant amount of unsurveyed area that could potentially support nesting Aleutian Terns. Moreover, we do not know whether birds from colonies that have declined or are no longer active have moved to new locations and established colonies that have not yet been identified. Banding or satellite tagging studies are needed to understand intercolony movements.

Even where count data are available, inference is drawn from a relatively small number of sampling events in any one colony location. Until 2013, counts were not conducted following a formal protocol. Furthermore, counts were not conducted within a standard temporal window during the breeding season, a standardized metric was not used for counts (e.g. birds in the air, nests etc.), and data quality is low in many cases (e.g. estimates were occasionally guesses rather than counts and were rarely replicated). In addition, there is known variability in attendance, both within and among years (Pyare *et al*. 2013); as a result, the limited data are confounded by extreme variation in attendance, partly due to breeding failure, and occasional colony movement (Oehlers 2012). However, recognizing this limitation, we see no reason for directional bias in the estimates. The strength of our analysis is based on the large number of colonies combined into a single model, together indicating a trend.

We are unaware of any published data on dispersal or philopatry in Aleutian Terns. Limited evidence from Alaska and Kamchatka suggests that Aleutian Terns can visit potential breeding sites 10–100 km apart from one year to the next (Lobkov 1998, Pyare *et al*. 2013). Movement between breeding colonies is common in some tern species (but see Braby *et al*. 2012), and this movement complicates the interpretation of colony count data. Emigration from a breeding colony can be caused by a variety of factors, including predation (Brindley *et al*. 1999, Cuthbert and Wires 1999), human disturbance from egging (Feare and Lesperance 2002), food availability (Crawford 2003) and management actions (Roby *et al*. 2002). The resulting immigration to neighboring colonies by dispersing individuals can have a profound effect on colony growth rate (Szostek *et al*. 2014). Although dispersing terns may occasionally establish new colonies (Roby *et al*. 2002), it seems more common that they will move to a previously established colony (e.g. Feare & Lesperance 2002, Tims *et al*. 2004, Devlin *et al*. 2008, Spendelow *et al*. 2010). For some species of tern, high rates of fidelity to previous breeding colonies have been observed, particularly at colonies that experience low rates of predation and disturbance (Spendelow *et al*. 1995, Devlin *et al*. 2008). Given the limitations of our data, we cannot quantify the influence that dispersal may have on the population dynamics of Aleutian Terns. We acknowledge the possibility that some of the observed decline at individual Aleutian Tern colonies in Alaska may be due, in part, to dispersal and that Aleutian Terns in Alaska likely comprise a metapopulation of local populations distributed among patches of suitable habitat. However, we believe that the effect of dispersal alone may not be enough to explain the observed declines in known colonies, because (1) dispersal rates may be low for remote colonies in Alaska that do not have high levels of disturbance, (2) dispersing birds may be more attracted to established colonies (as opposed to establishing new colonies, thus making them more likely to be counted at a neighboring colony), and (3) there would have to be considerably more emigration from known colonies to unknown colonies rather than the other way around (i.e. dispersal would have to be biased). Disturbance could cause such a bias, and would likely lead to increased breeding failure and decreased productivity as well.

Clearly, there is a need to examine potential habitat areas outside known colonies to confirm our results. Nonetheless, within Alaska, from our experience searching large areas for these colonies, we think it is unlikely birds could have relocated in Alaska, to locations not subsequently discovered, sufficiently to counter the large decline observed in known colonies.

At an even broader scale, the question about connectivity between Russian and Alaskan populations is still open. Based on data collected from two birds equipped with geolocators, the migration route for Alaskan Aleutian Terns overlapped some of the coastline where Russian birds have established colonies (Pyare *et al*. 2013). Still, birdwatchers' reports suggest a highly pelagic migration is most likely, with birds seen from land only during or after major storms.

We have no evidence of a single stressor responsible for the apparent reduction in Aleutian Terns in Alaska. Several factors, including predation, traditional harvest of eggs and disturbance by humans likely play a role in population change at local scales and, cumulatively, may have wider population-level effects. Aleutian Tern eggs and chicks are taken by a large variety of avian and terrestrial predators, and heavy predation can negatively affect reproductive success, particularly when combined with other forms of colony disturbance (Nechaev & Lobkov 1988, Haney *et al*. 1991, Oehlers 2007, North 2013). Subsistence egging by Alaska natives occurs at many colonies (e.g. Yakutat, Cape Krusenstern, Dillingham, Goodnews Bay, Kodiak Island, Situk River). Aleutian Terns can be highly sensitive to human disturbance (Buckley & Buckley 1979, North 2013) and have abandoned colonies after just a single human visit (Haney *et al*. 1991). Some of the large tern colonies in Alaska as well as in the south Sea of Okhotsk and southwest Bering Sea are near areas of substantial human activity, and we received anecdotal reports of regular disturbance at many colonies (see also Nechaev & Lobkov 1988, Lobkov 1998). Sometimes disturbance and predation can have a strong effect on single colonies: for example, Babenko (1996) identified egging and disturbance as the main threats to Aleutian Terns in the Schastya Gulf.

The availability of suitable nesting habitat is not known to be a limiting factor for Aleutian Terns at the population level, although habitat change has created local-scale effects in a few instances that may influence long-term tern nesting success (e.g. tectonic uplift in the Copper River Delta [Holtan 1980], coastal and fluvial processes at Situk River, Yakutat [Oehlers 2007], and storm tides and erosion on coastal barrier islands in the Bering Sea [Gill 2008]).

Other factors that may impact Aleutian Terns, and have not been studied, include the status of the marine-based food supply within foraging distance of breeding colonies and habitat quality in wintering areas. Changes in food availability have been implicated in a 57% Arctic Tern decline in Maine in the last decade (Linda Welch, pers. comm.; Gulf of Maine Seabird Working Group 2014). On a local level, food availability has also been shown to significantly influence colony size and fidelity in Greater Crested Terns *Thalasseus bergii* (Crawford 2003). Although the wintering areas of Aleutian Terns are still largely unknown, some evidence indicates that some birds spend the winter in Southeast Asia and Oceania in the tropical western Pacific (Haney *et al*. 1991, North 2013, Pyare *et al*. 2013). In particular, there are a small number of old specimen records from the Philippines and Indonesia (Lee 1992, Hill & Bishop 1999, Carey *et al*. 2001). Since the early 1990s, the species has been recorded annually in the fall off Hong Kong and less frequently in spring (Hill & Bishop 1999). In addition, a wintering area has been found recently in the Strait of Malacca (Poole *et al*. 2011). Little is known about the potential habitat quality or threats to Aleutian Terns in these areas.

Apparent numbers of Aleutian Terns in Alaskan colonies have declined dramatically since the 1960s. If these counts were to reflect the population history of the species, it would represent an almost unparalleled population crash within Alaskan seabirds. Many unanswered questions remain, however.

Recommendations

Although some effort has been made to monitor Aleutian Terns in a few discrete locations in Alaska (e.g. Yakutat, Kodiak Island), a coordinated, range-wide monitoring program, including an appropriate sampling design and protocol development, is needed to track the population. Surveys should also be conducted at historical colonies, particularly in the Aleutian Islands and Bering Sea/Alaska Peninsula (north side), where limited contemporary survey data are available. Tagging studies to determine inter-colony movement, and broad food habits studies, are needed. In the interim, we urge management efforts to insulate colonies from human disturbance and more concerted efforts among Alaska and Russian partners, especially focused on understanding colony movements and dispersal.

Outside of the breeding grounds, priority should be given to collecting information on Aleutian Tern wintering locations and ecology. Current information is limited to a handful of sight records and is insufficient to determine whether potential threats on the wintering grounds could be negatively impacting the species.

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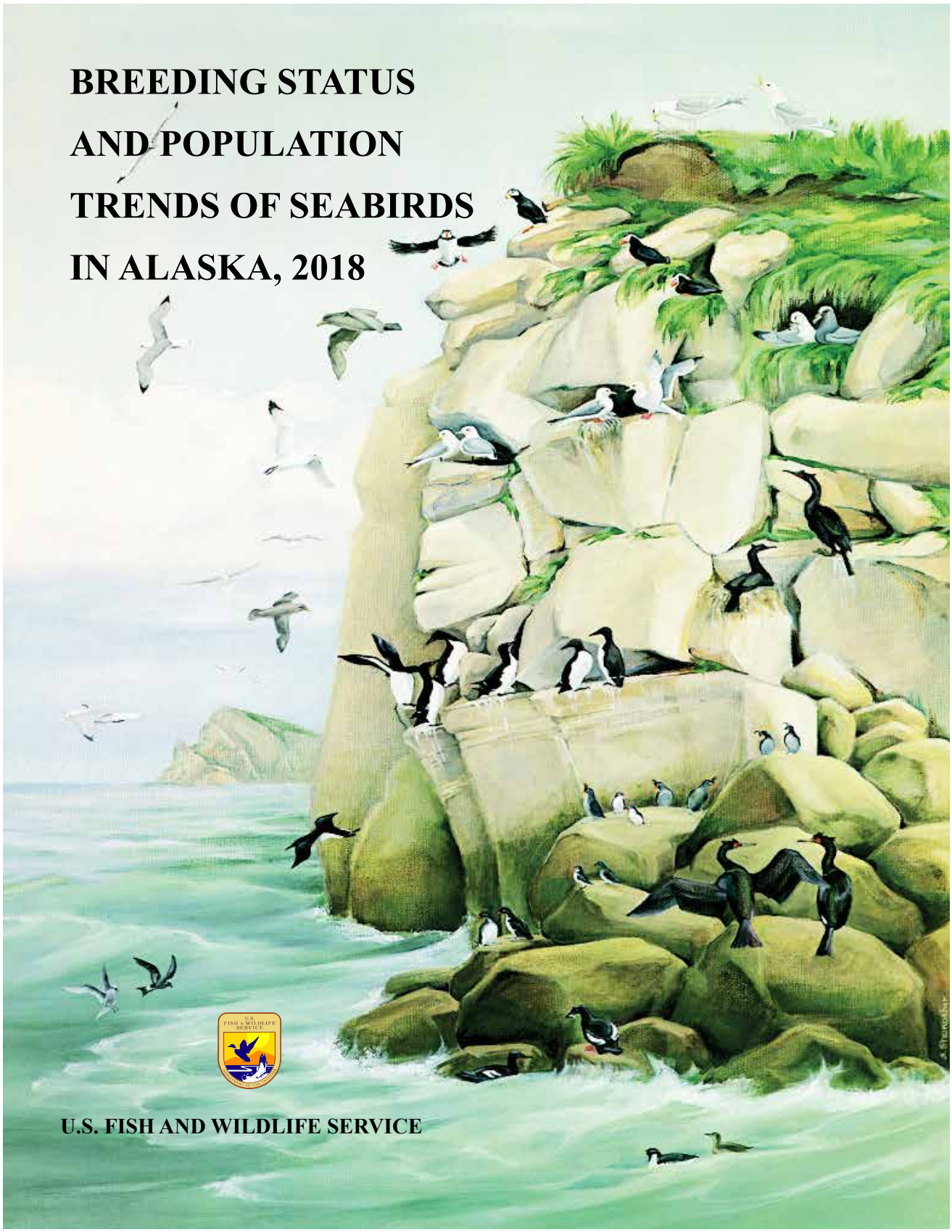
BREEDING STATUS
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IN ALASKA, 2018
U.S. FISH AND WILDLIFE SERVICE

AMNWR 2019/03

BREEDING STATUS AND POPULATION TRENDS OF SEABIRDS IN ALASKA, 2018

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, *Larus*, Leach's storm-petrel, least auklet, long-term monitoring, northern fulmar, *Oceanodroma*, 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 2018, seabird data were gathered at seven of the eight annual monitoring sites on the Alaska Maritime NWR. Birds were not monitored at Cape Lisburne in 2018. The species/species groups monitored were murres, pigeon guillemots, ancient murrelets, auklets, puffins, kittiwakes, glaucous-winged gulls, northern fulmars, storm-petrels, and cormorants. In addition, data were gathered at seven 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 2018 mean hatch date was early in 20%, average in 20%, and late in 60% of monitored species. Hatch dates of only three species (ancient murrelets, least auklets, and tufted puffins) were earlier than average in 2018. Most other species were late, with three species exhibiting average timing.

• Murre and kittiwake eggs failed to hatch on study plots at some monitored colonies in 2018 (e. g., murres at Aiktak Island; black-legged kittiwakes at St. George Island; red-legged kittiwakes at St. Paul Island). Least auklets hatched early at St. George Island for the fifth year in a row. Murres hatched later than average for the second year at the Pribilof Islands.

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 2018 are included.

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

[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, 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, only red-faced cormorants exhibited higher than average productivity in 2018 (6% of monitored species). Productivity was average in 59% of species, and below average in 35%.

• In 2018, common murres and black-legged kittiwakes exhibited widespread breeding failures, especially in the southeastern Bering Sea and Gulf of Alaska. However, in contrast to birds in other Gulf of Alaska colonies, murres, puffins, black-legged kittiwakes, and red-faced cormorants all exhibited higher than average

productivity at Chowiet Island in 2018.

• Observations made during a short visit to the Chukchi Sea indicated that murre productivity was very low at capes Lisburne and Thompson as well as at Sledge Island and Bluff in 2018.

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 2018 are included.

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

[c]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.

Population trends during 2009-2018 (Table C)

• Statewide, 12.5% of species/species groups showed increasing population trends, 37.5% were stable, and 50% declined between 2009 and 2018.

• Low colony attendance in recent years following the 2015-2016 winter die off may be a consequence of poor breeding performance, which could be due to local habitat conditions but also could be a result of poor body condition from the winter. Birds not attending the cliffs frequently form large rafts in nearby waters.

• In some cases, recent counts were a small fraction of prior years' counts. For example, the 2016-2018 counts of common murres at Cape Peirce all were below 100 birds, whereas counts prior to 2016 averaged almost 3000 birds. 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 breed in recent years.

Table C. Regional and statewide seabird population trends[a] between 2009 and 2018 within regions and the state of Alaska as a whole. Only sites for which there were data from at least two years (at least 5 years apart) within the target decade are included.

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

[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.

[b]BS=Bering Sea, CS=Chukchi Sea, GOA=Gulf of Alaska.

[c]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, NOFU=northern fulmar, FTSP=fork-tailed storm-petrel, STPE=unspecified storm-petrel, RFCO=red-faced cormorant, PECO=pelagic cormorant, UNCO=unspecified cormorant.

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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 2006-2018 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 2018, seabird data were gathered at seven of the eight annual monitoring sites on the Alaska Maritime NWR. Birds were not monitored at Cape Lisburne in 2018, although a short visit to the area occurred in late July-early August. Furthermore, data are recorded annually or semiannually at other sites in Alaska (e.g., Cape Peirce, Togiak NWR; Round and Middleton islands; 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 2018 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 2018). 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, but occasionally other variables were used (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 referenced herein.

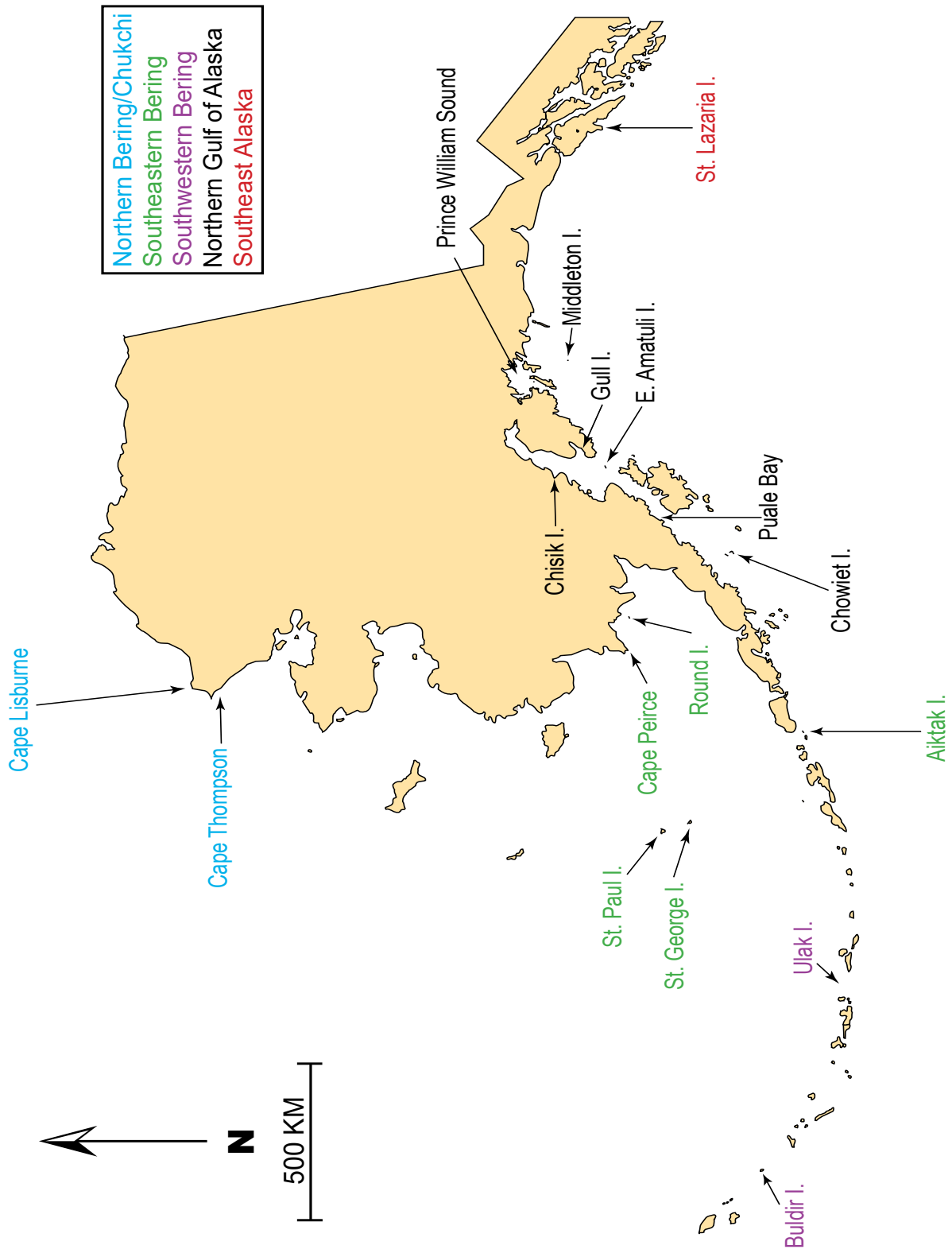

Figure 1. Map of Alaska showing the locations of seabird monitoring sites summarized in this report. Text color indicates geographic regions.

Table 1. Productivity parameters used in this report (see AMNWR 2018).

Species	Productivity Value
Murres	Chicks Fledged/Nest Site (Total chicks fledged/Total sites where egg was laid)
Ancient murrelet	Chicks Fledged/Egg (Total chicks fledged/Total eggs)
Auklets (except RHAU)	Chicks Fledged/Nest Site (Total chicks fledged/Total sites where egg was laid)
Rhinoceros auklet	Overall Residency Index (Late apparent occupancy/Early apparent occupancy)
Horned puffin	Chicks Fledged/Egg (Total chicks fledged/Total eggs)
Tufted puffin	Overall Residency Index (Late apparent occupancy/Early apparent occupancy)
Kittiwakes	Chicks Fledged/Nest (Total chicks fledged/Total nests)
Glaucous-winged gull	Hatching Success (Total chicks/Total eggs)
Storm-petrels	Chicks Fledged/Egg (Total chicks fledged/Total eggs)
Cormorants	Chicks Fledged/Nest (Total chicks fledged/Total nests)

This report summarizes monitoring data from 2018, and compares 2018 results with previous years. For sites with at least two years of data prior to 2018, 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 (≥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 (2009-2018 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 2009-2018), 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 2009 and 2018 were included.

Results

Common murre (*Uria aalge*)

Table 2. Hatching chronology of common murres at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	16 Aug (15)[a]	4 Aug (30)[a]	Mong et al. 2019
St. George I.	20 Aug (5)	4 Aug (33)	Guitart et al. 2018
Chowiet I.	21 Jul (37)	22 Jul (21)	Higgins et al. 2018
St. Lazaria I.	30 Aug (43)	13 Aug (22)	Evans 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 3. Reproductive performance of common murres at Alaskan sites monitored in 2018.

Site	Chicks Fledged/ Nest Site[a]	No. of Plots	Long-term Average	Reference
St. Paul I.	0.50	3 (42)[b]	0.47 (31)[b]	Mong et al. 2019
St. George I.	0.41	3 (22)	0.48 (34)	Guitart et al. 2018
Round I.	0.00	3 (6)	0.17 (17)	E. Weiss Unpubl. Data
Buldir I.	0.00	1 (6)	0.42 (18)	Pietzak et al. 2018
Aiktak I.	0.00	1 (3)	0.22 (21)	Youngren et al. 2019
Chowiet I.	0.66	11 (187)	0.50 (23)	Higgins et al. 2018
Gull I.	0.00	NA[c]	0.39 (7)	S. Schoen Unpubl. Data
Chisik I.	0.00	NA	0.37 (6)	S. Schoen Unpubl. Data
St. Lazaria I.	0.47	9 (43)	0.47 (23)	Evans et al. 2018

[a]Since murres do not build nests, nest sites were defined as sites where eggs were laid.

[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.

[c]Not applicable or not reported.

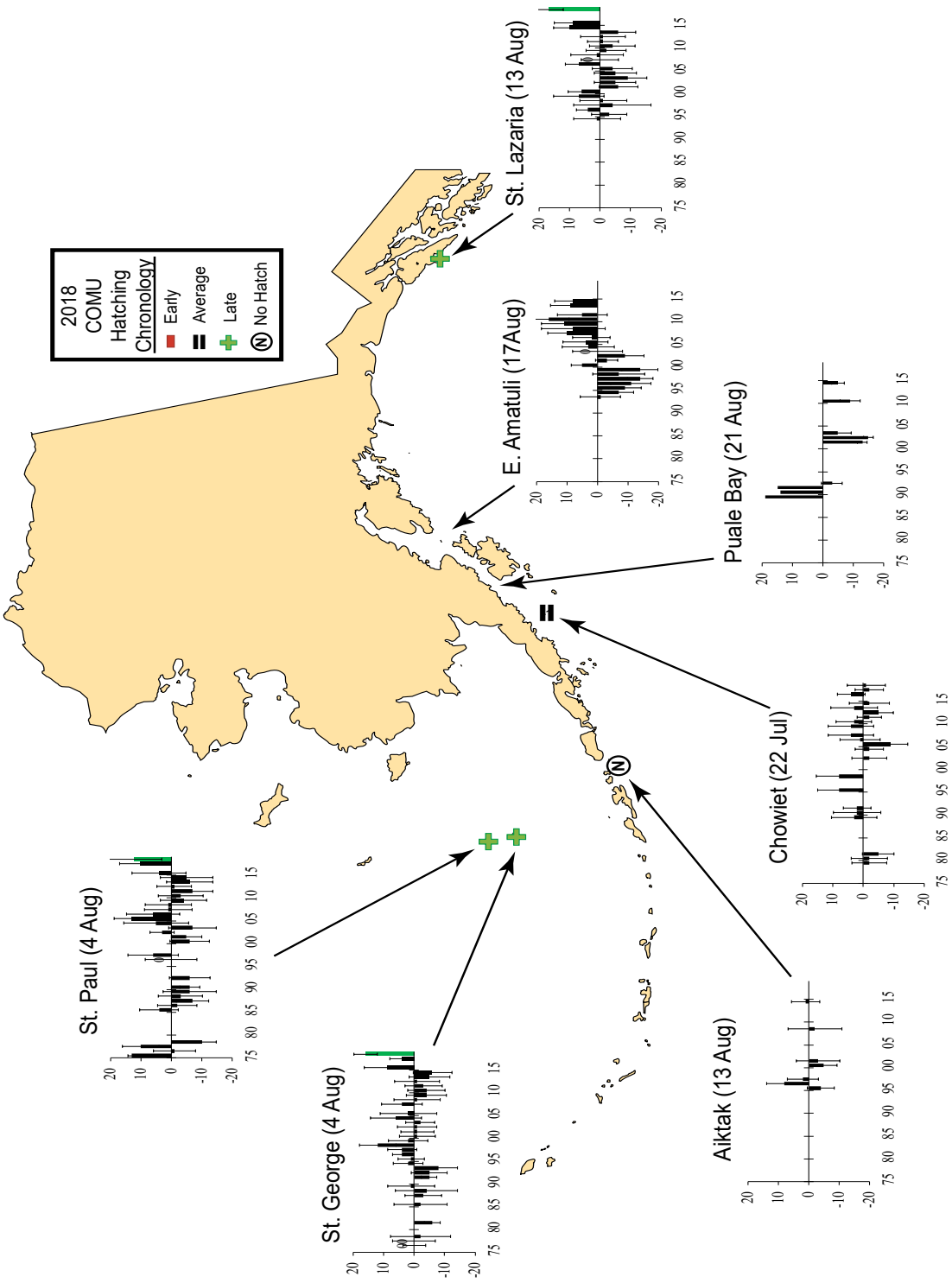

Figure 2. Hatching chronology of common murres at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current 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.

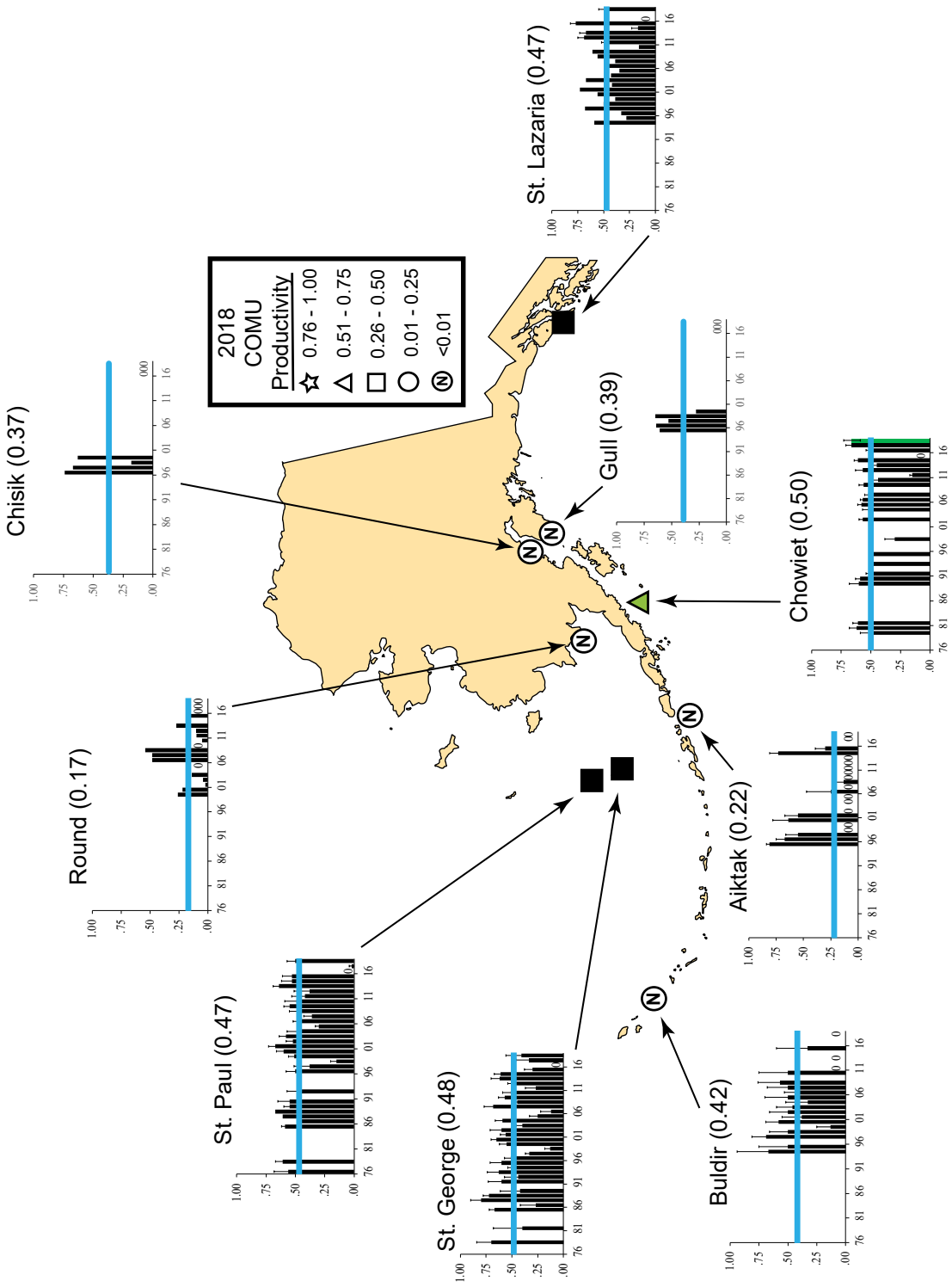

Figure 3. Productivity of common murres (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph 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.

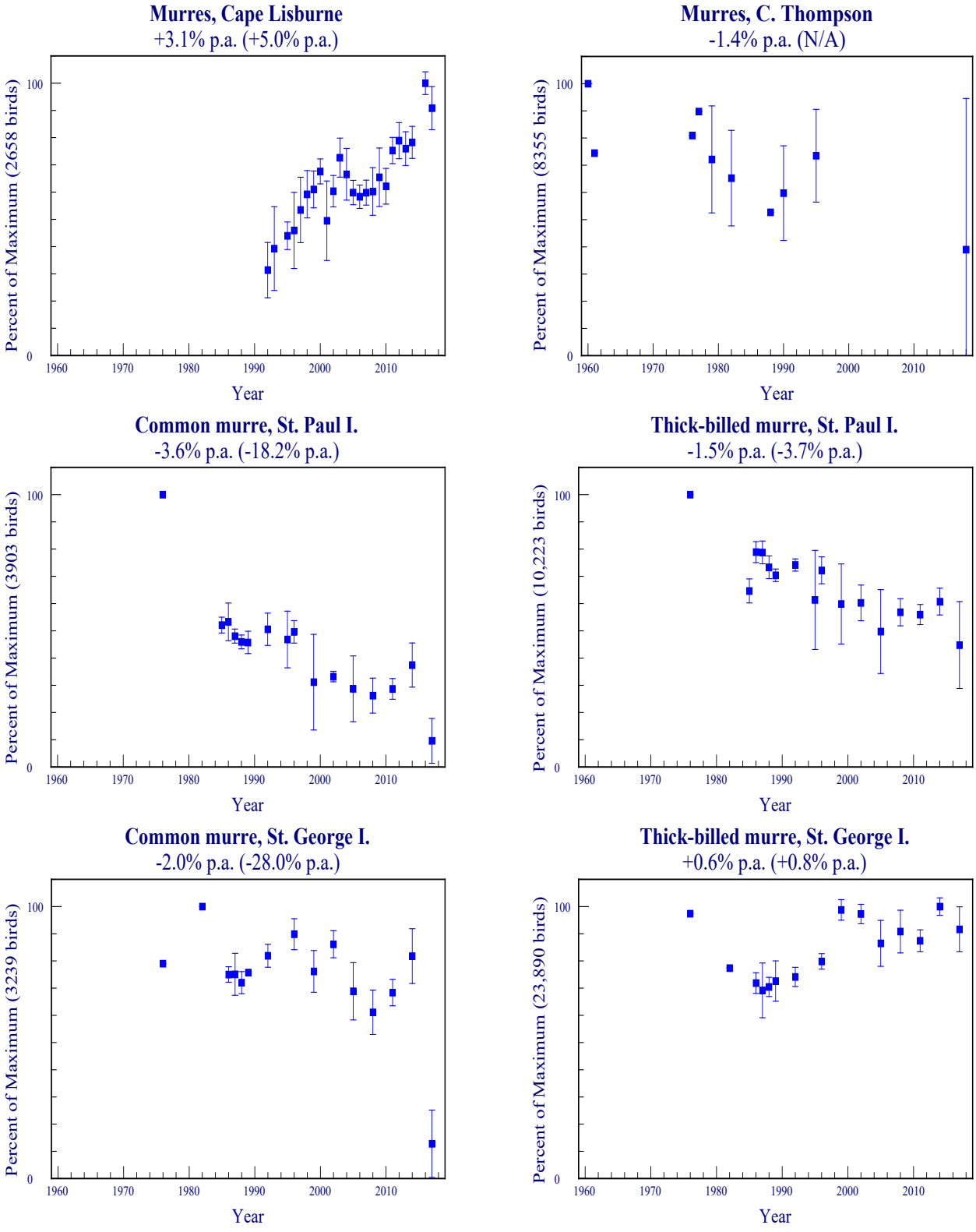

Figure 4. Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses). "N/A" indicates that insufficient data were available.

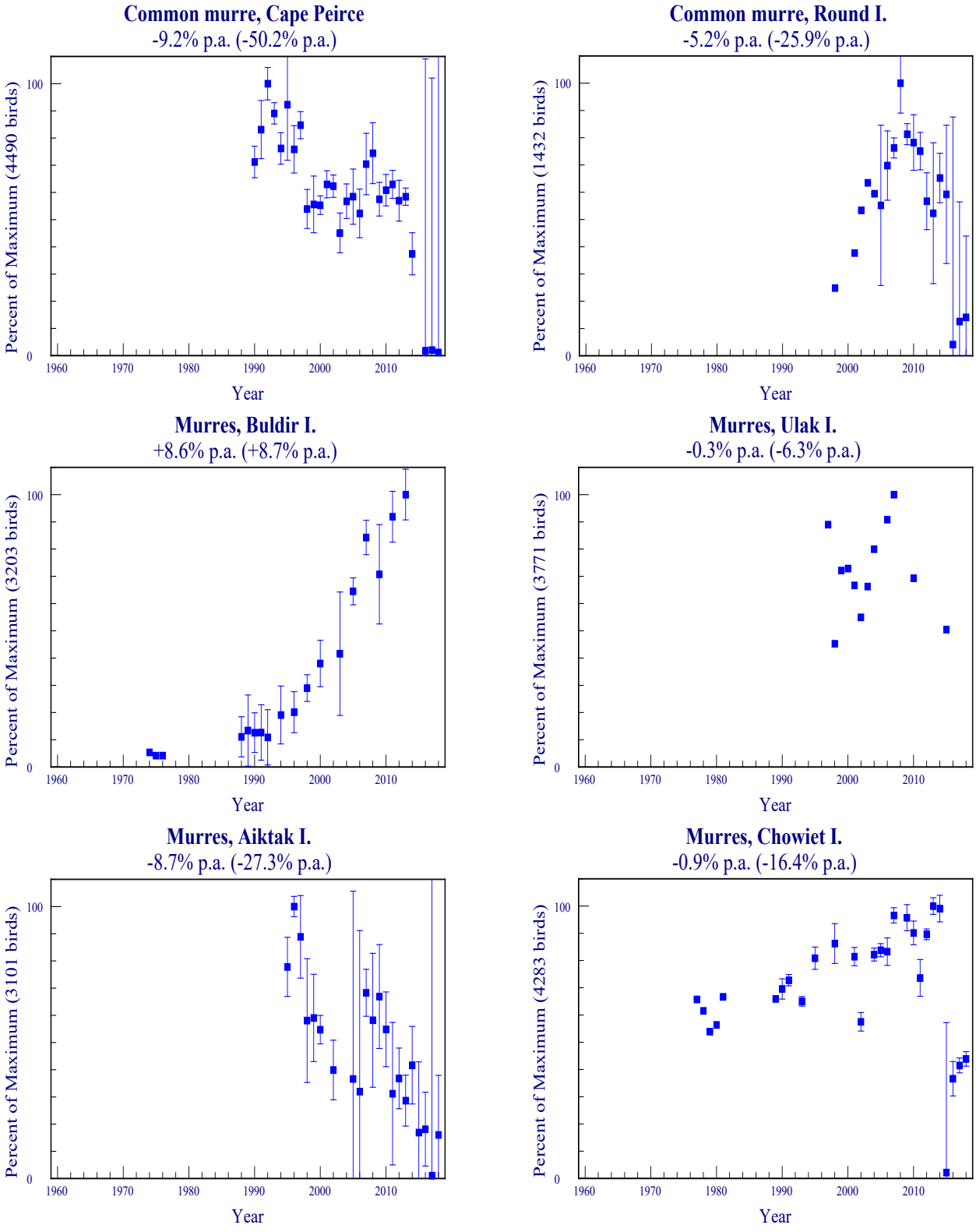

Figure 4 (continued). Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

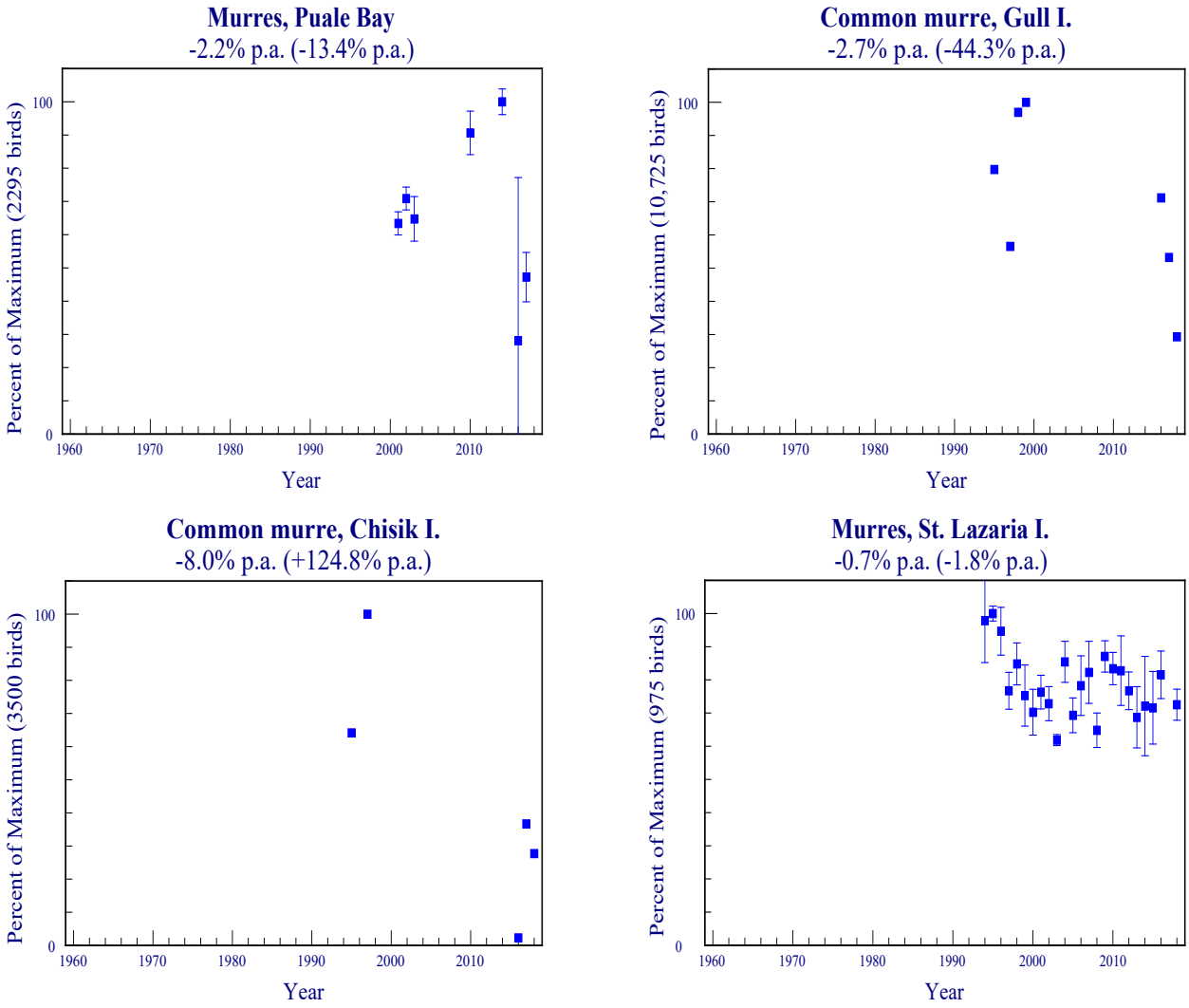

Figure 4 (continued). Trends in populations of murres at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

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

Table 4. Hatching chronology of thick-billed murres at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	21 Aug (141)[a]	6 Aug (33)[a]	Mong et al. 2019
St. George I.	17 Aug (112)	1 Aug (36)	Guitart et al. 2018
Buldir I.	25 Jul (120)	19 Jul (30)	Pietrzak et al. 2018
Chowiet I.	23 Jul (27)	21 Jul (20)	Higgins et al. 2018
St. Lazaria I.	1 Sep (7)	11 Aug (21)	Evans 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 5. Reproductive performance of thick-billed murres at Alaskan sites monitored in 2018.

Site	Chicks Fledged/ Nest Site[a]	No. of Plots	Long-term Average	Reference
St. Paul I.	0.34	13 (396)[b]	0.43 (33)[b]	Mong et al. 2019
St. George I.	0.42	15 (358)	0.49 (37)	Guitart et al. 2018
Buldir I.	0.41	9 (298)	0.65 (30)	Pietrzak et al. 2018
Aiktak I.	0.00	NA[c] (7)	0.25 (17)	Youngren et al. 2019
Chowiet I.	0.56	5 (108)	0.40 (23)	Higgins et al. 2018
St. Lazaria I.	0.60	5 (5)	0.44 (23)	Evans et al. 2018

[a]Since murres do not build nests, nest sites were defined as sites where eggs were laid.

[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.

[c]Not applicable or not reported.

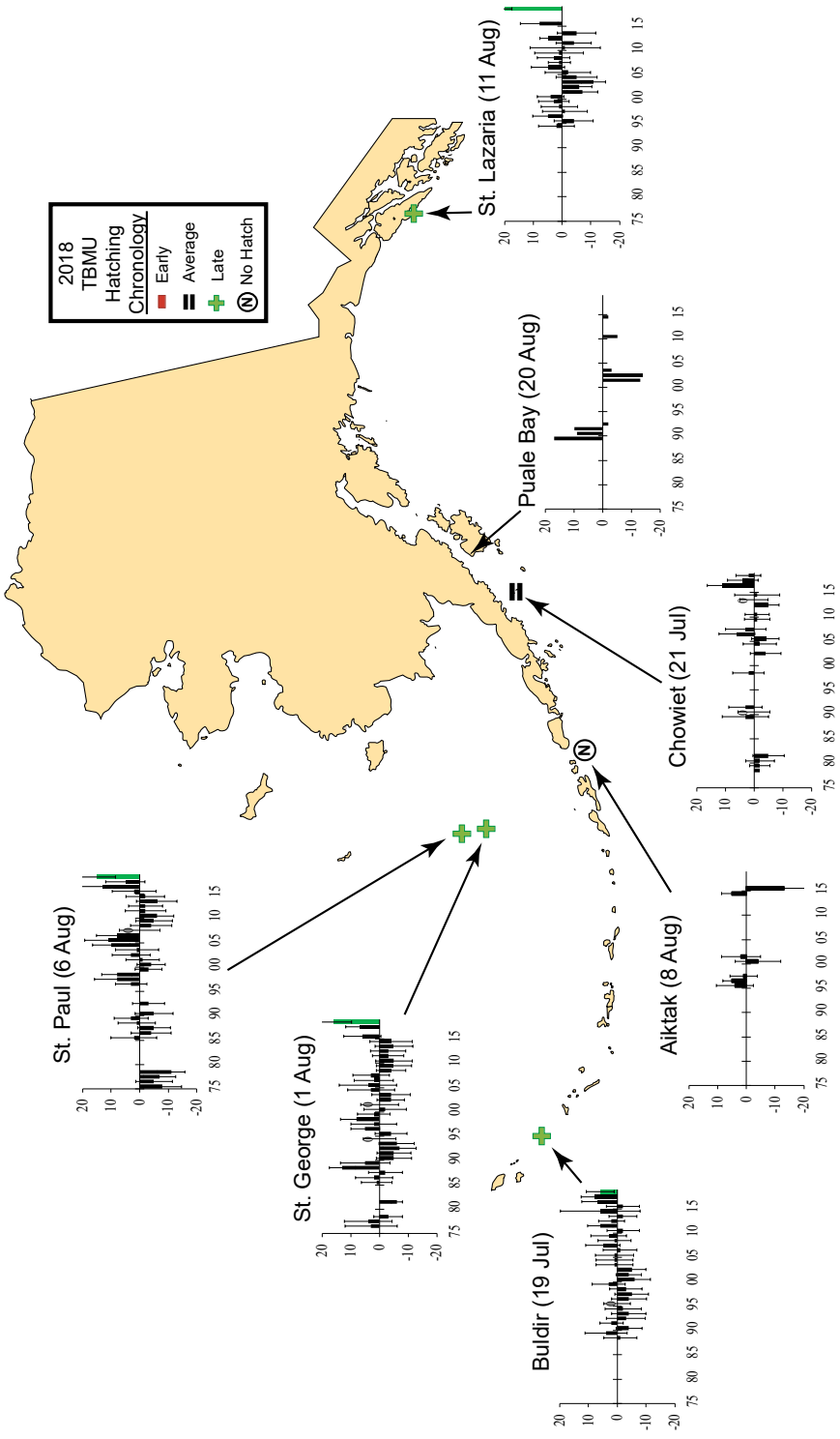

Figure 5. Hatching chronology of thick-billed murres at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how 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.

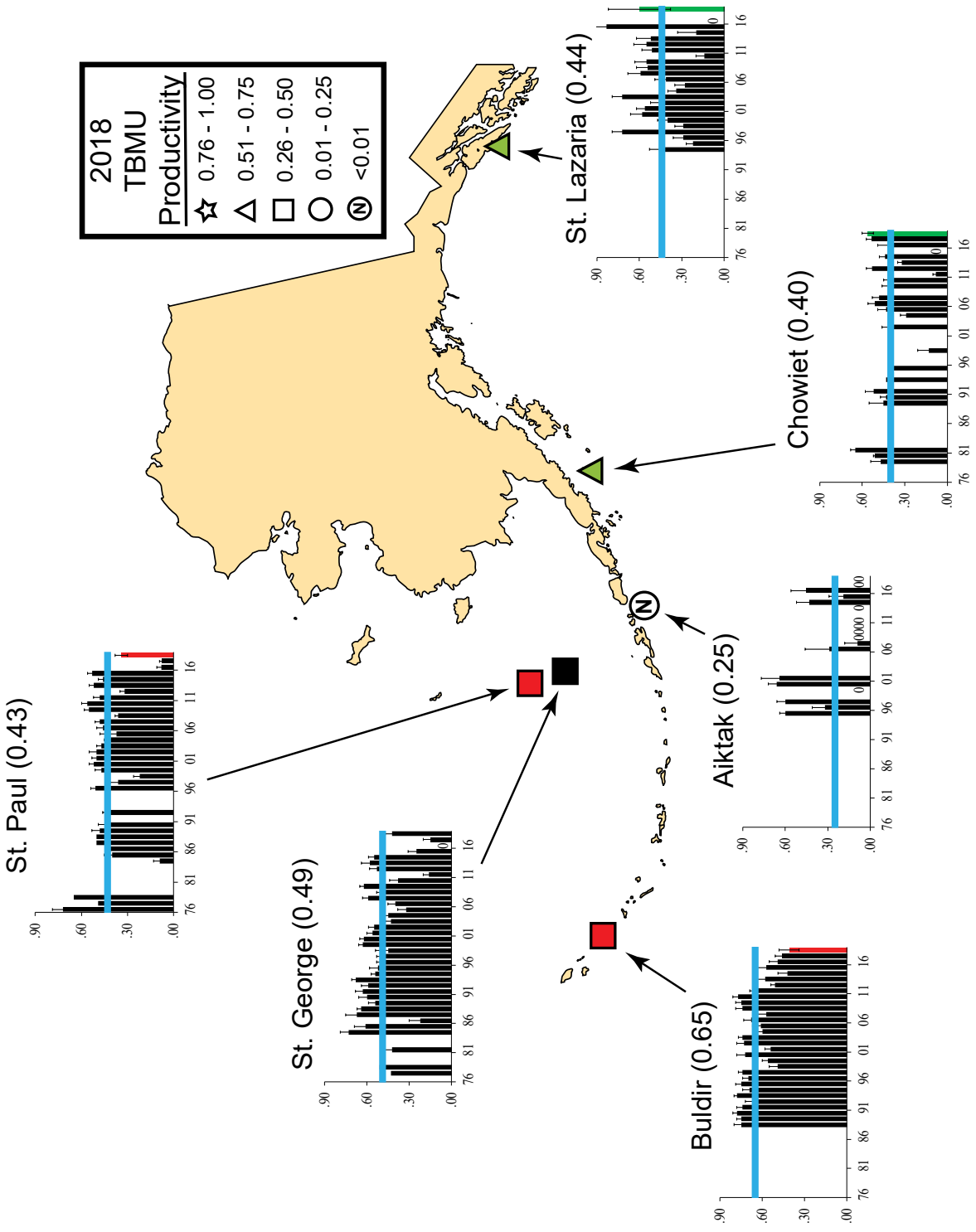

Figure 6. Productivity of thick-billed murres (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color 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.

Pigeon guillemot (*Cepphus columba*)

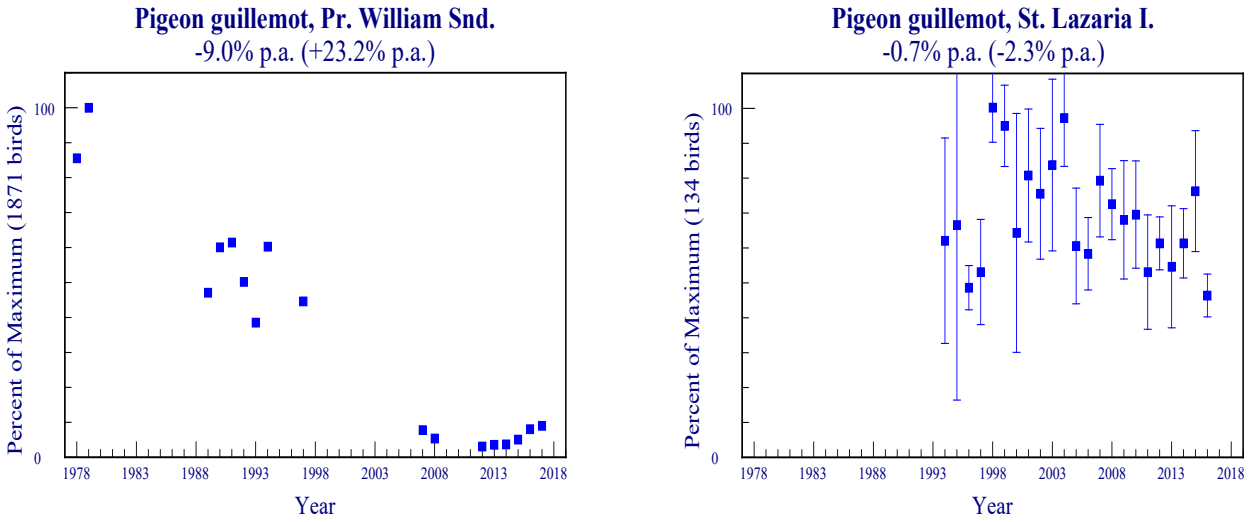

Figure 7. Trends in populations of pigeon guillemots at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

Ancient murrelet (*Synthliboramphus antiquus*)

Table 6. Hatching chronology of ancient murrelets at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Aiktak I.	28 Jun (76)[a]	3 Jul (21)[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 7. Reproductive performance of ancient murrelets at Alaskan sites monitored in 2018.

Site	Chicks Fledged/Egg[a]	No. of Plots	Long-term Average	Reference
Aiktak I.	0.87	NA[b] (167)[c]	0.80 (21)[c]	Youngren et al. 2019

[a]Total chicks fledged/Total eggs.
[b]Not applicable or not reported.
[c]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 8. Hatching chronology of parakeet auklets at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	8 Jul (27)[a]	4 Jul (26)[a]	Pietrzak et al. 2018
Chowiet I.	10 Jul (33)	4 Jul (13)	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 9. Reproductive performance of parakeet auklets at Alaskan sites monitored in 2018.

Site	Chicks Fledged/ Nest Site[a]	No. of Plots	Long-term Average	Reference
Buldir I.	0.82	NA[b] (68)[c]	0.53 (26)[c]	Pietrzak et al. 2018
Chowiet I.	0.14	NA (69)	0.40 (13)	Higgins et al. 2018

[a]Nest site is defined as a site where an egg was laid.
[b]Not applicable or not reported.
[c]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.

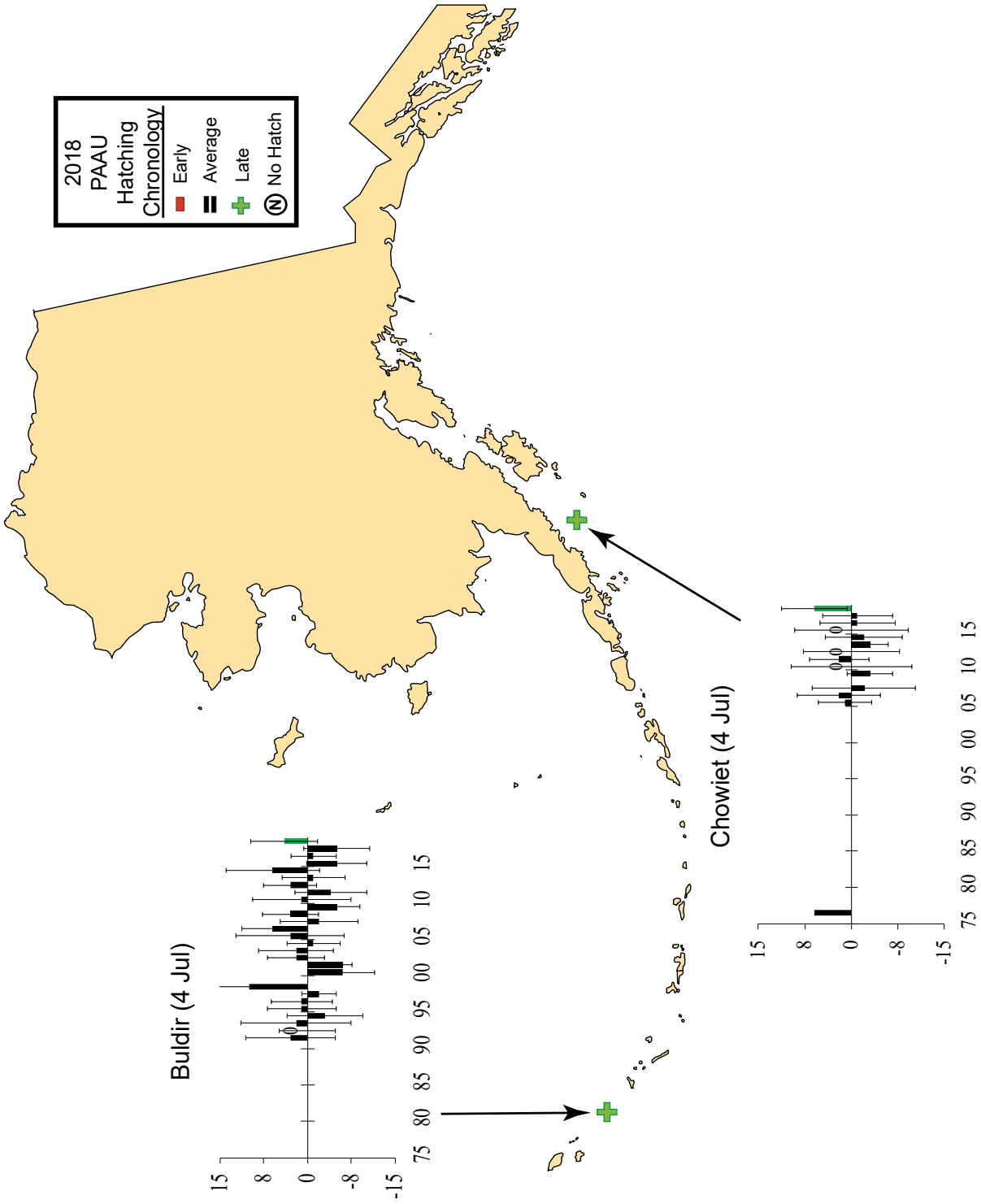

Figure 8. Hatching chronology of parakeet auklets at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current 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.

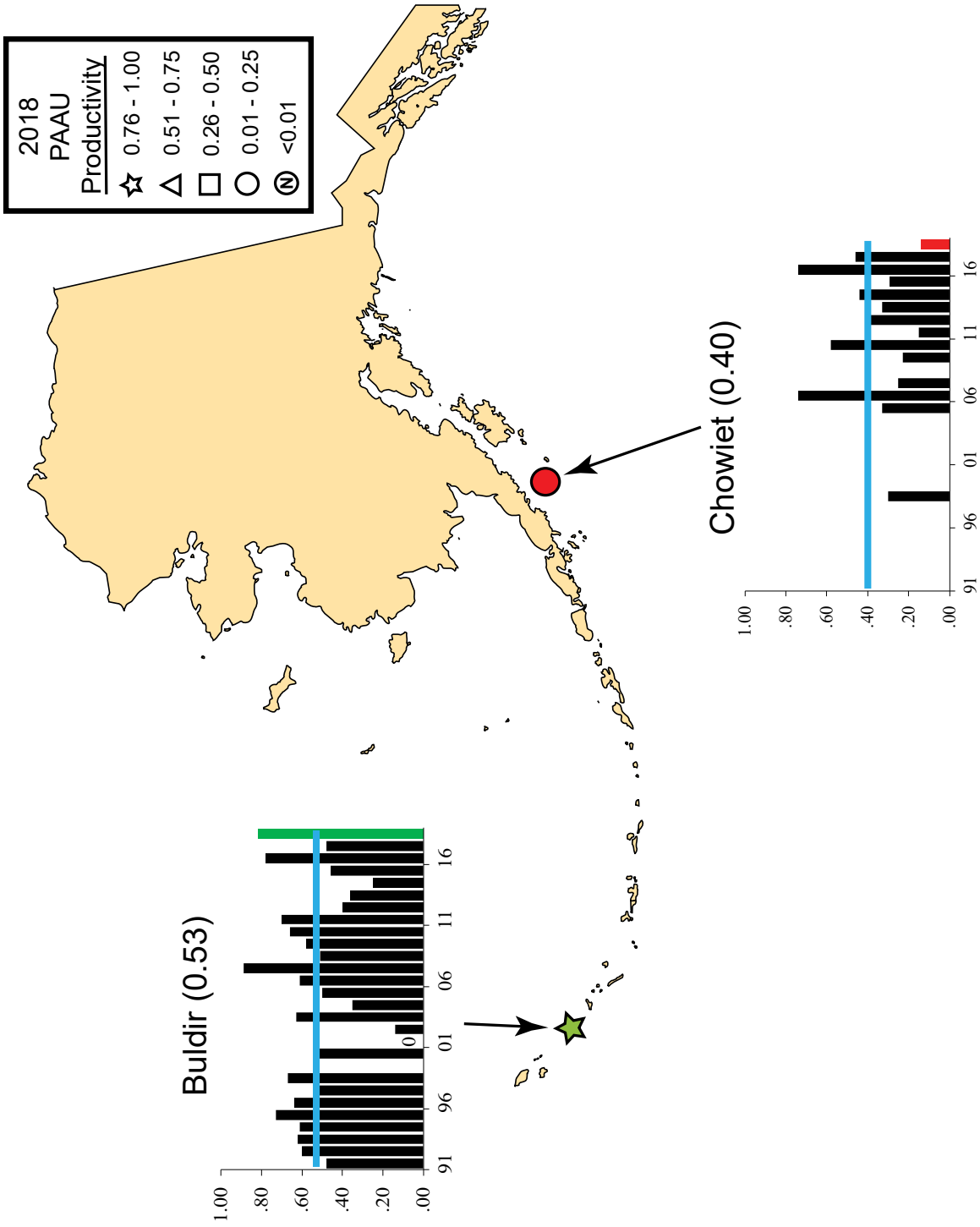

Figure 9. Productivity of parakeet auklets (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of 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).

Least auklet (*Aethia pusilla*)

Table 10. Hatching chronology of least auklets at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
St. George I.	4 Jul (3)[a]	12 Jul (10)[a]	Guitart et al. 2018
Buldir I.	28 Jun (26)	27 Jun (28)	Pietrzak 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 11. Reproductive performance of least auklets at Alaskan sites monitored in 2018.

Site	Chicks Fledged/ Nest Site[a]	No. of Plots	Long-term Average	Reference
St. George I.	0.24	NA[b] (21)[c]	0.58 (10)[c]	Guitart et al. 2018
Buldir I.	0.63	NA (65)	0.58 (29)	Pietrzak et al. 2018

[a]Nest site is defined as a site where an egg was laid.
[b]Not applicable or not reported.
[c]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.

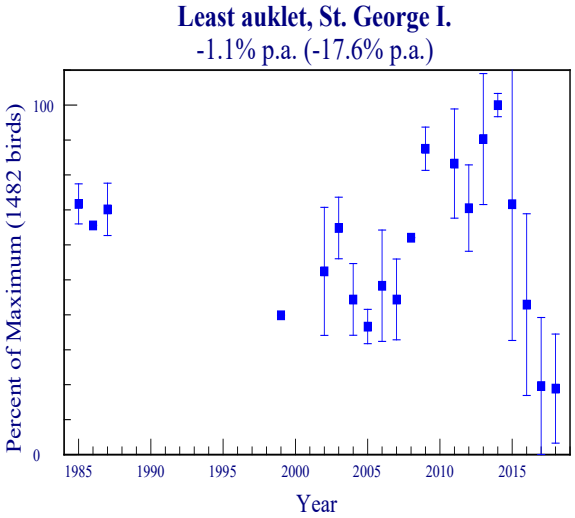

Figure 10. Trends in surface counts of least auklets at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

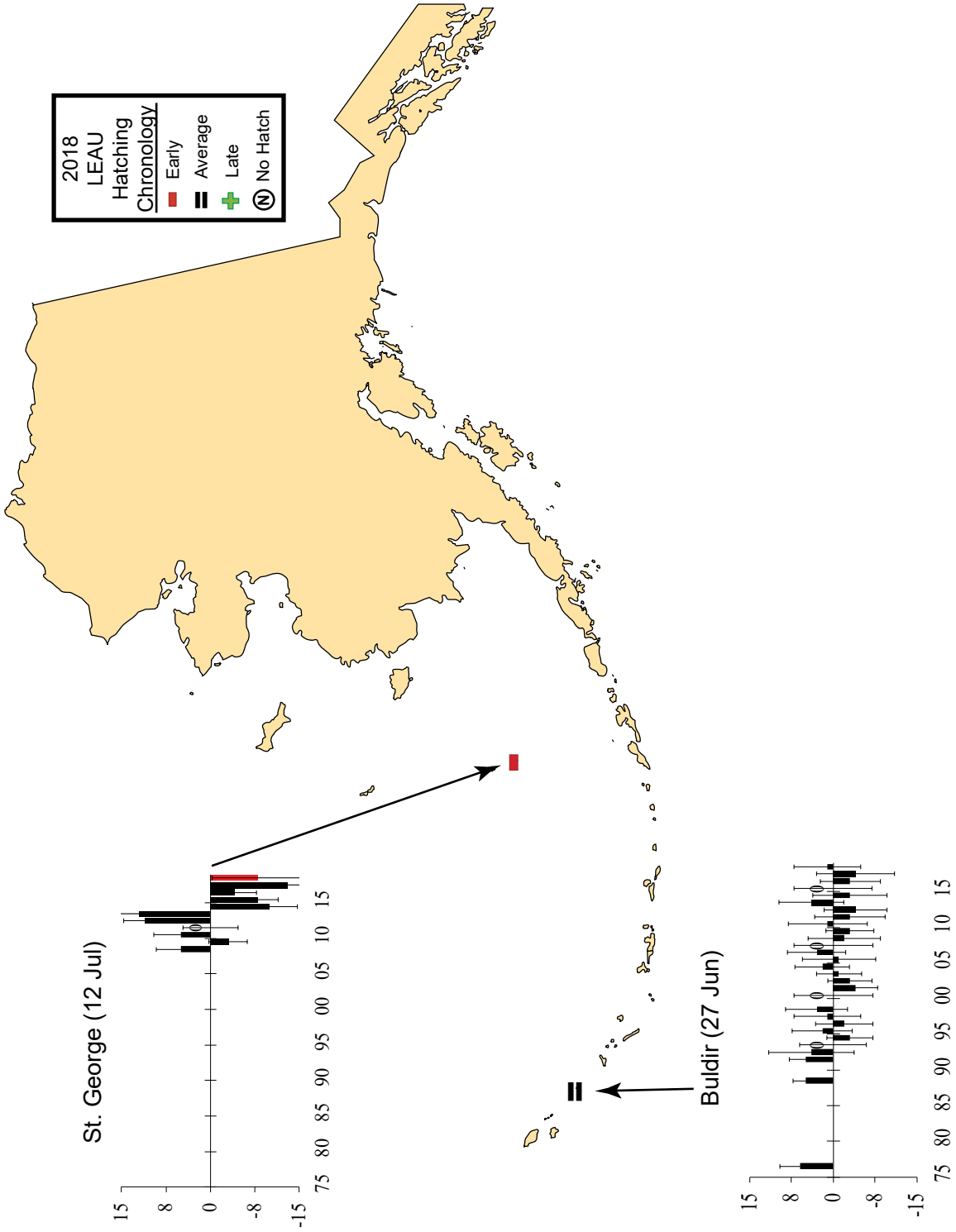

Figure 11. Hatching chronology of least auklets at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current 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.

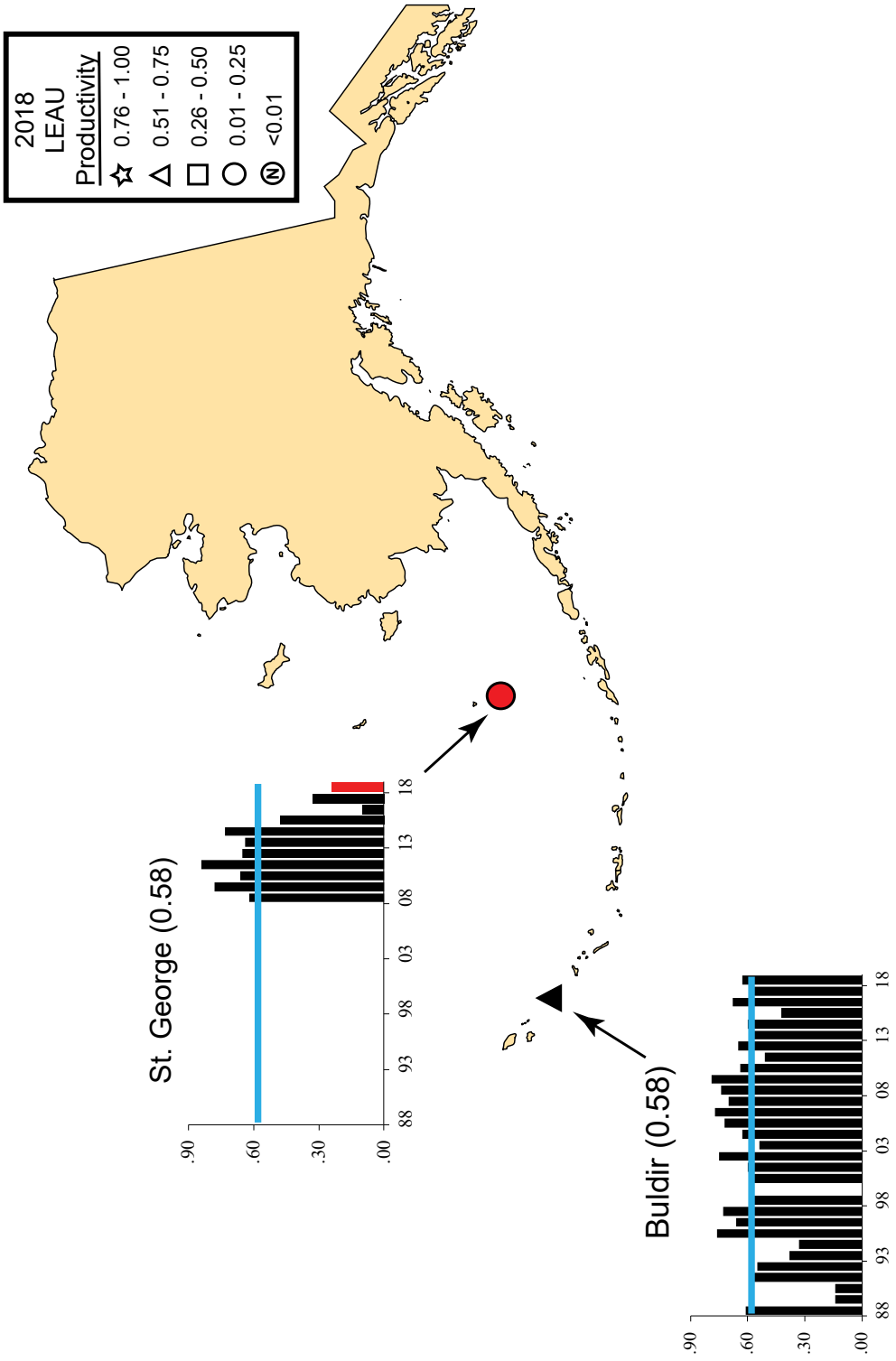

Figure 12. Productivity of least auklets (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean).

Whiskered auklet (*Aethia pygmaea*)

Table 12. Hatching chronology of whiskered auklets at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	22 Jun (34)[a]	21 Jun (27)[a]	Pietrzak 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 13. Reproductive performance of whiskered auklets at Alaskan sites monitored in 2018.

Site	Chicks Fledged/ Nest Site[a]	No. of Plots	Long-term Average	Reference
Buldir I.	0.77	NA[b] (87)[c]	0.65 (28)[c]	Pietrzak et al. 2018

[a]Nest site is defined as a site where an egg was laid.
[b]Not applicable or not reported.
[c]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 14. Hatching chronology of crested auklets at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	3 Jul (42)[a]	28 Jun (28)[a]	Pietrzak 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 15. Reproductive performance of crested auklets at Alaskan sites monitored in 2018.

Site	Chicks Fledged/ Nest Site[a]	No. of Plots	Long-term Average	Reference
Buldir I.	0.76	NA[b] (108)[c]	0.65 (29)[c]	Pietrzak et al. 2018

[a]Nest site is defined as a site where an egg was laid.
[b]Not applicable or not reported.
[c]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 16. Reproductive performance of rhinoceros auklets at Alaskan sites monitored in 2018.

Site	Chicks Fledged/Egg	No. of Plots	Long-term Average	Reference
Middleton I.	0.54	NA[a] (61)[b]	0.68 (18)[b]	ISRC 2018
St. Lazaria I.	0.71	3 (205)	0.65 (23)	Evans et al. 2018

[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.

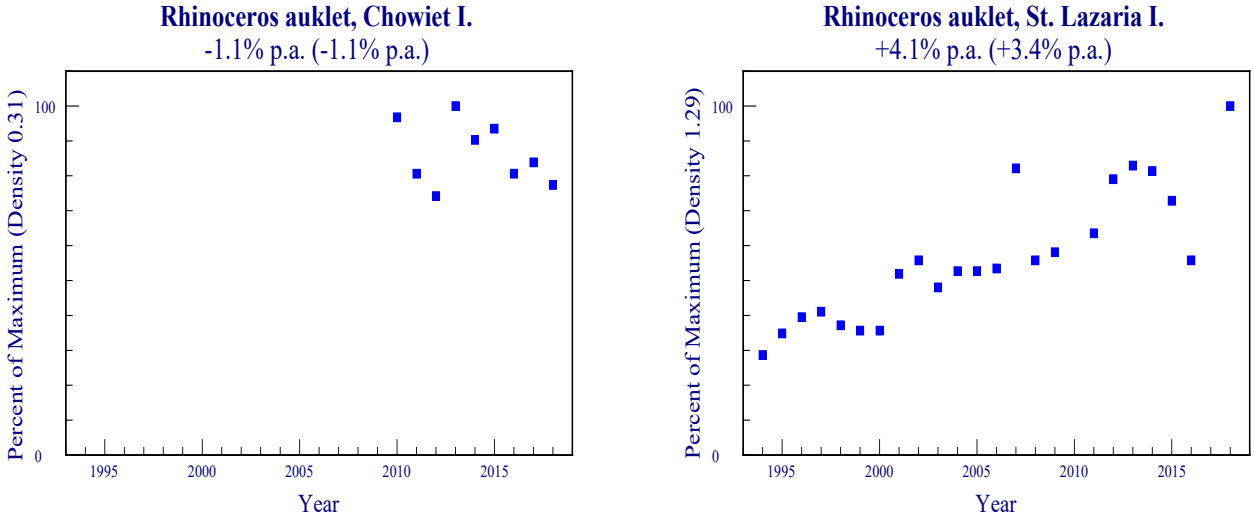

Figure 13. Trends in populations of rhinoceros auklets at Alaskan sites. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

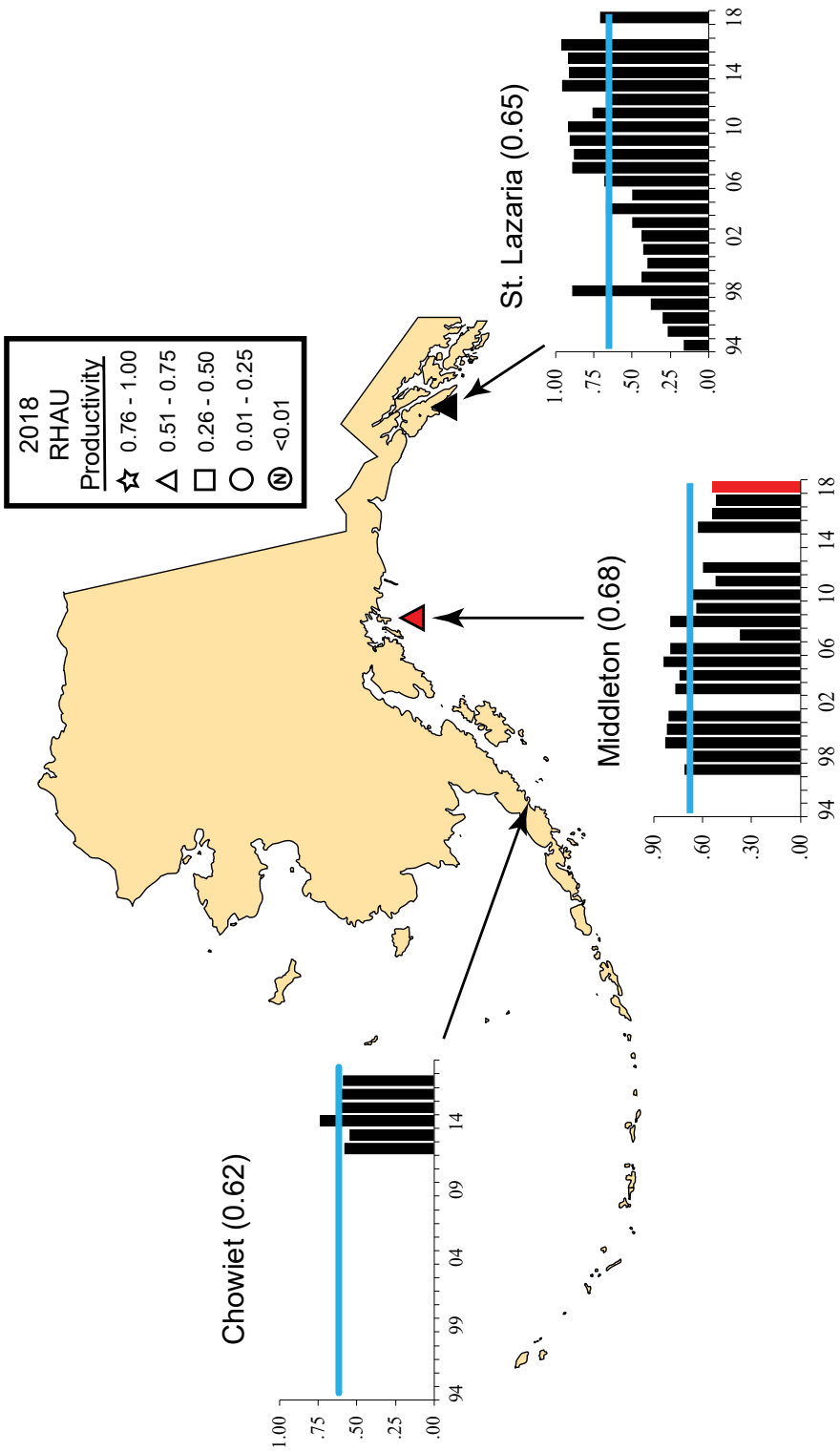

Figure 14. Productivity of rhinoceros auklets (chicks fledged/nest site) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how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

Horned puffin (*Fratercula corniculata*)

Table 17. Hatching chronology of horned puffins at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	1 Aug (34)[a]	25 Jul (28)[a]	Pietrzak et al. 2018
Aiktak I.	30 Jul (5)	31 Jul (13)	Youngren et al. 2019
Chowiet I.	22 Jul (47)	30 Jul (14)	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 18. Reproductive performance of horned puffins at Alaskan sites monitored in 2018.

Site	Chicks Fledged[a]/Egg	No. of Plots	Long-term Average	Reference
Buldir I.	0.45	NA[b] (61)[c]	0.48 (30)[c]	Pietrzak et al. 2018
Aiktak I.	0.29	NA (15)	0.58 (16)	Youngren et al. 2019
Chowiet I.	0.67	NA (88)	0.35 (13)	Higgins et al. 2018

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

[b]Not applicable or not reported.

[c]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.

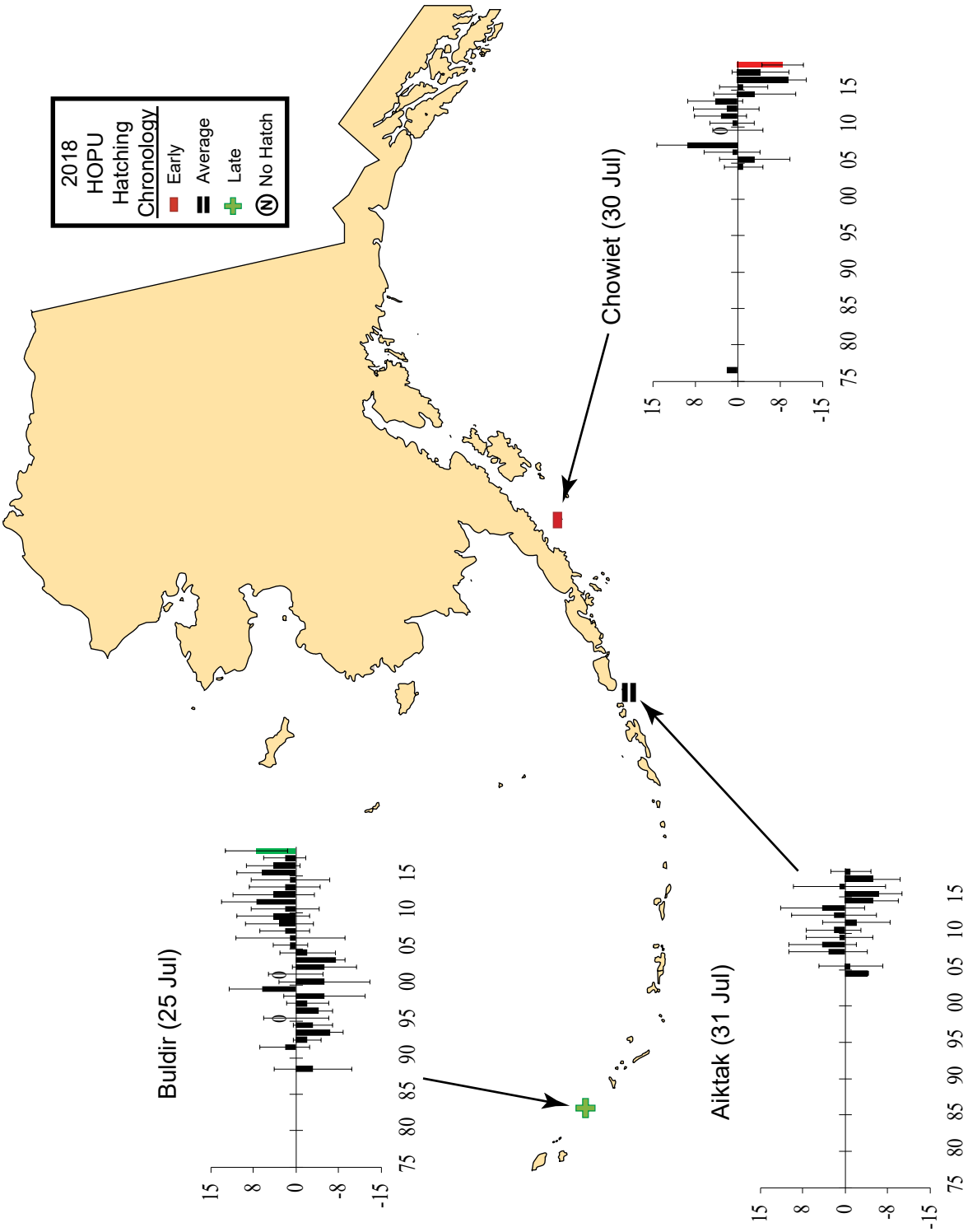

Figure 15. Hatching chronology of horned puffins at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current 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.

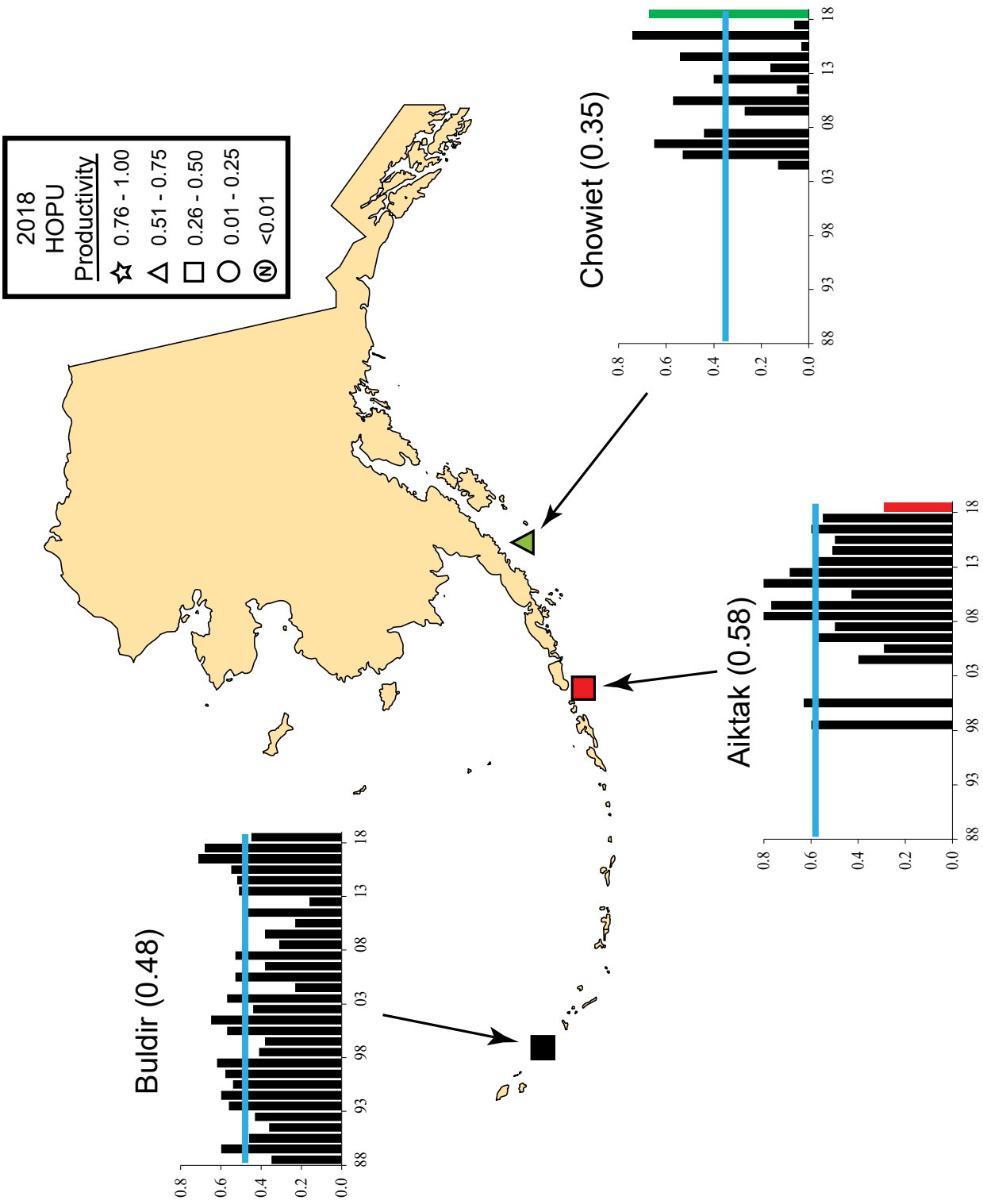

Figure 16. Productivity of horned puffins (chicks fledged/egg) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current year's success compared to the site mean (red is >20% below, black is within 20% and green is >20% above site mean).

Tufted puffin (*Fratercula cirrhata*)

Table 19. Hatching chronology of tufted puffins at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Aiktak I.	27 Jul (32)[a]	31 Jul (21)[a]	Youngren et al. 2019
Chowiet I.	19 Jul (29)	24 Jul (13)	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 20. Reproductive performance of tufted puffins at Alaskan sites monitored in 2018.

Site	Chicks Fledged[a]/Egg	No. of Plots	Long-term Average	Reference
Buldir I.	0.00	NA[b] (28)[c]	0.38 (30)[c]	Pietrzak et al. 2018
Aiktak I.	0.81	NA (84)	0.54 (22)	Youngren et al. 2019
Chowiet I.	0.61	NA (61)	0.37 (12)	Higgins et al. 2018
Middleton I.	0.43	NA (71)	0.39 (13)	ISRC 2018

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

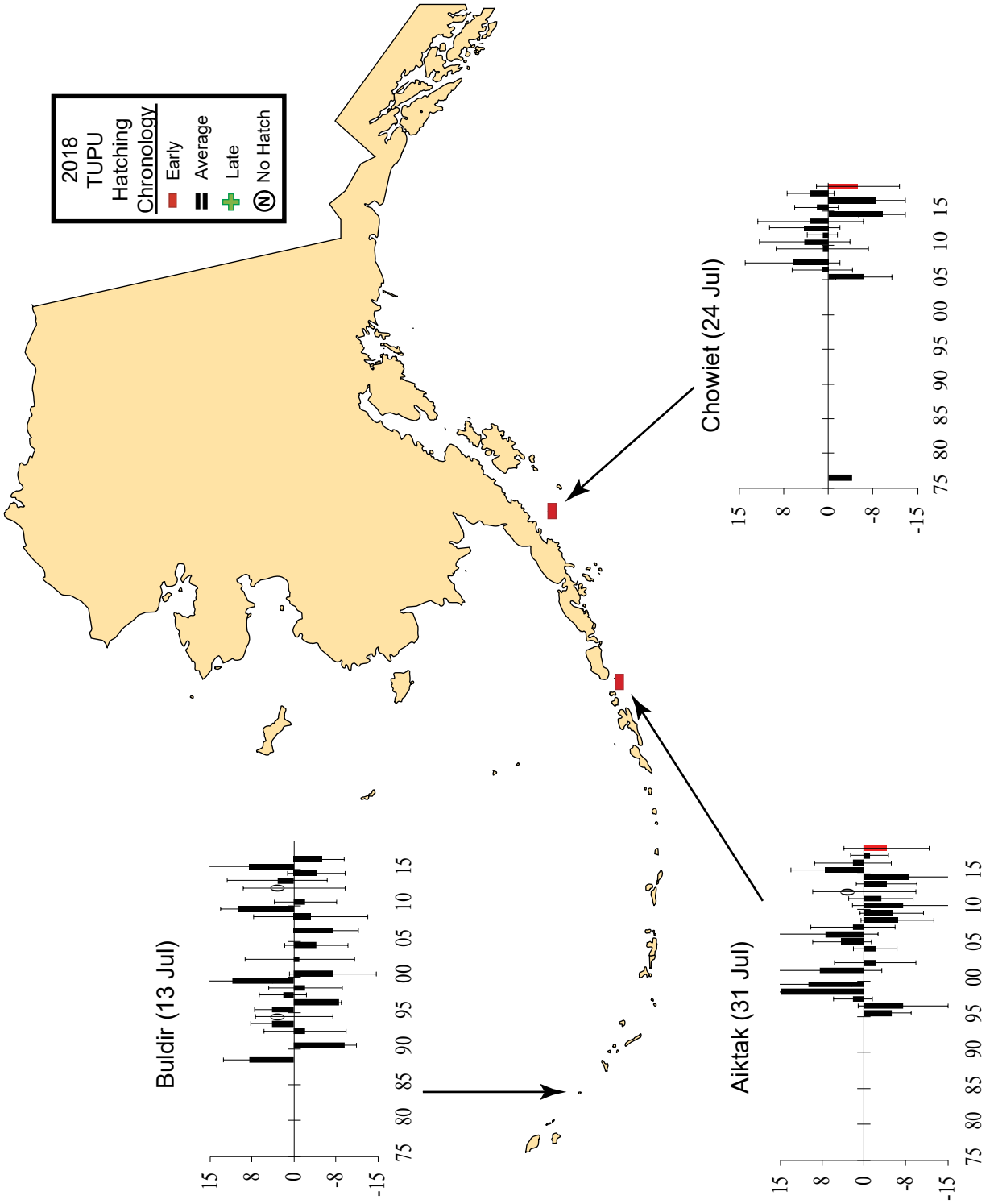

Figure 17. Hatching chronology of tufted puffins at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates how current 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.

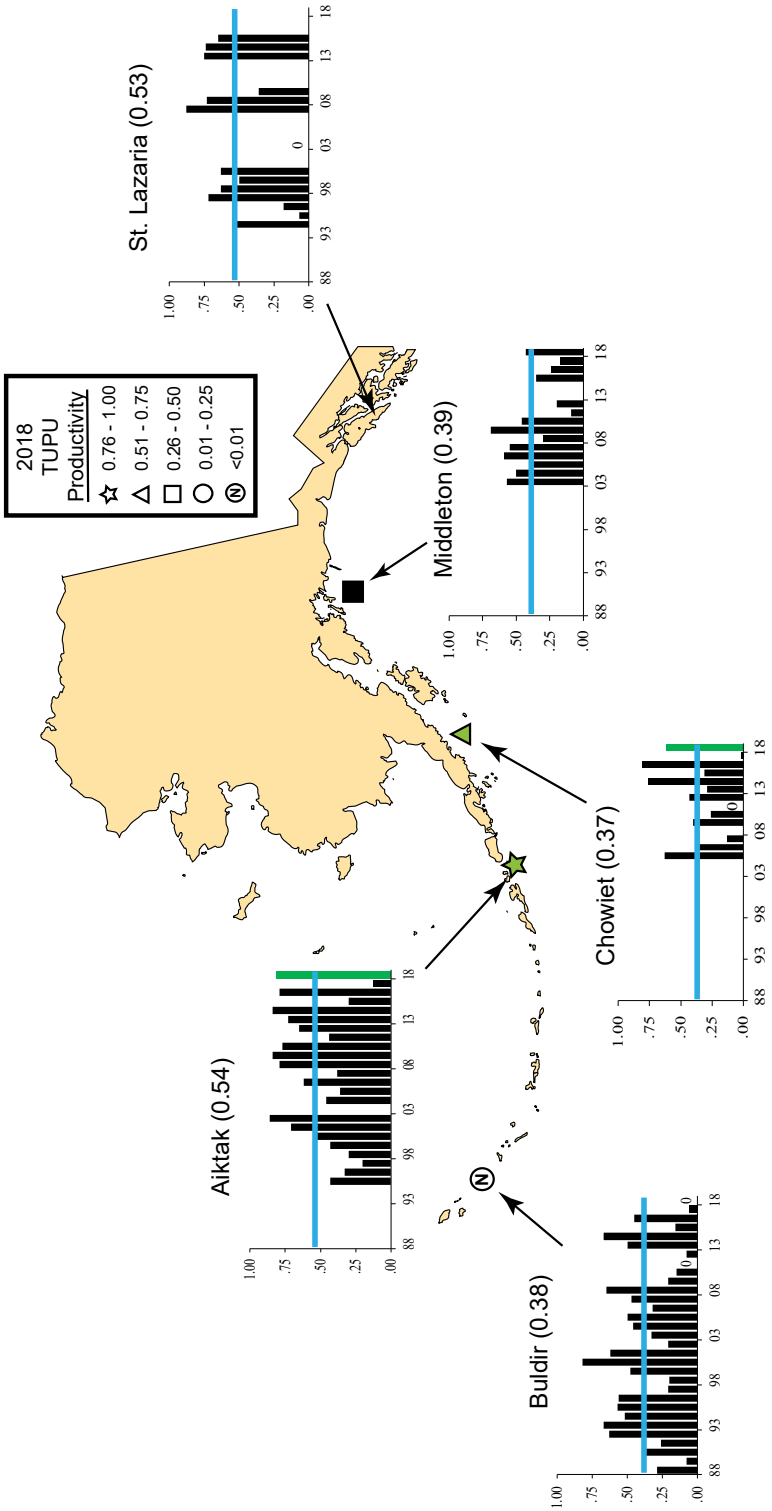

Figure 18. Productivity of tufted puffins (chicks fledged/egg) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph 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).

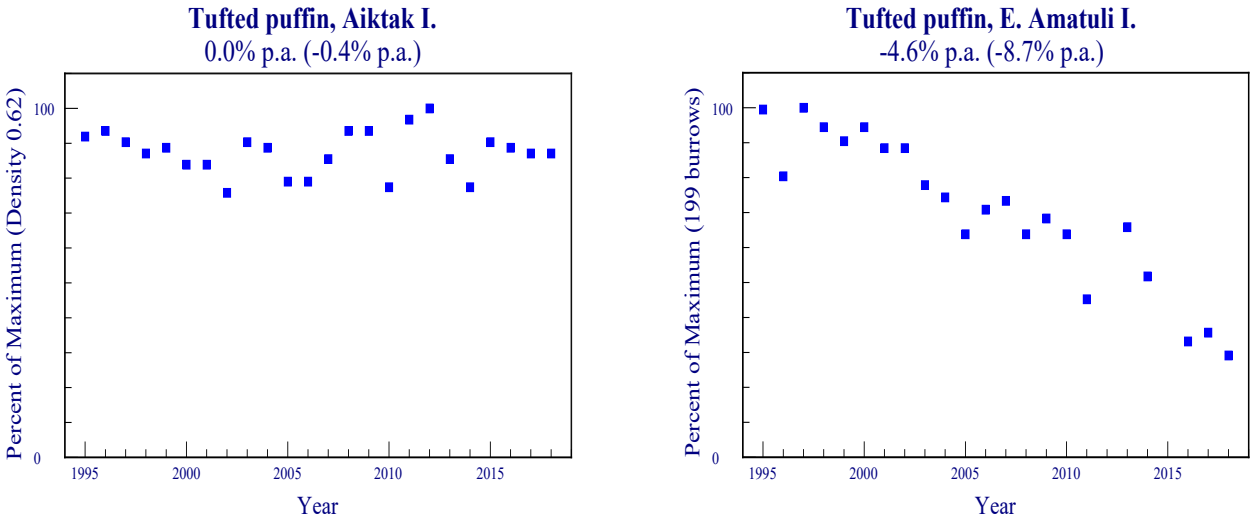

Figure 19. Trends in populations of tufted puffins at Alaskan sites. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

Black-legged kittiwake (*Rissa tridactyla*)

Table 21. Hatching chronology of black-legged kittiwakes at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	8 Aug (3)[a]	17 Jul (33)[a]	Mong et al. 2019
Buldir I.	22 Jul (51)	8 Jul (30)	Pietrzak et al. 2018
Chowiet I.	19 Jul (93)	17 Jul (21)	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 22. Reproductive performance of black-legged kittiwakes at Alaskan sites monitored in 2018.

Site	Chicks Fledged[a]/Nest	No. of Plots	Long-term Average	Reference
St. Paul I.	0.01	7 (159)[b]	0.26 (38)[b]	Mong et al. 2019
St. George I.	0.00	7 (186)	0.20 (42)	Guitart et al. 2018
C. Peirce	0.00	7 (161)	0.20 (33)	K. Hilwig Unpubl. Data
Round I.	0.00	4 (112)	0.18 (21)	E. Weiss Unpubl. Data
Buldir I.	0.14	7 (213)	0.16 (30)	Pietrzak et al. 2018
Chowiet I.	0.36	11 (295)	0.19 (22)	Higgins et al. 2018
Gull I.	0.00	NA[c]	0.42 (7)	S. Schoen Unpubl. Data
Chisik I.	0.00	NA	0.03 (6)	S. Schoen Unpubl. Data
Inner PWS[d]	0.00[e]	NA (11,629)	0.28 (33)	D. Irons Unpubl. Data
Outer PWS[d]	0.07[e]	NA (2599)	0.09 (33)	D. Irons Unpubl. Data
Middleton I.	0.31	NA (134)	0.36 (38)	ISRC 2018

[a]Total chicks fledged/Total nests.

[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.

[e]Short visit.

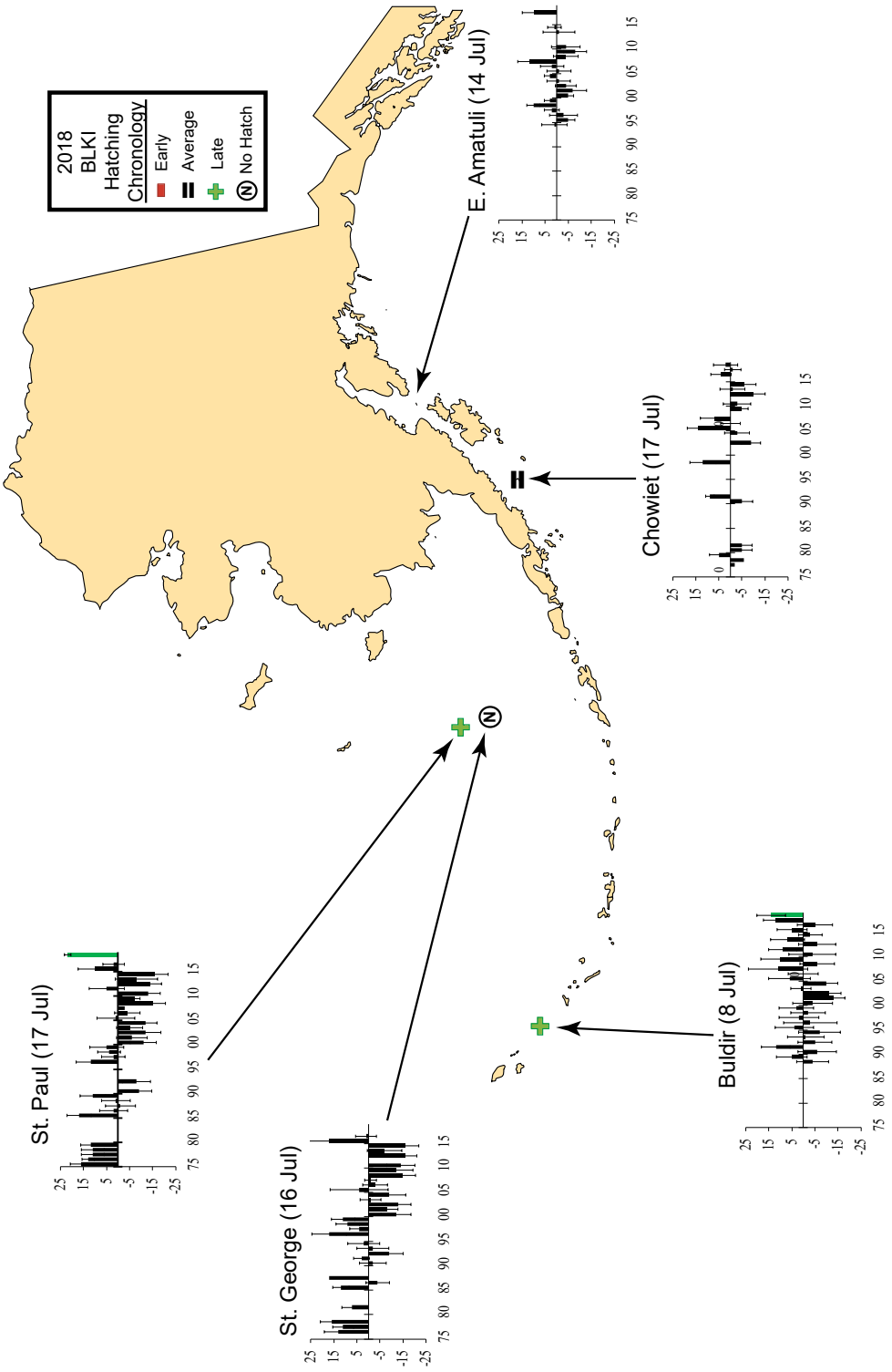

Figure 20. Hatching chronology of black-legged kittiwakes at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates 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.

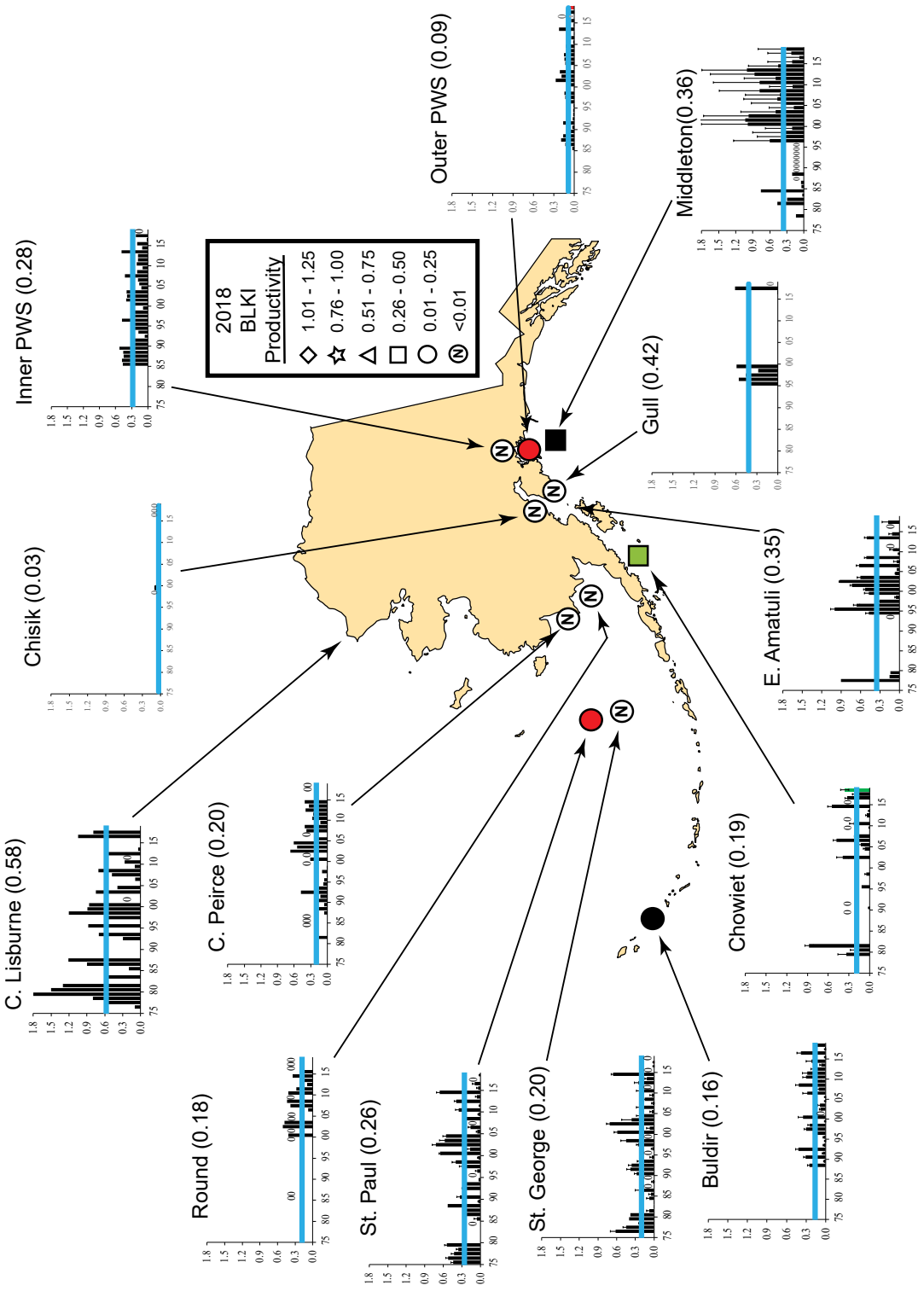

Figure 21. Productivity of black-legged kittiwakes (chicks fledged/nest) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color 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.

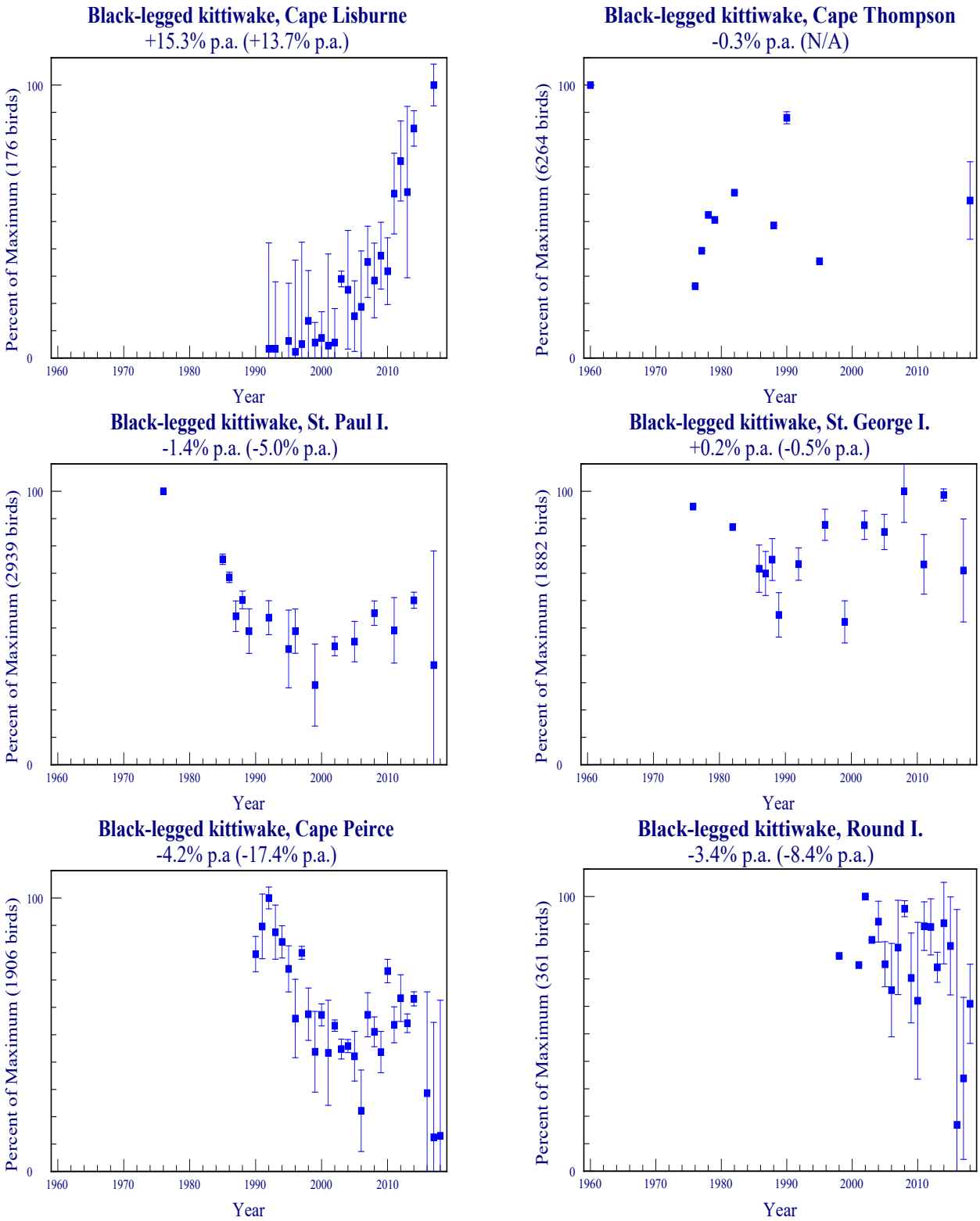

Figure 22. Trends in populations of black-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses). "N/A" indicates that insufficient data were available.

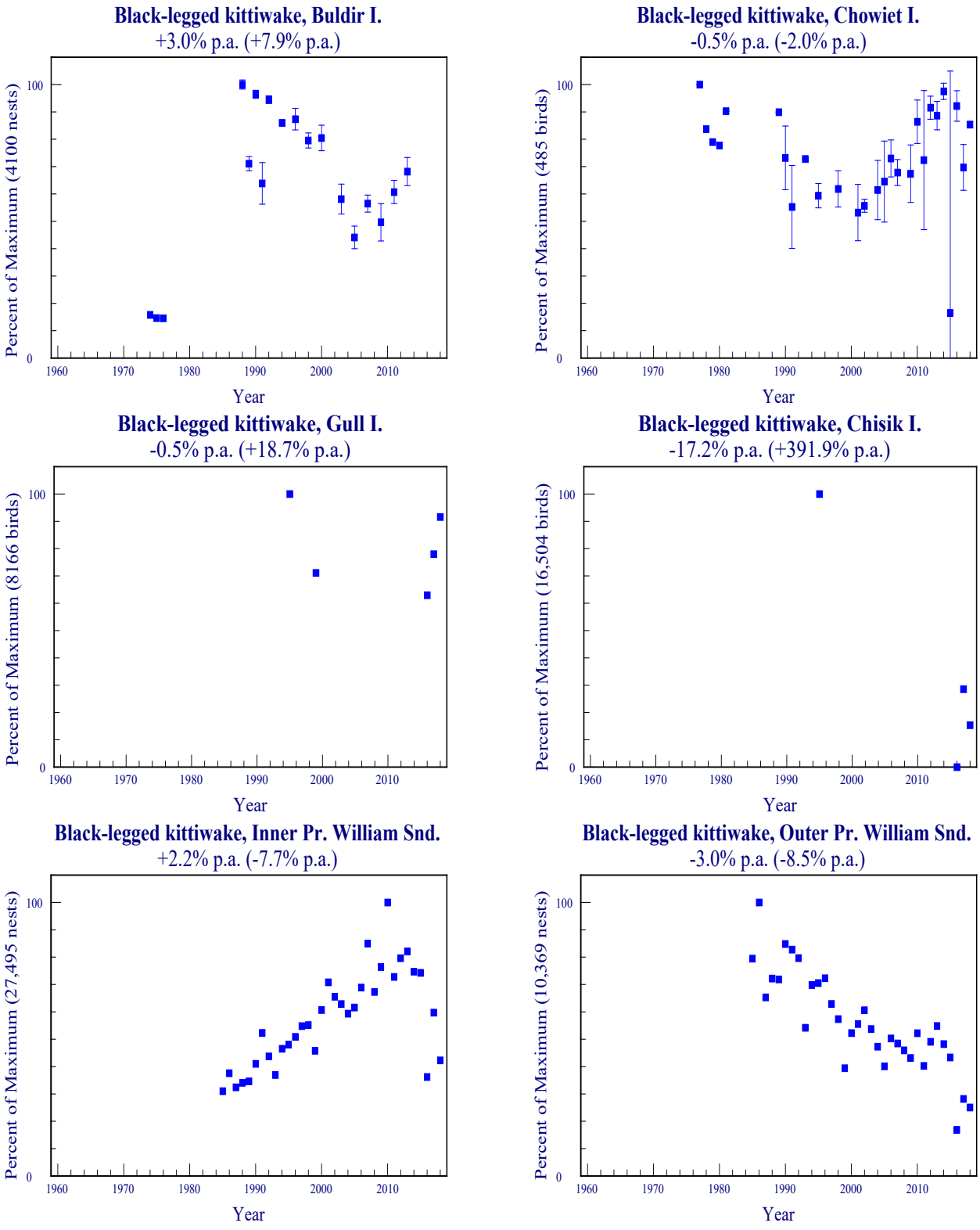

Figure 22 (continued). Trends in populations of black-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

Red-legged kittiwake (*Rissa brevirostris*)

Table 23. Hatching chronology of red-legged kittiwakes at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	23 Jul (14)[a]	10 Jul (25)[a]	Pietrzak 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 24. Reproductive performance of red-legged kittiwakes at Alaskan sites monitored in 2018.

Site	Chicks Fledged[a]/Nest	No. of Plots	Long-term Average	Reference
St. Paul I.	0.00	1 (3)[b]	0.24 (35)[b]	Mong et al. 2019
St. George I.	0.01	9 (205)	0.24 (42)	Guitart et al. 2018
Buldir I.	0.21	6 (38)	0.18 (30)	Pietrzak et al. 2018

[a]Total chicks fledged/Total nests.

[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.

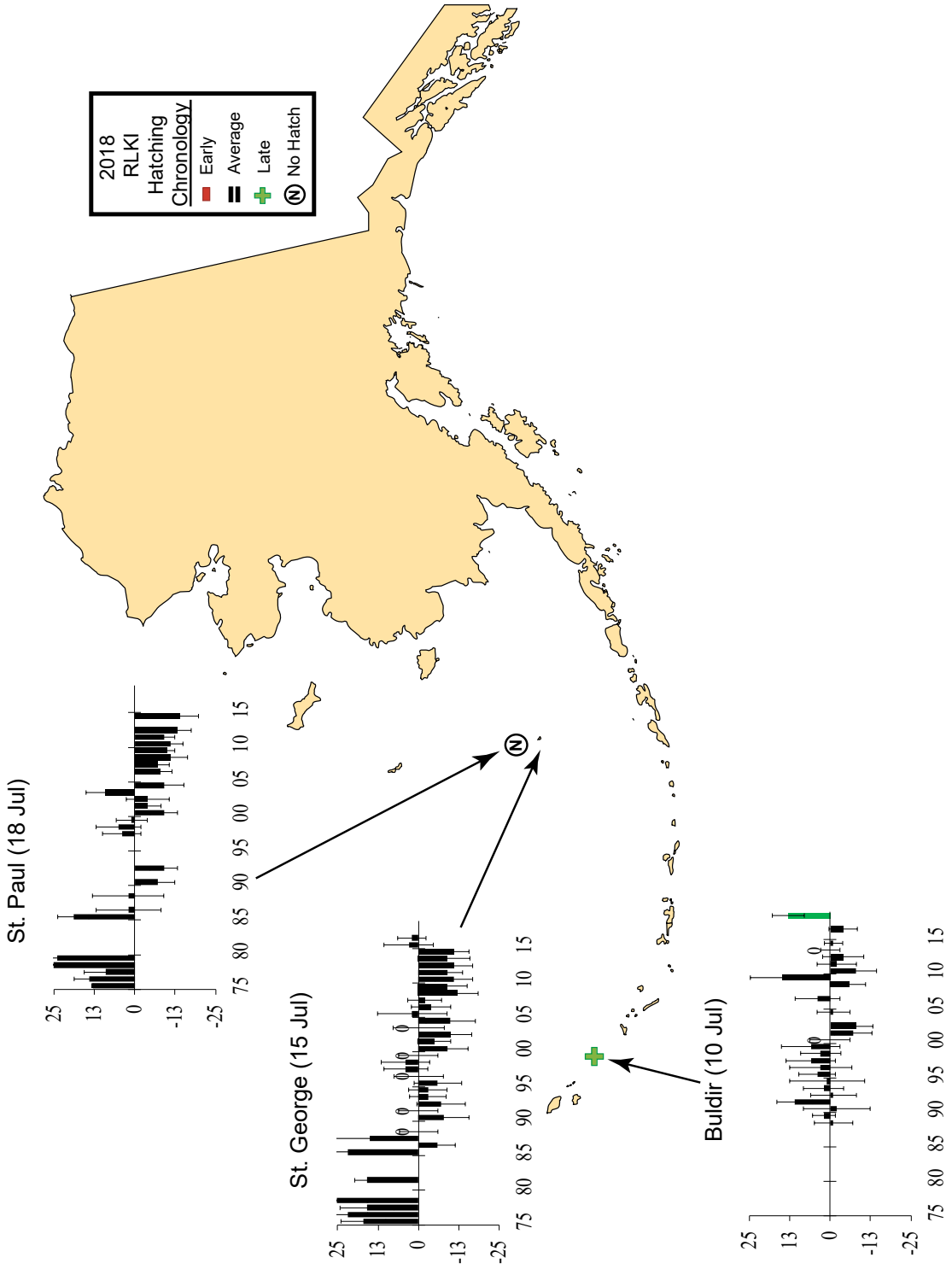

Figure 23. Hatching chronology of red-legged kittiwakes at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates 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.

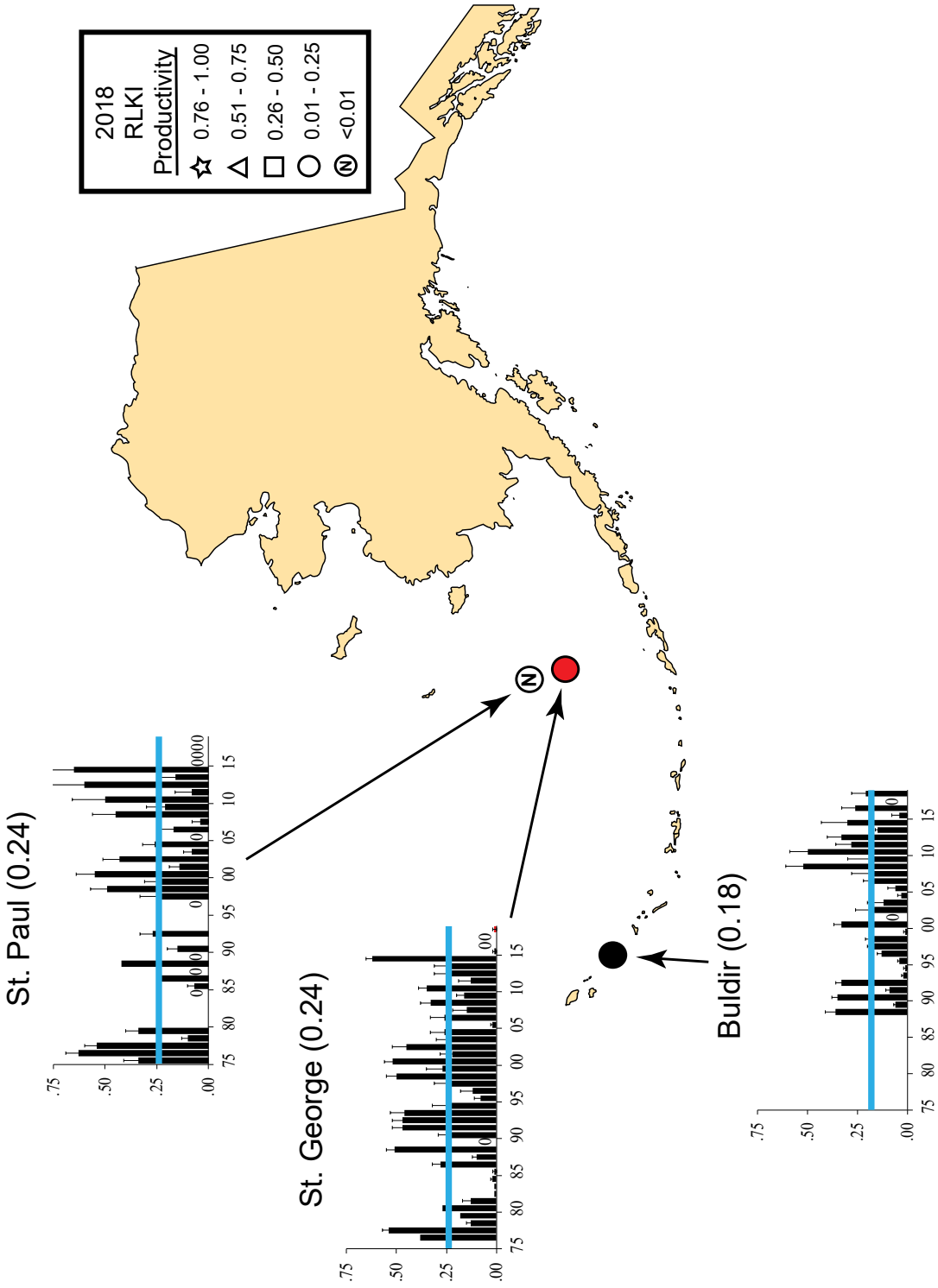

Figure 24. Productivity of red-legged kittiwakes (chicks fledged/nest) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color 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.

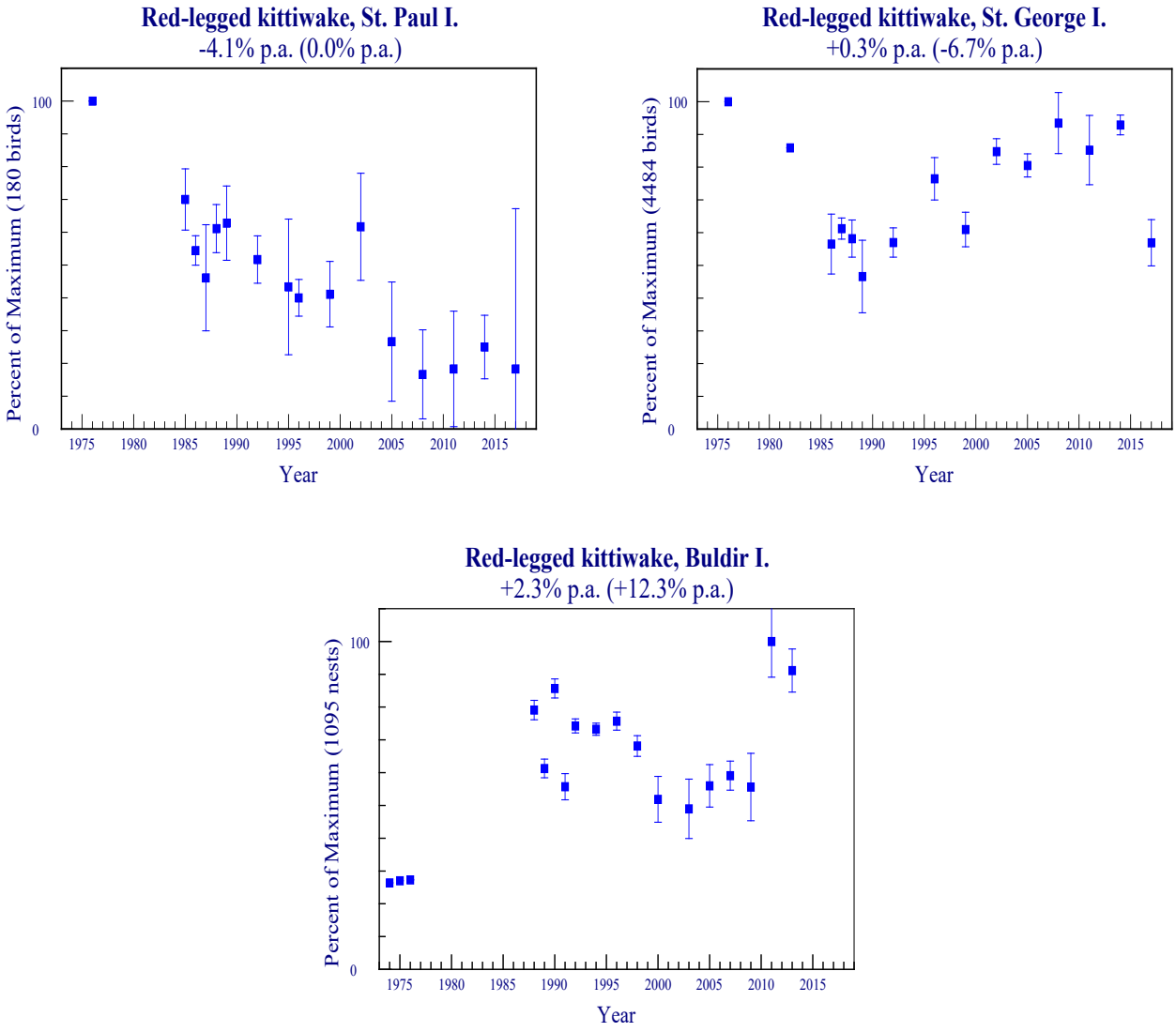

Figure 25. Trends in populations of red-legged kittiwakes at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

Glaucous-winged gull (*Larus glaucescens*)

Table 25. Hatching chronology of glaucous-winged gulls at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	4 Jul (8)[a]	24 Jun (17)[a]	Pietrzak et al. 2018
Aiktak I.	10 Jul (41)	11 Jul (23)	Youngren et al. 2019
Chowiet I.	29 Jun (33)	2 Jul (12)	Higgins et al. 2018
St. Lazaria I.	24 Jul (21)	5 Jul (19)	Evans 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 26. Reproductive performance of glaucous-winged gulls at Alaskan sites monitored in 2018.

Site	Hatching Success[a]	No. of Plots	Long-term Average	Reference
Buldir I.	0.48	NA[b] (46)[c]	0.47 (20)[c]	Pietrzak et al. 2018
Aiktak I.	0.34	4 (225)	0.54 (23)	Youngren et al. 2019
Chowiet I.	0.68	3 (86)	0.63 (11)	Higgins et al. 2018
St. Lazaria I.	0.17	3 (194)	0.53 (23)	Evans et al. 2018

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

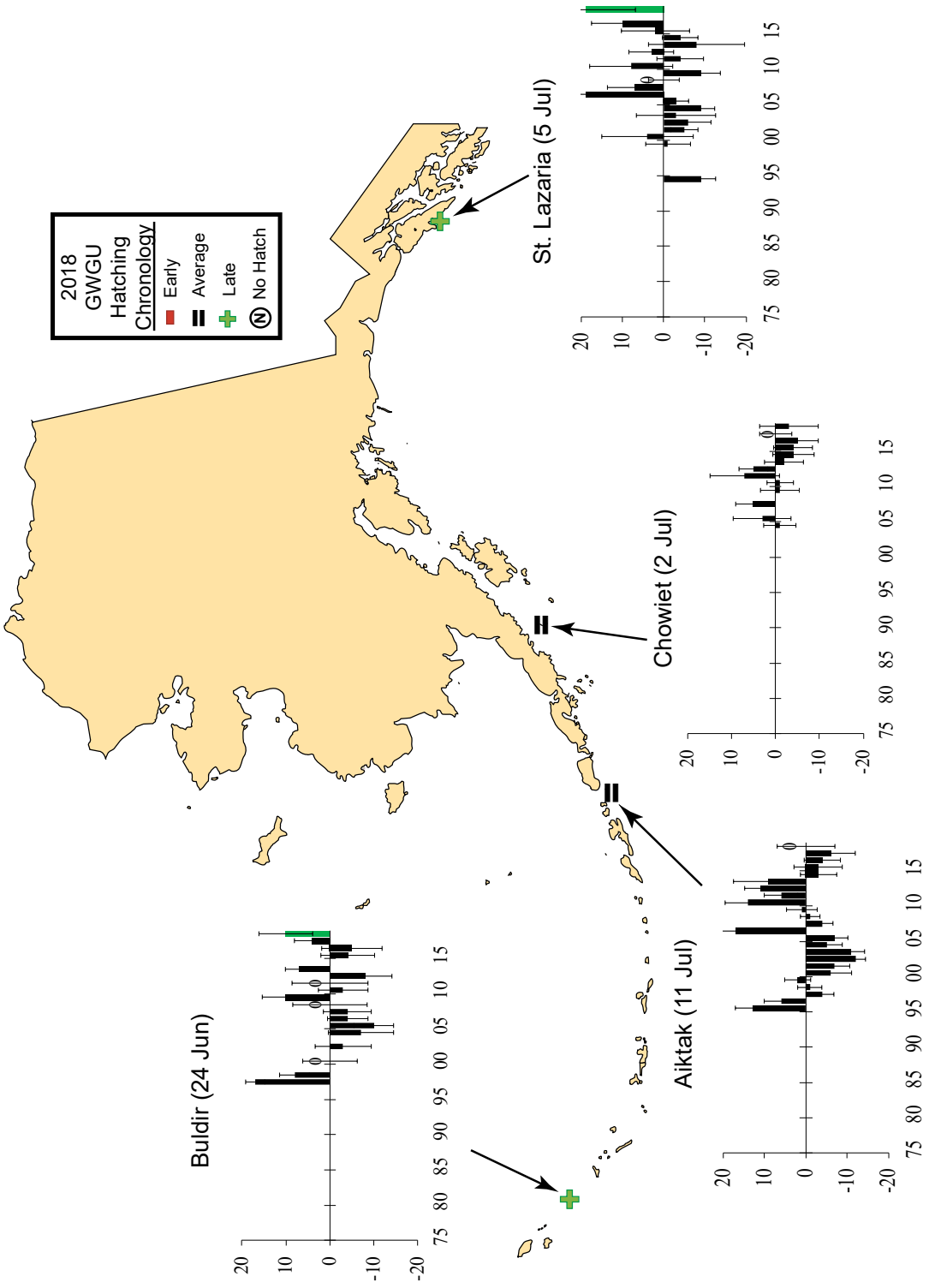

Figure 26. Hatching chronology of glaucous-winged gulls at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates 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.

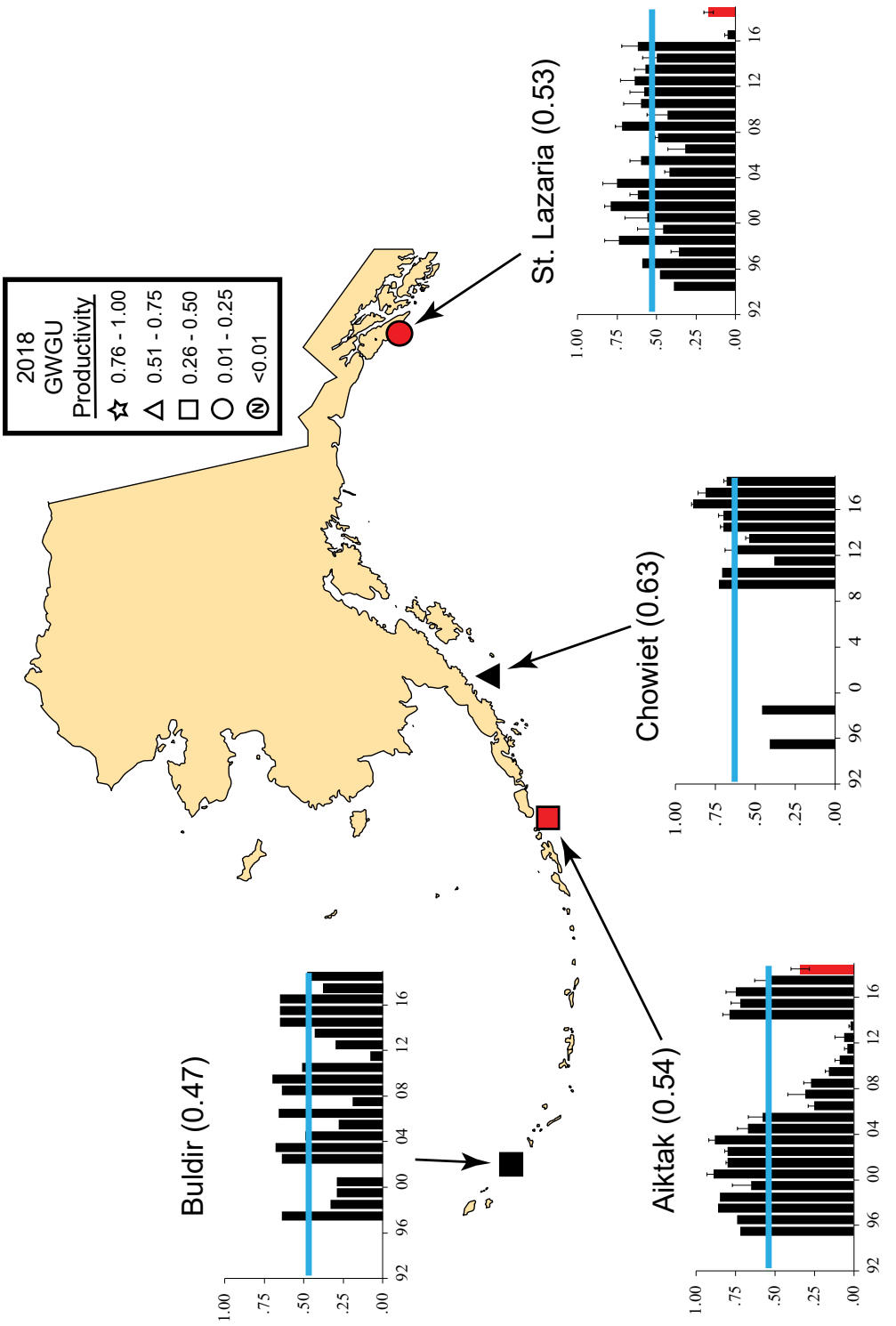

Figure 27. Productivity of glaucous-winged gulls (hatching success) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of 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.

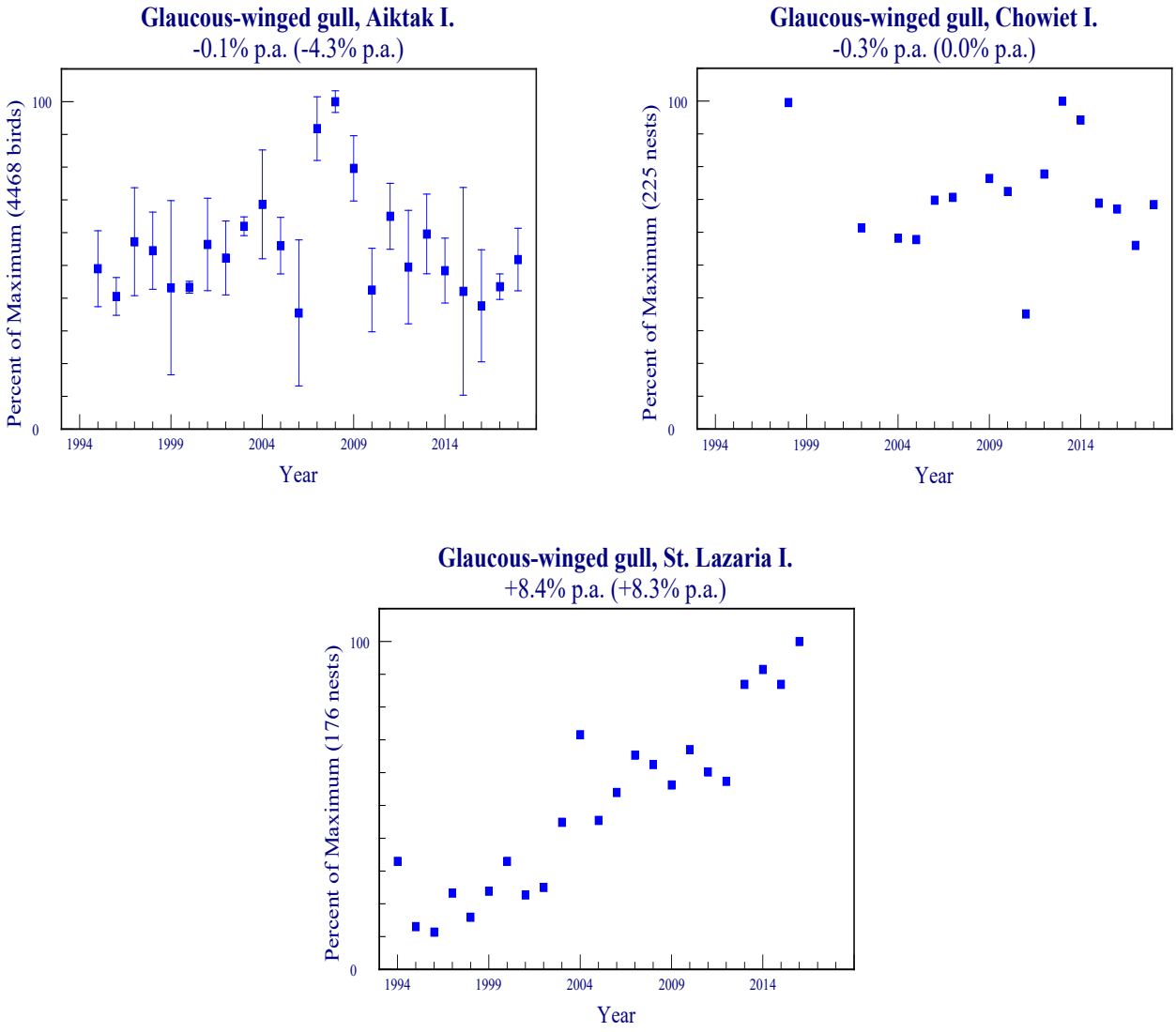

Figure 28. Trends in populations of glaucous-winged gulls at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

Northern fulmar (*Fulmarus glacialis*)

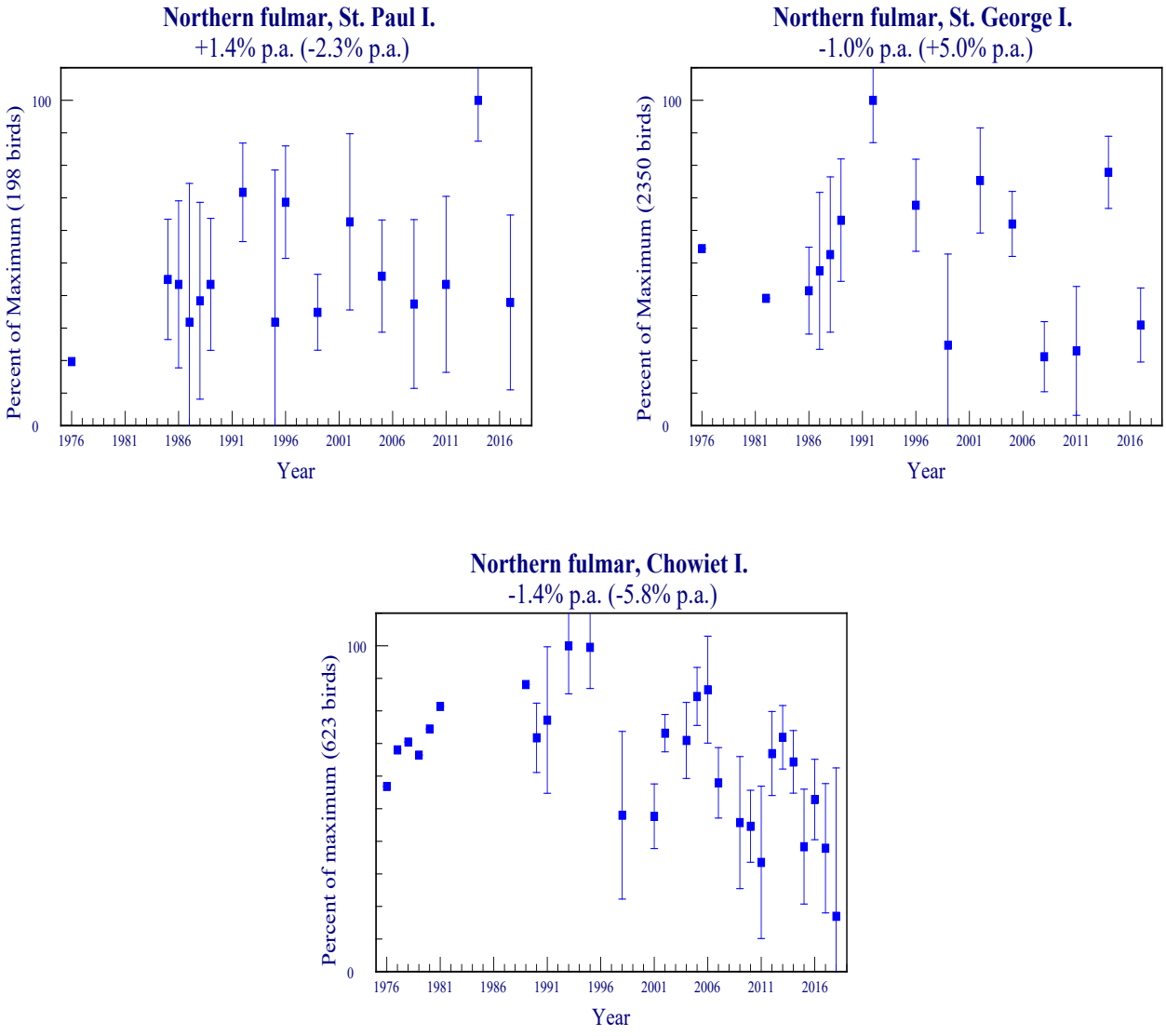

Figure 29. Trends in populations of northern fulmars at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

Fork-tailed storm-petrel (*Oceanodroma furcata*)

Table 27. Hatching chronology of fork-tailed storm-petrels at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	3 Aug (11)[a]	11 Jul (2)[a]	Pietrzak et al. 2018
Aiktak I.	4 Aug (26)	15 Jul (21)	Youngren et al. 2019
St. Lazaria I.	29 Jun (36)	14 Jul (13)	Evans 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 28. Reproductive performance of fork-tailed storm-petrels at Alaskan sites monitored in 2018.

Site	Chicks Fledged[a]/Egg	No. of Plots	Long-term Average	Reference
Buldir I.	0.73	5 (11)[b]	0.71 (31)[b]	Pietrzak et al. 2018
Aiktak I.	0.62	13 (61)	0.80 (18)	Youngren et al. 2019
St. Lazaria I.	0.80	8 (85)	0.68 (22)	Evans et al. 2018

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

[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.

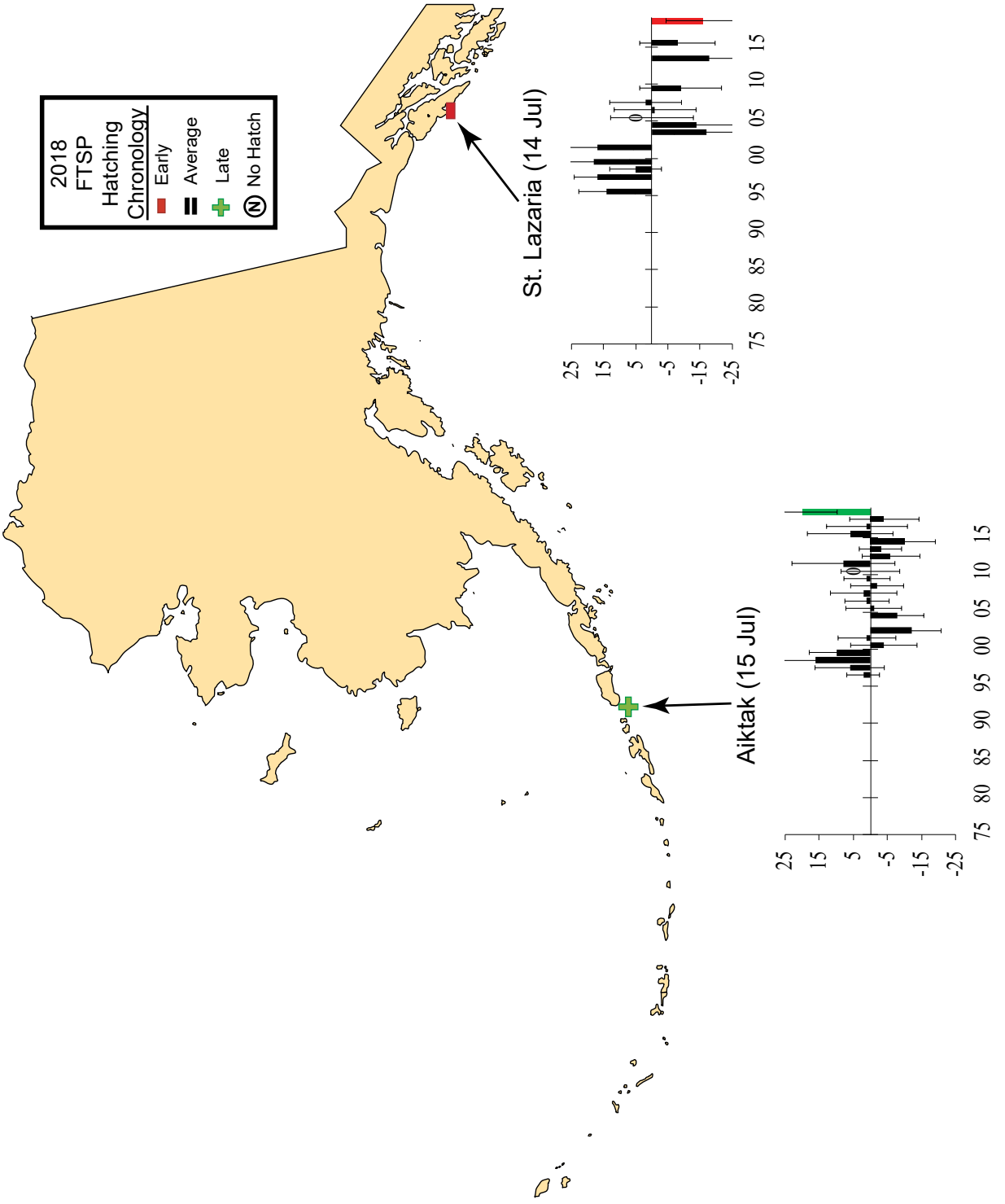

Figure 30. Hatching chronology of fork-tailed storm-petrels at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates 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.

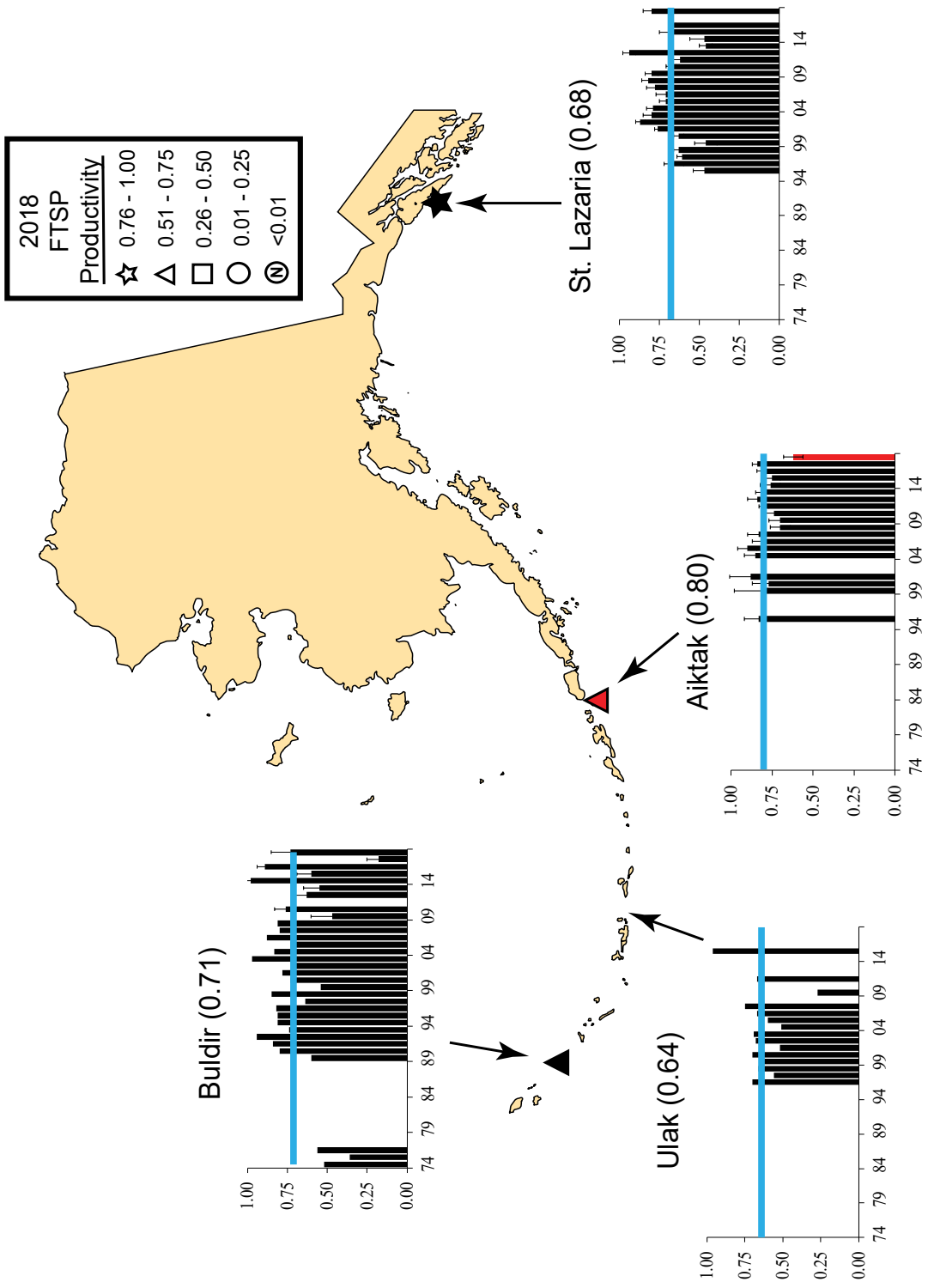

Figure 31. Productivity of fork-tailed storm-petrels (chicks fledged/egg) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how 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.

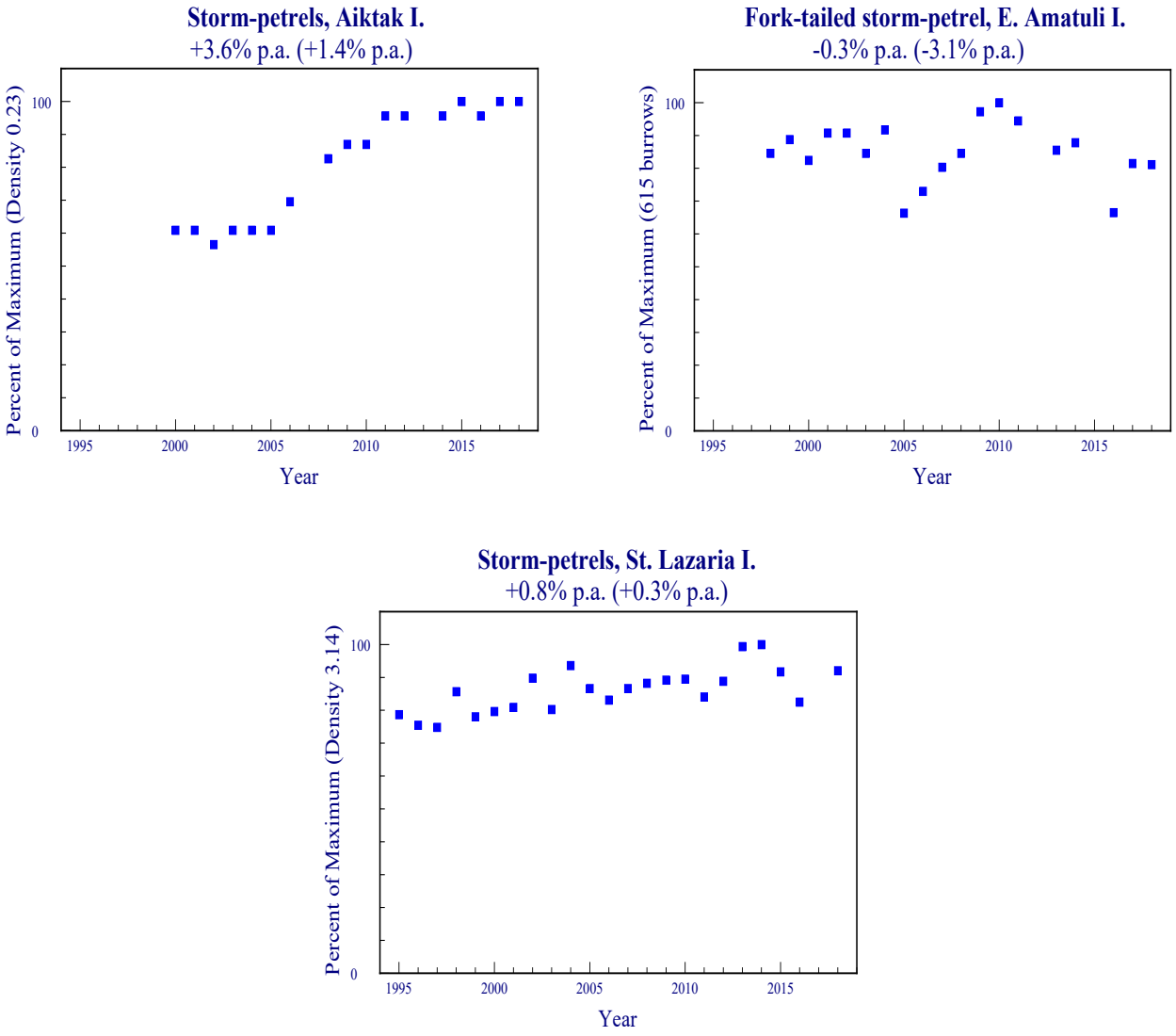

Figure 32. Trends in populations of storm-petrels at Alaskan sites. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

Leach's storm-petrel (*Oceanodroma leucorhoa*)

Table 29. Hatching chronology of Leach's storm-petrels at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
Buldir I.	14 Aug (19)[a]	31 Jul (2)[a]	Pietrzak et al. 2018
Aiktak I.	9 Aug (40)	30 Jul (21)	Youngren et al. 2019
St. Lazaria I.	27 Jul (25)	30 Jul (21)	Evans 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 30. Reproductive performance of Leach's storm-petrels at Alaskan sites monitored in 2018.

Site	Chicks Fledged[a]/Egg	No. of Plots	Long-term Average	Reference
Buldir I.	0.89	5 (28)[b]	0.75 (31)[b]	Pietrzak et al. 2018
Aiktak I.	0.92	12 (106)	0.85 (18)	Youngren et al. 2019
St. Lazaria I.	0.68	7 (80)	0.71 (22)	Evans et al. 2018

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

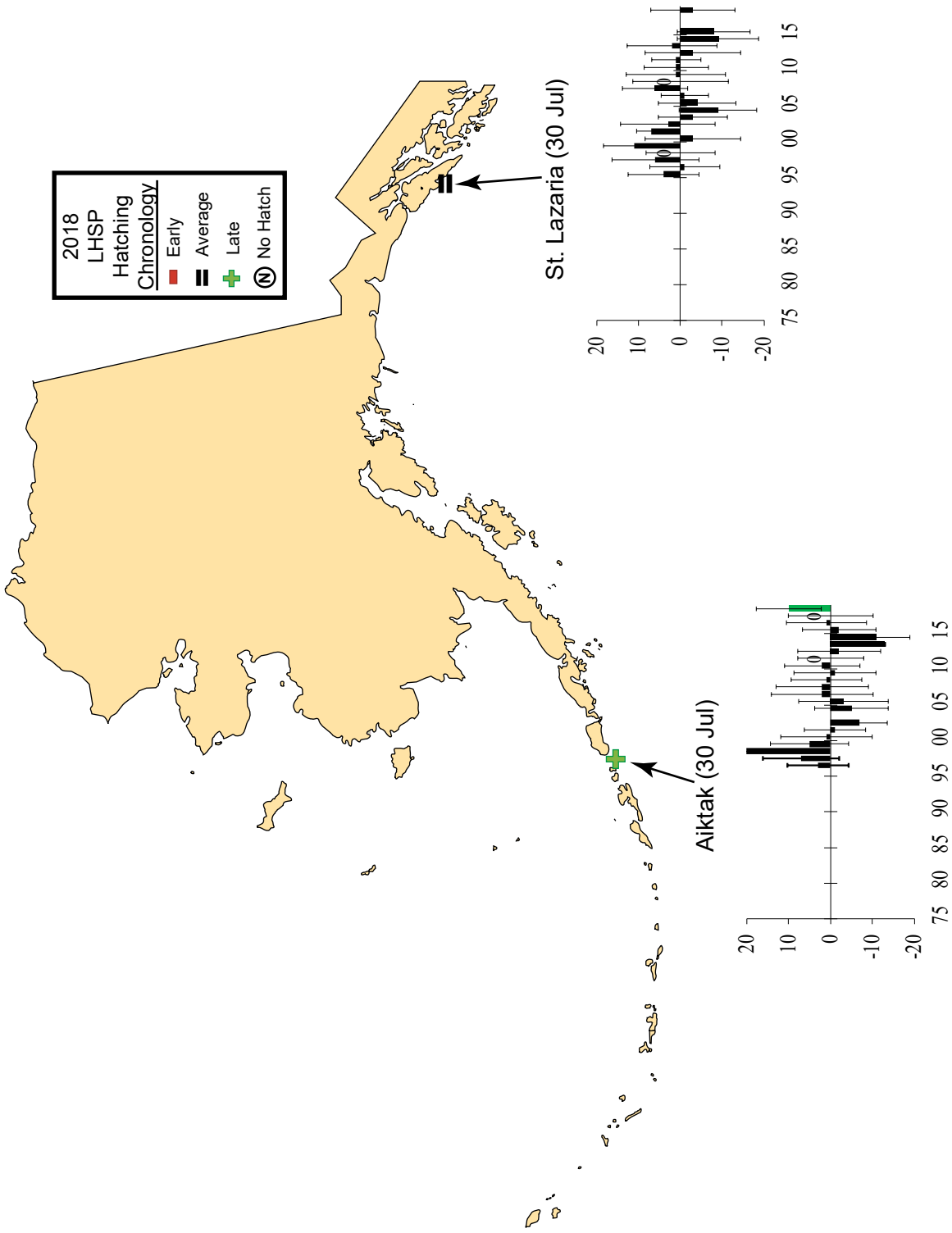

Figure 33. Hatching chronology of Leach's storm-petrels at Alaskan sites. Graphs indicate the departure in days (if any) from the site mean (value in parentheses; current year not included). Lack of bars indicates that no data were gathered in those years. Color of graph bar and map symbol indicates 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.

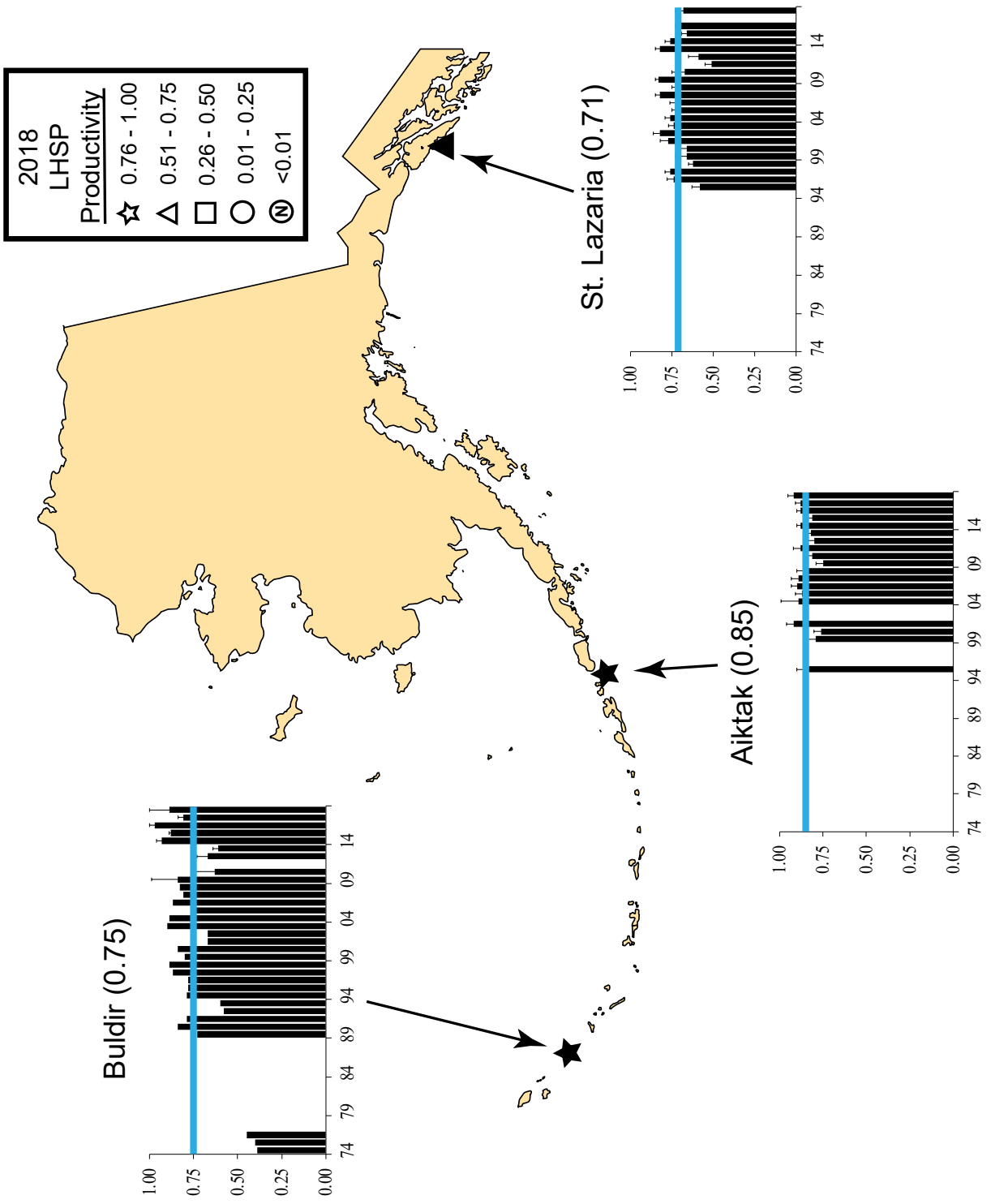

Figure 34. Productivity of Leach's storm-petrels (chicks fledged/egg) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of graph bar and map symbol indicates how current 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.

Red-faced cormorant (*Phalacrocorax urile*)

Table 31. Hatching chronology of red-faced cormorants at Alaskan sites monitored in 2018.

Site	Mean Hatch Date	Long-term Average	Reference
St. Paul I.	30 Jun (3)[a]	29 Jun (28)[a]	Mong 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 2018.

Site	Chicks Fledged/Nest	No. of Plots	Long-term Average	Reference
St. Paul I.	0.15	3 (39)[a]	1.31 (33)[a]	Mong et al. 2019
St. George I.	0.98	5 (42)	1.13 (18)	Guitart et al. 2018
Chowiet I.	0.90	2 (61)	0.17 (6)	Higgins et al. 2018

[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.

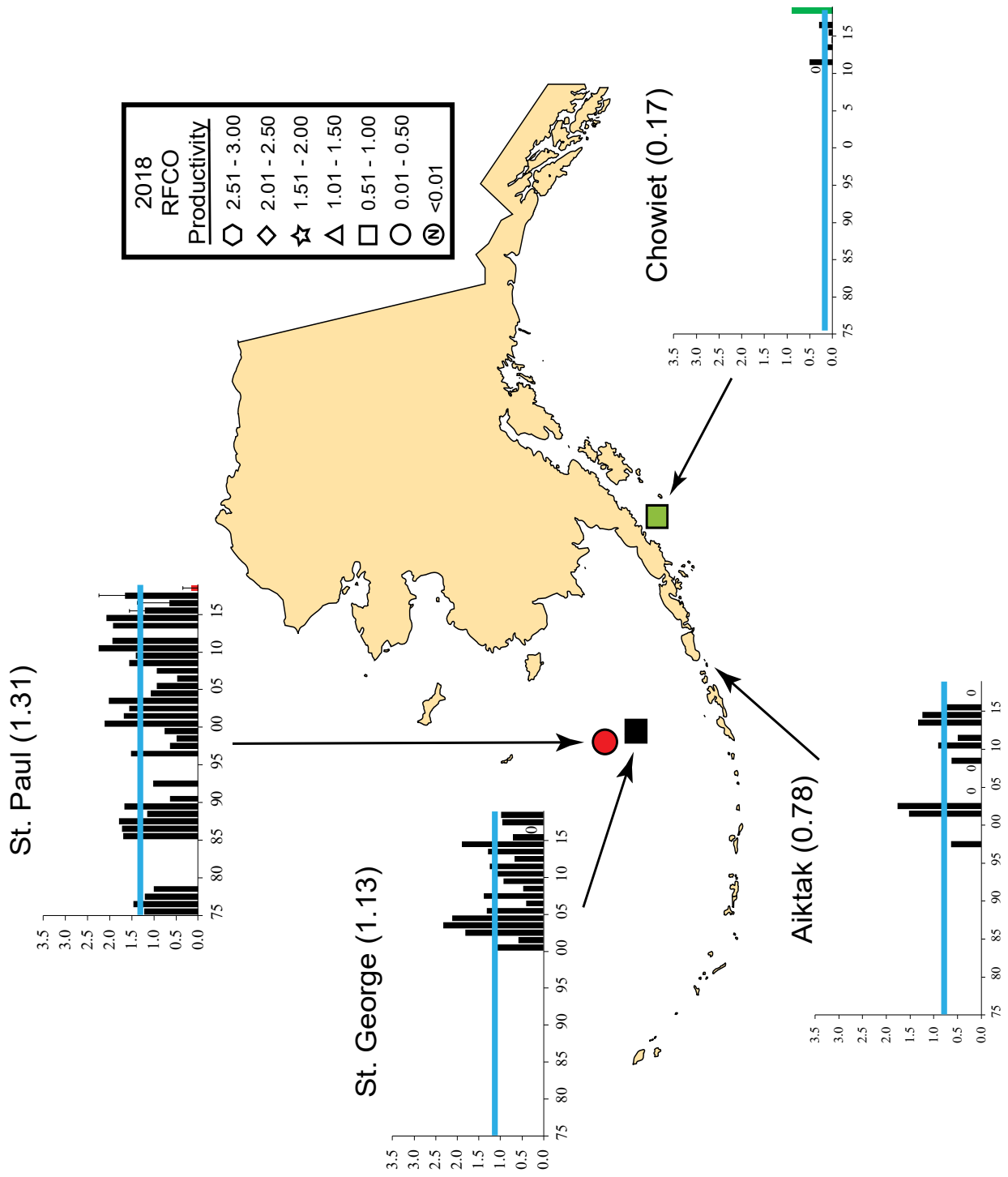

Figure 35. Productivity of red-faced cormorants (chicks fledged/nest) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of 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.

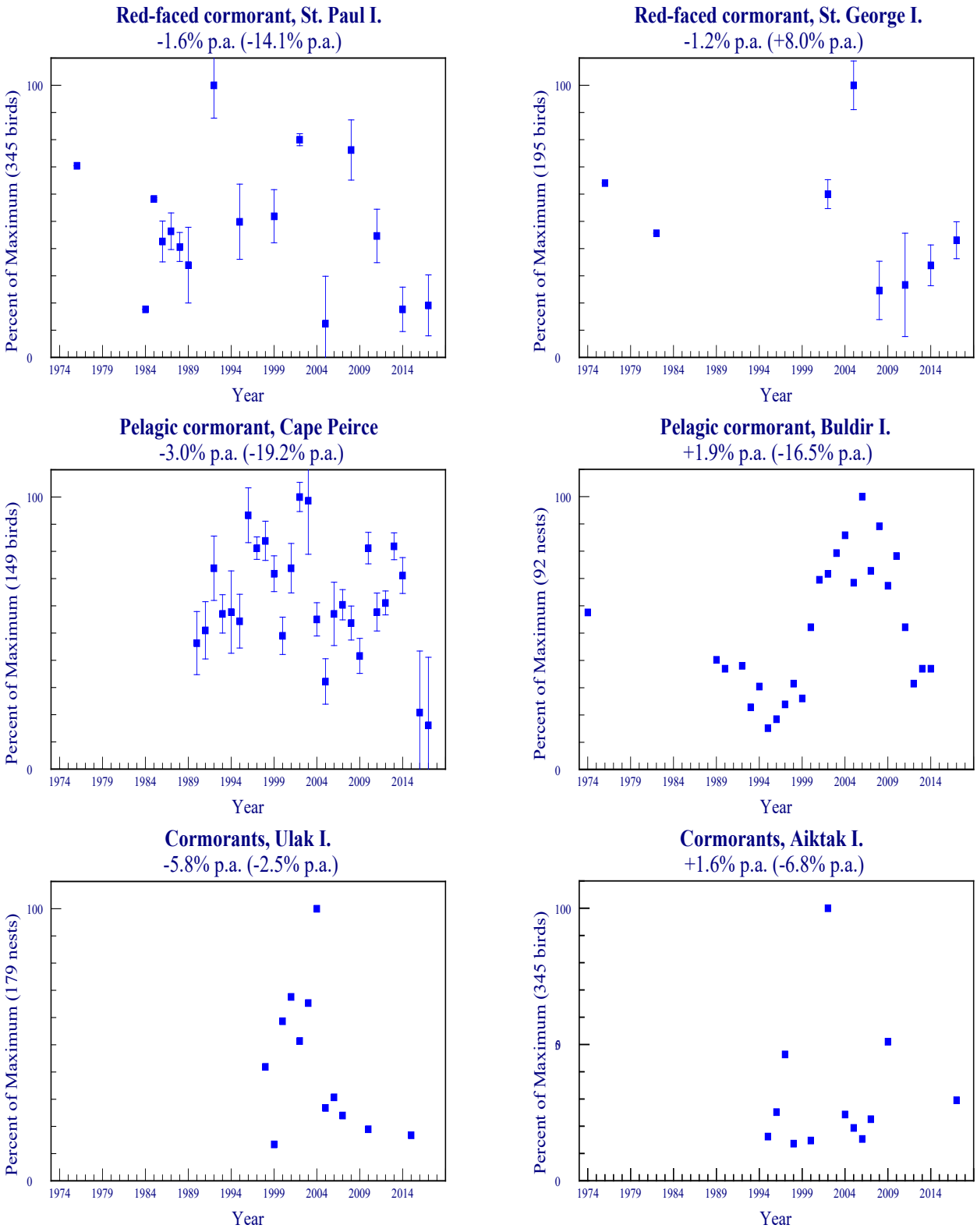

Figure 36. Trends in populations of cormorants at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

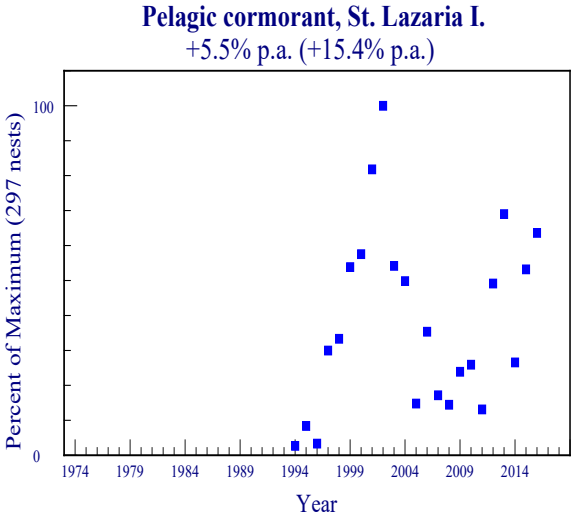

Figure 36 (continued). Trends in populations of cormorants at Alaskan sites. Error bars (90% confidence intervals) are shown for years with multiple counts. Percent per annum (p.a.) changes are indicated for all years and for just the last decade (2009-2018, in parentheses).

Pelagic cormorant (*Phalacrocorax pelagicus*)

Table 33. Reproductive performance of pelagic cormorants at Alaskan sites monitored in 2018.

Site	Chicks Fledged/Nest	No. of Plots	Long-term Average	Reference
C. Peirce	0.00	2 (18)[a]	1.12 (30)[a]	K. Hilwig Unpubl. Data
Round I.	0.20	4 (25)	1.22 (17)	E. Weiss Unpubl. Data
Chowiet I.	0.72	3 (25)	0.64 (6)	Higgins et al. 2018
Middleton I.	0.80	NA[b] (84)	0.86 (35)	ISRC 2018

[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.

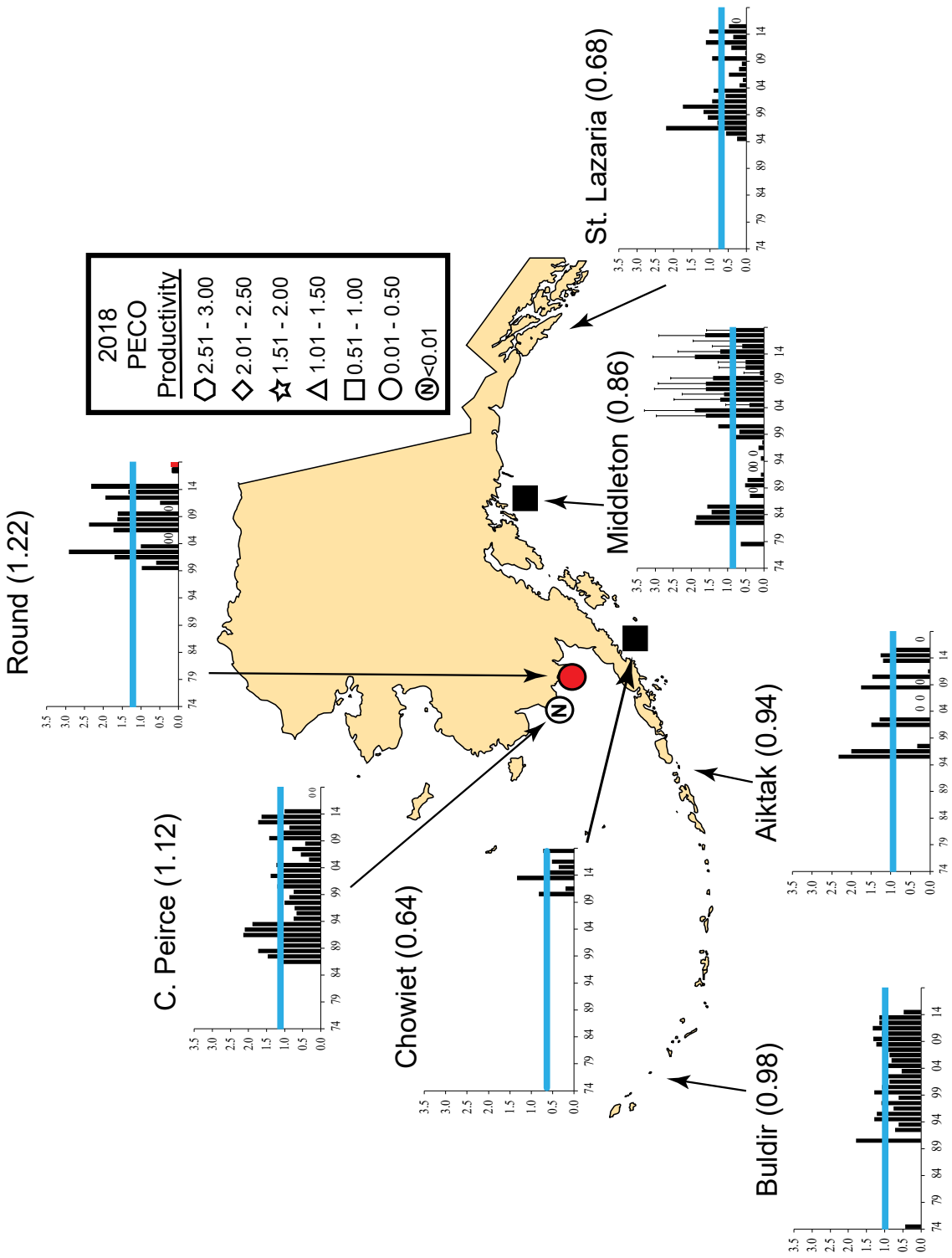

Figure 37. Productivity of pelagic cormorants (chicks fledged/nest) at Alaskan sites. Lack of bars indicates that no data were gathered in those years. Zeros indicate complete breeding failure. Blue line is the mean productivity at the site (value in parentheses; current year not included). Color of 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).

Table 34. Seabird relative breeding chronology[a] compared to averages for past years. Only sites for which there were data from 2018 are included.

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

[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, 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.

Table 35. Seabird relative productivity levels[a] compared to averages for past years. Only sites for which there were data from 2018 are included.

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

[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 (2009-2018, "D" columns).

		COMU[b]		TBMU		UNMU		PIGU		LEAU		RHAU		TUPU		BLKI		RLKI		GWGU		NOFU		FTSP		STPE		RFCO		PECO		UNCO	
Region	Site	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.					↓	↓							↔	↔					↔	↓					↑	↔					↔	↓
SW Bering	Buldir I.					↑	↑									↑	↑	↔	↑											↔	↓		
	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, NOFU=northern fulmar, FTSP=fork-tailed storm-petrel, STPE=unspecified storm-petrel, RFCO=red-faced cormorant, PECO=pelagic cormorant, UNCO=unspecified cormorant.

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

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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; all used with permission. Cover art by Susan Steinacher.

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ORIGINAL PAPER

Geographic and seasonal patterns of seabird subsistence harvest in Alaska

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Abstract
Assessing seabird harvest sustainability is difficult because of limited information on harvest and on harvest impacts on seabird populations. This study quantified seasonal harvest of seabirds and their eggs in all Alaska regions, addressed management and conservation questions, and identified topics where collaboration among stakeholders can support sustainable harvest opportunities and promote seabird conservation. In 2002–2015, the estimated subsistence harvest of seabirds was 24,315 birds/year. Murres (33%), auklets (28%), gulls (16%), and cormorants (14%) represented most of the harvest. Alaska-wide harvest patterns largely reflected harvest at the St. Lawrence–Diomede Islands, which represented 78% of the total seabird harvest. The Alaska-wide seasonal distribution of harvest was 56% in spring, 20% summer, and 24% fall-winter. The estimated egg harvest was 150,781 eggs/year and was largely composed of murres (51%) and gulls (45%) eggs. Harvest of most species, including species of conservation concern, was low relative to population sizes. However, harvest of eggs of terns may be significant compared to coastal egg productivity. A better understanding of threats to populations of terns is needed to clarify conservation priorities and to engage subsistence users in conservation efforts. Despite indications of reduced subsistence uses, harvesting of seabirds and their eggs remains culturally important and is a food security component in remote communities in Alaska.

Keywords Seabird harvest · Seabird egg harvest · Subsistence · Harvest surveys · Harvest management · Seabird conservation

Introduction

Seabirds and their eggs are harvested throughout the Arctic and Subarctic. Harvest traditions include indigenous and non-indigenous subsistence, sport (recreational), and commercial harvest. Providing opportunities for subsistence harvest is a seabird management goal in Alaska, and harvest sustainability is a circumpolar conservation priority (Delinger and Wohl 2001; Merkel and Barry 2008; U.S. Fish and Wildlife Service 2009). Seabird population declines have been occurring due to competition for food with commercial fisheries, mortality from fishing gear, environmental and food web changes, pollution, and invasive predators. Consequently, reduced harvest sustainability can have further negative impacts on both seabird populations and the harvesting communities (Croxall et al. 2012; Egevan et al. 2018). Mortality and indirect effects of harvest imply survival and reproductive losses, but harvest impacts on healthy seabird populations may be partially offset by density-dependent processes (Moller 2006). Ultimately, assessing harvest sustainability is challenging because of limited information on harvest and on its impacts on seabird populations.

Alaska Native (indigenous) peoples have used seabirds and their eggs as subsistence and cultural resources for thousands of years. Until the mid-1900s, seabirds provided skins for clothing, bones for tools, and food for people and sled dogs (Hughes 1984; Pratt 1990; Moss 2007; Corbett 2016). Currently, Alaska indigenous peoples use seabirds mostly as human food and cultural resources and these uses do not involve commercial trade. There are no sport and

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commercial harvest of seabirds in Alaska. In recent decades, subsistence bird harvest has been done primarily with shotguns, but other harvest methods are still used on small scale. Although some subsistence bird hunts are specialized, bird hunting often takes place opportunistically in conjunction with pursuits such as marine mammal hunting and berry picking (Little and Robbins 1984; Wolfe et al. 1990).

Alaska subsistence communities have a mixed economy relying on cash and harvest of wild resources for food and socio-cultural structure. The total subsistence harvest in Alaska is about 38 million edible pounds/year composed of fish (53%), land and marine mammals (23 and 14%), plants (4%), shellfish (3%), and birds and eggs (3%) (Fall 2016). Although birds represent a small proportion of the total harvest, bird harvest occurs when other resources are scarce, contributes to diet diversity, and is also socio-culturally important. Seabirds are harvested in low numbers compared to other birds, but seabird eggs represent a large proportion of the total egg harvest (Paige and Wolfe 1998; Hunn et al. 2002).

Previous seabird harvest studies in Alaska documented subsistence uses, gauged variation in amount and species composition, highlighted the need for harvest surveys, and allowed refinement of data collection and analysis (Wohl et al. 1995, 2008; Paige and Wolfe 1997, 1998). However, it has been difficult to characterize seabird harvest based on previous studies because available datasets were limited and some studies did not extrapolate data to represent non-surveyed communities. Previous studies have not depicted seasonal seabird harvest patterns in Alaska, which elucidate their role as subsistence resources. Also, proportions of adult and immature birds that are potentially subject to harvest vary seasonally and relate to harvest effects on bird populations because adults have more survival and reproductive value for populations than immatures (Martin 1995; Juillet et al. 2012; Lyver et al. 2015).

Utilizing a large dataset collected in the last two decades, the objectives of this study were to quantify current harvest of seabirds and their eggs in Alaska with better accounting for local harvest patterns and to describe seasonal harvest patterns for all regions. Although seabirds are a small proportion of subsistence harvests in Alaska, some species potentially harvested are of conservation concern (Red-throated Loon *Gavia stellata*, Yellow-billed Loon *G.adamsii*, Red-faced Cormorant *Phalacrocorax urile*, Pelagic Cormorant *P. pelagicus*, Red-legged Kittiwake *Rissa brevirostris*, Arctic Tern *Sterna paradisea*, Aleutian Tern *Onychoprion aleutica*, Cassin's Auklet *Ptychoramphus aleuticus*, and Whiskered Auklet *Aethia pygmaea*) (U.S. Fish and Wildlife Service 2009, 2014). Results of this study will help to (1) put subsistence harvest in perspective with other factors potentially affecting seabird populations; (2) facilitate engagement of subsistence users in seabird conservation; (3) support sustainable harvest opportunities; and (4) inform management and conservation actions.

Materials and methods

Data sources

Alaska's vast and diverse geographic areas include pelagic, coastal, and inland ecosystems in the Arctic and Subarctic domains of western North America and marine regions of the Gulf of Alaska and Bering, Chukchi, and Beaufort seas. For regulatory purposes related to subsistence harvest of migratory birds, including seabirds, this expanse is divided into 12 management regions (U.S. National Archives and Records Administration 2018) (Fig. 1). For this study, the Bering Strait–Norton Sound management region was divided into St. Lawrence–Diomede Islands and Bering Strait Mainland because of their distinct harvest patterns, and the Gulf of Alaska and Cook Inlet regions were combined. Within regions, 202 communities are eligible for the subsistence harvest of migratory birds and only a few of them have road access. Communities vary in size from a few dozen people to several thousands, with a total population of about 87,000 people, 68% of which are indigenous representing five large ethnic groups (Table 1) (U.S. Census Bureau 2011).

This study summarized seabird subsistence harvest data to portray an annual harvest in 2002–2015. Sampling effort was defined as "community-year," which refers to a harvest survey conducted in a specific community and year. The dataset used was composed of data from the Harvest Assessment Program of the Alaska Migratory Bird Co-Management Council (2018) (AMBCC-HAP) (410 community-years), the Community Subsistence Information System (2018) (117 community-years), Reedy-Maschner and Maschner (2012) (3 community-years), Bacon et al. (2011) (5 community-years), and Kawerak (2004) (10 community-years). Despite possible measurement errors, there are no indications that these surveys suffer from chronic issues that could consistently result in underestimated or overestimated harvest numbers (Usher and Wenzel 1987). Data collection in all sources was based on interview surveys conducted by partnerships among resource management agencies, indigenous organizations, and academia including local research assistants. In all sources, the household was the basic sampling unit. Participation in the surveys was voluntary at the community and household levels. Household participation in these surveys is typically higher than 80%. Of 545 community-years used in analysis, 523 referred to 2002–2015 and a small proportion of 1982–2000 data were used to represent communities insufficiently surveyed in more recent years (Table 1). Among the 202 communities eligible for the

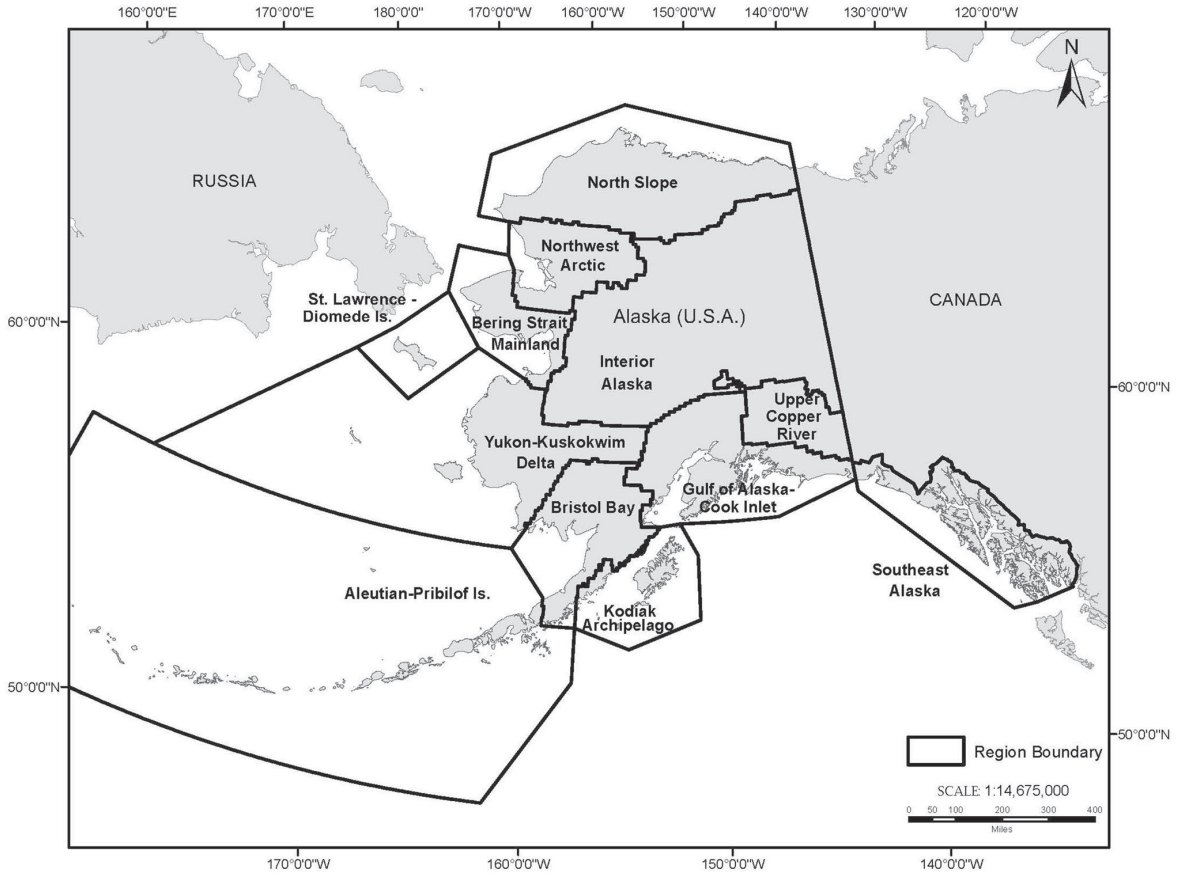

Fig. 1 Alaska regions, based on management regions for the Alaska subsistence harvest of migratory birds

subsistence harvest of migratory birds, only 14 communities across five regions were not represented in the dataset.

Data treatment

Harvest surveys differ on data collection and reporting methods and not all data available were used because of compatibility issues (species categories used, availability of seasonal estimates, and missing data issues). In AMBCC-HAP annual reports, mean replacement has been used to address missing data (Naves 2012). In this study, because diverse data sources were used, analytical steps to implement such mean replacement were impractical and 65 community-years affected by missing data were not included in analysis. For instance, harvest of Red-legged Kittiwake eggs was reported in 2005 in the Aleutian-Pribilof Islands and harvest of eggs and birds was reported in 2006 in the Kodiak Archipelago (Naves 2018). However, the 2005 survey did not include Pribilof Islands communities where Red-legged Kittiwakes are known to breed and breeding colonies have not been documented on the Kodiak Archipelago. These egg harvest reports may involve species misidentification and their absence in this study did not affect characterization of harvest. Also, 10 community-years surveyed in 1991–1997 in the Gulf of Alaska–Cook Inlet and Kodiak Archipelago were not included in analysis because surveys immediately following the 1989 Exxon Valdez Oil spill may not represent usual harvest patterns (Fall 1999).

Harvest surveys in Alaska have used multi-species categories because of challenges in species identification, limited understanding of local ethnotaxonomies, and the need for conciseness in surveys including many subsistence resources. Multi-species categories used in this study were loons (*Gavia* spp.), grebes (*Podiceps auritus* and *P. grisegena*), cormorants (*Phalacrocorax* spp.), Bonaparte's–Sabine's gulls (*Larus philadelphia* and *Xema sabini*), large gulls (*Larus* spp.), terns (*Sterna paradisea* and *Onychoprion aleutica*), murres (*Uria aalge* and *U. lomvia*), guillemots (*Cepphus grille* and *C. columba*), auklets (*Aethia* spp., *Ptychoramphus aleuticus*, and *Cerorhinca*

Table 1 Dataset used to estimate seabird subsistence harvest in Alaska, representing the 2002–2015 period. Unless otherwise noted, values are number of community-years (a community-year refers to a household harvest survey conducted in an individual community in a specific year)

Year	North Slope	Northwest Arctic	St. Lawrence–Diomede Islands	Bering Strait Mainland	Yukon–Kuskokwim Delta	Interior Alaska	Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archipelago	Gulf of Alaska–Cook Inlet	Southeast Alaska	Total
1982	–	–	–	–	–	1	–	–	–	–	–	–	1
1987	–	–	–	–	–	2	–	1	–	–	–	–	3
1992	–	–	–	–	–	–	–	–	1	–	–	–	1
1993	–	–	–	–	–	–	–	–	–	–	–	–	2
1994	–	1	–	–	–	–	–	–	2	–	–	–	3
1996	–	2	–	–	–	–	–	–	1	–	–	–	3
1997	–	3	–	–	–	–	–	–	–	–	–	2	5
2000	–	–	–	–	–	2	2	–	–	–	1	1	6
2002	–	1	2	8	–	2	–	–	–	–	–	–	13
2003	4	–	–	–	–	–	–	3	–	4	3	–	14
2004	1	–	2	9	16	18	6	17	–	–	4	–	73
2005	7	–	2	7	24	9	–	19	3	–	1	–	72
2006	–	5	–	–	24	19	–	1	–	4	3	–	56
2007	4	2	2	9	20	8	5	15	1	–	–	–	66
2008	4	–	–	–	15	2	–	11	4	–	–	–	36
2009	3	–	2	–	26	–	1	1	3	–	–	–	36
2010	–	–	2	5	17	20	2	1	–	5	2	–	54
2011	1	1	2	–	12	14	–	6	–	–	–	–	36
2012	1	5	2	1	1	3	1	–	–	–	–	2	16
2013	–	1	1	1	20	–	–	–	–	–	–		23
2014	–	–	–	–	–	6	–	–	–	–	3	–	9
2015	–	–	–	–	18	–	–	–	–	–	–	1	19
Total	25	21	17	40	193	106	17	75	15	13	17	6	545
Number of communities[a]	8	11	3	13	47	47	8	31	12	12	6	4	202
Number of households	2002	1908	368	2376	6372	3010	594	2503	1762	4630	1193	1173	27,911
Human population[c]	6766	7109	1467	7633	24,070	7538	1512	7283	4428	13,259	2987	2968	87,020

Source for human population and number of households: U.S. Census Bureau (2011)

A small proportion of 1982–2000 data were used to represent communities insufficiently surveyed in 2002–2015

[a]Communities eligible for the subsistence harvest of migratory birds in Alaska

[b]Human population does not include people living in group quarters (5221 people total), most of which are non-permanent residents and thus non-eligible for the subsistence harvest of migratory birds in Alaska

monocerata), and puffins (*Fratercula corniculata* and *F. cirrhata*) (Table 2). However, local ethnotaxonomies can differ from western taxonomy (Hunn and Thornton 2010; Naves and Zeller 2017). Indigenous names in St. Lawrence Island Yupik, Aleut (Aleutian-Pribilof Islands), and Central Yup'ik (Yukon–Kuskokwim Delta and Bristol Bay regions) languages were presented with the intent of making this study more meaningful for subsistence users (Table 2). To be concise, not all of their dialects were represented and the likely inaccuracies reflect the limited knowledge of ethnotaxonomies. These languages were selected to represent a large proportion of indigenous peoples in Alaska. Based on species distribution ranges, (1) all cormorants harvested in the St. Lawrence–Diomede Islands and Bering Strait Mainland regions were considered as Pelagic Cormorant; (2) shearwaters harvested in the St. Lawrence–Diomede Islands were considered as Short-tailed Shearwaters *Puffinus tenuirostris*; and (3) unidentified kittiwakes harvested in areas outside the Red-legged Kittiwake breeding range were considered as Black-legged Kittiwake *Rissa tridactyla* (Delinger 2006). Data on unidentified seabirds were excluded from analysis with negligible effect on harvest estimates (5 community-years included harvest of 137 unidentified seabirds and 76 unidentified seabird eggs).

Following methods of the AMBCC-HAP survey (the main data source used in this study), the annual harvest was divided into spring (April–June), summer (July–August), and fall-winter (September–March). This division reflects subsistence harvest practices, which follow seasonal cycles of availability of biological resources and relate to seabird phenology: arrival at colonies and egg-laying in April–June, chick-rearing and beginning of dispersal in July–August, and offshore dispersal and migration starting in September. Some other surveys used slightly different set of months to define seasons, and although it was impossible to adjust these data, this mismatch affected a small proportion of the whole dataset and was unlikely to affect characterization of seasonal harvests in this study. Moreover, a rigid definition of seasons was unnecessary in this study because seabird phenology and harvest timing are flexible depending on latitude and annual climate variation. Egg harvest estimates were presented for the entire year because eggs are available for only about a month in any given location during spring or spring–summer.

Data analysis

Community-level harvest estimates were calculated using AMBCC-HAP raw data at the household level (Online Resource 1, Eq. 1). Egg harvest reported as volume (e.g., 5-gallon bucket) was converted into number of eggs using standard equations (Naves and Fall 2017). The complete dataset was composed of these estimates as well as those from other data sources reporting at community level. The arithmetic mean of harvest estimates was used to represent communities surveyed more than once. For each region, estimates for individual communities (or mean for communities surveyed more than once) were summed and extrapolated to account for the few communities not represented in the dataset (Eq. 2). Region estimates were summed into Alaska-wide estimates.

Harvest estimates did not account for crippling (birds struck but not retrieved). Similar to sea ducks, seabird crippling may be higher than in waterfowl because some are large birds, their plumage is difficult to penetrate, and as strong divers they may be more likely to escape retrieval (Rothe et al. 2015). Crippling in eider subsistence harvest varied 3–20% depending on hunting conditions (Byers and Dickson 2001). The harvest estimates provided portray cultural importance and food productivity in subsistence economies, but they may not fully represent seabird hunting mortality.

For AMBCC-HAP data, variances for harvest estimates at the community level were calculated based on raw data (Online Resource 1, Eqs. 3a and 3b). For other data sources, community variances were retro-calculated based on reported confidence intervals assuming that all surveys used simple random sampling (Eq. 3c). Arithmetic means (variance, total households in communities, sampled households) were used to represent communities surveyed more than once. Variances for harvest estimates at the region level were calculated using formulas for two-stage sampling: communities were primary sampling units and households were secondary sampling units (Cochran 1977; Online Resource 1, Eqs. 4a–c). Region variances were summed into Alaska-wide variances. Confidence intervals were presented as percentages of harvest estimates (Online Resource 1 Eqs. 5a and 5b; Online Resources 2 and 3).

Arithmetic means of reported (non-extrapolated) harvest were also provided as indicators of minimum harvest (Online Resources 4 and 5). Species of conservation concern are typically harvested infrequently and in relatively low numbers, thus their harvest estimates (extrapolated data) are less accurate than estimates for species harvested frequently and in larger numbers (Copp and Roy 1986; George et al. 2015). Non-extrapolated numbers are relevant ancillary data to inform harvest management (U.S. Fish and Wildlife Service 2014).

Results

Seabird harvest

The estimated Alaska-wide harvest of seabirds was 24,315 birds/year and it was primarily composed of murres (33%),

Table 2 Alaska-wide seabird estimated subsistence harvest (number of birds/year) and seabird population sizes

Species categories Species that may be harvested[a]	Population in Alaska[b] (breeding birds)	Harvest estimate (number of birds/year)						
		1985[g]	1980s–1990s[h]	1995	1996	1995–2000[h]	2001–2005[h]	2002–2015
Loons, Yuwayu(aaghaq)[S], Qiguȓ[A]		–	[h]	[i]	1520	891	1688	980
Red-throated Loon, Eghqaaq[S] *Gavia stellata*[e]	15,360							
Arctic Loon, Melqupak[S] *G. arctica*	200							
Pacific Loon, Melqupak[S] *G. pacifica*	69,498							
Common Loon, Nangqwalek[S] *G. immer*	8886							
Yellow-billed Loon, Nangqwalek[S] *G. adamsii*[e, f]	3500							
Grebes, Aqfasuk[S], Chamdaaya-ȓ[A]		–	[h]	–	2	4	0	13
Horned Grebe, Qaleqcuuk[Y] *Podiceps auritus*[e]	100,000							
Red-necked Grebe, Aarayuli[Y] *P. grisegena*	12,000							
Short-tailed Shearwater, Kaputaghaq[S], Aduya-ȓ[A] *Puffinus tenuirostris*[f]		–	1	–	0	0	0	9
Cormorants								
Double-crested Cormorant, Txax[A] *Phalacrocorax auritus*	6100							
Red-faced Cormorant, Ingatuȓ[A] *P. urile*[e,f]	20,000							
Pelagic Cormorant, Ngelqaq[S], Agayuuĝim Kanuliisigiȓ[A] *P. pelagicus*[e]	44,000	–	992	–	2416	1671	3916	3412
Cormorants (unidentified), Agayuuȓ[A], Agayuuq[Y]		–	–	–	158	82	32	71
Bonaparte's–Sabine's gulls		–	24	–	0	58	28	32
Bonaparte's Gull *Larus philadelphia*	Tens of thousands							
Sabine's Gull, Nasallenguq[S] *Xema sabini*	Tens of thousands							
Mew Gull, Naruyak[Y] *Larus canus*	14,400[c]	–	11	–	–	145	352	564
Large gulls, Sluka-ȓ[A], Narusvak[Y]		–	460	–	–	899	2754	1618
Herring Gull, Ugraaq[S] *Larus argentatus*	1600[c]							
Glaucous-winged Gull *L. glaucescens*	250,000							
Glaucous Gull, Naghuyapik[S] *L. hyperboreus*	100,000							
Gulls (unidentified)		–	46	–	1571	12	0	0
Black-legged Kittiwake, Qaqsungiq[S], Gidaaȓ[A], Tiigilgaaȓ[A], Narayuacuaq[Y] *Rissa tridactyla*	1,300,000	–	25	–	476	423	1636	1032
Red-legged Kittiwake, Qaĝaya-ȓ[A] *R. brevirostris*[e]	210,000	–	0	–	688[j]	657[k]	0	657[k]
Terns, Tekeyiighaq[S], Qitiqda-ȓ[A]		–	13	–	21	80	457	66

Table 2 (continued)

Species categories Species that may be harvested[a]	Population in Alaska[b] (breeding birds)	Harvest estimate (number of birds/year)						
		1985[g]	1980s–1990s[h]	1995	1996	1995–2000[h]	2001–2005[h]	2002–2015
Arctic Tern, Teqiyaar[Y] *S. paradisaea*[e]	hundreds of thousands?[c,m]							
Aleutian Tern, Civtulgaq[Y] *Onychoprion aleutica*[e]	5500[n]							
Murres, Alpa[S], Sakita-x̂[A], Ulux̂ txa-x̂[A], Alpaq[Y]		–	2704	–	10,357	7261	8957	8138
Common Murre, Kuwaaq[S] *Uria aalge*	2,800,000							
Thick-billed Murre, Aqevgaghnak[S] *U. lomvia*	2,200,000							
Guillemots, Samseghhaghaq[S], Sipelaaghhaq[S], Siihmlu-x̂[A], Qayagpagayuli[Y]		–	12	–	0	6	261	770
Black Guillemot *Cepphus grille*	700							
Pigeon Guillemot *C. columba*	49,000							
Murrelets, Tagitugiiq[S], Qizangix̂[A], Qidangax̂[A], Cigur[Y]		–	0	–	30	28	0	0
Marbled Murrelet *Brachyramphus marmoratus*[e,f]	859,000[d]							
Kittlitz's Murrelet *B. brevirostris*[e, f]	9000–25,000[d]							
Ancient Murrelet *Synthliboramphus antiquus*[e, f]	300,000							
Auklets		–	2502	–	17,704	9196	8890	6705
Cassin's Auklet, Alugaaya-x̂[A], Hmaxchiida-x̂[A] *Ptychoramphus aleuticus*[e]	473,000							
Parakeet Auklet, Suklugraq[S], Agaluuya-x̂[A], Qihmuugda-x̂[A] *Aethia psittacula*	1,000,000[d]							
Least Auklet, Akmaliighaq[S], Chuuchiix̂[A] *A. pusilla*	5,500,000–9,000,000[d]							
Whiskered Auklet, Kdiix[A], Tuhmu-x̂[A] *A. pygmaea*[e]	116,000[d]							
Crested Auklet, Sukilpaq[S], Kunugyu-x̂[A] *A. cristatella*	3,000,000							
Rhinoceros Auklet *Cerorhinca monocerata*	180,000							
Puffins		–	285	–	228	226	1419	248
Horned Puffin, Quprughaq[S], Qagida-x̂[A], Quengacuar[Y] *Fratercula corniculata*	900,000							
Tufted Puffin, Pagrugaq[S], Uxchu-x̂[A], Qilangaq[Y] *F. cirrhata*	2,300,000							
Seabirds (unidentified)		4962	147	19,382[i]	1247	61	0	0
Total seabirds		4962	7222	19,382[i]	36,418	21,700	30,381	24,315
Total birds		307,242	–	360,28[i]	371,223	–	–	369,881

Table 2 (continued)

Sources of seabird harvest data: 1985 (Wolfe et al. 1990), 1980s–1990s (Wohl et al. 1995), 1995 (Paige and Wolfe 1997), 1996 (Paige and Wolfe 1998), 1995–2000 and 2001–2005 (Wohl et al. 2008), 2002–2015 (this study)

Sources of populations size data: Groves et al. (1996), Delinger (2006), U.S. Fish and Wildlife Service (2009, 2014), Wetlands International (2018), Renner et al. (2015)

Indigenous names in St. Lawrence Island Yupik (S), Aleut (A), and Central Yup'ik (Y) languages were presented with the intent of making this study more meaningful for subsistence users. However, to favor conciseness not all of their dialects were represented and the likely inaccuracies reflect the limited knowledge of ethnotaxonomies. These languages were selected to represent a large proportion of indigenous peoples in Alaska

[a]Species with occasional occurrence and limited geographic distribution in Alaska were not included because they are unlikely to be harvested

[b]Population size refers to number of birds breeding in Alaska, unless otherwise noted

[c]Coastal colonies only; data unavailable for inland colonies

[d]Total population occurring in Alaska, not only breeding birds

[e]Species of conservation concern (U.S. Fish and Wildlife Service 2009, 2014)

[f]Subsistence harvest not legally authorized in Alaska (U.S. National Archives and Records Administration 2018)

[g]Estimates depicted minimum harvest because data were unavailable for the St. Lawrence–Diomede and Aleutian-Pribilof islands, which represent most seabird harvest in Alaska. The category "other birds" included seabirds, loons, and shorebirds

[h]Estimates depicted minimum harvest because data were not extrapolated to account for non-surveyed communities. Also, loons and grebes were not included

[i]The large category *seabirds* included loons

[j]Reported harvest was extrapolated to communities outside the Red-legged Kittiwake breeding range

[k]Reported harvest was not extrapolated to communities outside the Red-legged Kittiwake breeding range

[l]Unpublished data (L. C. Naves; Alaska Department of Fish and Game, Division of Subsistence)

[m]Coastal colonies host about 11,000 breeding Arctic Terns and undocumented inland colonies may add to several hundred thousand birds

[n]Total breeding population occurs in coastal colonies, this species does not breed inland

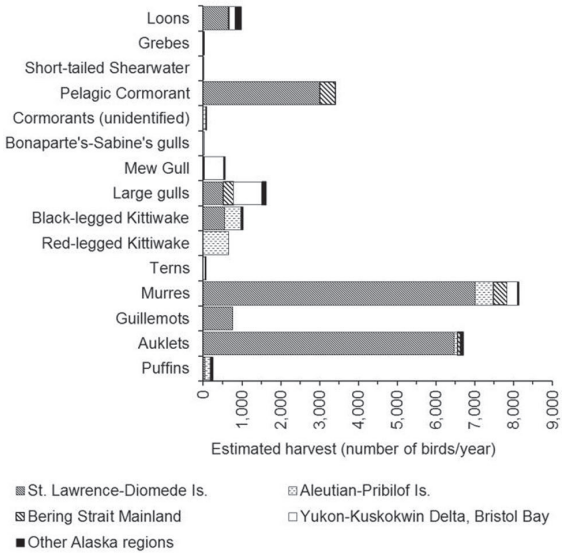

Fig. 2 Species (or species category) composition of the subsistence seabird harvest in Alaska

auklets (28%), gulls (16%, including kittiwakes), and cormorants (14%) (Table 2, Fig. 2). Harvest of loons, Mew Gull (*Larus canus*), Black- and Red-legged kittiwakes, guillemots, and puffins was in the order of hundreds of birds/year each. Harvest of Sabine's–Bonaparte's gulls, terns, and Short-tailed Shearwater was dozens of birds/year each. The dataset used included no reported harvest of albatrosses (*Phoebastria* spp.), Northern Fulmar (*Fulmarus glacialis*), jaegers (*Stercorarius* spp.), or murrelets (*Brachyramphus marmoratus*, *B. Brevirostris*, and *Synthliboramphus antiquus*). The seasonal distribution of harvest was 56% in spring, 20% in summer, and 24% in fall-winter (Table 3, Fig. 3). Spring represented 83% of the harvest of murres and 64% of the harvest of auklets. Fall-winter represented a large proportion of harvest of Pelagic (75%) and unidentified cormorants (84%), Black-legged Kittiwake (61%), guillemots (69%), and loons (50%). Species with a noteworthy summer harvest (> 20% of the annual total) were puffins, auklets, guillemots, and loons (Table 3).

Harvest in the St. Lawrence–Diomede Islands (19,073 birds/year) represented 78% of the Alaska-wide seabird harvest (Fig. 4). Harvest in this region had a strong spring component (54%), which was largely composed of auklets and murres, while summer (22%) and fall-winter harvest (24%) were composed of a diversity of species.

The Aleutian-Pribilof Islands ranked a distant second in seabirds' harvest (1830 birds/year) (Fig. 4). Spring represented 53% of the annual regional harvest and fall-winter harvest (33%) was higher than in other regions. Red-legged Kittiwakes (657 birds/year) were harvested in spring (35%), summer (14%), and fall-winter (51%). Harvest of auklets in this region where Cassin's and Whiskered auklets occur along with three species of *Aethia* auklets was 88 birds/year. Harvest of unidentified cormorants was low (62 birds/year) and included unknown proportions of Pelagic, Red-faced, and Double-crested (*Phalacrocorax auritus*) cormorants (Table 3).

The largest numbers of Mew Gulls were harvested in the Bristol Bay (32% of the regional seabird harvest) and Yukon–Kuskokwim Delta (24%) regions (Table 3). Large gulls were harvested mostly in the St. Lawrence–Diomede Islands (3% of the regional seabird harvest) and Bristol Bay (47%) regions. Mew Gulls were harvested mostly in spring (90% of the Alaska-wide total) and harvest of large gulls were distributed among seasons (48% in spring, 18% in summer, and 34% in fall-winter) (Table 3).

The Alaska-wide harvest of loons (980 birds/year) had three main components: fall-winter harvest in the St. Lawrence–Diomede Islands, spring harvest in the Yukon–Kuskokwim Delta, and summer harvest in the North Slope (Table 3). The harvest of terns was low (66 birds/year), occurred in spring, and was divided among the Yukon–Kuskokwim Delta (71%), North Slope (17%), and Bering Strait Mainland (12%) regions (Table 3).

Seabird egg harvest

The Alaska-wide estimated egg harvest (150,781 eggs/year) was largely composed of eggs of murres (51%), large gulls (17%), Mew Gull (13%), and unidentified gulls (12%) (Table 4, Fig. 5). Eggs of terns and Black-legged Kittiwake were harvested in the order of a few thousand eggs/year. Eggs of puffins, auklets, and loons were harvested in the order of a few hundred eggs/year.

The St. Lawrence–Diomede Islands (61,232 eggs/year) represented 41% of the total egg harvest and 78% of the harvest of murres eggs (Table 5). Regions harvesting the largest amounts of gulls' eggs were Bristol Bay (41% of the Alaska-wide total), Northwest Arctic (13%), and Bering Strait Mainland (12%). Eggs of terns (4862 eggs/year) were reported as harvested by all coastal regions except St. Lawrence–Diomede Islands and most harvest occurred in the Yukon–Kuskokwim Delta (22%), Gulf of Alaska–Cook Inlet (22%), Bristol Bay (20%), and Southeast Alaska (14%). Eggs of loons (441 eggs/year) were harvested in the largest numbers in the Bering Strait Mainland (62%) and Yukon–Kuskokwim Delta (20%) regions (Table 5).

Table 3 Estimated subsistence harvest of seabirds in Alaska (number of birds/year) by region and season, 2002–2015

Species or species categories (bird harvest)	North Slope	North-west Arctic	St. Lawrence–Diomede Islands	Bering Strait Mainland	Yukon–Kuskokwim Delta	Interior Alaska	Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archi-pelago	Gulf of Alaska–Cook Inlet	South-east Alaska	Alaska total
Loons	74	36	658	23	141	26	0	9	0	0	13	0	980
Spring	5	25	113	23	97	15	0	6	0	0	1	0	285
Summer	69	2	109	0	22	4	0	1	0	0	0	0	207
Fall-winter	[b]	9	436	0	22	7	0	2	0	0	12	0	488
Grebes	0	0	3	0	9	1	0	0	0	0	0	0	13
Spring	0	0	1	0	7	1	0	0	0	0	0	0	9
Summer	0	0	0	0	1	0	0	0	0	0	0	0	1
Fall-winter	[b]	0	2	0	1	0	0	0	0	0	0	0	3
Short-tailed Shear-water	0	0	9	0	0	0	0	0	0	0	0	0	9
Spring	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer	0	0	0	0	0	0	0	0	0	0	0	0	0
Fall-winter	[b]	0	9	0	0	0	0	0	0	0	0	0	11
Pelagic Cormorant	[a]	[a]	3006	406	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	3412
Spring	[a]	[a]	265	5	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	270
Summer	[a]	[a]	585	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	585
Fall-winter	[b]		2156	401	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	2557
Cormorants (uniden-tified)	0	0	[a]	[a]	6	0	0	1	62	0	2	0	71
Spring	0	0	[a]	[a]	2	0	0	0	8	0	0	0	10
Summer	0	0	[a]	[a]	0	0	0	0	0	0	2	0	2
Fall-winter	[b]	0	[a]	[a]	4	0	0	1	54	0	0	0	59
Bonaparte's–Sabine's gulls	0	0	2	2	28	0	0	0	0	0	0	0	32
Spring	0	0	2	0	28	0	0	0	0	0	0	0	30
Summer	0	0	0	0	0	0	0	0	0	0	0	0	0
Fall-winter	[b]	0	0	2	0	0	0	0	0	0	0	0	2
Mew Gull	0	20	7	30	172	0	0	335	0	0	0	0	564
Spring	0	0	5	30	140	0	0	334	0	0	0	0	509
Summer	0	0	2	0	0	0	0	1	0	0	0	0	3
Fall-winter	[b]	20	0	0	32	0	0	0	0	0	0	0	52
Large gulls	58	0	516	271	248	0	0	492	0	0	33	0	1618
Spring	8	0	24	72	232	0	0	412	0	0	23	0	771
Summer	50	0	35	196	5	0	0	10	0	0	0	0	296
Fall-winter	[b]	0	457	3	11	0	0	70	0	0	10	0	551

Table 3 (continued)

Species or species categories (bird harvest)	North Slope	North-west Arctic	St. Lawrence–Diomede Islands	Bering Strait Mainland	Yukon–Kuskokwim Delta	Interior Alaska	Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archi-pelago	Gulf of Alaska–Cook Inlet	South-east Alaska	Alaska total
Black-legged Kittiwake	0	2	559	3	6	0	0	1	420	1	40	0	1032
Spring	0	2	35	3	6	0	0	1	158	0	40	0	245
Summer	0	0	101	0	0	0	0	0	61	0	0	0	162
Fall-winter	[b]	0	423	0	0	0	0	0	201	1	0	0	625
Red-legged Kittiwake	0	0	0	0	0	0	0	0	657	0	0	0	657
Spring	0	0	0	0	0	0	0	0	231	0	0	0	231
Summer	0	0	0	0	0	0	0	0	91	0	0	0	91
Fall-winter	[b]	0	0	0	0	0	0	0	335	0	0	0	335
Terns	11	0	0	8	47	0	0	0	0	0	0	0	66
Spring	11	0	0	8	47	0	0	0	0	0	0	0	66
Summer	0	0	0	0	0	0	0	0	0	0	0	0	0
Fall-winter	[b]	0	0	0	0	0	0	0	0	0	0	0	0
Murres	12	18	7014	360	57	0	0	210	467	0	0	0	8138
Spring	12	8	5686	360	9	0	0	210	446	0	0	0	6731
Summer	0	1	992	0	25	0	0	0	12	0	0	0	1030
Fall-winter	[b]	9	336	0	23	0	0	0	9	0	0	0	428
Guillemots	0	0	770	0	0	0	0	0	0	0	0	0	770
Spring	0	0	0	0	0	0	0	0	0	0	0	0	0
Summer	0	0	240	0	0	0	0	0	0	0	0	0	240
Fall-winter	[b]	0	530	0	0	0	0	0	0	0	0	0	530
Auklets	0	0	6475	67	0	0	0	0	88	75	0	0	6705
Spring	0	0	4073	67	0	0	0	0	49	75	0	0	4264
Summer	0	0	2124	0	0	0	0	0	39	0	0	0	2163
Fall-winter	[b]	0	278	0	0	0	0	0	0	17	0	0	278
Puffins	3	0	54	34	2	0	0	0	136	0	19	0	248
Spring	0	0	5	34	2	0	0	0	79	0	9	0	129
Summer	3	0	25	0	0	0	0	0	57	0	10	0	95
Fall-winter	[b]	0	24	0	0	0	0	0	0	0	0	0	24
Total seabirds	158	76	19,073	1204	716	27	0	1048	1830	76	107	0	24,315
Spring	36	35	10,209	602	570	16	0	963	971	75	73	0	13,550
Summer	122	3	4213	196	53	4	0	12	260	0	12	0	4875
Fall-winter	[b]	38	4651	406	93	7	0	73	599	1	22	0	5890

[a]Cormorants harvested in the St. Lawrence–Diomede islands and Bering Strait Mainland regions were assumed to be Pelagic Cormorant based on species distribution

[b]Alaska Migratory Bird Co-Management Council survey not conducted in North Slope in fall because birds migrate out of this region in late summer

Discussion

Geographic harvest patterns

Seabird harvest in Alaska (24,315 birds/year) was small compared to other harvest traditions across the Arctic, which may harvest hundreds of thousands birds/year and collectively may amount to 1,000,000 birds/year (Merkel and Barry 2008; Merkel 2010). In general, harvest represented a minor proportion of seabird numbers occurring in Alaska. For most species and categories, the annual subsistence bird harvest was less than 0.5% of the number of birds breeding in Alaska (Groves et al. 1996; Delinger 2006; U.S. Fish and Wildlife Service 2009, 2014; Renner et al. 2015; Wetlands International 2018). Harvest represented higher proportions of populations of loons (1.0%), guillemots (1.5%), Mew Gull (3.9% of coastal populations), and Pelagic Cormorant (7.8%) (Table 2). Yet, for most species, the population data refer to numbers of seabirds breeding in Alaska, excluding non-breeding immatures and adults. For species that nest in small and dispersed groups, population data represent only portions of breeding populations (Pigeon Guillemot, Mew Gull, Arctic Tern) (Delinger 2006). Also, birds breeding in other areas can be available for harvest in Alaska. For example, Yellow-billed Loons that breed in northern Canada migrate west and across the Bering Sea and the St. Lawrence–Diomede Islands and Short-tailed Shearwaters breed in the southern hemisphere and winter in the North Pacific (Gibson and Byrd 2007; U.S. Fish and Wildlife Service 2014).

Seabirds were only 7% of the total Alaska-wide subsistence bird harvest (about 370,000 birds/year, of which 54% are ducks, 33% geese, 3% swans, 2% cranes, and < 1% shorebirds) (L.C. Naves, Alaska Department of Fish and Game, Division of Subsistence unpublished data). Regionally, the importance of seabirds as subsistence resources was highest in the St. Lawrence–Diomede (81% of total bird harvest) and Aleutian-Pribilof (15% of total bird harvest) islands (Naves 2018). Reasons for why the St. Lawrence–Diomede Islands, and to a lesser extent the Aleutian-Pribilof Islands, dominate the Alaska seabird harvest, despite their small human population (Table 1), are likely related to ecological and cultural factors. The islands' geographic position is extremely pelagic and high productivity in adjacent waters relates to high numbers of seabirds breeding, migrating, and over-wintering including some of the largest seabird colonies in the world and nine of the 12 largest colonies in Alaska (Stephensen and Irons 2003; Gibson and Byrd 2007). Habitat favorable to waterfowl is limited in these marine environments and islands. Thus, ducks and geese occur in lower abundance than in other Alaska regions, where they rank first and second in number of birds harvested (Wolfe et al. 1990; Stehn et al. 2013; Platte and Stehn 2015). The islands' geographic and ecological setting has favored the evolution of hunter–gatherer cultures based almost entirely on marine resources (Hughes 1984; Corbett 2016). The St. Lawrence–Diomede Islands seabird harvest tradition is shared with cultural groups in the Russian Far East (Gavrilo 2008).

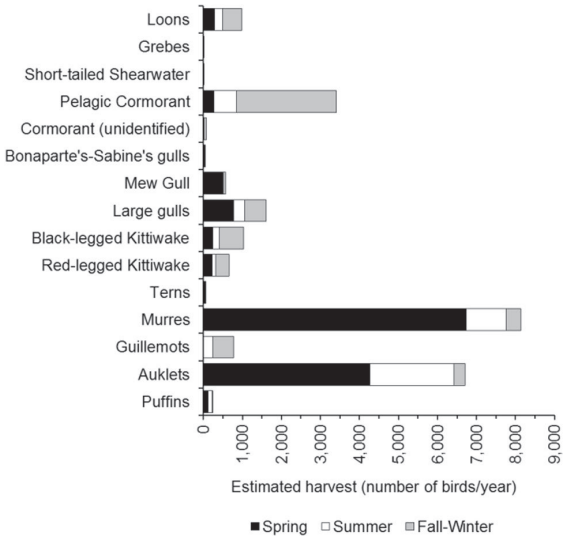

Fig. 3 Seasonal distribution of the subsistence harvest of seabirds in Alaska

Available data are insufficient for an overview of subsistence egg harvest in Alaska, but seabirds still represent the majority of egg harvest. In 1995, seabird eggs represented 80% of all egg harvest (Paige and Wolfe 1997). Geese egg harvest in the Yukon–Kuskokwim Delta (about 18,000 eggs/year) is another main component of all egg harvest (Naves 2018). It is difficult to assess the impact of egg harvest on bird productivity because harvest may refer to incomplete clutches, birds may lay replacement clutches, and harvest affects other causes of egg and chick loss (see below discussion of terns' egg harvest).

Seasonal harvest patterns

The subsistence harvest of birds including seabirds in Alaska has significant spring and fall components. In spring, migratory birds arriving in northern latitudes are the first subsistence resources available. Spring bird hunting often alleviated hunger and starvation when food stored in the previous summer-fall had been depleted. Spring birds were also the first fresh food after a winter diet based on preserved foods (Wolfe et al. 1990). Currently, although modern socio-economic conditions in remote Alaska communities

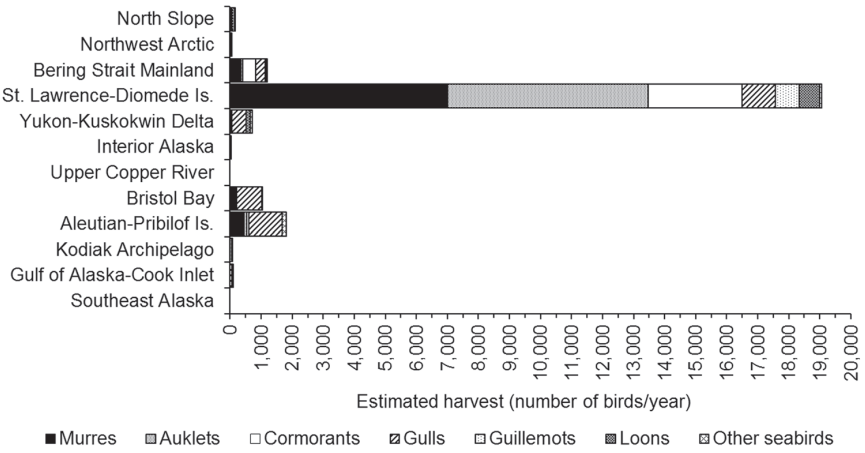

Fig. 4 Distribution of the subsistence seabird harvest by regions in Alaska

Table 4 Alaska-wide estimated subsistence harvest of seabird eggs (number of eggs/year)

Species or species categories	1985[a]	1980s–1990 s[b]	1995[c]	1995–2000[b]	2001–2005[b]	2002–2015
Loons	–	[b]	[c]	478	655	441
Grebes	–	[b]	–	0	0	2
Pelagic Cormorant	–	0	–	0	27	15
Cormorants (unidentified)	–	0	–	22	4	11
Parasitic Jaeger	–	0	–	0	0	1
Bonaparte's–Sabine's gulls	–	262	–	3306	703	365
Mew Gull	–	2813	–	6689	13,801	19,542
Large gulls	–	1416	–	27,353	38,128	25,830
Gulls (unidentified)	33,184	22,415	–	17,325	0	18,724
Black-legged Kittiwake	–	178	–	39	1215	2753
Red-legged Kittiwake	–	0	–	0	0	0
Terns	–	3008	–	2577	2408	4862
Murres	–	13,902	–	37,771	87,109	77,401
Guillemots	–	0	–	118	11	44
Murrelets	–	0	–	84	0	0
Auklets	–	15	–	189	922	338
Puffins	–	63	–	148	431	452
Seabirds (unidentified)	7670	3530	115,344	2213	0	0
Total seabird eggs	40,854	45,071	115,344	98,312	145,414	150,781
Total eggs	83,603	–	145,054	–	–	–

Sources of harvest data: 1985 (Wolfe et al. 1990), 1980s–1990s (Wohl et al. 1995), 1995 (Paige and Wolfe 1997), 1995–2000 and 2001–2005 (Wohl et al. 2008), 2002–2015 (this study)

1996 Egg harvest estimates were not provided in Paige and Wolfe (1998)

[a]Estimates depicted minimum harvest because data were unavailable for the St. Lawrence–Diomede and Aleutian-Pribilof islands, which represent most seabird harvest in Alaska. The category "other birds" included seabirds, loons, and shorebirds

[b]Estimates depicted minimum harvest because data were not extrapolated to account for non-surveyed communities. Also, loons and grebes were not included

[c]The large category "seabirds" included loons

prevent famines, the spring bird harvest retains cultural and nutritional values. Egg harvesting occurs in spring, but it may be delayed in the northernmost regions of Alaska with longer winters.

Murres and auklets are the most abundant birds breeding on St. Lawrence–Diomede Islands, and are found in dense colonies in spring and summer (Stephensen et al. 1998). High harvest of murres and auklets in spring is likely related

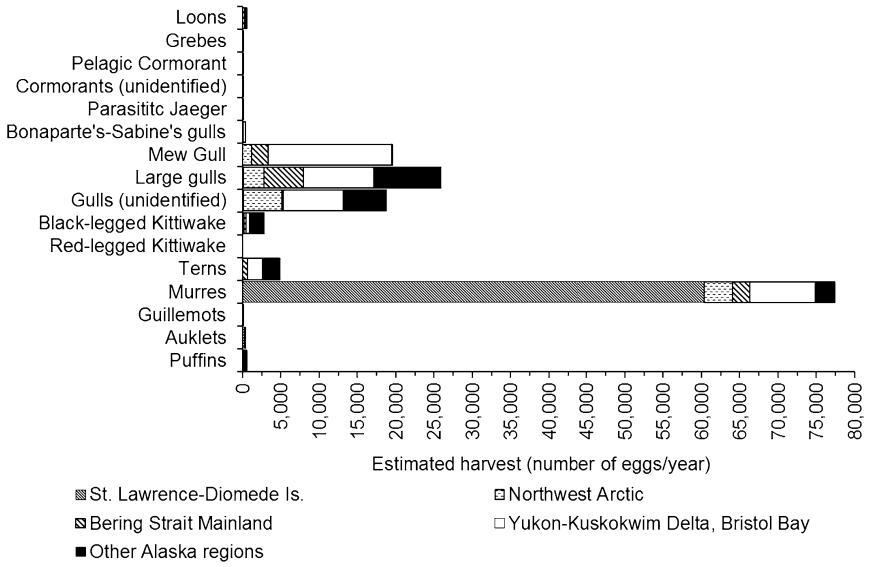

Fig. 5 Species (or species category) composition of the subsistence seabird egg harvest in Alaska

to the spatial concentration of these birds in colonies at this time of the year. Bird harvesting in general stops or is much reduced in summer when subsistence users focus on fishing and other harvest pursuits, which can yield higher harvest productivity. Also, after egg incubation starts, indigenous subsistence users to some extent curtail bird harvesting to allow birds to nest and raise young (Little and Robbins 1984; Wolfe et al. 1990). Summer bird harvest, defined in this study as July–August, may sometimes refer to late spring or early fall depending on latitude and annual climate variation. In northern Alaska, especially the North Slope region, the breeding season is compressed in time and birds outmigrate in late summer. Late fall and winter bird harvest occurs in southern regions, which are wintering grounds for seabirds and waterfowl (Aleutian-Pribilof Islands, Kodiak Archipelago, and Gulf of Alaska–Cook Inlet) (Wolfe et al. 1990). The high diversity of seabird species in fall harvest at these regions and also St. Lawrence–Diomede Islands likely reflects the diversity of marine birds that migrate past or visit the area that time of year, when many bird colonies disperse (Suryan et al. 2015).

Harvest seasonality has implications for harvest sustainability. Spring bird harvest largely affects adult breeding birds, which have lower natural mortality and higher reproductive value for populations than immature birds (Martin 1995; Lyver et al. 2015). Spring harvest may also negatively affect breeding productivity because of hunting-related disturbance and by delaying or preventing breeding if repairing is costly to widowed birds (Juillet et al. 2012). In Alaska, seabird categories harvested mostly in spring were murres, auklets, and gulls and categories harvested mostly in fall-winter were cormorants, guillemots, and loons. Some summer and fall harvest may be chicks harvested just before they leave the nest, especially for cliff-nesting species, but the harvest of nestlings has not been quantified (Little and Robbins 1984). In the St. Lawrence Island communities, current harvest of nestlings is reduced and fall seabird harvest happens by boat in conjunction with seal hunting. Local hunters explained that they prefer to harvest cormorants, kittiwakes, large gulls, guillemots, and loons in fall-winter because young birds are tender and fatter than adults (Naves and Zeller 2017). Hatch-year birds likely compose a significant proportion of fall-winter and possibly summer harvest, what likely lessens harvest effects on bird populations.

Long-term harvest trends

Marked changes in Alaska's hunter–gatherer cultures happened after contact with western cultures in the last 200 years and affected harvest patterns, including a reduced use of seabirds. Current seabird harvest occurs from land and by boat together with subsistence fishing and marine mammal hunting and maybe also with commercial fishing. Although modern boating equipment can facilitate access to pelagic resources, archeological and ethnographic information support higher harvest of pelagic seabirds such as albatrosses, shearwaters, fulmars, murrelets, and storm petrels in the past (Causey et al. 2005; Moss 2007; Casperson 2012; Corbett 2016). Until the early 1900s, a strong seabird harvest tradition existed on Nunivak Island (Yukon–Kuskokwim Delta region), where large numbers of birds and eggs were taken for materials, food, and trade (Pratt 1990). Nowadays, the Yukon–Kuskokwim Delta has low harvest of seabirds

Table 5 Estimated subsistence harvest of seabird eggs in Alaska (number of eggs/year) by region, 2002–2015

Species or es categories (egg harvest)	North Slope	Northwest Arctic	St. Lawrence–Diomede Islands	Bering Strait Mainland	Yukon–Kuskokwim Delta	Interior Alaska	Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archipelago	Gulf of Alaska–Cook Inlet	Southeast Alaska	Alaska total
Loons	18	12	27	274	89	0	0	21	0	0	0	0	441
Grebes	0	0	0	0	2	0	0	0	0	0	0	0	2
Pelagic Cormorant	[a]	[a]	4	11	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	15
Cormorants (unidentified)	0	2	[a]	[a]	3	0	0	6	0	0	0	0	11
Parasitic Jaeger	0	0	0	0	1	0	0	0	0	0	0	0	1
Bonaparte's–Sabine's gulls	0	42	0	7	171	0	0	145	0	0	0	0	365
Mew Gull	0	1123	40	2169	2338	37	0	13,831	0	4	0	0	19,542
Large gulls	68	2704	93	5123	2372	16	0	6868	1132	3177	749	3528	25,830
Gulls (unidentified)	132	5061	104	135	1087	8	0	6736	2191	620	660	1990	18,724
Black-legged Kittiwake	0	35	134	282	283	0	0	195	0	1809	15	0	2753
Terns	70	21	0	565	1069	3	0	980	38	359	1062	695	4862
Murres	1803	3718	60,362	2266	3107	0	0	5379	717	0	42	7	77,401
Guillemots	0	41	0	1	2	0	0	0	0	0	0	0	44
Auklets	0	19	277	0	0	0	0	0	42	0	0	0	338
Puffins	0	173	191	70	0	0	0	0	0	0	18	0	452
Total seabird eggs	2091	12,951	61,232	10,903	10,524	64	0	34,161	4120	5969	2546	6220	150,781

[a]Cormorants harvested in the St. Lawrence–Diomede islands and Bering Strait Mainland regions were assumed to be Pelagic Cormorant based on species distribution

and their eggs (this study). Also, human populations are much reduced at several islands where seabirds were important subsistence resources (e.g., Little Diomede and King Island in the Bering Sea; Attu, Kiska, and Nikolski in the Aleutian Islands; Belkofski in the lower Alaska Peninsula; and Kiniklik in Prince William Sound) (Laughlin 1980).

Data are limited to assess long-term trends in Alaska seabird harvest in the last decades (Tables 2, 4). The 1985 harvest estimates (Wolfe et al. 1990) used extrapolation to represent non-surveyed communities, but these numbers underestimated harvest because data were unavailable for the St. Lawrence–Diomede and Aleutian-Pribilof islands, which account for most seabird harvest. The 1980s–1990s, 1995–2000, and 2001–2005 estimates (Wohl et al. 1995, 2008) did not use extrapolation to represent non-surveyed communities and thus are an incomplete representation of the total harvest. These later estimates cannot support temporal comparison of harvest amounts, although they have been used for this purpose (Petersen et al. 2015). The 1995 (Paige and Wolfe 1997) and 1996 (Paige and Wolfe 1998) estimates used extrapolation to represent non-surveyed communities. The 1995 estimates represented all seabird species together. The 1996 estimates defined seabird categories and species and did not include egg harvest estimates.

Thus, the 1996 and 2002–2015 (this study) estimates are the most compatible ones to assess seabird harvest patterns in the last decades. It is unclear whether some differences between these estimates were due to changes in harvest or to a larger 2002–2015 dataset, which represented local harvest patterns related to seabird coloniality. However, the 2002–2015 estimates provided indicators of a continued reduction in the amount and diversity of seabird harvest. First, the substantially smaller 2002–2015 harvest estimate for auklets, a category taken in relatively large numbers, suggests an overall reduction of seabird harvest in the St. Lawrence–Diomede Islands and Bering Strait Mainland. Second, there was no documentation in the last two decades of harvest of Northern Fulmar and murrelets (birds or eggs). Also, other ethnographic studies have documented that subsistence users perceive a reduction in the use of seabirds and other birds in Alaska in recent decades (Fay and Cade 1959; Young et al. 2014).

Across the Arctic, current seabird harvest appears lower than historic levels because of harvest regulations, decreased seabird abundance, and socio-economic and cultural changes such as increased availability of industrialized foods, shifts in food preference, high cost of fuel and harvest gear, and time constraints related to employment and formal education (Nelson et al. 2005; Merkel 2010; Natcher et al. 2012; Fall et al. 2013). Nonetheless, harvesting of seabirds and their eggs remains culturally important and is one component of complex food security systems in remote communities.

Harvest of species of conservation concern

Red-faced and Pelagic cormorants' numbers have declined in some colonies in Alaska (Byrd and Williams 2004; Dragoo et al. 2015). Cormorants' harvest was small at the Aleutian-Pribilof Islands, Kodiak Archipelago, and Gulf of Alaska–Cook Inlet, where Red-faced Cormorants occur. Most harvest occurred in fall-winter and likely included a large proportion of hatch-year birds, what lessens effects of harvest on populations. In western Aleutian Islands, the largest Red-faced Cormorant colonies in decline are not subject to harvest because there are no nearby communities and these birds are not harvested elsewhere because they are largely resident (Causey 2002).

Yellow-billed Loons are a conservation priority because populations are naturally small and sensitive to changes in habitat and adult mortality (U.S. Fish and Wildlife Service 2014). Pacific Loons represent a large proportion of all loons harvested and few Yellow-billed Loons are harvested annually in Alaska (Naves and Zeller 2017). Bycatch in gillnet fisheries represented a large proportion of loons harvested in the North Slope, where loons are not usually hunted. In contrast, bycatch represented a small proportion of loons harvested in the St. Lawrence Island, where loons are hunted for food (U.S. Fish and Wildlife Service 2014). In this region, most loons are harvested in fall, likely including a high proportion of hatch-year birds.

Cassin's and Whiskered auklets are of conservation concern because they have small populations (Table 2). Declines and extirpations of auklet colonies in Alaska were caused by introduced foxes and rats (Bailey 1993). Most harvest of auklets occurred at the St. Lawrence–Diomede Islands. Based on the regional species composition, this harvest is largely composed of Crested and Least auklets, although Parakeet Auklets are also harvested (Little and Robbins 1984; Stephensen et al. 1998; Community Subsistence Information System 2018). The harvest of auklets was low at the Aleutian-Pribilof Islands region where Cassin's and Whiskered auklets occur, what also suggested low harvest-related disturbance.

The largest Red-legged Kittiwake colonies on the Pribilof Islands decreased by 50% in the 1970s–1990s and since then population numbers have stabilized (Byrd et al. 1997; Dragoo et al. 2015). Harvest preference for Red-legged Kittiwake by local subsistence communities has raised interest to evaluate harvest effects on the population (Veltre and Veltre 1981; Young et al. 2014). Based on the limited data available, the annual harvest was 0.31% of Red-legged Kittiwake Alaska breeding population (Mishler et al. 1996a, b; U.S. Fish and Wildlife Service 2009) (Table 2). Considering reduced subsistence activities by the local communities, it is unlikely that harvest of

Red-legged Kittiwake and their eggs increased in recent decades (Fall et al. 2013; Young et al. 2014). Collaboration with the local communities is needed to clarify current harvest amount and the importance of this species as food and cultural resource (e.g., Seabird Youth Network 2018).

Numbers of Arctic and Aleutian terns decreased by 90% in some Alaska colonies (Renner et al. 2015). Reduced numbers of piscivorous birds such as terns in the North Pacific coincided with an oceanographic regime shift in 1976–1977 and changes in the abundance of forage fish (Agler et al. 1999). The harvest of terns was small, but their egg harvest was widespread and may be substantial in relation to egg productivity in coastal colonies. Previous studies have documented widespread subsistence harvest of eggs of terns in Alaska, Greenland, and Canada. Egg harvest contributes to colony destabilization and increased predation and nest abandonment (Hatch 2002). Combining local and traditional knowledge of subsistence users related to terns together with western biological research has great potential to help fulfill information gaps across Alaska, develop collaboration among stakeholders, and devise conservation measures that recognize subsistence uses (Blanchard 1994).

Recommendations

Ongoing environmental changes in the Arctic including reduced sea ice have affected marine ecosystems and have brought increased shipping traffic and development projects (Grebmeier 2012; Moerlein and Carothers 2012; Huntington et al. 2015). Continuing warming of the Bering and adjacent seas is expected to affect seabird populations potentially reducing their availability as subsistence resources as well as their harvest sustainability (Renner et al. 2016). This study highlighted the importance of seabird harvest at the St. Lawrence–Diomede Islands and of seabird eggs as subsistence resources in coastal Alaska. This study also provided an analytical approach integrating diverse data sources to estimate harvest at large geographic scales. Continued harvest monitoring is needed to assess the resilience of marine resources and human communities to ongoing ecological and socio-economic changes in the Arctic. Harvest data that are reliable and easily accessible to all stakeholders are also a key element to enable advancements in seabird conservation and protection of subsistence uses.

A large dataset is needed to characterize seabird subsistence harvest over large geographic areas, such as Alaska. First, harvest composition and amount show large annual variation related to socio-economic and ecological factors (Wolfe et al. 1990; Fall et al. 2013). Several years of data are needed to depict the range of annual harvest and to detect temporal trends. Second, because seabirds are colonial, harvest patterns may differ at small geographic scales depending on communities' access to seabirds (Natcher et al. 2012). Third, in surveys designed to document diverse subsistence resources, harvest estimates for resources taken infrequently or in relatively small numbers such as seabirds are less accurate than estimates for commonly taken resources (Copp and Roy 1986; George et al. 2015). For rarely taken resources, a large dataset helps to detect and smooth irregularities in harvest numbers, although wide confidence intervals around harvest estimates are still expected. Awareness of these data requirements and limitations can lead to harvest estimates that are comparable across time and geographic locations.

Species identification issues are inherent to bird harvest surveys as well as to seabird population monitoring (Carney 1992; Wilhelm et al. 2008; Dragoo et al. 2015). Harvest surveys often refer to multi-species categories and species identification in studies that named individual species is sometimes unreliable (e.g., Red-faced Cormorant in Mishler et al. 1996a, b). Multi-species categories in indigenous ethnotaxonomies seem to be prevalent and suggest that subsistence users often do not identify individual seabird species (Hunn and Thornton 2010; Naves and Zeller 2017). Providing species-specific harvest estimates for most seabirds is nearly impossible without a species identification system based on biological sampling, such as bird parts or tissue provided by hunters. Nevertheless, a better understanding of local seabird ethnotaxonomies is needed to refine harvest monitoring, especially when dealing with species of conservation concern.

Further efforts are needed to engage subsistence users in seabird research and conservation as partners to collect biological and harvest data and contribute local and traditional knowledge (Blanchard 1994; Moller et al. 2009). This engagement can support traditional connections to seabirds as food and cultural resources and a lifestyle that favors the well-being of the subsistence communities. There is great potential in conservation efforts to reduce disturbance and inefficiencies in subsistence seabird harvest and bycatch in fishing gear. Non-wasteful harvest is a core principle in indigenous cultures and subsistence users may find common goals in such efforts.

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Compliance with Ethical standards

Conflict of interest The author declares that she has no conflict of interest.

Ethical approval This study re-analyzed and summarized the data from harvest surveys previously published. The original harvest surveys followed ethical principles for social science research (Arctic Research Consortium of the U.S. 1999) comparable to those of the 1964 Helsinki declaration and its later amendments. Community consent to conduct harvest surveys was formalized as tribal council resolutions.

Informed consent Informed consent was also obtained from all individual participants of harvest surveys. In this study, re-analyzing and summarizing previously available data did not require further consent.

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Geographic and Seasonal Patterns of Seabird Subsistence Harvest in Alaska

Polar Biology

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Electronic Supplementary Material 1 Formulas used to calculate estimated harvest and confidence interval.

Community estimated harvest, Alaska Migratory Bird Co-Management Council data

(Equation 1) $$\hat{Y}_i = \sum_{i=1}^{i}\left[\sum_{k=1}^{i}\frac{M_{ijk}}{m_{ijk}}\left(\sum_{j=1}^{k} y_{ijk}\right)\right]$$

Region estimated harvest

(Equation 2) $$\hat{Y}_{reg} = \frac{N}{n}\sum^{n}\hat{Y}_i$$

Community variance, Alaska Migratory Bird Co-Management Council data

(Equation 3.a) $$s_i^2 = \sum_{k=1}^{i}\left[\frac{1}{m_{ijk}-1}\sum_{j=1}^{k}\left(y_{ijk}-\bar{y}_{ijk}\right)^2\right]$$

(Equation 3.b) $$\bar{y}_{ijk} = \frac{\sum_{j=1}^{k} y_{ijk}}{m_{ijk}}$$

Community variance, other data sources

(Equation 3.c) $$s_i^2 = \left[\left(\frac{CI_{PUBi}\times\hat{Y}_i}{t_{\alpha/2}}\right)\times\left(\frac{\sqrt{m_{ij}}}{M_{ij}\times\sqrt{1-\frac{1}{M_{ij}}}}\right)\right]^2$$

Region variance

(Equation 4.a) $$v(\hat{Y}_{reg}) = \frac{N^2(1-f_1)}{n}s_u^2 + \frac{N}{n}\sum_{i=1}^{n}\frac{M_i^2(1-f_2)s_i^2}{m_i}$$

(Equation 4.b) $$s_u^2 = \frac{1}{n-1}\sum_{i=1}^{n}\left(\hat{Y}_i - \hat{\bar{Y}}_{reg}\right)^2$$

(Equation 4.c) $$\hat{\bar{Y}}_{reg} = \frac{\sum_{i=1}^{n}\hat{Y}_i}{n}$$

Confidence interval at region and Alaska-wide levels

(Equation 5.a) $$CI(\hat{Y}) = 2\times CV$$

(Equation 5.b) $$CV(\hat{Y}) = \frac{\sqrt{v(\hat{Y})}}{\hat{Y}}$$

i = communities (primary sampling units)

j = households (secondary sampling units)

k = harvest level strata (Alaska Migratory Bird Co-Management Council data)

reg = region

AK = Alaska-wide

$\hat{Y}$ = estimated harvest

y = harvest reported by individual households

$\hat{\bar{Y}}_{reg}$ = average community harvest in a region

$\bar{y}_{ijk}$ = mean household harvest in community i and harvest level strata k

m = sampled households

M = total households

n = sampled communities in region

N = total communities in region

$v(\hat{Y})$ = variance of harvest estimate

$t_{1/\alpha}$ = Student's t distribution value with tail area probability α

f_1 = sampling fraction in regions (n/N)

f_2 = sampling fraction in communities (m_i/M_i)

s_i^2 = variance among households in a community

s_u^2 = variance among communities in a region

CI_{PUBi} = confidence interval published for community estimated harvest (data sources other than Alaska Migratory Bird Co-Management Council)

$CI(\hat{Y})$ = confidence interval as a percentage of the harvest estimate

$CV(\hat{Y})$ = coefficient of variation

Geographic and Seasonal Patterns of Seabird Subsistence Harvest in Alaska

Polar Biology

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Electronic Supplementary Material 2 Confidence intervals for estimated subsistence harvest of seabirds in Alaska (as percentage of the estimate) by region and season, 2002–2015.

Species or species categories (Bird harvest)	North Slope	Northwest Arctic	St. Lawrence-Diomede Islands	Bering Strait Mainland	Kuskokwim Delta	Interior Alaska Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archipelago	Gulf of Alaska-Cook Inlet	Southeast Alaska	Alaska total
Loons	0.47	0.74	0.53	0.37	0.16	0.55	–	0.51	–	–	2.35	–	0.36
Spring	0.58	0.83	0.73	0.37	0.17	0.56	–	0.49	–	–	2.10	–	0.31
Summer	0.48	1.91	0.52	–	0.35	0.63	–	1.01	–	–	–	–	0.32
Fall-winter	[b]	1.15	0.62	–	0.31	0.56	–	0.83	–	–	2.41	–	0.56
Grebes	–	–		–	3.39	2.85	–	–	–	–	–	–	2.43
Spring	–	–		–	4.20	2.85	–	–	–	–	–	–	3.32
Summer	–	–	–	–	0.68	–	–	–	–	–	–	–	0.68
Fall-winter	[b]	–		–	0.68	–	–	–	–	–	–	–	0.69
Short-tailed Shearwater	–	–	1.03	–	–	–	–	–	–	–	–	–	1.03
Spring	–	–	–	–	–	–	–	–	–	–	–	–	–
Summer	–	–	–	–	–	–	–	–	–	–	–	–	–
Fall-winter	[b]	–	1.06	–	–	–	–	–	–	–	–	–	1.06
Pelagic Cormorant	[a]	[a]	0.62	0.59	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	0.55
Spring	[a]	[a]	0.50	1.78	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	0.49
Summer	[a]	[a]	0.82	–	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	0.82
Fall-winter	[b]		0.60	0.59	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	0.52
Cormorants (unidentified)	–	–	[a]	[a]	0.36	–	–	0.74	0.65	–	0.93	–	0.57
Spring	–	–	[a]	[a]	0.79	–	–	–	1.11	–	–	–	0.91
Summer	–	–	[a]	[a]	–	–	–	–	–	–	0.93	–	0.93
Fall-winter	[b]	–	[a]	[a]	0.41	–	–	0.76	0.73	–	–	–	0.67
Bonaparte's-Sabine's gulls	–	–	1.37	1.93	0.61	–	–	–	–	–	–	–	0.55
Spring	–	–	1.37	–	0.62	–	–	–	–	–	–	–	0.58
Summer	–	–	–	–	–	–	–	–	–	–	–	–	–
Fall-winter	[b]	–	–	1.93	–	–	–	–	–	–	–	–	1.93
Mew Gull	–	2.67	0.86	1.57	0.46	–	–	0.61	–	–	–	–	0.41
Spring	–	–	1.23	1.57	0.37	–	–	0.62	–	–	–	–	0.43
Summer	–	–	1.15	–	–	–	–	1.05	–	–	–	–	0.79
Fall-winter	[b]	2.67	–	–	1.89	–	–	–	–	–	–	–	1.55
Large gulls	0.70	–	0.51	0.83	0.25	–	–	0.64	–	–	0.88	–	0.29

Species or species categories (Bird harvest)	North Slope	Northwest Arctic	St. Lawrence-Diomede Islands	Bering Strait Mainland	Kuskokwim Delta	Interior Alaska Upper Copper River		Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archipelago	Gulf of Alaska-Cook Inlet	Southeast Alaska	Alaska total
Spring	0.77	–	0.60	0.59	0.28	–	–	0.77	–	–	0.95	–	0.42
Summer	0.71	–	0.68	1.13	0.51	–	–	0.77	–	–	–	–	0.76
Fall-winter	[b]	–	0.51	0.79	0.32	–	–	0.78	–	–	1.42	–	0.44
Black-legged Kittiwake	–	0.64	0.87	2.05	0.49	–	–	1.01	0.63	1.30	0.93	–	0.59
Spring	–	0.64	0.87	2.05	0.49	–	–	1.01	0.73	–	0.93	–	0.51
Summer	–	–	1.02	–	–	–	–	–	1.40	–	–	–	0.83
Fall-winter	[b]	–	0.99	–	–	–	–	–	0.77	1.30	–	–	0.72
Red-legged Kittiwake	–	–	–	–	–	–	–	–	0.56	–	–	–	0.58
Spring	–	–	–	–	–	–	–	–	0.56	–	–	–	0.56
Summer	–	–	–	–	–	–	–	–	1.04	–	–	–	1.04
Fall-winter	[b]	–	–	–	–	–	–	–	0.85	–	–	–	0.85
Terns	4.32	–	–	0.97	0.40	–	–	–	–	–	–	–	0.80
Spring	5.17	–	–	0.97	0.40	–	–	–	–	–	–	–	0.94
Summer	–	–	–	–	–	–	–	–	–	–	–	–	–
Fall-winter	[b]	–	–	–	–	–	–	–	–	–	–	–	–
Murres	0.75	1.00	0.52	0.58	0.39	–	–	1.42	0.61	–	–	–	0.45
Spring	0.76	1.06	0.56	0.58	0.33	–	–	1.44	0.62	–	–	–	0.48
Summer	–	1.11	0.88	–	0.77	–	–	–	0.60	–	–	–	0.85
Fall-winter	[b]	1.29	0.57	–	0.37	–	–	–	1.33	–	–	–	0.51
Guillemots	–	–	0.87	–	–	–	–	–	–	–	–	–	0.87
Spring	–	–	–	–	–	–	–	–	–	–	–	–	–
Summer	–	–	0.99	–	–	–	–	–	–	–	–	–	0.99
Fall-winter	[b]	–	0.82	–	–	–	–	–	–	–	–	–	0.82
Auklets	–	–	0.39	0.54	–	–	–	–	0.91	1.27	–	–	0.38
Spring	–	–	0.50	0.54	–	–	–	–	1.08	1.27	–	–	0.48
Summer	–	–	0.52	–	–	–	–	–	1.23	–	–	–	0.51
Fall-winter	[b]	–	0.61	–	–	–	–	–	–		–	–	0.61
Puffins	0.70	–	1.17	0.54	0.84	–	–	–	0.66	–	1.24	–	0.43
Spring	–	–	1.17	0.54	0.84	–	–	–	0.76	–	1.53	–	0.50
Summer	0.70	–	1.27	–	–	–	–	–	0.71	–	1.10	–	0.56
Fall-winter	[b]	–	0.97	–	–	–	–	–	–	–	–	–	0.97
Total seabirds	0.53	0.63	0.45	0.45	0.17	0.54	0.17	0.67	0.47	1.26	0.65	–	0.30
Spring	1.64	0.63	0.45	0.45	0.18	0.56	0.18	0.74	0.44	1.27	0.65	–	0.34
Summer	0.52	1.54	0.24	1.13	0.39	0.63	0.39	0.70	0.59	–	0.91	–	0.21
Fall-winter	[b]	1.47	0.57	0.59	0.67	0.56	0.67	0.74	0.67	1.30	1.46	–	0.46

[a] Cormorants harvested in the St. Lawrence-Diomede islands and Bering Strait Mainland regions were assumed to be Pelagic Cormorant based on species distribution.

[b] Alaska Migratory Bird Co-Management Council survey not conducted in North Slope in fall because birds migrate out of this region in late summer.

–: Estimated harvest = 0.

Geographic and Seasonal Patterns of Seabird Subsistence Harvest in Alaska

Polar Biology

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Electronic Supplementary Material 3 Confidence intervals for estimated subsistence harvest of seabird eggs in Alaska (as percentage of the estimate) by region and season, 2002–2015.

Species or species categories (Egg harvest)	North Slope	Northwest Arctic	St. Lawrence-Diomede Islands	Bering Strait Mainland	Yukon-Kuskokwim Delta	Interior Alaska Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archipelago	Gulf of Alaska-Cook Inlet	Southeast Alaska	Alaska total
Loons	1.03	1.40	1.28	0.34	0.22	–	1.13	–	–	–	–	0.24
Grebes	–	–	–	–	0.44	–	–	–	–	–	–	0.44
Pelagic Cormorant	[a]	[a]	2.04	2.01	[a]	[a]	[a]	[a]	[a]	[a]	[a]	1.56
Cormorants (unidentified)	–	2.67	[a]	[a]	0.75	–	0.89	–	–	–	–	0.70
Parasitic Jaeger	–	–	–	–	0.54	–	–	–	–	–	–	0.54
Bonaparte's-Sabine's gulls	–	1.40	–	1.93	0.32	–	1.23	–	–	–	–	0.54
Mew Gull	–	0.62	0.83	0.21	0.17	0.80	0.40	–	1.30	–	–	0.29
Large gulls	0.65	0.47	0.72	0.22	0.11	0.78	0.21	0.42	1.06	0.52	1.23	0.23
Gulls (unidentified)	0.84	0.52	1.63	1.02	1.79	2.03	0.30	0.44	0.89	0.98	0.77	0.23
Black-legged Kittiwake	–	0.42	1.07	0.37	0.27	–	0.44	–	1.36	1.36	–	0.89
Terns	0.74	0.69	–	0.28	0.46	1.02	0.29	1.06	1.70	2.29	1.03	0.55
Murres	0.58	0.43	0.69	0.53	0.28	–	0.62	0.77	–	1.20	1.91	0.54

Species or species categories (Egg harvest)	North Slope	Northwest Arctic	St. Lawrence-Diomede Islands	Bering Strait Mainland	Yukon-Kuskokwim Delta	Interior Alaska	Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archipelago	Gulf of Alaska-Cook Inlet	Southeast Alaska	Alaska total
Guillemots	–	2.67	–	1.37	0.76	–	–	–	–	–	–	–	2.51
Auklets	–	1.78	0.78	–	–	–	–	–	0.83	–	–	–	0.65
Puffins	–	0.66	1.29	0.74	–	–	–	–	–		1.24	–	0.61
Total seabird eggs	0.49	0.33	0.68	0.21	0.22	0.59	–	0.24	0.27	0.96	1.02	0.76	0.29

[a] Cormorants harvested in the St. Lawrence-Diomede islands and Bering Strait Mainland regions were assumed to be Pelagic Cormorant based on species distribution.

–: Estimated harvest = 0.

Geographic and Seasonal Patterns of Seabird Subsistence Harvest in Alaska

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Electronic Supplementary Material 4 Reported harvest of seabirds by regions in Alaska (non-extrapolated number of birds/year), 2002–2015.

Species or species categories (Bird harvest)	North Slope	Northwest Arctic	St. Lawrence-Diomede Islands	Bering Strait Mainland	Yukon-Kuskokwim Delta	Interior Alaska	Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archipelago	Gulf of Alaska-Cook Inlet	Southeast Alaska	Alaska total
Loons	24	18	229	8	39	18	0	3	0	0	3	0	342
Grebes	0	0	2	0	5	1	0	0	0	0	0	0	8
Short-tailed Shearwater	0	0	7	0	0	0	0	0	0	0	0	0	7
Pelagic Cormorant	[a]	[a]	1,151	26	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	1,177
Cormorants (unidentified)	0	0	[a]	[a]	2	0	0	1	33	0	1	0	37
Bonaparte's-Sabine's gulls	0	0	1	1	11	0	0	0	0	0	0	0	13
Mew gull	0	10	4	19	83	0	0	77	0	0	0	0	193
Large gulls	14	0	225	116	81	0	0	192	0	0	29	0	657
Black-legged Kittiwake	0	2	194	1	2	0	0	1	213	1	10	0	424
Red-legged Kittiwake	0	0	0	0	0	0	0	0	386	0	0	0	386
Terns	10	0	0	4	22	0	0	0	0	0	0	0	36
Murres	10	14	2,992	27	17	0	0	83	234	0	0	0	3,377
Guillemots	0	0	287	0	0	0	0	0	0	0	0	0	287
Auklets	0	0	2,945	7	0	0	0	0	43	26	0	0	3,021
Puffins	1	0	24	3	1	0	0	0	96	0	18	0	143
Total seabirds	59	44	7,912	210	262	19	0	357	1,005	24	61	0	9,953

[a] Cormorants harvested in the St. Lawrence-Diomede islands and Bering Strait Mainland regions were assumed to be Pelagic Cormorant based on species distribution.

Geographic and Seasonal Patterns of Seabird Subsistence Harvest in Alaska

Polar Biology

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Electronic Supplementary Material 5 Reported harvest of seabird eggs by regions in Alaska (non-extrapolated number of eggs/year), 2002–2015.

Species or species categories (Egg harvest)	North Slope	Northwest Arctic	St. Lawrence-Diomede Islands	Bering Strait Mainland	Yukon-Kuskokwim Delta	Interior Alaska Upper Copper River	Bristol Bay	Aleutian-Pribilof Islands	Kodiak Archipelago	Gulf of Alaska-Cook Inlet	Southeast Alaska	Alaska total
Loons	11	6	9	91	28	0	0	12	0	0	0	0	157
Grebes	0	0	0	0	1	0	0	0	0	0	0	0	1
Pelagic Cormorant	[a]	[a]	3	3	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	6
Cormorants (unidentified)	0	1	[a]	[a]	1	0	0	4	0	0	0	0	6
Parasitic Jaeger	0	0	0	0	1	0	0	0	0	0	0	0	1
Bonaparte's-Sabine's gulls	0	23	0	2	63	0	0	85	0	0	0	0	173
Mew Gull	0	523	16	651	903	24	0	3,691	0	2	0	0	5,810
Large gulls	51	892	42	1,361	997	9	0	2,885	640	941	478	2,123	10,419
Gulls (unidentified)	89	2,251	67	83	586	5	0	3,994	1,327	259	302	830	9,793
Black-legged Kittiwake	0	18	80	60	146	0	0	68	0	528	12	0	912
Terns	46	14	0	155	582	2	0	565	22	146	354	380	2,266
Murres	1,225	2,052	27,777	619	1,817	0	0	1,917	331	0	36	2	35,776
Guillemots	0	20	0	1	1	0	0	0	0	0	0	0	22
Auklets	0	16	105	0	0	0	0	0	24	0	0	0	145
Puffins	0	91	144	26	0	0	0	0	0	0	18	0	279
Total seabird eggs	1,422	5,907	28,243	3,052	5,127	40	0	13,221	2,344	1,876	1,200	3,335	65,767

[a] Cormorants harvested in the St. Lawrence-Diomede islands and Bering Strait Mainland regions were assumed to be Pelagic Cormorant based on species distribution

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The Status of Glaucous Gulls *Larus hyperboreus* in the Circumpolar Arctic

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ABSTRACT. The entire world population of the Glaucous Gull *Larus hyperboreus* breeds in the circumpolar Arctic. Some local populations appear to be declining significantly. In this paper, we summarize the current state of knowledge on Glaucous Gull populations and trends. The total Arctic population is estimated at 138 600 to 218 600 breeding pairs (277 200 to 437 200 breeding individuals) distributed among at least 2768 colonies (many not documented). Population declines may be attributable to egg harvest, contaminants, or food shortages, but other factors operating outside the breeding season should not be excluded. We recommend collaborative conservation efforts that will include better population estimates in most countries, as well as standardized monitoring programs.

Key words: Glaucous Gull; *Larus hyperboreus*; Arctic; population status; population trends; monitoring; conservation concerns

RÉSUMÉ. Toute la population mondiale de goélands bourgmestres *Larus hyperboreus* se reproduit dans l'Arctique circumpolaire. Certaines populations locales semblent diminuer considérablement. Dans cette communication, nous résumons l'état actuel des connaissances sur les populations et les tendances concernant le goéland bourgmestre. La population arctique totale est estimé de 138 600 à 218 600 couples reproducteurs (de 277 200 à 437 200 individus reproducteurs) répartis dans au moins 2 768 colonies (dont grand nombre n'ont pas été consignées). Les déclins de population peuvent être attribuables à la récolte des œufs, aux contaminants ou aux pénuries de nourriture, bien qu'il ne faille pas exclure d'autres facteurs ne se rapportant pas à la saison de reproduction. Nous recommandons des efforts de conservation communs qui comprendront de meilleures estimations de population dans la plupart des pays de même que des programmes de surveillance normalisés.

Mots clés : goéland bourgmestre; *Larus hyperboreus*; Arctique; état de la population; tendances de la population; surveillance; préoccupations de conservation

Traduit pour la revue *Arctic* par Nicole Giguère.

INTRODUCTION

The entire global population of the Glaucous Gull *Larus hyperboreus* (Fig. 1) breeds in the Arctic, with a widespread, circumpolar distribution (Burfield and van Bommel 2004; Fig. 2). Although most also winter within the Arctic region, some birds disperse south towards Japan and California in the Pacific or towards northwestern Europe and the Carolinas in the Atlantic (Cramp, 1983; Gilchrist, 2001). During the non-breeding season, birds may disperse in offshore waters, where they are often associated with sea ice or the ice edge, and in association with walrus *Odobenus rosmarus* and seals near open leads and polynyas (K.J. Kuletz, unpubl. data).

Four subspecies of the Glaucous Gull are generally recognized: *hyperboreus* in the European Arctic and western Siberia, *leuceretes* in West Greenland and most of the Canadian Arctic, *barrovianus* in Alaska and east to the Mackenzie River in Canada, and *pallidissimus* from eastern Siberia to the Pribilof Islands (Banks, 1986; Liebers et al., 2004; de Knijff et al., 2005).

Glaucous Gulls breed primarily on or near the coast, sometimes a few kilometers inland. On the Taimyr Peninsula, Russia, they can breed along riverbanks more than

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FIG. 1. Glaucous Gulls on Franz Josef Land, Russian Arctic. Photo: Maria Gavrilo, August 2007.

100 km inland (Rogacheva, 1992; Yudin and Firsova, 2002). Breeding sites may be used by a single pair or up to more than 1000 pairs (Mineev and Mineev, 2000; Gilchrist, 2001; Strøm, 2006a; Zöckler et al., 2009). Glaucous Gull nest locations are highly variable, including grassy slopes, low islands on lakes near the coast, tops of rock stacks, and ledges on steep, inaccessible cliffs, where the gulls often nest together with other seabirds (Gudmundsson, 1955; Gilchrist, 2001). Level ground is also used on the mainland where mammalian predators are uncommon, for example, in Alaska, Arctic Canada, and Franz Josef Land, Russia.

The Glaucous Gull is a species of international responsibility for the Arctic countries, some of which (United States, Canada, Greenland, Iceland, Norway, Russia) harbour the entire world breeding population. Evidence of recent declines prompted biologists in these countries to review available published and unpublished information on this species, to examine the distribution, status, and trends of breeding Glaucous Gulls in the circumpolar Arctic. They have also examined current monitoring activities to see how well changes in the different populations are documented and to evaluate the main concerns for Glaucous Gulls.

METHODS

The U.S. Fish and Wildlife Service conducts the Aerial Breeding Bird Survey, a population monitoring program that includes Glaucous Gulls, in the Yukon-Kuskokwim Delta coastal region and the Arctic Coastal Plain region. The Survey has indexed the abundance, population trend, and distribution of Glaucous Gulls since 1992. The North Pacific Pelagic Seabird Database (NPPSD, 2014) includes data since 1975 on distribution of Glaucous Gulls at sea. Seasonal and spatial aspects of survey effort, which were largely opportunistic vessel-based surveys, need to be addressed before long-term trends in at-sea distribution can be examined. Pelagic survey effort in Alaska increased in 2006 and continued through 2014.

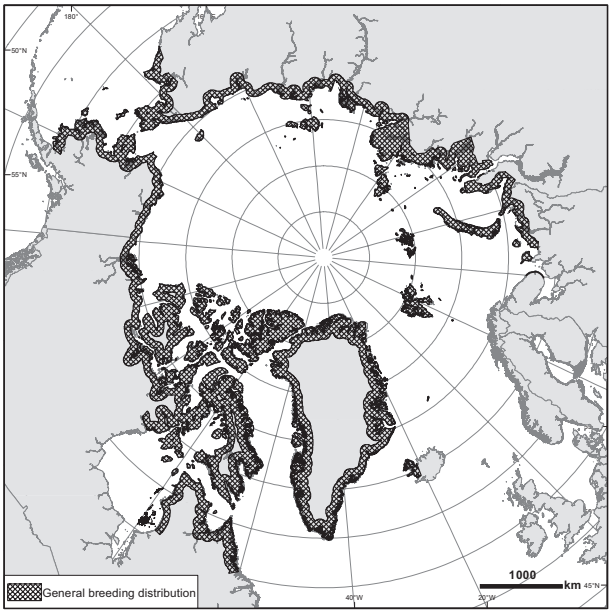

FIG. 2. The Glaucous Gull has a truly circumpolar breeding distribution.

Environment Canada has also monitored Glaucous Gull breeding populations at five locations in the Canadian Arctic. However, this monitoring is typically auxiliary to focal research on other seabirds and is generally not systematic. Although research has been conducted recently on Glaucous Gulls in the Canadian Arctic (Allard et al., 2010; Wayland et al., 2010), reproductive success is monitored only once a year on Coats Island and every 2–3 years on Prince Leopold Island (Gaston et al., 2005, 2009). Distribution of Glaucous Gulls away from the breeding colonies is also recorded during opportunistic at-sea surveys (Fifield et al., 2009; McKinnon et al., 2009).

In Greenland, no monitoring program covers Glaucous Gull colonies, and data on population trends are fragmentary and not systematic. However, Glaucous Gulls are included in programs that monitor contaminants in Greenland taxa (Cleemann et al., 2000; Riget and Dietz, 2000; Riget et al., 2000; AMAP, 2005; Vorkamp et al., 2012).

In Iceland, no organized monitoring program exists for Glaucous Gulls. Individual colonies have been surveyed for numbers at irregular intervals, but until a recent census, coverage for larger areas during the same time period was limited (Petersen et al., 2014). Winter numbers and distribution are monitored annually as part of the Icelandic Christmas Bird Counts (Petersen, 1983), but no other population parameters are monitored.

In Bjørnøya, Svalbard, the number of breeding pairs (from 1986), adult survival, and breeding success are monitored annually by the Norwegian Polar Institute. In 2012 monitoring was started in Kongsfjorden, Spitsbergen (Descamps et al., 2013). Glaucous Gulls are also included in contaminant monitoring programs for Svalbard taxa.

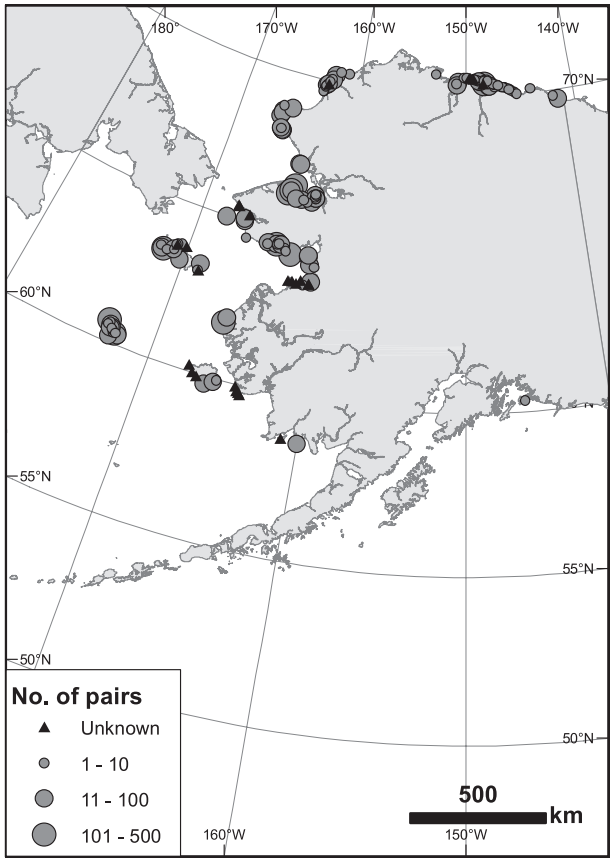

FIG. 3. Distribution of coastal Glaucous Gull colonies in Alaska. Note, however, that the gulls also breed inland.

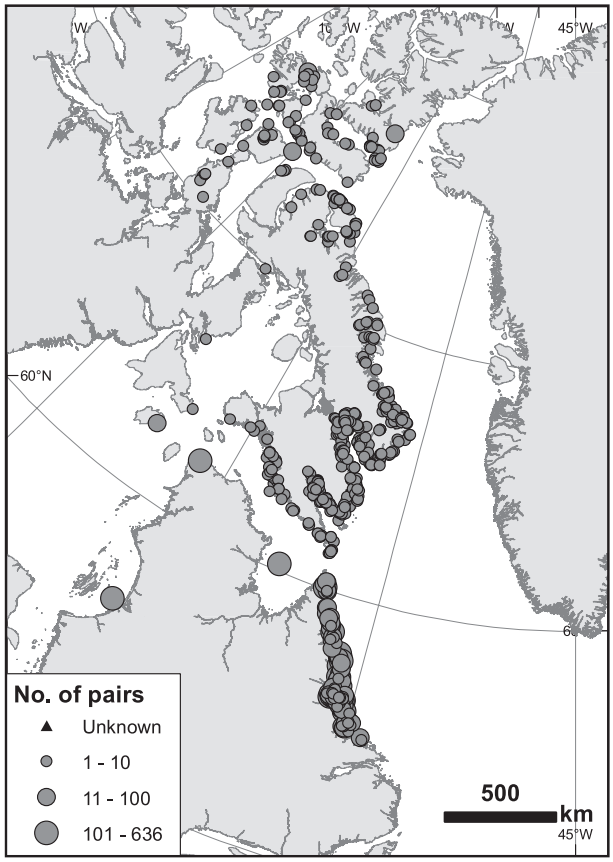

FIG. 4. Map showing Glaucous Gull nesting locations mapped along the marine shorelines in northern Labrador, Quebec, and Nunavut. Glaucous Gulls also nest in pairs or small colonies in the central and western Canadian Arctic, but those breeding locations have not been mapped.

Russia has no specific monitoring programs for Glaucous Gulls, although some repeated surveys of abundance have been undertaken in several locations as parts of general seabird surveys. The recently established Russian Arctic National Park includes Glaucous Gulls on the list of its seabird monitoring network.

RESULTS

Breeding Distribution

In the United States, the subspecies *L. h. barrovianus* occurs along the coast and inland in northern and western Alaska (Fig. 3). Moving east into Canada, the subspecies *L. h. leuceretes* occurs throughout coastal parts of Yukon, the Northwest Territories, and Nunavut, as well as in Nunavik (northern Quebec) and northern Labrador (Fig. 4). The Glaucous Gull *L. h. leuceretes* is a widespread breeder throughout Greenland (Fig. 5), occurring mainly in small colonies and solitary pairs, often within or close to colonies of other seabird species (Boertmann, 1994). In Iceland, the species currently breeds principally in the northwest (Fig. 6), in the regions of Vestfirðir, Breiðafjörður, and Faxaflói, but the breeding range contracted considerably through the 20th century from its former extent around the country (Ingólfsson, 1982; Petersen, 1998; Petersen et al., 2014). The Norwegian breeding population of Glaucous Gulls is found on the islands of Jan Mayen (*L. h. leuceretes*; Fig. 7) and Svalbard (*L. h. hyperboreus*; Fig. 8). In Russia, the breeding range is not well documented, so only the better-known sites are depicted in Fig. 9. Gulls breed along the mainland coast and throughout the Russian Arctic archipelagoes (Kokhanov, 1981; Yudin and Firsova, 2002). Two subspecies are found in the Russian Arctic: *L. h. hyperboreus*, in the western part towards East Taimyr, and *L. h. pallidissimus* east of the Lena Delta (~ 126˚ E), with an intergrade zone between these areas (Stepanyan, 2003).

Wintering Distribution in the Arctic

During winter, Glaucous Gulls are reported in the pack ice and polynyas of the Bering Sea as well as near the Aleutian and Pribilof Islands (U.S. Fish and Wildlife Service, 2009), along Newfoundland and Labrador (Brown et al., 1975; Allard et al., 2010), and in polynyas of southern

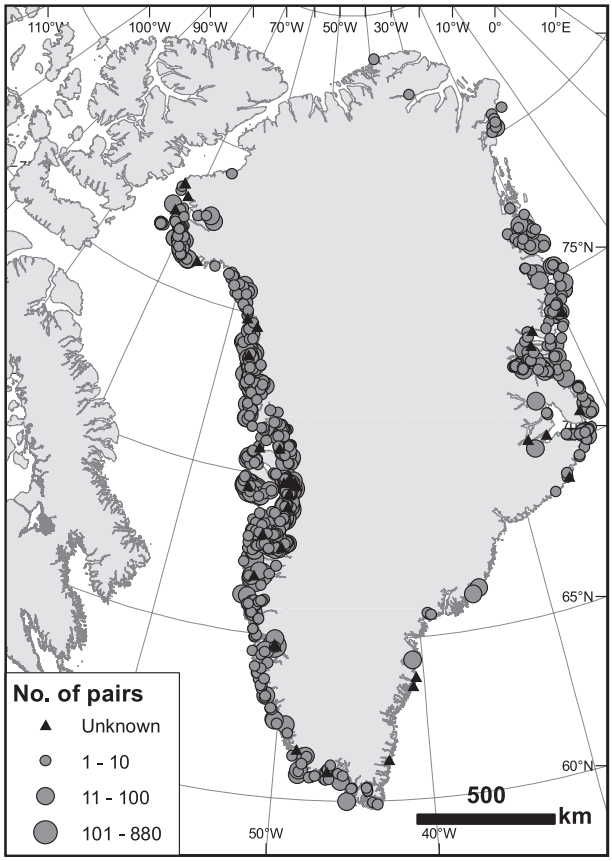

FIG. 5. Distribution of Glaucous Gull breeding sites in Greenland, as recorded in the Greenland Seabird Colony Register (n = 829). Survey effort in North and Southeast Greenland is very low, and the literature indicates that the species is more widespread in those areas than the map shows.

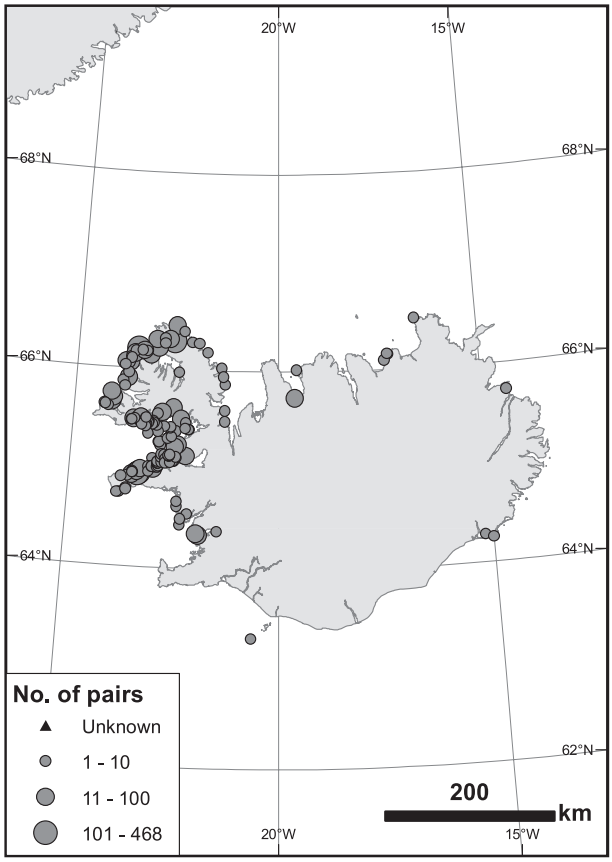

FIG. 6. Distribution and relative numbers of Glaucous Gulls nesting in Iceland. Most of the data are from 2005 to 2011, but older data have been used for areas not surveyed in those years. Birds at breeding sites away from the core regions of western and northwestern Iceland most likely included Glaucous Gull–Herring Gull hybrids.

Hudson Bay, Canada (Gilchrist and Robertson, 2000). Many birds from Canada, Svalbard, and Iceland may winter along the more or less ice-free coasts of West Greenland (Gilchrist, 2001; Lyngs, 2003; Boertmann et al., 2004). In the European Arctic, Glaucous Gulls winter along the coast and offshore in mainland Norway, the Faroes, and Iceland, and in the ice-free parts of the Barents and Greenland Seas (Petersen, 1998; Bakken et al., 2003; Strøm, 2006a).

Population Estimates

Population estimates for Glaucous Gulls are difficult because of the large extent and remote nature of the breeding range, and their numbers are poorly known, except for Iceland. The most up-to-date information suggests that there are more than 2768 colonies in the circumpolar Arctic, supporting between 138 600 and 218 600 breeding pairs of gulls (Table 1). Many seabirds skip breeding in some years (Hamer et al., 2002), so the total breeding population could be more than 437 200 breeding individuals, and there are also many immature birds and other non-breeders.

Approximately 100 000 individuals have been reported for Alaska (U.S. Fish and Wildlife Service, 2009), but only 158 colonies have been documented (Seabird Information Network, 2012). Of these, 132 colonies have population estimates that total about 8000 individuals, and only 36 of these colonies have been surveyed since 1992.

Gilchrist (2001) estimated 69 000 individuals distributed in at least 1000 colonies in Canada, but this estimate was based on coarse data from the 1970s and probably included some Iceland Gulls *Larus glaucoides*. Gaston et al. (2012) revised this estimate downward to 25 000 individuals, acknowledging that this number is likely a minimum estimate.

The Greenland Seabird Colony Register includes 830 colonies or breeding sites, totaling approximately 12 000 pairs. However, like the Canadian figure, this is an underestimate, as many solitary breeding pairs and colonies smaller than five pairs are not included. Thus, the population estimate of 20 000 – 100 000 pairs given by Boertmann et al. (1996) is still the best available for Greenland.

In Iceland, the breeding population was estimated at 3500 pairs in 1955 (Gudmundsson, 1955), and two decades later it was thought that the Breiðafjörður region alone

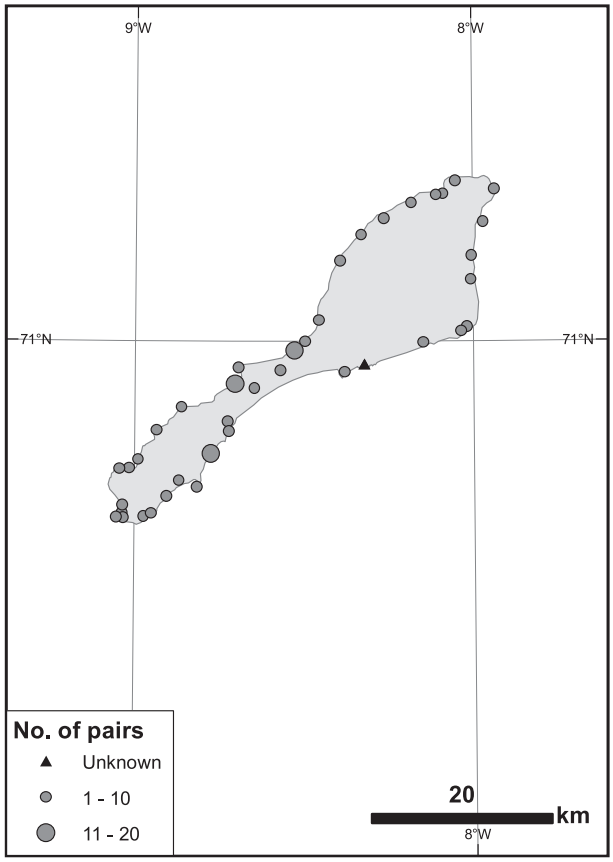

FIG. 7. Distribution of colonies/breeding sites and relative numbers of Glaucous Gulls on Jan Mayen, based on censuses conducted in 2010. Data from the Seabird Colony Registry of the Barents and White Seas (Norwegian Polar Institute/SEAPOP).

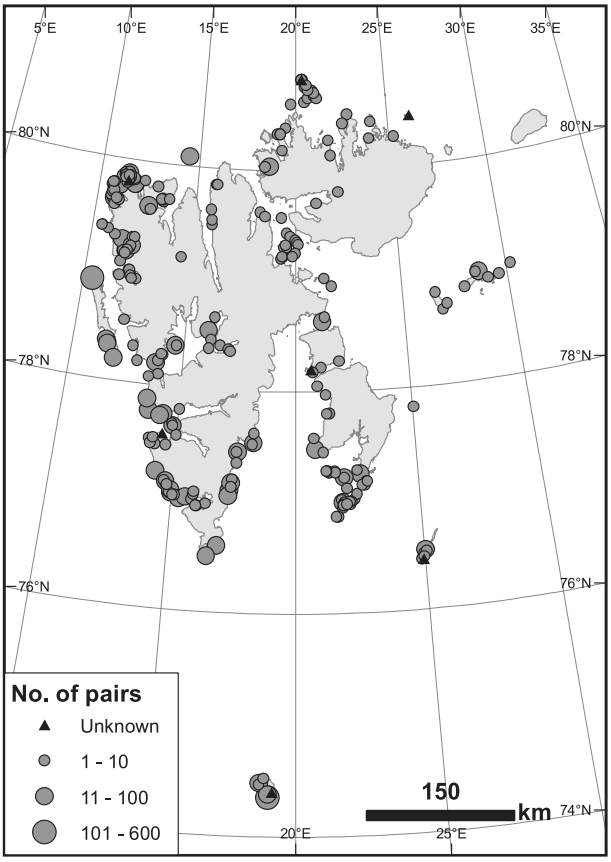

FIG. 8. Distribution of colonies/breeding sites and relative numbers of Glaucous Gulls in Svalbard, based on censuses conducted from 2006 to 2012. Data from the Seabird Colony Registry of the Barents and White Seas (Norwegian Polar Institute/SEAPOP).

supported 3500 breeding pairs (Gardarsson, 1973). The population estimate later increased to 10 000 pairs (Ingólfsson 1982), but by 1995 it was reassessed downwards to 8000 breeding pairs (Asbirk et al., 1997; Petersen, 1998), with the largest colony supporting 1400 pairs. In 2005–09, a new census of Glaucous Gulls in the principal breeding areas in Iceland suggested only 2400 breeding pairs, distributed among 245 breeding locations, which includes sites of single pairs and some of possible hybrid pairs with Herring Gull *Larus argentatus* (Petersen et al., 2014).

In Svalbard, a total 230 colonies are known (SCRIB, 2009), most of which are on the west coast of Spitsbergen and Bjørnøya. Estimates based on the 1980s and 1990s censuses in Svalbard suggest a total breeding population of up to 10 000 pairs (Mehlum and Bakken, 1994; Strøm, 2006a), but new surveys in 2005–12 indicated a population size close to 4000 pairs (Strøm, 2006b; H. Strøm and S. Descamps, unpubl. data). On Jan Mayen, a census in 2010 documented a minimum of 181 breeding pairs in 40 colonies (H. Strøm, unpubl. data).

Only a rough population estimate of approximately 50 000 breeding pairs can be provided for the entire Russian Arctic, with more than 20 000 *hyperboreus* and 30 000 or fewer *pallidissimus*. No overall historical estimates are available, nor have broad-scale surveys been conducted in the western part of the species' range. Most regional population estimates must be considered crude at present (summarized in Table 2). On the basis of data from 1936 to 1994, Bakken and Tertitski (2000) estimated that on Novaya Zemlya, there are at least 55 colonies with at least 1000 breeding pairs, which is undoubtedly an underestimate since many areas were not surveyed. An estimate based on data collected before the 1990s gave more than 100 colonies with ~500 pairs on Franz Josef Land (Bakken and Tertitski, 2000). A recent estimate gave more than 70 colonies with probably 2000–3000 pairs (M. Gavrilo, unpubl. data). The previous estimate for the southeastern Barents Sea was at least 1500 pairs (Bakken and Tertitski, 2000), but a recent update provided data for up to 1900 pairs in two locations (Mineev and Mineev, 2000; Zöckler et al., 2009). Farther east, in the Kara Sea, the limited data suggest more than 75 recorded colonies, most of them in the Severnaya Zemlya archipelago (Gavrilo and Bakken, 2000), and numbers estimated at under 1000 pairs (de Korte et al., 1995).

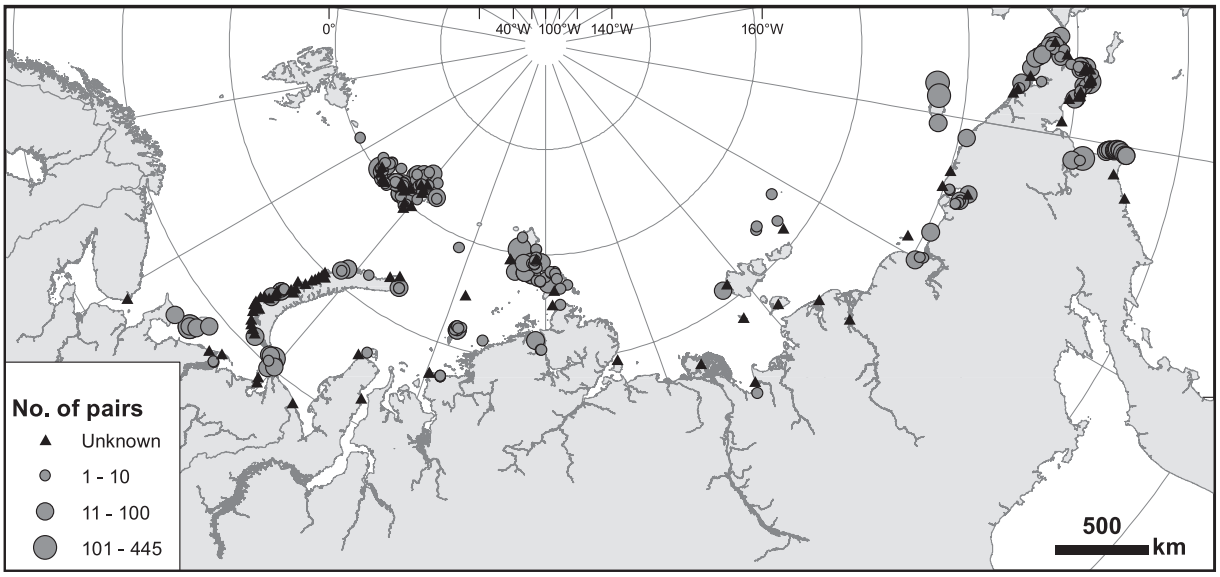

FIG. 9. Breeding colonies of Glaucous Gulls in Russia. Only the better-documented breeding sites are presented because the distribution is poorly mapped, especially on the mainland, where the gulls mostly dispersed on flat tundra or salt marshes.

Population Trends

Since 1992, aerial breeding bird surveys of the Arctic Coastal Plain (northwestern Alaska east to the Alaska–Canada border) have documented Glaucous Gull populations, providing indices between 10 000 and 20 000 birds, with a mean population index of about 13 000 that was considered stable from 1992 to 2006, but increased from 2001 to 2010 (Larned et al., 2011). Over this same time period (1992 to 2010) in western Alaska, estimates of the population have fluctuated around a mean of about 38 000 birds (annual range 21 000–67 000; Platte and Stehn, 2009).

Surveys in Canada have not been conducted systematically or annually, as in Alaska, but sporadically and often ancillary to other research. Around the Belcher Islands (56˚ N, 79.5˚ W), Gilchrist and Robertson (1999) found a 50% decline in breeding numbers from 1985 to 1997. At Digges Sound (62.5˚ N, 78˚ W) from 1980 to 2008, A.J. Gaston (unpubl. data) documented a decrease of about 50% from the initial ~55 nests at this colony. On nearby Coats Island (63˚ N, 82˚ W), one of two colonies has remained stable (Gaston et al., 2009) while at the other, Glaucous Gulls disappeared between 1979 and 1995 (Gaston and Ouellet, 1997). At Prince Leopold Island (74˚ N, 90˚ W), monitoring has suggested an 80% decrease in breeders from 1975 to 2008, and only a few tens of pairs remain at present (A.J. Gaston, unpubl. data). Annual Christmas Bird Counts in eastern Canada suggest a 6.6% (± 1.6%) annual decline in Glaucous Gull numbers during the period 1980–2010. While the population had seemed to be increasing through the 1980s and into the 1990s, declines appeared to occur in the mid-1990s. On the other side of the North Atlantic, numbers of wintering birds in the United Kingdom have remained relatively stable over a similar time period (Balmer et al., 2013). In the western Canadian Arctic, anecdotal evidence suggests that numbers have declined, but these estimates are not based on systematic surveys.

In contrast to the declining population trends near Canadian seabird colonies, informal interviews with Inuit hunters in several local communities in Nunavut (Resolute Bay, Grise Fiord, Iqaluit, Arctic Bay) indicate that there are now many more Glaucous Gulls resident through the spring and summer than was the case in the past several decades (M.L. Mallory, unpubl. data). However, neither aerial surveys nor interviews give evidence of new breeding colonies appearing near communities.

In West Greenland, 86 colonies were surveyed more than once in the period 1988–2008, with 45 (52%) colonies unchanged, 17 (20%) increasing, and 24 (28%) declining. Local surveys provide more insights. In Upernavik municipality (72˚–75˚ N), 15 colonies supported 329 pairs in 1965, but this number had increased to 419 pairs by 1994 (Joensen and Preuss, 1972; Boertmann et al., 1996). Surveys of the fjords south of Disko Bay (67˚–69˚ N) between 1954 and 2005 suggested overall increases in gull numbers (Boertmann, 2006). In southwest Greenland (south of 61˚ N), three colonies decreased in numbers since the previous survey, while six new colonies were established, resulting in an overall increase of almost 100% in the number of pairs (Boertmann, 2004). Collectively, the few data available on Glaucous Gulls in West Greenland indicate a slight positive trend, an impression also shared with biologists by people living in Greenland during collaborative research work or informal interviews in communities.

In Iceland, data suggest that a serious decline occurred concurrent with climatic amelioration during the first half

TABLE 1. Available, conservative estimates of number of colonies, population size (breeding pairs), and population trend for Glaucous Gulls breeding in the circumpolar Arctic.

Country	Number of colonies	Breeding pairs	Population trend
USA (Alaska)	> 158	50000	Stable or increasing
Canada	1000	> 12000	Declining
Greenland	830	20000 – 100000	Stable or increasing
Iceland	245	2400	Declining
Norway			
Jan Mayen	40	> 200	–
Svalbard	230	4000	Declining (on Bjørnøya)
Russia	> 265	50000	Stable or increasing
Total	> 2768	138600 – 218600	

TABLE 2. Available regional estimates for Glaucous Gull populations from the Russian Arctic.

Region	Period	Breeding pairs	Colonies	Source
SE Barents Sea	1960 – 94	1500		Bakken and Tertitski, 2000
Kolguev Island	2000s	≥ 700		Zöckler et al., 2009
Kolokolkova Bay area	2000s	900 – 1200	> 10	Mineev and Mineev, 2000; WWF Russia, unpubl. data
Novaya Zemlya	1936 – 96	1000	55	Bakken and Tertitski, 2000
Novaya Zemlya	1950s	8500		Uspensky, 1984
Franz Josef Land	2000s	2000 – 3000	> 100	M. Gavrilo, unpubl.
Severnaya Zemlya Archipelago	1990s	< 1000		de Korte et al., 1995
Wrangel Island	1970s – 80s	250 – 1000		Stishov et al., 1991
Chukotka Peninsula	1983 – 91	> 1000	50	Konyukhov et al., 1998
Russian Bering Sea	1980s – 2000s	> 1500	70	Artukhin, 2010a

of the 20th century (Gudmundsson, 1955). An increase occurred in the latter half of the 20th century until the mid-1990s (Petersen, 1998), after which a decline took place. In 2005 a census was carried out in one of two main breeding regions in Iceland, along the coast of the Breiðafjörður Bay in the west. A major decline had occurred (from 3500 pairs in 1973 to 1210 pairs in 2005), but during part of that period the population increased (Petersen, 1998). In the northwest peninsula, only 1081 pairs were estimated in 2007 – 09, although this area had previously supported an estimated 3500 pairs (Gardarsson, 1973). Around 2007, the total Icelandic Glaucous Gull population was estimated at 2400 breeding pairs, representing a population decline of around 75% since 1995 (cf. Asbirk et al., 1997).

Little is known about trends in the Svalbard population as a whole. The population on Bjørnøya has declined since 1980, when it was estimated at 2000 breeding pairs (Franeker and Luttik, 1981; Bakken and Mehlum, 1988). A survey in 2006 gave approximately 700 pairs, or a 65% reduction (Strøm, 2007). A survey of the island Hopen in 2012 indicated a 75% reduction in the number of breeding pairs, from 1000 pairs in 1985 to 239 in 2012 (S. Descamps, unpubl. data).

In the western Russian Arctic, population changes for Glaucous Gulls can be evaluated in only a few sites because of data deficiency. On Kolguev Island, a small increase has occurred, perhaps in response to increases in numbers of Barnacle Goose *Branta leucopsis*, the eggs and chicks of which constitute the principal prey in summer (Ganter et al., 1999; Zöckler et al., 2009). An increase was also suggested on Vaygach Island, southeastern Barents Sea, for the same reason (Kalyakin, 1993). A few colonies revisited on Franz Josef Land also showed an increase; an example is Rubini Rock, where numbers grew from 12 to 35 – 50 pairs during 1930 – 2013 (Demme, 1934; Belikov and Randla, 1984; Skakuj, 1992; Lunk and Joern, 2007; M. Gavrilo, unpubl. data). The small population in the Sedov Archipelago, Kara Sea, appears to be stable (Gavrilo and Volkov, 2008).

For the *pallidissimus* population in the eastern Russian Arctic, surveys between 1970 and 1991 found increases at Wrangel, Kolyuchin, and Big Diomede Islands, three large colonies in the Chukchi and northern Bering Seas (Tomkovich and Sorokin, 1983; Bogoslovskaya et al., 1988; Stishov et al., 1991; Konyukhov et al., 1998). In northern Chukotka, the population is increasing (Belyaka Spit in Kolyuchiskaya Bay; Tomkovich and Soloviev, 2012) or stable (Chaun Delta; Solovyeva, 2012). In the Chaun Delta, a stable population was observed even under conditions of increasing numbers of the Vegae Gull *Larus vegae* but decreasing numbers of Sabine's Gull *Xema sabini* (Solovyeva and Zelenskaya, 2015).

Conservation Concerns

Various conservation concerns exist for this species and differ by location across the circumpolar North.

In Alaska, Glaucous Gulls face few conservation concerns from humans primarily because of their remote breeding locations. The harvest of birds and eggs is the main issue at present, but rural residents can legally harvest Glaucous Gulls for subsistence purposes. Between

1995 and 2005, the total estimated annual harvest of Glaucous Gull eggs increased from 17 700 eggs and 800 birds to 36 700 eggs and 2100 birds (these figures may include Glaucous-winged Gulls *L. glaucescens*). This harvest, which takes place primarily in Bristol Bay and the Aleutian and Pribilof Islands, represents about 25% of the total seabird egg harvest and about 1% of the total seabird harvest in Alaska (Wohl et al., 2008).

Glaucous Gulls are taken incidentally in groundfish fisheries in the Aleutian Islands and Bering Sea regions, although mortality estimates combine all large gull species. Bycatch of these gulls decreased from 2400 birds per year (22% of seabird bycatch) in 1993 to 800 birds per year in 2010 (derived from NOAA, 2006, 2011).

In the Aleutian Islands, increasing vessel traffic through the Great Circle route could increase the risk of shipping accidents and spills. At the northern end of the Bering Sea, longer periods of ice-free conditions, oil and gas exploration, and predicted increases in vessel traffic could increase impacts and risks.

In Canada, changes in numbers, especially the steep decline at Prince Leopold Island, have created concern. Reproductive success at Prince Leopold Island has been low compared to Coats Island, where the population is stable (Gaston et al., 2005, 2009). Among Canadian Arctic marine birds, Glaucous Gulls have relatively high contaminant levels (Braune et al., 2002; Buckman et al., 2004), but not as high as those in Svalbard, where negative effects on physiology and behavior have been found (Bustnes et al., 2003; Bustnes, 2006; Verreault et al., 2007, 2008).

Studies from two Canadian colonies suggest relatively low survival rates for Glaucous Gulls (Gaston et al., 2009; Allard et al., 2010). Some years with high mortality have been reported, perhaps related to gulls' scavenging on carcasses infected with avian cholera (Allard et al., 2010). Some Glaucous Gulls have also been found dead but apparently in good physical condition, with no obvious cause of mortality (Mallory et al., 2009a).

There are no immediate concerns for the Glaucous Gull population in Greenland. Hunting is allowed outside the breeding season, and egg collecting is allowed until 15 June. Commercial egging of gulls (Great Black-backed Gulls *Larus marinus* and Glaucous Gulls) was allowed in spring 2009, which may give reason for some concern, but no information is available on the numbers harvested. In the long run, climate change may negatively affect the population in the southwestern parts of Greenland, where the temperate Herring Gull, and especially Lesser Black-backed gull *L. fuscus*, have established breeding populations in recent decades (Boertmann, 2008).

In Iceland, the large decline in Glaucous Gulls remains unexplained. Adults and eggs are harvested, but this harvest has diminished in recent decades. From 1995 to 2002, on average 3847 birds (range: 2471 – 5496) were killed annually as pest species, but this average declined in 2004 – 11 to 1722 birds (range: 1124 – 2407). This harvest was less than half that in the preceding period and mirrors the observed population decline (Petersen et al., 2014). Better care of community dumps, closure of offal disposals from fish processing plants, and better control of offal and bycatch from fishing vessels may have contributed to the observed decline of gulls in recent decades by reducing food availability. Declines at some colonies are believed to be due to Arctic foxes *Vulpes lagopus*, the population of which has greatly increased in recent decades (Hersteinsson, 2004). However, fox predation of eggs and chicks is not believed to have caused the population decline, but rather to have resulted in re-distribution of breeding pairs. The hybridization of Herring Gulls with Glaucous Gulls (Ingólfsson, 1970; Vigfúsdóttir et al., 2008; Pálsson et al., 2009) and Herring Gulls' continually approaching the core Glaucous Gull breeding regions (Petersen, 1998) are causes for real concern regarding the status of Glaucous Gulls as a separate species.

In Norway, contaminants and food shortages have been suggested as the main causes for concern. Glaucous Gulls on Bjørnøya, especially those specializing on eggs and chicks of other seabirds, accumulate high levels of organic contaminants. Effects on hormone production and the immune system have been documented, as well as reduced reproductive success and adult survival (e.g., Bustnes et al., 2003; Verreault et al., 2010; Erikstad and Strøm, 2012). Significant numbers of dead or dying birds have been found annually near the breeding colonies on Bjørnøya. Autopsies and analyses of environmental contaminants have shown that the birds were emaciated and contained high levels of OCP, PCB, and PBDE in the liver and brain (Sagerup et al., 2009). The high levels of contaminants may contribute to the death of weakened individuals, although it is not known whether the emaciation is triggered by high levels of contaminants or by environmental factors such as food shortage (Sagerup et al., 2009). Changes in food availability and predation or competition by a growing population of Arctic foxes and Great Skua *Stercorarius skua* may also be factors influencing the decline of the Bjørnøya Glaucous Gull population (Strøm, 2007; Erikstad and Strøm, 2012). Nothing is known about trends in the Jan Mayen breeding population.

In western Russia, most gulls breed in remote, uninhabited regions, and thus there have been few concerns for their populations. Much of the population breeds within specially protected areas (strict nature reserves or refuges) such as the Franz Josef Land Refuge, the Great Arctic Reserve, the Lena Delta Reserve, or the Wrangel Island Reserve. However, in recent years several adult Glaucous Gulls found dead on Franz Josef Land had no visible external signs explaining mortality (M. Gavrilo, unpubl. data). It is suspected that toxic contamination may explain these deaths in a situation similar to that on Svalbard.

In eastern Russia, gulls breed in regions of low human activity. Bycatch in long-line fisheries has increased in winter, mainly in the Kamchatka waters (Artukhin, 2010b). Eggs are harvested in seabird colonies in Chukotka near some settlements, but the scale of the Glaucous Gull egg harvest is unknown (Portenko, 1989).

DISCUSSION

Despite the position of the Glaucous Gull at the top of Arctic marine food webs and its role as a sentinel species for the health of the Arctic marine ecosystem (Braune et al., 2002; Sagerup et al., 2009), we have little knowledge of its population size and breeding distribution in the Arctic countries. The main exceptions are Svalbard and Iceland, where new censuses have led to better knowledge. In Alaska, Russia, and Canada, colonies are widely scattered in remote areas and often consist of single pair or a few pairs, which makes full coverage of distribution and population size difficult, even impossible, to achieve. At present, the total Arctic population is estimated at 138 600 to 218 600 breeding pairs (277 200 to 437 200 individuals); possibly the largest proportion is in Greenland, but significant populations are also found in Russia and Canada.

Although some overriding factors appear to drive consistent, long-term population trends in Arctic marine birds (Irons et al., 2008), shorter term, regional differences in population trends within a species appear typical, as do simultaneous, different trajectories among species. For example, Thick-billed Murre *Uria lomvia* populations are increasing in Canada (Gaston et al., 2012) but declining in Greenland (Merkel et al., 2014), while Lesser Black-backed Gulls are increasing in Greenland (Boertmann, 2008) and Ivory Gulls *Pagophila eburnea* have declined in both Canada (Gilchrist et al., 2008) and Greenland (Gilg et al., 2009). Black-legged Kittiwake *Rissa tridactyla* numbers have declined in Greenland (Labansen et al., 2010), Norway (Krasnov et al., 2007; Cury et al., 2011), and northwestern Russia (Krasnov et al., 2007), but in Arctic Canada they are apparently increasing (Mallory et al., 2009b). Northern Fulmar *Fulmarus glacialis* numbers appear to be in slow decline in Canada (Gaston et al., 2012), and perhaps across the North Atlantic (e.g., JNCC, 2013). Several seabird species have shown serious declines in Iceland in recent years, such as European Shag *Phalacrocorax aristotelis*, Northern Fulmar, Black-legged Kittiwake, Razorbill *Alca torda*, Thick-billed Murre, Common Murre *Uria aalge*, and Black-headed Gull *Chroicocephalus ridibundus* (Petersen and Thorstensen, 2005; Gardarsson, 2006; Gardarsson and Petersen, 2009). Conversely others have increased, such as Northern Gannet *Morus bassanus*, Great Cormorant *Phalacrocorax carbo*, and Mew Gull *Larus canus* (Gardarsson, 2008a, b; Thorstensen and Petersen, 2013).

In the case of the Glaucous Gull, the population has declined drastically in Canada, Iceland, and Svalbard (at least on Bjørnøya) in recent decades, although undocumented redistribution may account for some local changes. Reasons for the Glaucous Gull declines remain largely unexplained, although some possible causal factors have been identified. On Bjørnøya (Svalbard), the population decline has been related to contaminants (Bustnes et al., 2003; Sagerup et al., 2009; Verreault et al., 2010; Erikstad and Strøm, 2012). At some sites in Canada, apparent adult annual survival is 84%, which is somewhat low for a large gull (Gaston et al., 2009; Allard et al., 2010). Moreover, a significant number of adult-plumaged birds have been found dead near colonies without obvious signs of cause (e.g., Mallory et al., 2009a), as was similarly observed in Svalbard. No autopsies have been performed on the Canadian birds, but these mortality events could be related to contaminants. The first analogous cases of potential contaminant mortality were observed in recent years in the Russian part of the northern Barents Sea. In Iceland, both redistribution and declines seem to have occurred; the latter are probably due to reduced food availability resulting from better controls on fish offal and bycatch.

In contrast to examples from the North Atlantic region, the limited information from the North Pacific suggests different trends. The Russian situation remains largely unknown, but there are indications of stability or even local increases in Glaucous Gull numbers. In Alaska, the available information, though limited, indicates a stable breeding population.

Clearly there are changes underway for some breeding regions or subpopulations of this species that may be related to proximate anthropogenic factors (e.g., development of community dumps, changes in fishery discards; Bicknell et al., 2013), local conditions (e.g., increased food base, such as Barnacle Goose) and other factors that may be attributable to broader, regional environmental change (e.g., competition with other gulls due to range shifts with global warming; Boertmann, 2008). The Glaucous Gull is a top predator and scavenger and a species that can play a major role in local ecosystems (e.g., Gilchrist and Gaston, 1997; Gaston and Elliott, 2013); therefore, a better understanding of Glaucous Gull populations and trends will yield greater insights into the status of Arctic marine ecosystems.

We therefore recommend that future research should:

- Undertake more extensive and systematic surveys of Glaucous Gull colonies for better information on distribution, numbers, and trends. This information is needed to establish and improve management (Greenland, Iceland, Russia) and to enhance programs that monitor breeding (Alaska, Canada, Norway).

- Examine Glaucous Gull biology during the non-breeding period to determine the extent to which factors that affect birds during that part of their annual cycle may be responsible for population declines. Such studies could include winter (including at-sea) surveys, tracking studies for population connectivity, and studies of non-breeding ecology, such as food habits and exposure to contaminants. Studies of the non-breeding season may be particularly important as climate change reduces annual sea ice extent and duration in the Arctic.

- Enact research and monitoring programs on two of the poorly studied subspecies of Glaucous Gull, *hyperboreus* (in the European Arctic) and *leuceretes* (in

West Greenland). Both are listed on the Action Plan of the African-Eurasian Waterbird Agreement (AEWA, 2012) as requiring international attention. In particular, delineation between subspecies needs to be revisited.

The Glaucous Gull is one of 22 Arctic seabird species proposed for priority circumpolar monitoring by the Arctic countries as a species of international responsibility (Petersen et al., 2008). Collaborative conservation efforts, especially by the Arctic countries, are needed to obtain a better understanding of the population changes taking place in Glaucous Gull populations and possible causal factors. Given the regional differences in its population trends, the Glaucous Gull should be a suitable species through which to examine the factors affecting these different trends.

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INFORMATION BULLETIN - September 2019

Cooperative Salmon Escapement Monitoring Projects. Contact: Pat Walsh
ADF&G has monitored Chinook, chum and sockeye salmon escapement on the Middle Fork Goodnews River since 1980. Togiak Refuge has worked with ADF&G since 1992 to assist in staffing the weir until 2017, after which reduced Refuge funding prevented providing staff assistance.

On the Kanektok River, ADF&G, Native Village of Kwinhagak, Coastal Villages and Togiak Refuge have worked cooperatively to monitor salmon and Dolly Varden runs since 2001. However, this project has been cancelled since 2016 due to lack of funding.

Mulchatna Caribou Contact: Andy Aderman
Togiak Refuge assisted ADF&G with telemetry monitoring flights, radiocollar deployment, satellite data acquisition, data entry and database management. A July 2019 post-calving survey estimated the Mulchatna herd at approximately 13,500 caribou, well below the population objective of 30,000-80,000 caribou. In response, ADF&G issued an emergency order in August reducing the bag limit from two caribou to one caribou only under the RC503 hunt. A special action was submitted to the Federal Subsistence Board to effect the same change. Public hearings are planned for early October.

Nushagak Peninsula Caribou Contact: Andy Aderman
A photocensus of the Nushagak Peninsula Herd on July 3, 2018 found a minimum of 710 caribou in 5 groups which resulted in a total population estimate of 822 +/- 164 (710-986) caribou at the 95% confidence interval (Meg Inokuma, ADF&G, personal communication). A similar effort in 2018 found a minimum of 709 caribou in 4 groups resulting in an estimate of 787 +/- 114 (673-901) caribou.

The Nushagak Peninsula Caribou Planning Committee plans to meet the week of October 21, 2019 to review results of previous hunts, population and lichen monitoring and the harvest strategy. Average lichen cover on the Nushagak Peninsula has declined from 48% estimated in 2002 down to 30% in 2017. Because the population estimate in 2019 was similar to the 2018 estimate, the same harvest limit of 2 caribou per hunter was set for the 2019-2020 hunt. As of September 3, 2019, only 5 caribou (2 bulls and 3 cows) have been reported harvested in the

Federal permit hunt. Only 1 caribou (bull) has been reported in the RC501 hunt immediately north of the Federal hunt.

Moose Contact: Andy Aderman
In May 2019, 21 of 30 (70%) radio-collared adult cows produced 38 calves suggesting a production rate of 126.7 calves per 100 adult cows which is up from the previous 5 year average of 111.2 calves per 100 adult cows. The twinning rate was 76.2% which is higher than the previous 5 year average of 63.5%. Calf survival will be estimated in November 2019 and again in April 2020.

The relationships of wolf and brown bear predation with moose population density and growth at Togiak National Wildlife Refuge and BLM Goodnews Block, Alaska Contact: Pat Walsh
In summer 2014, Togiak Refuge, the USFWS Genetics Lab, ADF&G, and BLM initiated a study to understand the effects of wolf and brown bear predation in regulating the populations of moose. The study relies on radio telemetry and stable isotope analysis. Our approach is to relate the predation impact by wolves and bears on moose at varying levels of moose population density. We will use existing population estimates for brown bears, and through the use of radio telemetry, we will estimate the number and composition of wolf packs on the Refuge. We will model wolf and bear predation on moose based on the quantity of wolves and bears and diet composition of both species determined through analysis of carbon and nitrogen isotopes occurring in bear and wolf hair. Hair is being collected from wolves when captured during radio collaring operations, and has been collected from brown bears using break-away hair snares. So far, we have captured and radioed 35 wolves from seven packs. During summers 2014-2016, we deployed over 400 snares, and collected over 200 brown bear hair samples. Initial analysis in 2017 identified data gaps, so additional bear hair was collected in 2018. Lab analyses are ongoing.

Walrus Contact: Doug Holt
The Togiak Refuge has annually monitored the number and timing of Pacific walruses at haul-outs since 1985, using ground counts (1985-2008), aerial surveys (2003-2011) and time lapse photography (2010-2019). Overall, walrus numbers observed at haul-outs on Togiak Refuge have declined, with the greatest declines at Cape Peirce and Cape Newenham. Peak counts in the most current year when every day was counted (2016) were 401 at Cape Peirce, 897 on Hagemeister Island, and 454 at Cape Newenham. Walrus using haul-outs in Bristol Bay are typically recorded from late spring to late fall but have been observed at Cape Newenham every month since cameras were deployed in fall of 2014 with the exception of February, July, and September 2017. However, counts for 2017 are incomplete because field work was cancelled in 2018 due to weather and logistic constraints. Data were recovered at all sites during summer 2019 and results will be updated when the data are examined.

Seabirds Contact: Kara Hilwig

The abundance and reproductive success of black-legged kittiwakes, common murres, and pelagic cormorants was monitored annually at Cape Peirce from 1990-2014 and 2016-2019. In the past 29 years, the long-term average number of birds counted on study plots was 1,075

kittiwakes (range = 238-1,906), 2,595 murres (range = 53-4,563), and 80 cormorants (range = 15-123). In 2019, an average of 1,052 kittiwakes, 564 murres, and 33 cormorants were counted, which is average for kittiwakes, but well below average for murre and cormorant adult returns. Counts of adult seabirds returning to the nesting cliffs were up 71%, 91% and 55% from last year's record low counts respectively (307, 53, and 15). Despite greater numbers of adult seabirds returning to the cliffs, all three species demonstrated zero or near zero fledging success. The long-term overall productivity (the number of nests with fledged chicks to the total number of nests) of kittiwakes, murres, and cormorants averaged 22%, 36%, and 49% respectively. Historically, the number of kittiwake eggs available in the study plots for monitoring observation was in excess of 200, however, from 2016 to 2018, the number of eggs available for observation in the plots was 1, 89, and 51. In 2019, 359 eggs were monitored in the study plots but despite this improvement in egg laying success, none of the 127 kittiwake chicks that hatched from these eggs successfully fledged. This marks the fourth year in a row of reproductive failure for this species at Cape Peirce and the first time hatching was observed in the past four years. Fifty-five murre eggs and 16 chicks were monitored this year, however, observers were not present to quantify fledging. Historically, the number of murre eggs monitored annually tended to be in excess of 150, however, from 2016 to present, the number of eggs available to be monitored in the study plots was 0, 18, 3, and 55. This marks the fourth year in a row of low reproductive success for murre at Cape Peirce and the first time hatching was observed in the last four years. Thirty-eight cormorant eggs and 23 chicks were monitored in 2019 with 9 fledglings observed. Historically, the number of eggs and chicks combined that were available for observation in the study plots has tended to be in excess 50. From 2016-2019, eggs and chicks counted in the monitoring plots were 16, 4, 22, and 36. Overall productivity for cormorants was 31% in 2019. Twenty-nine years of seabird monitoring at Cape Peirce has revealed high variation in nesting adult counts and reproductive success, but never four consecutive years of reproductive success as low as 2016-2019 for all three species. Other seabird monitoring sites in Alaska have also exhibited low numbers of returning adult birds and low reproductive success. This has been attributed to several factors including warmer climatic conditions occurring earlier in the breeding season affecting migration timing, adult condition, ocean temperature, ocean productivity, disease prevalence, and the distribution and abundance of forage items. Population and productivity monitoring will continue in June 2020 at Cape Peirce.

Invasive Aquatic Plant Surveys Contact: Kara Hilwig

Elodea spp. is a highly invasive and difficult to control aquatic plant implicated in the degradation and loss of fish habitat across the world. It was confirmed present in Alaska in 2009 and is now found in several waterbodies across the State. *Elodea* fragments carried by floatplanes and other means are able to rapidly colonize large areas forming dense mats, resulting in severe negative ecological consequences for native species and substantial economic costs to control or eradicate them. *Elodea* infestations in salmon streams and lakes can reduce the quality of salmon spawning and rearing habitat. Bristol Bay has been identified as a high risk area for new introductions of *Elodea* and has a large economic loss potential due to the value of its sockeye fishery. Early detection and removal of Elodea from pristine waters of Bristol Bay will be the least expensive and most effective method of protecting one of the largest salmon fisheries in the world from the detrimental effects of this invader.

In 2019, Refuge and Park staff cooperated to complete the second round of *Elodea* surveys on Togiak Refuge, Wood-Tikchik State Park and the surrounding area. The Refuge and the Park are popular floatplane destinations and many flights to these areas originate from Elodea infested floatplane bases. Survey sites were prioritized based on 1) a State-wide risk assessment completed by T. Schwoerer (Ph.D. Dissertation, University of Alaska Fairbanks, 2017) which incorporated economic risk factors with *Elodea* habitat suitability criteria, and 2) floatplane operations on the Refuge and the Park with known connections to *Elodea* infested waters. During this effort, biologists determined the most efficient survey methods. These included 1) surveying when *Elodea* was at its greatest biomass and fragmentation stage, 2) beach combing for plant fragments on leeward shorelines on moderately windy days, 3) overflights to visually assess habitat suitability and presence of aquatic vegetation mats, and 4) rake grabs in vegetation mats to verify plant identification. Crews continue to sample locations by boat and floatplane and, thus far, no *Elodea* has been detected. Among the sites that were surveyed in 2018, biologists identified discrete locations where annual monitoring was clearly prudent. Funding proposals are currently being submitted to continue this work in 2020.

Water Temperature Monitoring Contact: Doug Holt

Stream temperature monitoring has been conducted at 21 locations on 14 rivers in Togiak National Wildlife Refuge since August 2001. Continuous hourly water temperatures were recorded at each site. Over 2.4 million temperature records were collected, quality-graded, and digitally stored in a relational database through October 2018. The warmest month each year was July. The maximum recorded mean daily summer temperatures varied by location, with median values of 9.8–22.9°C across sites. The warmest temperatures were observed in the Kukaktlim Lake outlet and the coolest temperatures were observed in the Weary River. Based on differences in maximum daily mean temperature, the four warmest sites were each located near a lake outlet. Recorded temperature measurements at each site except the Weary River exceeded the Alaska Department of Environmental Conservation's 13°C temperature criteria for fish habitat two or more years, with temperature readings at Gechiak Lake outlet, Kukaktlim Lake outlet, Middle Fork Goodnews Lake outlet, and Nichols Lake outlet exceeding these criteria annually. The warmest year observed was 2004. Previous analyses of data collected on these sites indicated a cooling trend but recently a warming trend has been observed. More monitoring is required to determine if differences in previous and current trend observations are the result of cyclical patterns or a long-term warming trend.

We used moored all-season temperature arrays to record hourly temperatures throughout the water column in 2 lakes on or near the Togiak National Wildlife Refuge 2011-2018. The lakes differed significantly in surface area, water volume, and elevation with Ongivinuk Lake being smaller and at higher elevation than Snake Lake. We observed variation in lake ice phenology and fewer days of ice cover on Snake Lake than on Ongivinuk Lake each winter when data were available for both lakes. We observed freeze, thaw, and refreeze events during the same over-winter period on Ongivinuk during 1 of 6 and on Snake Lake during 2 of the 5 winter periods of monitoring. We observed that both lakes were dimictic, exhibiting turnover events in spring and fall. We observed water temperatures in excess of standards for fish rearing and migration habitats down to 12.5 m during the summers of 2013-2016 in Snake Lake but not that low during the summer of 2017 or before the end of monitoring in the August 2018.

Togiak Refuge received reports of dead fish observed in streams throughout the Refuge during summer 2019. Warm water might play a role in fish die-offs. Water temperature monitoring is ongoing and at stream and lake sites. Data from the summer of 2019 will not be available until sensors are recovered and downloaded in 2020. When those data are available water temperature reports will be updated and made publically available.

Quantifying River Discharge Contact: Pat Walsh
Togiak Refuge and the USFWS Water Resources Branch have worked cooperatively since 1999 to acquire baseline hydrologic data of the flow regime (magnitude, duration, timing, frequency, and rate of change) and water quality. A network of stream discharge gages collected stream flow data from 1999-2005 at 20 locations. A subset of five of these stations continued to collect data through fall 2009, after which three of the five stations were removed. We will monitor discharge in the Togiak and Kulukak Rivers indefinitely.

Education and Outreach Contact: Terry Fuller
Togiak Refuge has an active education and outreach program, conducting an average of 60+ classroom visits throughout 12 Bristol Bay villages annually. Classroom visits include lessons about the Migratory Bird Calendar, National Wildlife Refuge Week, careers in natural resource conservation, and numerous teacher requested classroom presentations. The refuge works with several school districts and private schools including the Southwest Region, Lower Kuskokwim, Dillingham City school districts and the Dillingham 7th Day Adventist School. Field trips with area students for the 2018-2019 school year included bird walks, wilderness survival skills, archery, salmon life cycles, aquatic resources and bear safety. The refuge website is also an education tool and is available at http://togiak.fws.gov.

The refuge, in partnership with Alaska Department of Fish and Game and the Southwest Region School District, has also conducts hunter safety courses throughout western Bristol Bay Villages. Classes have impacted more than 100 students in Manokotak, Dillingham, Twin Hills, Togiak, Aleknagik and Quinhagak. The refuge plans to continue these courses, as requested, in 2019 and is in the planning stages to add a National Archery in School Program to its offerings in the future. The Refuge also plans to train additional staff members as Hunter Safety instructors.

The refuge education program also produces Bristol Bay Field Notes, an award-winning weekly radio program on KDLG 670 AM that covers an array of outdoor-related topics (past episodes can be found on KDLG's website. Togiak Refuge has an active and heavily followed Facebook page which disseminates information on a daily basis to a rapidly growing global audience.

The refuge hosted its annual Open House at the Refuge Headquarters on Saturday, September 29, 2018 and over 130 people were in attendance and took part in a number of "hands on" activities. The refuge co-sponsored a 5K "Salmon Fun Run/Walk" on July 27, 2019 with the Bristol Bay Area Health Corporation. Nearly 200 people participated and received information on healthy lifestyle choices, including staying active in the outdoors on National Wildlife Refuges.

Other annual outreach programs for the community continue as well. The refuge hosted a family

bird feeder building program in December and the annual Christmas Bird Count (Dillingham circle) January 5th. The family "Build-A-Bird Feeder Workshop" increased the Christmas Bird Count participation. The refuge is grateful for financial assistance from the Friends of Alaska National Wildlife Refuges to conduct these programs.

Togiak Refuge staff continues to work with the Alaska Migratory Bird Co-Management Council and the Alaska Department of Fish and Game to conduct household subsistence waterfowl surveys. Refuge staff and volunteers are currently conducting surveys (spring 2019) in Aleknagik, Dillingham, Togiak, Clark's Point, Igiugig, Port Alsworth, Newhalen, Naknek, Pilot Point, Chignik Lake, and Goodnews Bay.

Also, the refuge partners with others to conduct three environmental education camps described below:

Cape Peirce Marine Science and Yup'ik Culture Camp Contact: Terry Fuller
In July 2019 an enthusiastic group of seven area junior high students representing three villages (Dillingham, Togiak and Platinum) traveled to Cape Peirce for this camp. Students were able to observe seabirds, marine mammals, and learn how field work is conducted, as well as learning about the food webs and ecological relationships found at the Cape Peirce area. Students also learned about traditional Yup'ik uses of animals and plants and about Native survival skills. This camp is designed to help students gain a better understanding of the biological diversity of a marine ecosystem. It also strengthens their sense of stewardship for local natural resources. Other topics at this camp included tide pools, wilderness survival skills, archery, bear safety, Leave No Trace camping practices and careers with USFWS. Refuge Interpreter Jon Dyasuk spoke with students about traditional resource uses. A special offering for this year's camp was the chance for the students to try their hand drawing with Colorado pastel artist Penny Creasy. Traditional councils and school districts from throughout western Bristol Bay are cooperators with this camp.

Southwest Alaska Science Academy (Salmon Camp) Contact: Terry Fuller
In July 2019, Togiak Refuge helped with the 19th year of a summer camp aimed at teaching middle and high school students about fisheries science and the importance of salmon to our ecosystem. Students were selected from the Bristol Bay region. During the camp students worked in the field alongside fisheries professionals. Cooperators with the refuge on this project included the Bristol Bay Economic Development Corporation, Bristol Bay Science and Research Institute, University of Alaska, University of Washington School of Fisheries, the Dillingham City and Southwest Region school districts, and ADF&G.

Summer Outdoor Skills and River Ecology Float Camp Contact: Terry Fuller
The 2019 Float Camp took place on the Togiak River early August. At this camp, four high school students learned about river ecosystems and how to enjoy them safely and responsibly while taking part in a float trip conducted on a refuge river. Students observed and learned about the many fish, wildlife and plant species found on the Togiak and its tributaries. Rafting skills, water safety, different angling practices (Catch and Release), Leave No Trace camping practices and bear safety were topics during the trip. Students also participated in other outdoor activities

such wilderness survival skills. This camp helps students grasp the biological diversity of riparian ecosystems and the importance of salmon as a nutrient source, while developing a deeper sense of stewardship for local natural resources. Montana Artist Mara Menahan was along as an "Artist-in-Residence" and all of the students had an opportunity to work with Mara on natural history illustration while in the field. Traditional councils and school districts in western Bristol Bay are cooperators with this camp.

Division of Refuge Law Enforcement Contact: Derek Thompson
Federal Wildlife Officers work to protect wildlife and habitat and make refuges safe places for visitors and staff. Senior Federal Wildlife Officer (SFWO) Derek Thompson is stationed in Dillingham, AK. He is the Officer responsible for patrolling Togiak National Wildlife Refuge (TNWR) and managing TNWR's law enforcement program.

SFWO Thompson encountered and investigated a multitude of resource and permit violations during 2019. Violations ranged from a human caused wildfire to littering. SFWO Thompson is always glad to assist other state and federal agencies. He works closely with the Alaska Wildlife Troopers as well as the State Parks Rangers. This year Thompson teamed with law enforcement Ranger's from the Bureau of Land Management and detailed an FWO from the Big Muddy NWR in Missouri. The additional officers provided patrolling assistance within TNWR.

FWO Thompson encourages anyone with questions regarding US FWS law enforcement to contact him, and reminds all who enjoy TNWR their tips and eyewitness accounts are invaluable in protecting wildlife and punishing poachers.

River Ranger Program Contact: Kenton Moos
The Refuge River Ranger Program was conceived during the public use management planning process and was first implemented in 1991. River Rangers are the main contact source for sport fishermen and local residents. Information distributed to the public includes Service policies, regulations, resource management practices, State sport fish regulations, bear safety, wilderness ethics, Leave-No-Trace camping and information about private lands to prevent trespass. Rangers document public use occurring on the rivers along with the location and timing of activities, conflicts between users, and sport fish catch/harvest per unit effort. Rangers also assist Refuge staff with biological studies. In addition, Rangers patrol campsites for litter, monitor compliance of sport fishing guides and offer assistance as needed. In recent years, continuing into 2019, the Refuge Information Technicians (RITs) and River Rangers have also recruited local volunteers to assist them in river patrols. This helps build capacity and partnership within the villages. River Ranger volunteers donated nearly 100 hours of their time over the 2019 summer. During the summer of 2019, there was one Togiak Refuge River Ranger on the Kanektok River (Charlie Roberts), and the same is planned for the summer of 2020.

The Village of Goodnews Bay has developed its own River Ranger Program, and Togiak Refuge has been working closely with their two rangers, Cathy Evan and Paul Bright. Cathy took park in the Refuge annual seasonal training in May and June 2019 (Paul participated in 2018), including motorboat operation and bear and firearms safety. Paul and Cathy assisted with some of the logistics for Refuge administrative float trips on the Goodnews River during August 2019, and

plan to help again in the summer of 2020.

Staff Update

In late September 2019, Refuge Manager Susanna Henry retired after 36 of Federal Service and 6 years at Togiak Refuge and has moved to Arizona. Her position remains vacant for now. Deputy Refuge Manager Kenton Moos is currently Acting Refuge Manager. New Togiak Refuge Information Technician (RIT) Willard Church (Quinhagak) reported for duty in May 2019, replacing retired RIT John Mark. The refuge is fortunate in that John continues to volunteer his time in many areas, including subsistence waterfowl harvest surveys.

Applying for an Alaska Real ID License, Permit or ID Card?

U.S. Citizens, Permanent Residents, Temporary Resident with Lawful Status in the U.S. need the following documents:

DMV Division of MOTOR VEHICLES

To ensure your application process is as smooth as possible, please complete all elements below:

Use the checklist below to ensure that you have the correct documentation before visiting a Driver License office. If you have any questions about what is required, please visit our website at *www.Alaska.gov/DMV*

To be issued an Alaska **Real ID** driver license, permit or ID card, you must prove the following elements: your full legal name, identity, date of birth, lawful status in the United States, social security number, and proof of residential address. Multiple documents may be required to show all name changes.

All documents presented must be unaltered certified originals, certified amended originals, or true copies certified by the issuing agency. Documents **must** be valid and unexpired and may not be laminated. Foreign documents must have certified English translation (DMV Form COFAT.PDF).

If you cannot prove each of the required elements with the documents set forth below, you may be eligible to apply for a standard card. These guidelines may not cover every situation. Knowledge, vision, and/or other eligibility criteria may apply to your individual situation.

Proof of your Name, Identity, Date of Birth, Lawful Status, and Primary Residency:

You can provide any combination of documents that prove the elements (some documents may be used to prove more than one element)

Identity
Name / Date of Birth

- ☐ Valid, unexpired U.S. passport or passport card
- ☐ Certified copy of U.S birth certificate (issued by a city, county, or state vital statistics office)
- ☐ Certified copy of birth certificate from a U.S. Territory. Puerto Rico birth certificates issued on or after July 1, 2010
- ☐ Consular Report of Birth Abroad of U.S. Citizen
- ☐ Unexpired foreign passport with valid U.S. Visa and approved I-94 form
- ☐ Certificate of Naturalization or Certificate of U.S. Citizenship
- ☐ Valid, unexpired I-551 Resident Alien / Permanent Resident Card
- ☐ Valid, unexpired I-766 Employment Authorization Document Card
- ☐ Valid REAL ID license or ID card from a compliant state (Documentation of U.S. citizenship or lawful status is required)

Lawful Status

- ☐ Valid, unexpired U.S. passport or passport card
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- ☐ Certificate of Citizenship / Certificate of Naturalization
- ☐ Unexpired foreign passport with valid U.S. Visa and approved I-94 form
- ☐ Refugee/Asylee I-94
- ☐ I-551 Resident Alien / Permanent Resident Card
- ☐ I-766 Employment Authorization Document Card

Name Change

- ☐ Adoption documents that contain the legal name as a result of the adoption
- ☐ Court Certificate of document that contains the legal name both before and after the name change
- ☐ Marriage certificate
- ☐ A certificate, declaration, or registration document verifying the formation of a civil union or domestic partnership
- ☐ Certified Divorce Decree, Dissolution of marriage/civil union/domestic partnership document that contains the legal name as a result of the court action
- ☐ Amended Birth Certificate
- ☐ Certificate of Naturalization/ Certificate of Name Change
- ☐ Certified Court Order That Contains all previous and current Names, and Date of Birth.

SSN
Complete SSN

- ☐ Social security card (not metal)
- ☐ W-2 form
- ☐ Social Security Administration (SSA) 1099 form
- ☐ Non-SSA-1099 form
- ☐ Pay stub
- ☐ I am ineligible for a social security number, a letter from SSA will issued within 90 days be required

Principal Residency
Two documents must be presented and cannot be handwritten.
One document must have been issued within 90 days
Resident documents may have account numbers and balances redacted.

- ☐ Rental or Lease Agreement with The Signature of The Owner/Landlord and The Tenant/Resident
- ☐ Deed or Title to Residential Real Property
- ☐ Mortgage Document
- ☐ Home Utility Bills (Including Cellular Phone)
- ☐ Employment Documents
- ☐ Insurance Documents, Including Medical, Dental, Vision, Life, Home, Rental and Vehicle
- ☐ Government Issued Tax Document
- ☐ Statement from A Financial Institution/Bank
- ☐ Voter Registration Confirmation Letter or Postcard Issued by The Alaska Division of Elections
- ☐ Proof of Payment of Resident Tuition at A Public Institution of Higher Education in Alaska
- ☐ A Letter on Letterhead from A Homeless Shelter, Shelter for Abused Women, Nonprofit Entity, Faith-Based Organization, Employer or Government Agency Within the United States Attesting That the Applicant Resides in Alaska
- ☐ Alaska Certificate of Vehicle Titles or Registration (Issued At Least 30 Days Prior To The Date of Application)
- ☐ Change of Address Confirmation by The U.S.P.S.
- ☐ 1st Class Mail with Postmark (Mail May Be Handwritten)
- ☐ Alaska Tribal Card (For Non-Standard Remote Alaska Addresses Only, Within the Tribal Area Indicated on The Card)
- ☐ At DMV's Discretion Other Documents May Be Accepted. Please Contact 907-269-5551 For Assistance

The Alaska DMV must electronically verify documents to determine validity and status before Issuance of an ID / Driver License

For Renewals, you may be able to skip the office completely – Go to *ALASKA.GOV/DMV* to see if you are eligible!

(06/19/2019)

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FEDERAL LIMITS APPLY

Proof of your Name, Identity, Date of Birth, Lawful Status and Primary Residency:

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- ☐ Consular Report of Birth Abroad of U.S. Citizen
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- ☐ US Adoption Order W/Birth Information
- ☐ Active or Retired Military ID / Common Access Card

Secondary Identity

- ☐ Any Document in The Previous Column
- ☐ Social Security Card
- ☐ Canadian Tribal Card
- ☐ State Issued Driver License or ID Card That Has NOT Been Expired Over A Year
- ☐ Court Order That Contains the Applicant's Date of Birth
- ☐ Foreign Birth Certificate
- ☐ Health Insurance Card
- ☐ Marriage License or Certificate
- ☐ Individual's Medical Records from A Doctor or A Hospital
- ☐ Military Dependent Identification
- ☐ Military Discharge or Separation Papers (DD214)
- ☐ Gun Permit
- ☐ Pilot's License
- ☐ Certified School Record or Transcript
- ☐ Photographic Government / Employer / School Identification Card
- ☐ Vehicle Title (Must Be Issued 30 Days Prior To Application)
- ☐ Welfare Card
- ☐ Prison Release Document or Photographic Prison Identification Card
- ☐ TWIC Card (Transportation Worker Identification Credential)

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Complete SSN

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- ☐ Alaska Certificate of Vehicle Titles or Registration (Issued At Least 30 Days Prior To The Date of Application)
- ☐ Change of Address Confirmation by The U.S.P.S.
- ☐ 1st Class Mail with Postmark (Mail May Be Handwritten)
- ☐ Alaska Tribal Card (For Non-Standard Remote Alaska Addresses Only, Within the Tribal Area Indicated on The Card)
- ☐ At DMV's Discretion Other Documents May Be Accepted. Please Contact 907-269-5551 For Assistance

The Alaska DMV must electronically verify documents to determine validity and status before Issuance of an ID / Driver License

For Renewals, you may be able to skip the office completely – Go to *ALASKA.GOV/DMV* to see if you are eligible!

(06/19/2019)

Winter 2020 Regional Advisory Council Meeting Calendar

Due to travel budget limitations placed by Department of the Interior on the U.S. Fish and Wildlife Service and the Office of Subsistence Management, the dates and locations of these meetings will be subject to change.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Feb. 2	*Feb. 3* *Window Opens*	*Feb. 4* **BB — Naknek**	*Feb. 5*	*Feb. 6*	*Feb. 7*	*Feb. 8*
Feb. 9	*Feb. 10*	*Feb. 11* **YKD — Bethel** **WI — Fairbanks**	*Feb. 12*	*Feb. 13*	*Feb. 14*	*Feb. 15*
Feb. 16	*Feb. 17* ***PRESIDENT'S DAY*** ***HOLIDAY***	*Feb. 18*	*Feb. 19* **NS — Utqiaġvik**	*Feb. 20* **NWA — Kotzebue**	*Feb. 21*	*Feb. 22*
Feb. 23	*Feb. 24*	*Feb. 25* **SE — Petersburg**	*Feb. 26*	*Feb. 27* **KA — Kodiak**	*Feb. 28*	*Feb. 29*
Mar. 1	*Mar. 2*	*Mar. 3* **EI — Fairbanks**	*Mar. 4* **SC — Anchorage**	*Mar. 5*	*Mar. 6*	*Mar. 7*
Mar. 8	*Mar. 9*	*Mar. 10*	*Mar. 11* **SP — Nome**	*Mar. 12*	*Mar. 13* *Window Closes*	*Mar. 14*

Fall 2020 Regional Advisory Council Meeting Calendar

Due to travel budget limitations placed by Department of the Interior on the U.S. Fish and Wildlife Service and the Office of Subsistence Management, the dates and locations of these meetings will be subject to change.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Aug. 16	*Aug. 17 Window opens*	*Aug. 18*	*Aug. 19*	*Aug. 20*	*Aug. 21*	*Aug. 22*
Aug. 23	*Aug. 24*	*Aug. 25*	*Aug. 26*	*Aug. 27*	*Aug. 28*	*Aug. 29*
Aug. 30	*Aug. 31*	*Sep. 1*	*Sep. 2*	*Sep. 3*	*Sep. 4*	*Sep. 5*
Sep. 6	*Sep. 7* **LABOR DAY HOLIDAY**	*Sep. 8*	*Sep. 9*	*Sep. 10*	*Sep. 11*	*Sep. 12*
Sep. 13	*Sep. 14*	*Sep. 15*	*Sep. 16*	*Sep. 17*	*Sep. 18*	*Sep. 19*
Sep. 20	*Sep. 21*	*Sep. 22*	*Sep. 23*	*Sep. 24*	*Sep. 25*	*Sep. 26*
Sep. 27	*Sep. 28*	*Sep. 29*	*Sep. 30*	*Oct. 1*	*Oct. 2*	*Oct. 3*
Oct. 4	*Oct. 5*	*Oct. 6*	*Oct. 7*	*Oct. 8*	*Oct. 9*	*Oct. 10*
Oct. 11	*Oct. 12* **COLUMBUS DAY HOLIDAY**	*Oct. 13*	*Oct. 14*	*Oct. 15*	*Oct. 16*	*Oct. 17*
Oct. 18	*Oct. 19*	*Oct. 20*	*Oct. 21*	*Oct. 22*	*Oct. 23*	*Oct. 24*
Oct. 25	*Oct. 26*	*Oct. 27*	*Oct. 28*	*Oct. 29*	*Oct. 30*	*Oct. 31*
Nov. 1	*Nov. 2*	*Nov. 3*	*Nov. 4*	*Nov. 5*	*Nov. 6 Window closes*	*Nov. 7*

Subsistence Regional Advisory Council Correspondence Policy

The Federal Subsistence Board (Board) recognizes the value of the Regional Advisory Councils' role in the Federal Subsistence Management Program. The Board realizes that the Councils must interact with fish and wildlife resource agencies, organizations, and the public as part of their official duties, and that this interaction may include correspondence. Since the beginning of the Federal Subsistence Program, Regional Advisory Councils have prepared correspondence to entities other than the Board. Informally, Councils were asked to provide drafts of correspondence to the Office of Subsistence Management (OSM) for review prior to mailing. Recently, the Board was asked to clarify its position regarding Council correspondence. This policy is intended to formalize guidance from the Board to the Regional Advisory Councils in preparing correspondence.

The Board is mindful of its obligation to provide the Regional Advisory Councils with clear operating guidelines and policies, and has approved the correspondence policy set out below. The intent of the Regional Advisory Council correspondence policy is to ensure that Councils are able to correspond appropriately with other entities. In addition, the correspondence policy will assist Councils in directing their concerns to others most effectively and forestall any breach of department policy.

The Alaska National Interest Lands Conservation Act, Title VIII required the creation of Alaska's Subsistence Regional Advisory Councils to serve as advisors to the Secretary of the Interior and the Secretary of Agriculture and to provide meaningful local participation in the management of fish and wildlife resources on Federal public lands. Within the framework of Title VIII and the Federal Advisory Committee Act, Congress assigned specific powers and duties to the Regional Advisory Councils. These are also reflected in the Councils' charters. *(Reference: ANILCA Title VIII §805, §808, and §810; Implementing regulations for Title VIII, 50 CFR 100 _.11 and 36 CFR 242 _.11; Implementing regulations for FACA, 41 CFR Part 102-3.70 and 3.75)*

The Secretaries of Interior and Agriculture created the Federal Subsistence Board and delegated to it the responsibility for managing fish and wildlife resources on Federal public lands. The Board was also given the duty of establishing rules and procedures for the operation of the Regional Advisory Councils. The Office of Subsistence Management was established within the Federal Subsistence Management Program's lead agency, the U.S. Fish and Wildlife Service, to administer the Program. *(Reference: 36 CFR Part 242 and 50 CFR Part 100 Subparts C and D)*

Policy

1. The subject matter of Council correspondence shall be limited to matters over which the Council has authority under §805(a)(3), §808, §810 of Title VIII, Subpart B §___.11(c) of regulation, and as described in the Council charters.

2. Councils may, and are encouraged to, correspond directly with the Board. The Councils are advisors to the Board.

3. Councils are urged to also make use of the annual report process to bring matters to the Board’s attention.

4. As a general rule, Councils discuss and agree upon proposed correspondence during a public meeting. Occasionally, a Council chair may be requested to write a letter when it is not feasible to wait until a public Council meeting. In such cases, the content of the letter shall be limited to the known position of the Council as discussed in previous Council meetings.

5. Except as noted in Items 6, 7, and 8 of this policy, Councils will transmit all correspondence to the Assistant Regional Director (ARD) of OSM for review prior to mailing. This includes, but is not limited to, letters of support, resolutions, letters offering comment or recommendations, and any other correspondence to any government agency or any tribal or private organization or individual.
    a. Recognizing that such correspondence is the result of an official Council action and may be urgent, the ARD will respond in a timely manner.
    b. Modifications identified as necessary by the ARD will be discussed with the Council chair. Councils will make the modifications before sending out the correspondence.

6. Councils may submit written comments requested by Federal land management agencies under ANILCA §810 or requested by regional Subsistence Resource Commissions (SRC) under §808 directly to the requesting agency. Section 808 correspondence includes comments and information solicited by the SRCs and notification of appointment by the Council to an SRC.

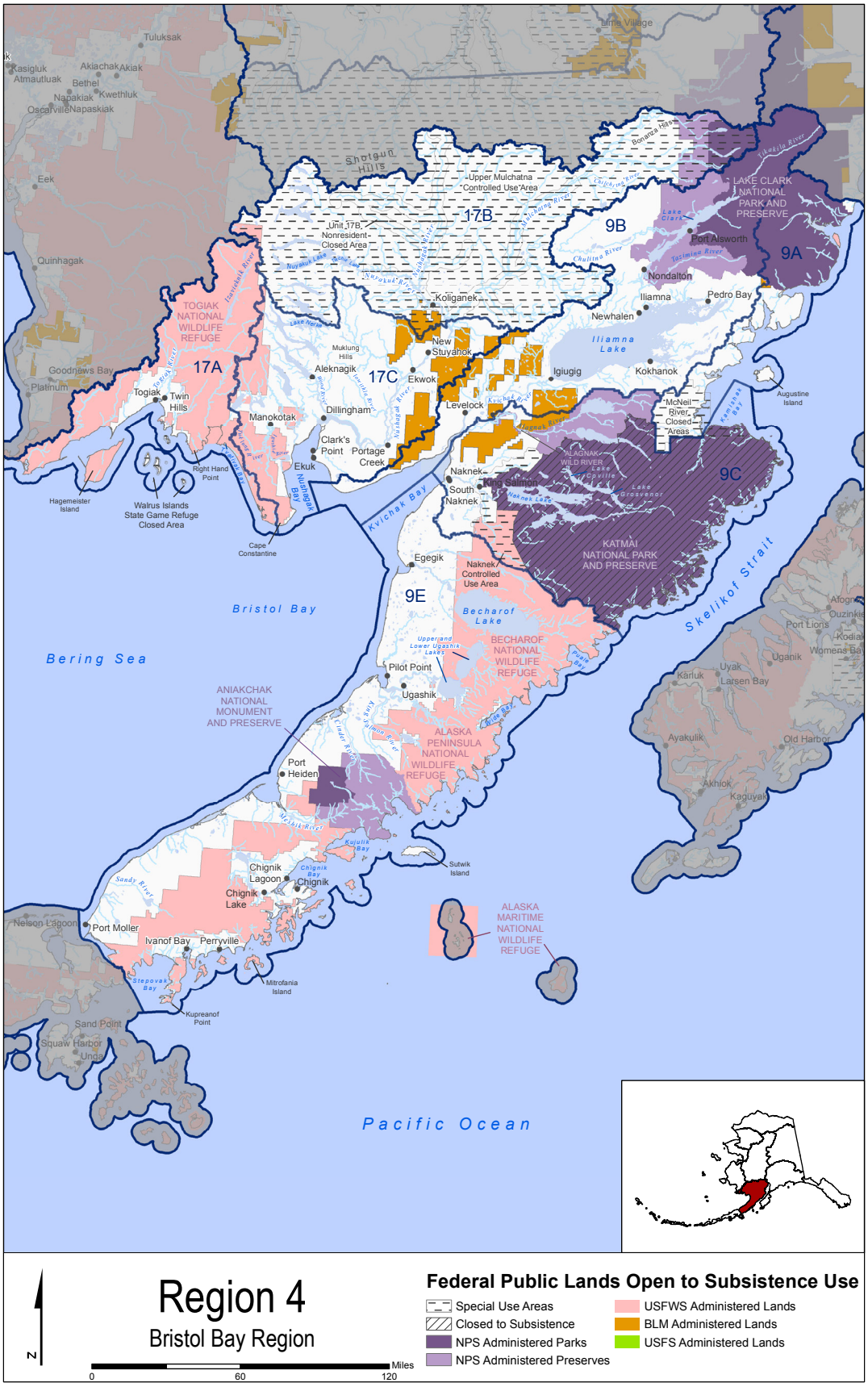
7. Councils may submit proposed regulatory changes or written comments regarding proposed regulatory changes affecting subsistence uses within their regions to the Alaska Board of Fisheries or the Alaska Board of Game directly. A copy of any comments or proposals will be forwarded to the ARD when the original is submitted.

8. Administrative correspondence such as letters of appreciation, requests for agency reports at Council meetings, and cover letters for meeting agendas will go through the Council's regional coordinator to the appropriate OSM division chief for review.

9. Councils will submit copies of all correspondence generated by and received by them to OSM to be filed in the administrative record system.

10. Except as noted in Items 6, 7, and 8, Councils or individual Council members acting on behalf of or as representative of the Council may not, through correspondence or any other means of communication, attempt to persuade any elected or appointed political officials, any government agency, or any tribal or private organization or individual to take a particular action on an issue. This does not prohibit Council members from acting in their capacity as private citizens or through other organizations with which they are affiliated.

Approved by the Federal Subsistence Board on June 15, 2004.


Region 4
Bristol Bay Region
N
0
60
120
Miles
Federal Public Lands Open to Subsistence Use
Special Use Areas
Closed to Subsistence
NPS Administered Parks
NPS Administered Preserves
USFWS Administered Lands
BLM Administered Lands
USFS Administered Lands
Bristol Bay
Bering Sea
Pacific Ocean
Kvichak Bay
Skelikof Strait
17A
17B
17C
9A
9B
9C
9E
TOGIAK NATIONAL WILDLIFE REFUGE
ANIAKCHAK NATIONAL MONUMENT AND PRESERVE
ALASKA PENINSULA NATIONAL WILDLIFE REFUGE
BECHAROF NATIONAL WILDLIFE REFUGE
KATMAI NATIONAL PARK AND PRESERVE
LAKE CLARK NATIONAL PARK AND PRESERVE
ALAGNAK WILD RIVER
ALASKA MARITIME NATIONAL WILDLIFE REFUGE
Walrus Islands State Game Refuge Closed Area
Unit 17B Nonresident Closed Area
Upper Mulchatna Controlled Use Area
Naknek Controlled Use Area
McNeil River Closed Areas
Tuluksak
Akiachak
Akiak
Bethel
Napakiak
Kwethluk
Oscarville
Napaskiak
Eek
Quinhagak
Goodnews Bay
Platinum
Togiak
Twin Hills
Manokotak
Dillingham
Aleknagik
Koliganek
New Stuyahok
Ekwok
Levelock
Igiugig
Kokhanok
Newhalen
Iliamna
Pedro Bay
Nondalton
Port Alsworth
Lime Village
Clark's Point
Portage Creek
Ekuk
Naknek
South Naknek
King Salmon
Egegik
Pilot Point
Ugashik
Port Heiden
Chignik
Chignik Lagoon
Chignik Lake
Nelson Lagoon
Port Moller
Ivanof Bay
Perryville
Sutwik Island
Mitrofania Island
Kupreanof Point
Sand Point
Squaw Harbor
Unga
Cape Constantine
Hagemeister Island
Right Hand Point
Becharof Lake
Iliamna Lake
Lake Clark
Augustine Island
Port Lions
Ouzinkie
Kodiak
Womens Bay
Uganik
Karluk
Uyak
Larsen Bay
Ayakulik
Old Harbor
Akhiok
Kaguyak

Department of the Interior
U. S. Fish and Wildlife Service

Bristol Bay Subsistence Regional Advisory Council

CHARTER

1. **Committee's Official Designation.** The Council's official designation is the Bristol Bay Subsistence Regional Advisory Council (Council).

2. **Authority.** The Council is renewed by virtue of the authority set out in the Alaska National Interest Lands Conservation Act (ANILCA) (16 U.S.C. 3115 (1988)), and under the authority of the Secretary of the Interior, in furtherance of 16 U.S.C. 410hh-2. The Council is regulated by the Federal Advisory Committee Act (FACA), as amended, 5 U.S.C. Appendix 2.

3. **Objectives and Scope of Activities.** The objective of the Council is to provide a forum for the residents of the Region with personal knowledge of local conditions and resource requirements to have a meaningful role in the subsistence management of fish and wildlife on Federal lands and waters in the Region.

4. **Description of Duties.** Council duties and responsibilities, where applicable, are as follows:

   a. Recommend the initiation, review, and evaluation of proposals for regulations, policies, management plans, and other matters relating to subsistence uses of fish and wildlife on public lands within the Region.

   b. Provide a forum for the expression of opinions and recommendations by persons interested in any matter related to the subsistence uses of fish and wildlife on public lands within the Region.

   c. Encourage local and regional participation in the decision-making process affecting the taking of fish and wildlife on the public lands within the Region for subsistence uses.

   d. Prepare an annual report to the Secretary containing the following:

      (1) An identification of current and anticipated subsistence uses of fish and wildlife populations within the Region;

      (2) An evaluation of current and anticipated subsistence needs for fish and wildlife populations within the Region;

(3) A recommended strategy for the management of fish and wildlife populations within the Region to accommodate such subsistence uses and needs; and

(4) Recommendations concerning policies, standards, guidelines, and regulations to implement the strategy.

e. Appoint three members to the Lake Clark National Park and three members to the Aniakchak National Monument Subsistence Resource Commissions, in accordance with Section 808 of the ANILCA.

f. Make recommendations on determinations of customary and traditional use of subsistence resources.

g. Make recommendations on determinations of rural status.

h. Provide recommendations on the establishment and membership of Federal local advisory committees.

i. Provide recommendations for implementation of Secretary's Order 3347: Conservation Stewardship and Outdoor Recreation, and Secretary's Order 3356: Hunting, Fishing, Recreational Shooting, and Wildlife Conservation Opportunities and Coordination with States, Tribes, and Territories. Recommendations shall include, but are not limited to:

(1) Assessing and quantifying implementation of the Secretary's Orders, and recommendations to enhance and expand their implementation as identified;

(2) Policies and programs that:

(a) increase outdoor recreation opportunities for all Americans, with a focus on engaging youth, veterans, minorities, and other communities that traditionally have low participation in outdoor recreation;

(b) expand access for hunting and fishing on Bureau of Land Management, U.S. Fish and Wildlife Service, and National Park Service lands in a manner that respects the rights and privacy of the owners of non-public lands;

(c) increase energy, transmission, infrastructure, or other relevant projects while avoiding or minimizing potential negative impacts on wildlife; and

(d) create greater collaboration with states, tribes, and/or territories.

j. Provide recommendations for implementation of the regulatory reform initiatives and policies specified in section 2 of Executive Order 13777: Reducing Regulation and Controlling Regulatory Costs; Executive Order 12866: Regulatory Planning and Review, as amended; and section 6 of Executive Order 13563: Improving Regulation and Regulatory Review. Recommendations shall include, but are not limited to:

Identifying regulations for repeal, replacement, or modification considering, at a minimum, those regulations that:

(1) eliminate jobs, or inhibit job creation;

(2) are outdated, unnecessary, or ineffective;

(3) impose costs that exceed benefits;

(4) create a serious inconsistency or otherwise interfere with regulatory reform initiative and policies;

(5) rely, in part or in whole, on data or methods that are not publicly available or insufficiently transparent to meet the standard for reproducibility; or

(6) derive from or implement Executive Orders or other Presidential and Secretarial directives that have been subsequently rescinded or substantially modified.

At the conclusion of each meeting or shortly thereafter, provide a detailed recommendation meeting report, including meeting minutes, to the Designated Federal Officer (DFO).

5. **Agency or Official to Whom the Council Reports.** The Council reports to the Federal Subsistence Board Chair, who is appointed by the Secretary of the Interior with the concurrence of the Secretary of Agriculture.

6. **Support.** The U.S. Fish and Wildlife Service will provide administrative support for the activities of the Council through the Office of Subsistence Management.

7. **Estimated Annual Operating Costs and Staff Years.** The annual operating costs associated with supporting the Council's functions are estimated to be $155,000, including all direct and indirect expenses and 1.0 staff years.

8. **Designated Federal Officer**. The DFO is the Subsistence Council Coordinator for the Region or such other Federal employee as may be designated by the Assistant Regional Director - Subsistence, Region 7, U.S. Fish and Wildlife Service. The DFO is a full-time Federal employee appointed in accordance with Agency procedures. The DFO will:

(a) Approve or call all of the Council and subcommittee meetings;

(b) Prepare and approve all meeting agendas;

(c) Attend all Council and subcommittee meetings;

(d) Adjourn any meeting when the DFO determines adjournment to be in the public interest; and

(e) Chair meetings when directed to do so by the official to whom the advisory committee reports.

9. **Estimated Number and Frequency of Meetings.** The Council will meet 1-2 times per year, and at such times as designated by the Federal Subsistence Board Chair or the DFO.

10. **Duration**. Continuing.

11. **Termination.** The Council will be inactive 2 years from the date the charter is filed, unless prior to that date, the Charter is renewed in accordance with the provisions of section 14 of the FACA. The Council will not meet or take any action without a valid current charter.

12. **Membership and Designation.** The Council's membership is composed of representative members as follows:

Ten members who are knowledgeable and experienced in matters relating to subsistence uses of fish and wildlife and who are residents of the Region represented by the Council.

To ensure that each Council represents a diversity of interests, the Federal Subsistence Board in their nomination recommendations to the Secretary will strive to ensure that seven of the members (70 percent) represent subsistence interests within the Region and three of the members (30 percent) represent commercial and sport interests within the Region. The portion of membership representing commercial and sport interests must include, where possible, at least one representative from the sport community and one representative from the commercial community.

The Secretary of the Interior will appoint members based on the recommendations from the Federal Subsistence Board and with the concurrence of the Secretary of Agriculture.

Members will be appointed for 3-year terms. A vacancy on the Council will be filled in the same manner in which the original appointment was made. Members serve at the discretion of the Secretary.

Council members will elect a Chair, Vice-Chair, and Secretary for a 1-year term.

Members of the Council will serve without compensation. However, while away from their homes or regular places of business, Council and subcommittee members engaged in Council, or subcommittee business, approved by the DFO, may be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in Government service under section 5703 of title 5 of the United States Code.

13. **Ethics Responsibilities of Members.** No Council or subcommittee member will participate in any Council or subcommittee deliberations or votes relating to a specific party matter before the Department or its bureaus and offices including a lease, license, permit, contract, grant, claim, agreement, or litigation in which the member or the entity the member represents has a direct financial interest.

14. **Subcommittees.** Subject to the DFOs approval, subcommittees may be formed for the purpose of compiling information and conducting research. However, such subcommittees must act only under the direction of the DFO and must report their recommendations to the full Council for consideration. Subcommittees must not provide advice or work products directly to the Agency. Subcommittees will meet as necessary to accomplish their assignments, subject to the approval of the DFO and the availability of resources.

15. **Recordkeeping.** Records of the Council, and formally and informally established subcommittees of the Council, shall be handled in accordance with General Records Schedule 6.2, and other approved Agency records disposition schedule. These records shall be available for public inspection and copying, subject to the Freedom of Information Act, 5 U.S.C. 552.

Secretary of the Interior

DEC 0 1 2017

Date Signed

DEC 0 4 2017

Date Filed

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