SOUTHCENTRAL ALASKA SUBSISTENCE REGIONAL ADVISORY COUNCIL

Meeting Materials

March 4-5, 2020
Anchorage

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On the cover...

Quartz Creek Dolly Varden Char

photo by V. Orange

SOUTHCENTRAL ALASKA SUBSISTENCE REGIONAL ADVISORY COUNCIL

U.S. Fish & Wildlife Service Building, 1011 E. Tudor Road,
Gordon Watson Conference Room
Anchorage

March 4 – 5, 2020
convening at 9:00 a.m. daily

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. **Election of Officers***

    Chair (*Designated Federal Officer*)

    Vice-Chair (*New Chair*)

    Secretary (*New Chair*)
7. **Review and Approve Previous Meeting Minutes*** (*Chair*) 5
8. **Reports**

    Council Members' Reports

    Chair's Report
9. **Public and Tribal Comment on Non-Agenda Items** (available each morning)

10. Old Business (*Chair*)

a. Nonrural Determination Process Update – Moose Pass (*Robbin La Vine*)......................13

11. New Business (*Chair*)

a. Fisheries Resources Monitoring Program Update (*Scott Ayers*)

b. Call for Federal Fish and Shellfish Proposals* (*Office of Subsistence Management*) 14

c. Review and approve FY2019 Annual Report* (*Coordinator*)........................Supplemental

d. Denali NPP Subsistence Resource Commission* (*Amy Craver*)....................................17

e. Shifting stream temperatures & salmon production (*Luca Adelfio, Theresa Tanner*) 18

f. Bear Project Update (*Milo Burcham*)

12. Agency Reports

(*Time limit of 15 minutes unless approved in advance*)

1. Tribal Governments
    a. Ninilchik Traditional Council (*Ivan Encelewski*)
2. Native Organizations
    a. Native Village of Eyak (*Matt Piche*)
    b. Ahtna Inter-Tribal Resource Commission (*Ahtna*)
3. US Fish and Wildlife Service (*Jeffry Anderson*)
4. US Forest Service
5. National Park Service
    a. Wrangell-St. Elias National Park and Preserve (*Judy Putera, Dave Sarafin*)
6. Bureau of Land Management
7. Alaska Department of Fish and Game
8. Office of Subsistence Management
    a. Charters
    b. Staffing
    c. General Program Updates
    d. Tribal Consultation presentation [Q&A] (*Orville Lind*)

13. Future Meeting Dates*

Confirm Fall 2020 meeting date and location 32

Select Winter 2021 meeting date and location 33

14. Closing Comments

15. 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 DeAnna Perry, 907-586-7918, deanna.perry@usda.gov, or 800-877-8339 , or 800-877-8339 (TTY), by close of business on February 18, 2020.

REGION 2
Southcentral Alaska Subsistence Regional Advisory Council

Seat	Year Appointed *Term Expires*	Member Name and Community
1	2016 ***2022***	**Edward H. Holsten** Cooper Landing
2	 ***2019***	***VACANT***
3	2003 ***2022***	**Richard Greg Encelewski** **Chair** Ninilchik
4	2016 ***2022***	**Diane A. Selanoff** Valdez
5	 ***2019***	***VACANT***
6	2003 ***2020***	**Gloria Stickwan** **Vice-Chair** Tazlina
7	2017 ***2020***	**Dennis M. Zadra** Cordova
8	2011 ***2020***	**Michael V. Opheim** Seldovia
9	2011 ***2020***	**Andrew T. McLaughlin** Chenega Bay
10	 ***2021***	***VACANT***
11	2018 ***2021***	**Aaron Bloomquist** Copper Center
12	2018 ***2021***	**John C. Whissel** Cordova
13	 ***2021***	***VACANT***

SOUTHCENTRAL SUBSISTENCE REGIONAL ADVISORY COUNCIL

Meeting Minutes

University of Alaska Fairbanks - Seward Marine Center
Seward
October 10-11, 2019

Invocation:

Gloria Stickwan gave an invocation.

Call to Order, Roll Call and Quorum Establishment:

The meeting was called to order on Thursday, October 10, 2019, at approximately 9:00 a.m. Council members Ed Holsten, Greg Encelewski, Daniel Stevens, Gloria Stickwan, Andrew McLaughlin, Dennis Zadra, Michael Opheim, and John Whissel were present in person. Council Member Eleanor Dementi resigned from the Council prior to this meeting. Diane Selanoff and Aaron Bloomquist were not present and were excused. With 8 out of 10 seated Council members present (Council has three vacant seats), the quorum was established.

Attendees:

In person:

Todd Eskelin	Kenai	Kenai National Wildlife Refuge (NWR), U.S. Fish and Wildlife Service (USFWS)
Tom Whitford	Anchorage	U.S. Forest Service (USFS)
Dustin Carl		Ahtna Intertribal Resource Commission (AITRC)
Carol Damberg	Anchorage	USFWS
Matte Piche		Native Village of Eyak
Jesse Hankins	Glennallen	Bureau of Land Management (BLM)
Bronwyn Jones		Alaska Department of Fish and Game (ADF&G)
Jason Herreman	Homer	ADF&G
Barbara Cellarius		Wrangell-St. Elias National Park and Preserve (NPP), National Park Service (NPS)
Milo Burcham	Cordova	USFS
Odin Miller		AITRC
Pat Petrivelli	Anchorage	Bureau of Indian Affairs (BIA)
Nicole Farnham		AITRC
Dave Sarafin		Wrangell-St. Elias NPP, NPS
Darrel Williams	Ninilchik	
Francisco Sanchez	Seward	USFS
Scott Ayers	Anchorage	Office of Subsistence Management (OSM)

Jordan Rymer	Anchorage	USFS
Tom Evans	Anchorage	OSM
Ivan Encelewski	Ninilchik	
Dan Sharp	Anchorage	BLM
Tom Doolittle	Anchorage	OSM
Willow Hetrick	Moose Pass	
Christine Brummer	Anchorage	OSM
John Kinsner	Anchorage	USFS
DeAnna Perry	Juneau	USFS
Benjamin Pister		Kenai Fjord National Park (NP), NPS
David Pearson	Moose Pass	USFS
Amy Craver	Anchorage	Denali National Park, NPS
Chris McKee	Anchorage	OSM
Megan Klosterman	Anchorage	OSM
Hannah Vorhees	Anchorage	OSM
Robin LaVine	Anchorage	OSM
Wayne Owen	Juneau	USFS
Jeff Estes		

Via teleconference:

Suzanne Worker	Anchorage	OSM
Jeff Anderson	Kenai	USFWS
Mark Burch	Anchorage	ADF&G
Joshua Ream	Anchorage	NPS
Raeanna Wood	Juneau	USFS
Ben Mulligan	Anchorage	ADF&G
Jeff Bryden	Moose Pass	
Jeff Wells	Tok	ADF&G
Sue Entsminger	Mentasta	Eastern Interior RAC

Review and Adopt Agenda:

Motion made by Mr. Whissel, seconded by Mr. Holsten, to adopt the agenda as read with the following changes:

- Add Request for Reconsideration 15-01 - Update as 10d under Old Business
- Add WSA19-08 Ptarmigan in Unit 13E - Special Action as 11a under New Business
- Add Ninilchik Traditional Council to 12 - Agency Reports, under Tribal Governments
- Add Partners for Fisheries Monitoring Update to Agency Reports
- Add Denali Subsistence Resource Commission Appointment Information
- Set a specific time for the Moose Pass agenda item

The motion passed unanimously.

Review and Approve Previous Meeting Minutes:

Motion made by Mr. Holsten, seconded by Mr. Opheim, to approve the winter 2019 meeting minutes with the following modifications: On page 11 of the meeting book, change "court" to "council." The motion passed unanimously.

Council Member and Chair Reports:

Edward Holsten of Cooper Landing reported that his community had a mild spring and early snow melt with record dry temperatures, and it was very warm in April and May. There was a large infestation of spruce bark beetles that resulted in a tremendous amount of tree kill in the area. The first run of Sockeye Salmon in Kenai was great, and the majority of subsistence users got to participate in fishing the first run. Because of the Swan Lake wildfire, the air quality was poor and most businesses experienced adverse effects.

Greg Encelewski of Ninilchik reported that the Ninilchik subsistence fishery was awesome. A large number of permits were issued, and all were filled. It was dry, hot, and calm this year, and the fish went up in the inlet to deeper water. Over a million Sockeye flooded the Kenai River and probably resulted in over escapement. The commercial fishermen did not do well. There was an increase in the bull moose population in Unit 15c, and the moose harvest was good; many locals harvested moose so it was a good season.

Daniel Stevens of Chitina reported that his community saw a good run of salmon, both Kings and Reds. There was an abundance of rabbits. He has seen strange things recently: he observed a black wolf in his driveway and a silver fox nearby.

Gloria Stickwan of Tazlina reported that it was a hot and dry summer. There was a good run of fish this year, both Sockeyes and Kings. Many people harvested moose, which might be attributed to the wildfires in the area. She did not observe many caribou. She just attended a meeting of the Subsistence Resource Commission prior to this RAC meeting.

Dennis Zadra of Cordova reported that it was an unusual summer in his community (hot and dry). Despite decreasing salmon trends, he observed Kings and Reds coming back this year and that they were bigger, even though the recent trend showed they were decreasing in size. The hatchery runs came back strong, and the salmon are bouncing back. Bears were everywhere last year trying to find something to eat, but bear sightings were way down this year. Halibut fishing was good this year.

Michael Opheim of Seldovia reported that there were no berries in his area this year. No bears had been taken. A couple of goats were harvested. This was a dry season and the streams dried up with only small fish coming back. It was a good year for Kings with a small run of Silvers that were started from transplants. The Tribe recently sent in a couple of proposals to the Alaska Board of Fisheries to expand the subsistence fishery.

Andrew McLaughlin of Chenega Bay reported that there were more bears this year than in recent years. Deer are bouncing back. Silvers showed up late in the season. The berry crop was good. The vegetation was short because of dry and hot weather. There was a moratorium on harvest of shellfish because of paralytic shell poisoning by the Center for Disease Control and Prevention.

John Whissel of Cordova reported that Sockeye Salmon came back this year after a poor Sockeye run last year. It was a tropical summer in Cordova with a good berry year, so the bears stayed out of town. It was a good season for subsistence Halibut. There was a fairly weak run of Cohos on the Delta this year.

Old Business:

The Council heard the status of these issues; however, no action by the Council was necessary:

- Wildlife Closure Reviews (WCR20-03, WCR20-41, WCR20-42)
- 805(c) Report
- Nonrural Determination Process – Moose Pass Proposal
- Request for Reconsideration 15-01

New Business:

WSA19-08: Motion made by Mr. Holsten, seconded by Mr. Opheim, to support this special action regarding ptarmigan harvest in Unit 13E. The motion passed on a unanimous vote. The Council felt that local users were seen as self-regulating and that there was a conservation concern due to the impact of hunting, predation, and other conditions. Council agreed that the reduction in harvest was necessary because it could prevent overharvesting.

Wildlife Proposals:

Regional Proposals:

WP20-18a: Revise the customary and traditional use determination for goat in Unit 7

Motion made by Mr. Whissel, seconded by Mr. Opheim, to support WP20-18a as modified by OSM. The Council felt that the analysis showed a clear customary and traditional use by the communities for goat and other resources as described in the OSM modification. The motion passed on a unanimous vote.

WP20-18b: Establish a goat season in Unit 7

Motion made by Mr. McLaughlin, seconded by Mr. Holsten, to support WP20-18b with modifications. Modifications included the OSM modification and Council's modification to make a hunter ineligible to get a permit for a billy for 3 years if one is harvested and 5 years if a nanny is harvested. The Council received a variety of explanations for the decline in this species and believes that these restrictions are needed in the regulations instead of a stipulation under the permit conditions due to conservation concerns for the species and the way it is managed. This proposal will provide an opportunity for Federal subsistence users. If adopted, the delegation of authority letter will allow a more timely response within the Federal process. The motion passed on a unanimous vote.

WP20-19: Revise the elder/minor sheep hunt in Unit 11

Motion made by Ms. Stickwan, seconded by Mr. Stevens, to support WP20-19. The Council wanted existing regulations to remain on the books and if this proposal is rejected by the Board, then the hunts provided under the existing regulation would continue. The Council did not agree with the Solicitor's opinion that this proposal is not permissible under ANILCA, as there is no reason to have a Section 804 to restrict harvest because there is no shortage of animals. In fact, it could be interpreted as the opposite when talking about sustaining a livelihood. This has a lot to do with passing knowledge from one generation to another, for which there is precedent. The Council was concerned that there may eventually be only 'special hunts' and did not want to run the risk of existing hunts being restricted. The Council opposed this proposal to maintain 'status quo.' The motion to support failed on a unanimous vote.

WP20-20: Restrict hunting/trapping in residential areas and mark trap sites in Unit 7

Motion was made by Ms. Stickwan, seconded by Mr. Opheim, to support WP20-20. The Council felt that this proposal would make regulations more complex, be difficult to enforce, and users trapping under State regulations do not have such restrictions. Although the Council appreciated an attempt to reduce conflict between pet owners and trappers, it felt this proposal exaggerated the issue. The Council specifically noted that smaller buffers are more consistent with what is normally done. Marked traps would be more susceptible to disturbance by people and it wouldn't stop illegal trapping. The motion failed on a unanimous vote.

WP20-21: The Council took no action on WP20-21 as this proposal was withdrawn by the proponent prior to its presentation to the Council.

WP20-22a: Revise customary and traditional use determination for caribou in Unit 15

Motion by Mr. Whissel, seconded by Mr. McLaughlin, to support WP20-22a as modified by OSM. The Council stated that the analysis makes it clear that the residents of the communities listed in the OSM modification have a clear history of traditional use of caribou in the area. The proposal makes sense since the population has increased and the communities listed should have the ability to utilize the resource now. The motion passed on a unanimous vote.

WP20-22b: Establish a season and harvest limit for caribou in Unit 15

Motion by Ms. Stickwan, seconded by Mr. Stevens, to support WP20-22b. The Council stated that there needs to be opportunity for harvest by Federally qualified subsistence users and, to date, the majority of harvest has been by non-Federally qualified users. The Council noted that caribou populations move around and the Council did not want restrictions about where Federally qualified subsistence users could hunt. Further, the Council stated that the evidence supports the recommendation because it would be beneficial to subsistence users without unnecessarily restricting other users. The motion passed with 7 votes in favor to 1 against.

WP20-23a: Revise the customary and traditional use determination for goat in Unit 15

Motion by Mr. Whissel, seconded by Mr. McLaughlin, to support WP20-23a as modified by OSM. The Council believes that there is a clear need for an opportunity for Federally qualified subsistence users to have access to resources where no access currently exists. The Council recognizes that it has been difficult for Federally qualified subsistence users to obtain a State drawing permit due to competition from the large number of non-local applicants. The motion passed on a unanimous vote.

WP20-23b: Establish a season and harvest limit for goat in Unit 15

Motion by Mr. Whissel, seconded by Mr. Opheim, to support WP20-23b with modification. The modification prohibits the take of nannies with kids, the take of kids, and made a hunter ineligible to get a permit for a billy for 3 years if one is harvested, and for 5 years if a nanny is harvested. This restriction should be put in regulation. The Council stated that a drawing permit was too restrictive and wanted to ensure that Federally qualified users would have an opportunity to harvest this limited resource. The motion passed on a unanimous vote.

WP20-24a: Revise the customary and traditional use determination and recognize the use of sheep by residents of Ninilchik

Motion by Mr. Whissel, seconded by Mr. Stevens, to support WP20-24a. The Council believes that the people living closest to the resource should have first access to the resource. The Council believes that only the communities mentioned in the proposal should be addressed and not add additional communities. Other communities should submit their own customary and traditional use determination proposals. The motion passed on a unanimous vote.

WP20-24b: Establish a season and harvest limit for sheep in Unit 15

Motion by Mr. Holsten, seconded by Mr. Opheim, to support WP20-24b as modified by OSM. The Council feels that a Federal priority needs to be established to provide opportunity for Federally qualified users to harvest a sheep. With the declining population, it is important to establish this priority before harvest restrictions occur. Delegated authority will allow flexibility in how the hunt is managed and give the land manager the ability to be close the season if needed for conservation or other reasons. The motion passed on a unanimous vote.

Crossover Proposals:

WP20-50: Revise hunt areas, seasons, and harvest limits for moose in Unit 12

Motion by Ms. Stickwan, seconded by Mr. Opheim, to support WP20-50 with Council's modification. The modification was to maintain the harvest limit and season throughout Unit 12 remainder (8/20 – 9/20, one antlered bull) and create a separate hunt area for the RM291 hunt as described in the original proposal. The Council believed it should support a subsistence priority on Federal public lands, per ANILCA to assure that opportunities for local users are not limited. The Council was concerned that harvest opportunity would be reduced for local people and make it harder to harvest an antlered bull. The Council beleieved that the proposal was confusing for the user. The Council stated that this modification would provide for a subsistence priority and ensure opportunities for local users are not limited. The motion passed on a unanimous vote.

WP20-51: Revise the customary and traditional use determination for sheep in Unit 12

Motion by Ms. Stickwan, seconded by Mr. Stevens, to support WP20-51. The Council believed that use of Dall sheep resource has been demonstrated and the rural residents of Unit 12 have been using the resource for some time. The motion passed on a unanimous vote.

Statewide Proposals:

WP20-08: Require traps and snares be marked with a State identification

Motion by Mr. Whissel, seconded by Mr. Holsten, to support WP20-08. The Council believed that there should not be a standard for the whole state. It is an issue that should be addressed at the local level if there are conflicts/problems. Implementing a uniform regulation across the State of Alaska would place an unnecessary burden on Federally qualified subsistence users. The motion failed.

2020 Fisheries Resource Monitoring Program:

Scott Ayers, OSM, provided information on the 2020 Fisheries Resource Monitoring Program. The Council took no action on this matter.

Identify Issues for FY2019 Annual Report:

- Ask the Board to keep the working group for Unit 13 caribou/moose in Unit 13, which was mentioned at the Federal Subsistence Board meeting in April, 2019
- Ask that an FRMP project include monitoring the Copper River to identify specific stocks, run timing, and escapement (pay more attention to Coho Salmon)

- Climate Change: continue observing climate change issues in terms of salmon and fisheries and research the stressors on salmon and effects caused by warming temperatures
- Research wildlife populations with a focus on parasites
- Provide an explanation of the nonrural determination process in more detail and how this will be dealt with in the future

Agency Reports:

- Ninilchik Traditional Council provided 2019 final reports on the Kasilof Subsistence Gillnet Fishery and Kenai River Subsistence Gillnet Fishery presented by Ivan Encelewski
- Native Village of Eyak project report presented by Matt Piche
- Partners for Fisheries Monitoring Update presented by Odin Miller, AITRC
- U.S. Fish and Wildlife updates presented by Jeff Anderson
- U.S. Forest Service updates on law enforcement, program and agency presented by Jordan Rymer, Milo Burcham, and Tom Whitford
- National Park Service updates on fisheries, wildlife, subsistence, anthropology and Denali Subsistence Resource Commission appointments and updates presented by Dave Sarafin, Barbara Cellarius, and Amy Craver
- Bureau of Land Management wildlife report presented by Jesse Hankins
- Office of Subsistence Management program updates presented by Tom Doolittle

Future Meeting Dates:

The winter 2020 Council meeting was set for the week of March 4 – 5, 2020, in Anchorage.
The fall 2020 Council meeting was set for October 7 – 8, 2020, in Anchorage; however, this location may be changed at the 2020 winter meeting based on agenda subjects.

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DeAnna Perry, DFO
USFWS Office of Subsistence Management

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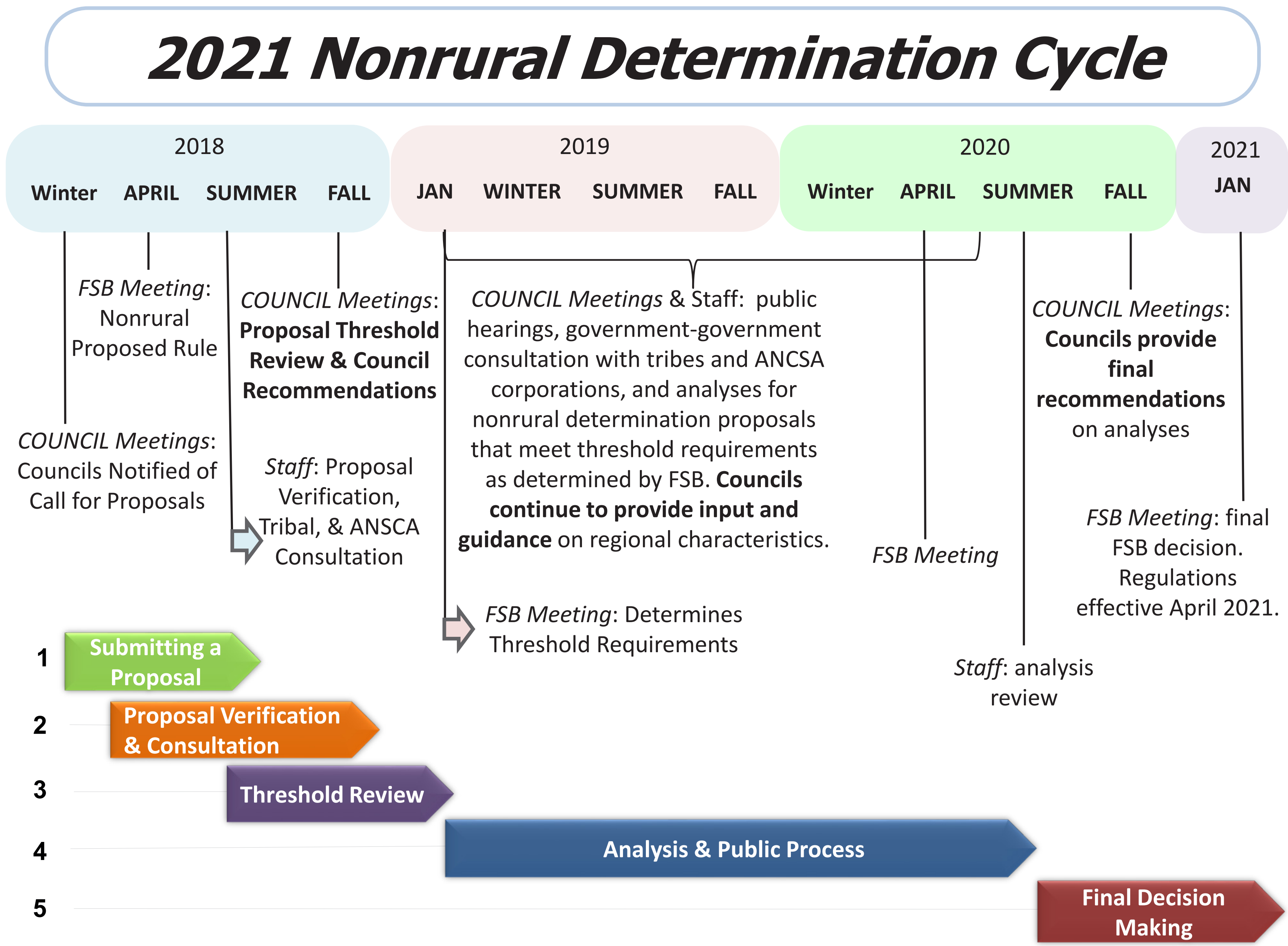
Richard Greg Encelewski, Chair
Southcentral Subsistence Regional Advisory Council

These minutes will be formally considered by the Southcentral Subsistence Regional Advisory Council at its March 4 – 5, 2020, meeting in Anchorage, and any corrections or notations will be incorporated in the minutes at that meeting.

A more detailed report of this meeting, copies of the transcript, and meeting handouts are available upon request. Call DeAnna Perry at 1-800-478-1456 or 907-586-7918, email deanna.perry@usda.gov.


2021 Nonrural Determination Cycle
2018
Winter
APRIL
SUMMER
FALL
2019
JAN
WINTER
SUMMER
FALL
2020
Winter
APRIL
SUMMER
FALL
2021
JAN
FSB Meeting: Nonrural Proposed Rule
COUNCIL Meetings: Councils Notified of Call for Proposals
COUNCIL Meetings: Proposal Threshold Review & Council Recommendations
Staff: Proposal Verification, Tribal, & ANSCA Consultation
COUNCIL Meetings & Staff: public hearings, government-government consultation with tribes and ANCSA corporations, and analyses for nonrural determination proposals that meet threshold requirements as determined by FSB. Councils continue to provide input and guidance on regional characteristics.
FSB Meeting: Determines Threshold Requirements
FSB Meeting
Staff: analysis review
COUNCIL Meetings: Councils provide final recommendations on analyses
FSB Meeting: final FSB decision. Regulations effective April 2021.
1
Submitting a Proposal
2
Proposal Verification & Consultation
3
Threshold Review
4
Analysis & Public Process
5
Final Decision Making

Federal Subsistence Board Informational Flyer

U.S. Fish and Wildlife Service
Bureau of Land Management
National Park Service
Bureau of Indian Affairs

Forest Service

Contact: Regulatory Affairs Division Chief
(907) 786-3888 or (800) 478-1456
subsistence@fws.gov

How to Submit a Proposal to Change Federal Subsistence Regulations

Alaska residents and subsistence users are an integral part of the Federal regulatory process. Any person or group can submit proposals to change Federal subsistence regulations, comment on proposals, or testify at meetings. By becoming involved in the process, subsistence users assist with effective management of subsistence activities and ensure consideration of traditional and local knowledge in subsistence management decisions. Subsistence users also provide valuable wildlife harvest information.

A call for proposals to change Federal subsistence fishing regulations is issued in January of even-numbered years and odd-numbered years for wildlife. The period during which proposals are accepted is no less than 30 calendar days. Proposals must be submitted in writing within this time frame.

You may propose changes to Federal subsistence season dates, harvest limits, methods and means of harvest, and customary and traditional use determinations.

What your proposal should contain:

There is no form to submit your proposal to change Federal subsistence regulations. Include the following information in your proposal submission (you may submit as many as you like):

- Your name and contact information (address, phone, fax, or E-mail address)
- Your organization (if applicable).
- What regulations you wish to change. Include management unit number and species. Quote the current regulation if known. If you are proposing a new regulation, please state, “new regulation.”
- Write the regulation the way you would like to see it written in the regulations.
- Explain why this regulation change should be made.
- You should provide any additional information that you believe will help the Federal Subsistence Board (Board) in evaluating the proposed change.

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This document has been cleared for public release #0605132015.

You may submit your proposals by:

1. By mail or hand delivery to:

   Federal Subsistence Board
   Office of Subsistence Management
   Attn: Theo Matuskowitz
   1011 E. Tudor Rd., MS-121
   Anchorage, AK 99503

2. At any Federal Subsistence Regional Advisory Council meeting (A schedule will be published in the Federal Register and be announced statewide, bi-annually, prior to the meeting cycles)
3. On the Web at http://www.regulations.gov

Submit a separate proposal for each proposed change; however, do not submit the same proposal by different accepted methods listed above. To cite which regulation(s) you want to change, you may reference 50 CFR 100 or 36 CFR 242 or the proposed regulations published in the Federal Register: http://www.gpoaccess.gov/fr/index.html. All proposals and comments, including personal information, are posted on the Web at http://www.regulations.gov.

For the proposal processing timeline and additional information contact the Office of Subsistence Management at (800) 478-1456/ (907) 786-3888 or go to http://www.doi.gov/subsistence/proposal/submit.cfm.

How a proposal to change Federal subsistence regulations is processed:

1. Once a proposal to change Federal subsistence regulations is received by the Board, the U.S. Fish and Wildlife Service, Office of Subsistence Management (OSM) validates the proposal, assigns a proposal number and lead analyst.
2. The proposals are compiled into a book for statewide distribution and posted online at the Program website. The proposals are also sent out the applicable Councils and the Alaska Department of Fish and Game (ADF&G) and the Interagency Staff Committee (ISC) for review. The period during which comments are accepted is no less than 45 calendar days. Comments must be submitted within this time frame.
3. The lead analyst works with appropriate agencies and proponents to develop an analysis on the proposal.
4. The analysis is sent to the Councils, ADF&G and the ISC for comments and recommendations to the Board. The public is welcome and encouraged to provide comments directly to the Councils and the Board at their meetings. The final analysis contains all of the comments and recommendations received by interested/affected parties. This packet of information is then presented to the Board for action.
5. The decision to adopt, adopt with modification, defer or reject the proposal is then made by the Board. The public is provided the opportunity to provide comment directly to the Board prior to the Board's final decision.
6. The final rule is published in the Federal Register and a public regulations booklet is created and distributed statewide and on the Program's website.

A step-by-step guide to submitting your proposal on www.regulations.gov:

1. Connect to www.regulations.gov – there is no password or username required.
2. In the white space provided in the large blue box, type in the document number listed in the news release or available on the program webpage, (for example: FWS-R7-SM2014-0062) and select the light blue "Search" button to the right.

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3. Search results will populate and may have more than one result. Make sure the Proposed Rule you select is by the U.S. Fish and Wildlife Service (FWS) and **not** by the U.S. Forest Service (FS).
4. Select the proposed rule and in the upper right select the blue box that says, "Comment Now!"
5. Enter your comments in the "Comment" box.
6. Upload your files by selecting "Choose files" (this is optional).
7. Enter your first and last name in the spaces provided.
8. Select the appropriate checkbox stating whether or not you are providing the information directly or submitting on behalf of a third party.
9. Fill out the contact information in the drop down section as requested.
10. Select, "Continue." You will be given an opportunity to review your submission.
11. If everything appears correct, click the box at the bottom that states, "I read and understand the statement above," and select the box, "Submit Comment." A receipt will be provided to you. Keep this as proof of submission.
12. If everything does not appear as you would like it to, select, "Edit" to make any necessary changes and then go through the previous step again to "Submit Comment."

Missing out on the latest Federal subsistence issues? If you'd like to receive emails and notifications on the Federal Subsistence Management Program you may subscribe for regular updates by emailing fws-fsb-subsistence-request@lists.fws.gov. Additional information on the Federal Subsistence Management Program may be found on the web at www.doi.gov/subsistence/index.cfm or by visiting www.facebook.com/subsistencealaska.

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This document has been cleared for public release #0605132015.

Denali National Park Subsistence Resource Commission - March 2019

Name	Appointing Source	Affiliation	Term Expires
Ray Collins – Chair McGrath, AK 99627	Secretary of the Interior	Subsistence User,	11/01/19
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ARTICLE

Warm winters reduce landscape-scale variability in the duration of egg incubation for coho salmon (*Oncorhynchus kisutch*) on the Copper River Delta, Alaska

Luca A. Adelfio, Steven M. Wondzell, Nathan J. Mantua, and Gordon H. Reeves

Abstract: We quantified the sum of daily mean temperature above 0 °C and modeled incubation duration using water temperature data collected at 12 coho salmon (*Oncorhynchus kisutch*) spawning sites during two incubation periods with cool, snow-dominant conditions and three incubation periods with anomalously warm, rain-transitional conditions, a proxy for a future climate scenario. Warmer water temperatures during warm–rain-transitional winters yielded a 58-day reduction in the median duration of egg incubation; however, the magnitude of change at individual sites varied widely and was controlled by water source. At groundwater-fed sites, temperature variations were strongly attenuated, leading to small interannual differences in incubation duration that were relatively insensitive to short-term changes in air temperature. In contrast, modeled incubation duration was shortened by up to 3 months during warm–rain-transitional winters at precipitation-fed sites. Remarkably, our modeling showed increased uniformity in incubation duration across the landscape during warm–rain-transitional winters. The potential loss of diversity in incubation duration during warmer winters, in isolation, may reduce portfolio effects in this region's coho salmon population by promoting greater synchronization in the time of spawning.

Résumé : Nous avons quantifié la somme des températures moyennes quotidiennes supérieures à 0 °C et modélisé la durée d'incubation en utilisant des données sur la température de l'eau obtenues dans 12 lieux de frai de saumons cohos (*Oncorhynchus kisutch*) durant deux périodes d'incubation caractérisées par des conditions froides dominées par la neige et trois périodes d'incubation caractérisées par des conditions pluvieuses anormalement chaudes de transition, représentant un scénario de climat futur. Les températures de l'eau plus élevées durant les hivers chauds et pluvieux de transition entraînent une baisse de 58 jours de la durée médiane d'incubation des œufs; l'ampleur du changement dans chaque lieu de frai varie toutefois considérablement et est contrôlée par la source d'eau. Aux sites alimentés par de l'eau souterraine, les variations de température sont fortement atténuées, menant à de faibles différences interannuelles de la durée d'incubation relativement insensibles aux changements à court terme de la température de l'air. En revanche, la durée d'incubation modélisée est de jusqu'à 3 mois plus courte durant les hivers chauds et pluvieux de transition dans les sites alimentés en eau par les précipitations. Fait à noter, la modélisation fait ressortir une uniformité accrue de la durée d'incubation à l'échelle du paysage durant les hivers chauds et pluvieux de transition. La baisse potentielle de diversité des durées d'incubation durant les hivers chauds pourrait, en soi, réduire les effets de portefeuille dans la population de saumons cohos de la région en favorisant une plus grande synchronisation du moment du frai. [Traduit par la Rédaction]

Introduction

Climate change is already affecting water temperature in freshwater ecosystems that support Pacific salmon (*Oncorhynchus* spp.) and other cold-water fishes (Schindler et al. 2005; Isaak et al. 2012). Growth and metabolic rates for ectothermic aquatic organisms, including Pacific salmon (Beer and Anderson 2011; Crozier and Hutchings 2014) and their primary prey species (Gerten and Adrian 2000; Durance and Ormerod 2007), are largely controlled by water temperature. Much of the research examining the potential impacts of changing thermal regimes in cold-water ecosystems has focused on summer temperatures, when annual thermal maxima may exceed tolerance thresholds for cold-water fishes. However, quantifying the influence of climate change on water temperature during the autumn, winter, and spring months, the "cool season" at northern latitudes, may also be important, because physiology and behavior have adapted to the constraints of winter conditions (Shuter et al. 2012).

The embryos of most Pacific salmon incubate throughout the cool season. Incubation temperature influences egg-to-fry survival, incubation duration, and size at emergence (Murray and McPhail 1988). Spawn timing is finely tuned to local environmental conditions, notably water temperatures during the incubation period (Beacham and Murray 1990), to promote juvenile emergence at a favorable time of year for growth and viability (Brannon 1987; Webb and McLay 1996; Brannon et al. 2004). Increases in water temperatures during the incubation period can accelerate development and may trigger cascading effects on growth, viability, and seaward migration timing for juvenile anadromous sal-

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monids (Jonsson et al. 2005; Finstad and Jonsson 2012). Rising water temperatures associated with climate change may accelerate incubation, affecting salmon life-history expression and resilience (Crozier et al. 2008). Understanding the scale and magnitude of potential warming effects on the early life-history stages may be critical for anticipating the overall impacts of climate change on anadromous salmonids.

Quantifying climate change effects on water temperature at incubation sites remains a challenge due to spatial and temporal variability in the climatic (Hilderbrand et al. 2014), physiographic (Mayer 2012; Luce et al. 2014), and geomorphic (Leach and Moore 2011; Kelleher et al. 2012) factors that control water temperature. For example, advection and conduction of heat through the streambed interface as a result of hyporheic exchange (Arrigoni et al. 2008; Hannah et al. 2009; Gariglio et al. 2013), upwelling groundwater (Brown et al. 2005; O'Driscoll and DeWalle 2006), and lateral stormflow (Kobayashi et al. 1999; Leach and Moore 2014) can influence stream temperature, particularly in small streams and during the winter months when net radiative and sensible heat fluxes at the water's surface are strongly negative (Caissie et al. 2014).

Snowmelt and ice melt also exert control over water temperature (Webb and Nobilis 1997; Malard et al. 2001), and the quantity and timing of meltwater inputs are anticipated to change in catchments where the fraction of precipitation that accumulates as snowpack is declining as mean near-surface air temperatures rise (Arismendi et al. 2013; Safeeq et al. 2016). In regions where the mean cool-season air temperature is anticipated to rise above the freezing point, both increasing air temperatures and decreasing snowpack may affect water temperature (Mantua et al. 2010; Null et al. 2013).

One such region is coastal Alaska, habitat for some of the world's most robust Pacific salmon populations, where mean annual air temperature is projected to rise 3–5 °C by 2080, based on midrange emissions scenarios (University of Alaska 2015). Hydrologically important changes in water sources and associated thermal regimes are anticipated, because mean winter air temperature is projected to surpass the freezing point along the coastline, greatly reducing low-elevation snowpack and seasonal ice cover on freshwater bodies (McAfee et al. 2014). Water temperature in rivers in coastal Alaska is generally anticipated to increase in response to the projected increase in air temperature (Kyle and Brabets 2001; Mauger et al. 2017), the reduction in glacier cover (Hood and Berner 2009; Fellman et al. 2014), and the loss of seasonal snowpack (Lisi et al. 2015). However, considerable variability in the magnitude and timing of these effects is likely because of the region's complex geomorphology and physiography, which creates sharp gradients in atmospheric conditions, water sources, and water-residence times. For example, the size, steepness, and elevation of the watershed and the presence of glaciers, lakes, and upwelling groundwater have all been correlated with water temperature in salmon-bearing streams in Alaska (Lisi et al. 2013; Adelfio 2016; Winfree et al. 2018).

In this study, we used surface and shallow streambed water-temperature monitoring data collected at coho salmon (*Oncorhynchus kisutch*) spawning sites on the Copper River Delta (hereinafter CRD) in southcentral Alaska to examine how winter climate conditions affect water temperature. The southern coast of Alaska experienced pervasive and record-setting warm weather from June 2013 to September 2016 (Thoman and Brettschneider 2016; Walsh et al. 2017), providing an opportunity to observe changes in incubation conditions during anomalously warm winters with precipitation dominated by rainfall and transient seasonal snow and ice cover (warm–rain-transitional), conditions that are anticipated to become increasingly common (Littell et al. 2017). We compared how differences in water temperatures during cool–snow-dominant and warm–rain-transitional winters influenced the duration of incubation in streams with different water sources.

Materials and methods

Study area

The CRD (Fig. 1), a low-relief coastal foreland between the Gulf of Alaska and the Chugach Mountains, has complex geomorphology shaped by glacial activity (Barclay et al. 2013), marine and tectonic forces (Reimnitz 1966; Plafker 1990), and high rates of fluvial sedimentation (Jaeger et al. 1998). Deposits of glaciomarine and fluvial sediment are up to 180 m thick (Reimnitz 1966). Layers of outwash deposits, sediment transported by distributaries of nearby glaciers, cover most of the subaerial deltaic surface below glaciated valleys that bisect the Chugach Mountains.

The relatively coarse glacial alluvium provides an appropriate structure for alluvial aquifers, which are recharged by abundant annual precipitation and meltwater from snowpack and glaciers (Dorava and Sokup 1994). The layers of glacial alluvium thin toward their seaward extent, likely driving the groundwater upwelling that feeds small spring creeks and augments baseflow into certain reaches of larger precipitation-fed rivers. Similar hydrologic connectivity has been observed on glacial outwashes around the world (Ward et al. 1999; Robinson et al. 2008; Crossman et al. 2011).

Piedmont areas, where shallow till or peat is underlain by sedimentary or extrusive igneous bedrock, are located between glacial outwashes and adjoin the Chugach Mountains (Wilson et al. 2008). The structure and morphology of the piedmont is not believed to be conducive for storing large quantities of groundwater, and we have not observed upwelling groundwater in these catchments. Despite the range of geomorphic conditions exhibited across the CRD, cold-water fishes, particularly coho salmon, are widely distributed and use streams in both the outwash and piedmont areas for spawning.

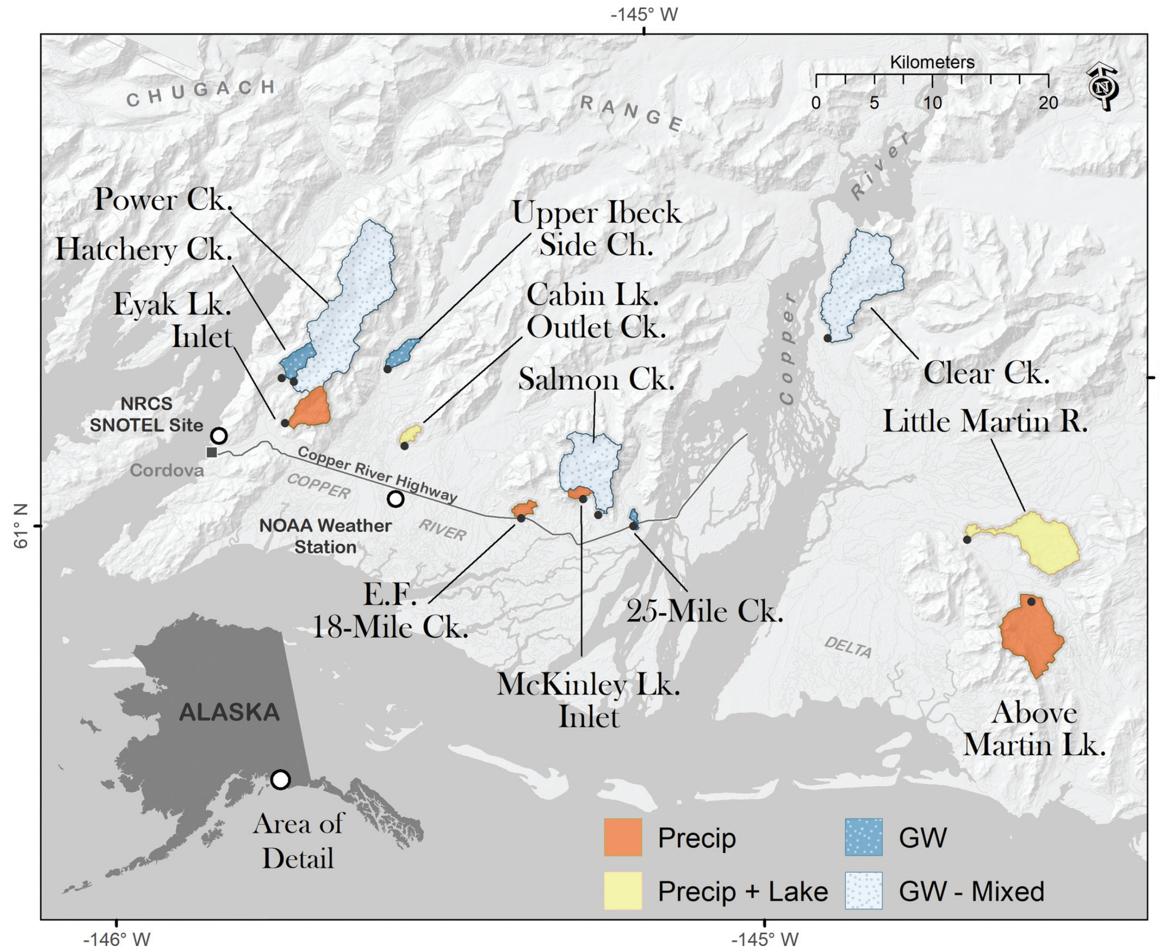
The CRD is characterized by a subarctic maritime climate. The 1981–2010 climatic normal was cool (4 °C mean annual air temperature) and wet (235 cm precipitation·year^{-1}), with mean monthly air temperatures below freezing (–0.4 to –3.0 °C) from November through March (National Oceanic and Atmospheric Administration (NOAA), Global Historic Climatology Network, weather station #26410 located within the study area). Winter air temperatures exhibited substantial interannual variability and were strongly influenced by the Pacific Decadal Oscillation (PDO). We calculated the shift from the cool to warm phase of the PDO in 1977 resulted in a 1.6 °C increase in mean winter temperature.

Climate models project an average surface air temperature increase of 5 °C for the CRD by the year 2100 under the Representative Concentration Pathway 6.0 greenhouse gas emissions scenario, with the greatest warming in the winter months (University of Alaska 2015). Mean monthly near-surface air temperatures are anticipated to exceed freezing throughout the entire year by 2050, contributing to a 20%–40% reduction in mean snowpack snow-water equivalent (SWE) below 500 m elevation on the CRD (Littell et al. 2017), a change that is anticipated to reduce the mean ratio of peak (1 April) SWE to cool season (October–March) precipitation from 0.30 to 0.15. At the highest elevations of the study area (500–1500 m), a seasonal reduction in SWE is projected for late autumn (October–November), but annual SWE is anticipated to remain within ±10% of historic condition (Littell et al. 2017), suggesting climate change effects on water sources may vary with catchment hypsometry.

Study catchment characteristics

We collected surface (stream) and shallow streambed (intergravel) water temperature data at 12 coho salmon spawning and rearing sites, each in a unique catchment on the CRD. The study sites were located between 5 and 48 m above sea level. Using

Fig. 1. Study site and weather station locations on the Copper River Delta, Alaska, USA. Study catchments were interpolated from surficial topography using a 5 m resolution digital elevation model produced and distributed by the US Geological Survey. The hillshade layer was generated from a 20 m resolution digital elevation model produced by SPOT Image Corporation and obtained from the US Forest Service.



spatial analyst tools in ArcGIS 10.3 (Environmental Systems Research Institute, Redlands, California, USA), we interpolated catchment boundaries based on surficial topography from the US Geological Survey (USGS) interferometric synthetic aperture radar (IFSAR) 5 m digital elevation model. The study catchments varied in total area (61 to 5426 ha), mean elevation (25 to 622 m), and mean slope (3 to 28 degrees). Surficial geology was variable, with glacial outwash deposits present in nine catchments (Wilson et al. 2008).

We calculated lake and ice cover with data from USGS National Hydrography Dataset. Five catchments contained shallow lakes and ponds, but in only two catchments (Little Martin River and Cabin Lake Outlet) did lake area exceed 5% of total area (15.4% and 6.4%, respectively; Table 1). The three highest-elevation catchments (Power Creek, Salmon Creek, and Clear Creek) had perennial ice cover (12.7%, 7.2%, and 1.8% of catchment area, respectively). Two sites (McKinley Lake Inlet and Eyak Lake Inlet) were located at the mouths of inlet streams, within the range of influence of lakes.

Six sites were anticipated to have upwelling groundwater (Table 1) because of unusually cold summertime water temperatures. The groundwater influence was confirmed during piezometer installation, when we observed strongly positive vertical head gradients through the streambed. Subsequent water-temperature measurement showed these streams had low diel and annual variance in temperature, supporting evidence of groundwater dominance (Middleton et al. 2016).

Water-source categories

We divided the study sites into four categories that describe the dominant water source: groundwater (GW), groundwater-mixed (GW-Mixed), precipitation (Precip), and precipitation with a lake upstream (Precip+Lake). The GW sites were upwelling spring creeks in small (<454 ha) catchments with a low mean elevation. GW sites had stable hydrographs with relatively small contributions from rain and seasonal snowmelt. The GW-Mixed sites were located in large (2267–5426 ha) "U-shaped" mountain valleys with high mean catchment elevations and perennial ice in the headwaters. Upwelling groundwater contributed to baseflow, particularly in the winter months; however, precipitation and meltwater from glaciers and seasonal snowpack provided most of the annual water flow at GW-Mixed sites. In contrast, sites in the Precip and Precip+Lake categories drained piedmont catchments that lacked

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Table 1. Location and description of catchment characteristics for the 12 study sites.

Thermal sensitivity category	Site information			Catchment physiography			
	Site name	Latitude (°N)	Longitude (°W)	Area (ha)	Lake area (%)	Glacier area (%)	Mean elevation (m)
Precip+Lake	Cabin Lk. Outlet Ck.	60.53	145.46	166	6.7	0.0	83
	Little Martin R.	60.40	144.61	2156	15.4	0.0	158
Precip	E. Fk. 18-Mile Ck.	60.46	145.29	188	0.0	0.0	33
	Above Martin Ck.	60.34	144.52	2274	1.3	0.0	271
	McKinley Lk. Inlet	60.47	145.19	155	0.0	0.0	224
	Eyak Lk. Inlet	60.56	145.64	792	0.0	0.0	433
GW-Mixed	Clear Ck.	60.57	144.78	3504	0.3	1.8	337
	Power Ck.	60.59	145.62	5426	0.0	12.7	622
	Salmon Ck.	60.45	145.17	2267	0.1	7.2	388
GW	Hatchery Ck.	60.59	145.64	454	0.0	0.0	308
	Upper Ibeck Side Ch.	60.59	145.47	336	0.0	0.0	74
	25-Mile Ck.	60.44	145.12	61	0.0	0.0	25

perennial ice cover. Rainfall and seasonal snowmelt moved through the catchment quickly, creating a "flashy" hydrograph with low baseflows and high storm peaks. In contrast with the Precip sites, more than 5% of the upstream catchment area at the Precip+Lake sites was occupied by broad, shallow lakes, which have been demonstrated to influence water temperature elsewhere in coastal Alaska (Lisi et al. 2013; Fellman et al. 2014).

Temperature data collection

We monitored surface (stream) and streambed (intergravel) water temperatures hourly from 1 October 2011 (start of water year 2012) through 30 September 2016 (end of water year 2016) using data loggers with ±0.2 °C sensor accuracy (Onset Computer Corporation, Bourne, Massachusetts). We recorded surface-water temperature at each site with 1 HOBO Pro v2 data logger housed in a 15 cm long section of 4.1 cm internal diameter galvanized steel pipe to shade the sensor and protect it from physical damage. Surface-water temperature loggers were placed at the bottom of the water column. Deployment depths were at least 20 cm, typically 50 to 60 cm, at average summer water flows, and the surface water at each study site was assumed to be well mixed by turbulent flow.

We measured streambed water temperature 50 to 70 cm into the streambed, using two interchangeable techniques: (*i*) a Pro v2 data logger installed behind a 10 cm long screen near the bottom of a 101 cm long piezometer with a foam baffle located above the screened section to limit vertical water flow or (*ii*) a TidbiT v2 data logger installed directly into the substrate after boring a hole with a custom-made driver (Zimmerman and Finn 2012). We deployed two streambed loggers at each site using one or both methods.

Burial depth for coho salmon eggs ranges between 8 and 55 cm and is correlated with size of the maternal female (van den Berghe and Gross 1984; DeVries 1997). By measuring water temperature at the stream bottom and 50 to 70 cm into the streambed, we bracketed the potential range of incubation temperature experienced by eggs at each location.

We downloaded data loggers every 6 to 12 months throughout the study period. We removed erroneous values, including unreasonable outliers (which suggest sensor error) and abnormally high hourly variance (>3 °C), suggesting the sensor was exposed to air. Occasional data gaps occurred when streambed data loggers were exposed to surface water, when surface-water loggers were exposed to air, and when data loggers were lost or malfunctioned. We filled gaps in the surface-water time series at four sites by fitting a linear regression between streambed and surface-water temperature and calculating daily average surface-water temperatures from the daily average streambed temperatures. In all cases, adjusted R^2 was 0.7 or greater, and the modeled data composed 12% to 45% of the total time series. Gaps in the streambed data-logger time series, which were particularly common at Power Creek owing to a channel shift in the study reach, were left unfilled.

Using hourly temperature data, excluding days with fewer than 20 measurements, we calculated daily mean temperature for each data-logger location at each site. We calculated weekly (7-day, "non-rolling") and monthly mean temperatures for surface-water temperatures at each site from the daily mean temperature, excluding weeks with fewer than 7 days of data and months with fewer than 21 days of data.

Thermal sensitivity analysis

We regressed weekly mean surface-water temperatures against weekly mean air temperatures, which we calculated from daily temperature averages observed at NOAA GHCN weather station #26410, located near sea level within the study area (Fig. 1). Although localized air temperature departures were likely, previous work has shown that regional temperatures are acceptable for this type of analysis (Mohseni et al. 1998; Caldwell et al. 2015). To assess correlation between water temperature (dependent variable) and air temperature (independent variable) for all weeks with a mean air temperature exceeding 0 °C, we fitted a simple linear regression model with coefficients for intercept and slope.

Linear models have frequently been applied to correlate water and air temperatures (see Benyahya et al. 2007 for a review). The slope has been used as a metric to describe "thermal sensitivity" (Kelleher et al. 2012), the expected change in water temperature per unit change in air temperature, and is useful for making comparisons across catchments and landscapes (Mantua et al. 2010; Mayer 2012; Snyder et al. 2015). Note, however, that thermal sensitivity does not imply that the change in air temperature is causing the change in water temperature (see Caissie 2006 for a review).

Winter types

We divided the 5 study years into two winter types, "cool–snow-dominant" and "warm–rain-transitional", based on October through May surface air temperature at the NOAA weather station near sea level, April mean snowpack SWE depth at Mt. Eyak Snow Telemetry (SNOTEL) site #1073 (USDA National Resources Conservation Service) located at 425 m elevation in the study area, and the fraction of total October to March precipitation contained in snowpack as SWE on 1 April at the Mt. Eyak SNOTEL site. Water years 2012 (WY2012) and WY2013 were anomalously cool from October through May (Fig. 2*a*) and accumulated above average SWE relative to the 2006–2016 period of record (Fig. 2*b*). These two winters were classified as cool–snow-dominant and the October to April SWE-to-precipitation ratio exceeded 60% at the Mt. Eyak SNOTEL site (Fig. 2*c*). Further, sea-level snowpack and persistent

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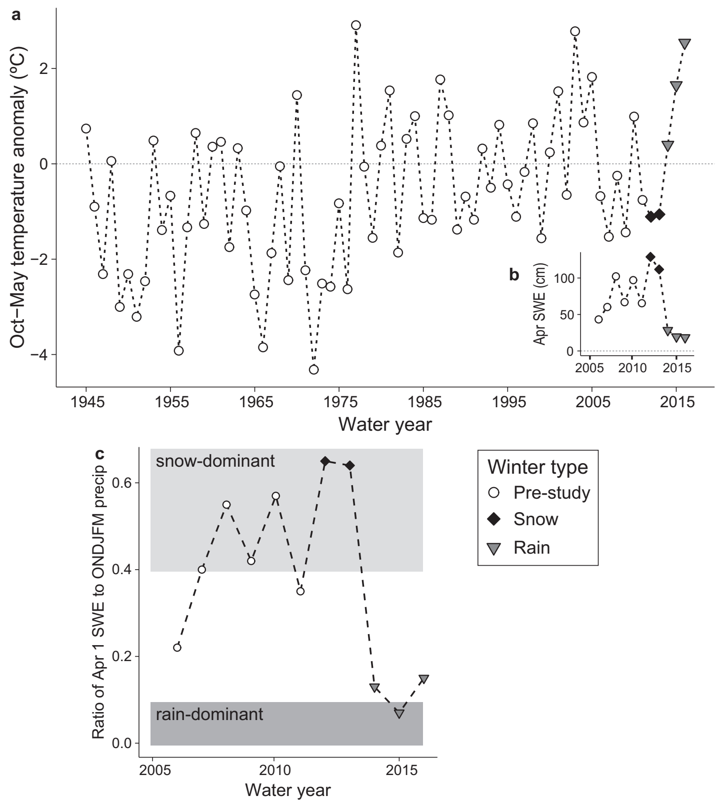
Fig. 2. (*a*) Anomalies (°C) from the 1981–2010 mean temperature between 1 October and 31 May for the 72-year period of continuous record at an NOAA weather station located at 13 m elevation within the study area; (*b*) mean April snow water equivalent (SWE); and (*c*) ratio of snow water equivalent on 1 April to total precipitation between 1 October and 31 May for the 11-year period of record at an NRCS SNOTEL station located at 425 m elevation within the study area.



waterbody ice were also observed in the study catchments. During the preceding cool-phase PDO (1947–1976), October through May air temperatures on the CRD measured 1.5 °C cooler than they did during the climatic "normal" period of 1981–2010, and very cold winters were common. The conditions occurring during the two snow-dominated winters in this study (WY2012 and WY2013) would have been slightly warmer than the average conditions for 1947–1976.

Conditions were noticeably mild during the three warm–rain-transitional winters (WY2014 through WY2016). Sea-level snow cover was nearly absent, and April snowpack SWE at 425 m was as much as 70 cm less than the period-of-record average. Air temperatures were anomalously warm, particularly during WY2015 and WY2016, when October through May mean air temperatures were the second and sixth warmest observed in the 71-year record. Less than 20% of the October to April precipitation accumulated as snowpack at the Mt. Eyak SNOTEL site. The warm–rain-transitional winters examined here, especially WY2015 and WY2016, were warmer than any single winter season during the previous cool phase of the PDO; however, the conditions resulting in warm–rain-transitional winters occurred more frequently during the most recent warm phase of the PDO (1977–1998).

Accumulated thermal units (ATU) analysis

ATU were calculated from the cumulative sum of the daily mean temperature (°C) during the assumed coho salmon incubation period, which we defined as the 243 days between 1 October and 31 May (29 February was excluded), based on presumed mean spawning and emergence dates. We recognize that actual spawning and emergence dates were likely to vary at each site as well as interannually. Our intent here was not to examine the actual incubation period in each stream in each year, but rather to use a standardized time period to examine relative differences in the effects of interannual climatic variability on incubation conditions across sites with different water sources.

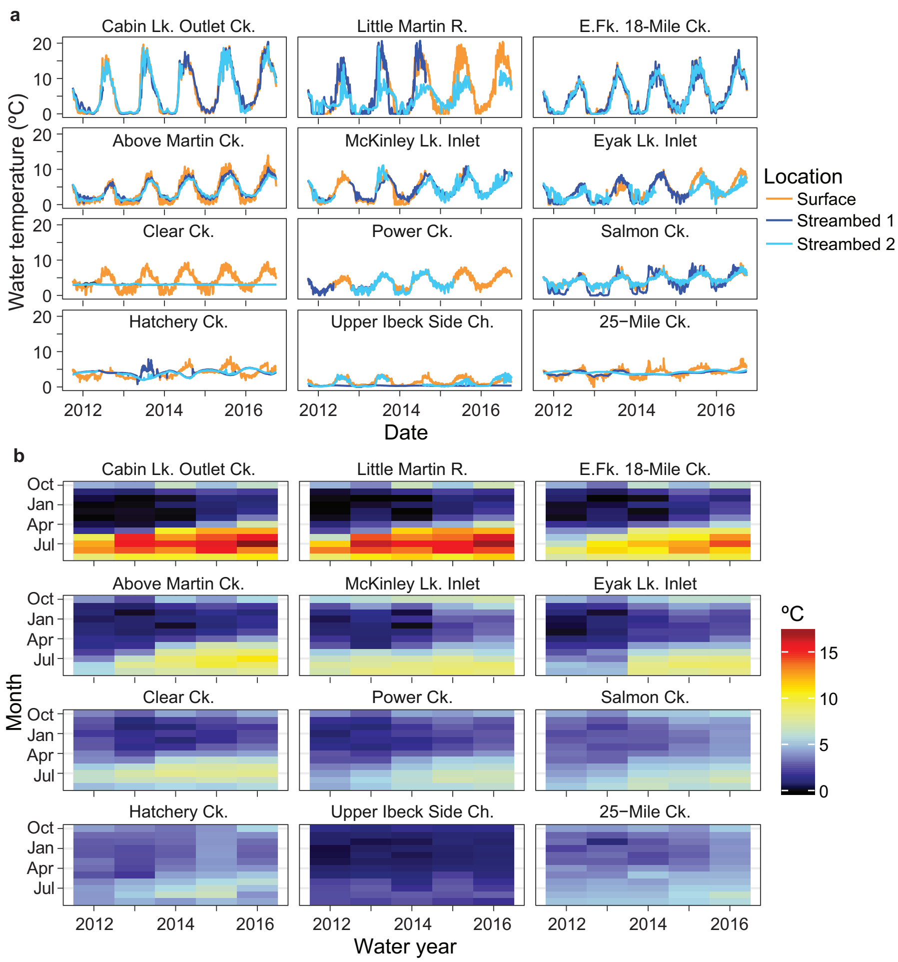
For each site, we calculated cumulative ATU for each of the three data-logger locations (one surface and two streambed loggers) when more than 240 days of data were available. We calculated mean total ATU for each 243-day incubation period at each site by averaging the surface-water ATU with the mean of the two streambed ATU measurements. We applied two-factor analysis of variance (ANOVA) using sequential sum of squares (a "type I" analysis) to test for significant differences in mean total ATU. We used Tukey's honest significant differences test to assess the significance of pairwise comparisons across winter types and water-source categories.

To assess landscape-scale variability in total ATU, we calculated the coefficient of variation (CV) among sites. A Welch two-sample *t* test was applied to test the hypothesis that CV was equal during the cool–snow-dominant and warm–rain-transitional winters.

Incubation duration analysis

We calculated incubation duration by applying an empirically derived Bělehrádek model (Alderdice and Velsen 1978) that was

Fig. 3. (*a*) Daily mean water temperature recorded in the surface (orange line) and streambed (blue lines) water and (*b*) monthly mean water temperature recorded in the surface water at 12 study sites during the 5-year study period.



developed by Beacham and Murray (1990) and modified by Sparks et al. (2019). Beacham and Murray fitted 10 models to development data collected for coho salmon embryos and determined the log-inverse Bělehrádek model was among the best-fitting models (r^2 = 0.98) across a range of incubation temperatures (1.5 to 12 °C) and, importantly for our study, performed particularly well at low (1.5 to 3 °C) water temperatures. Sparks et al. modified the Beacham and Murray approach by solving for the inverse of the original function, which they described as the daily "effective value." The effective value model equation is

$$E_i = \frac{1}{\exp[7.018 - 1.069 \times \log_e(T_i + 2.062)]} \quad (1)$$

where E_i is the relative daily effective value, which has a range of 0–1, and T_i is the daily mean water temperature (°C), which we calculated by averaging the daily mean surface-water temperature with the daily mean streambed water temperature. We calculated the duration of incubation from 1 October, the assumed average spawning date, until the date fry emerge from the gravel (when E = 1), as predicted by the effective value model. A Welch two-sample *t* test was applied to test the hypothesis that the duration of incubation was equal during the cool–snow-dominant and warm–rain-transitional winters.

Results

Spatial and temporal water-temperature heterogeneity

Surface and streambed water temperatures exhibited spatial and temporal heterogeneity on daily and monthly time scales (Figs. 3*a*, 3*b*). Linear regression demonstrated that weekly surface-water temperature was strongly correlated with air temperature (Fig. 4*a*; Table 2) at all study sites. The regression slope ranged from 0.16 to 1.29, indicating that the most thermally sensitive site was eight times more sensitive than the least sensitive site.

Geomorphic differences between the sites, captured by the water-source categories, correlated with these differences in thermal sensitivity across the landscape (Fig. 4*b*), suggesting that differences in water sources and geomorphology are responsible for the observed landscape-scale temperature heterogeneity. Sites with shallow lakes upstream (Precip+Lake) were most sensitive to air temperature, whereas sites in small, low-elevation catchments with upwelling groundwater (GW) were the least sensitive. Sites

Fig. 4. (*a*) Linear regressions (black lines) relating observations of weekly average air temperature to weekly average surface-water temperature (gray points) and (*b*) thermal sensitivity related to dominant water source for all 12 study sites.

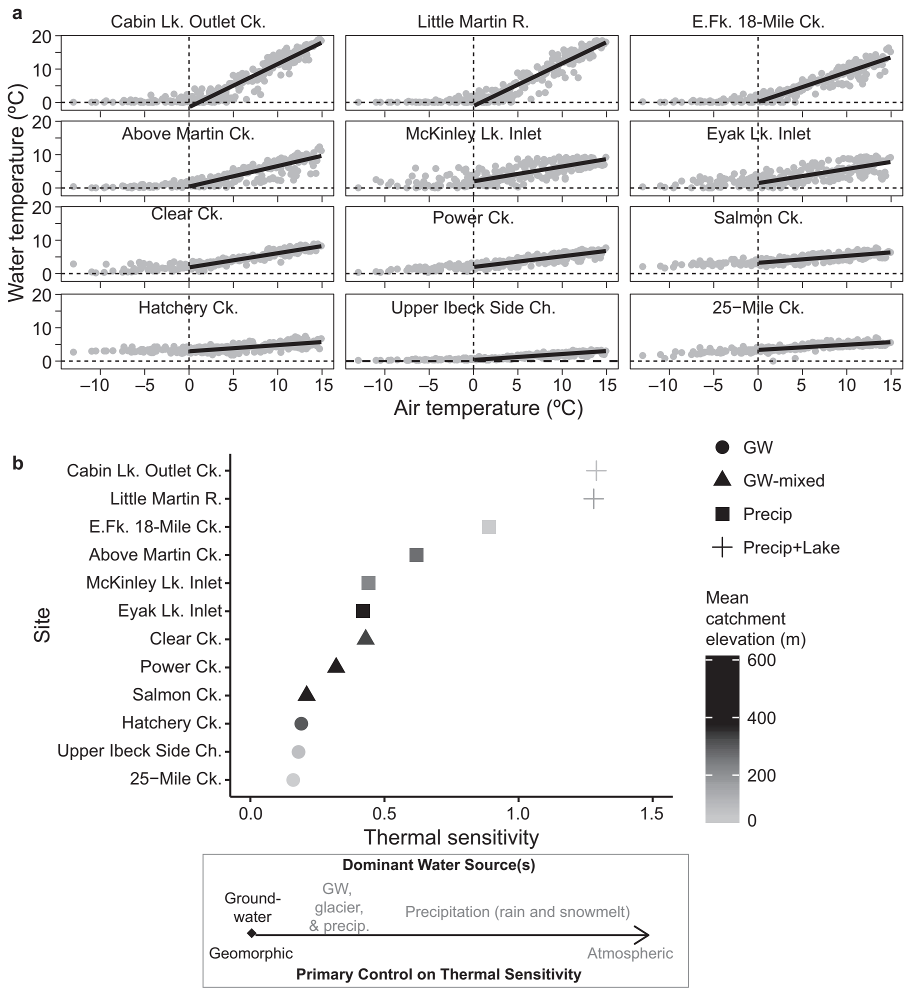
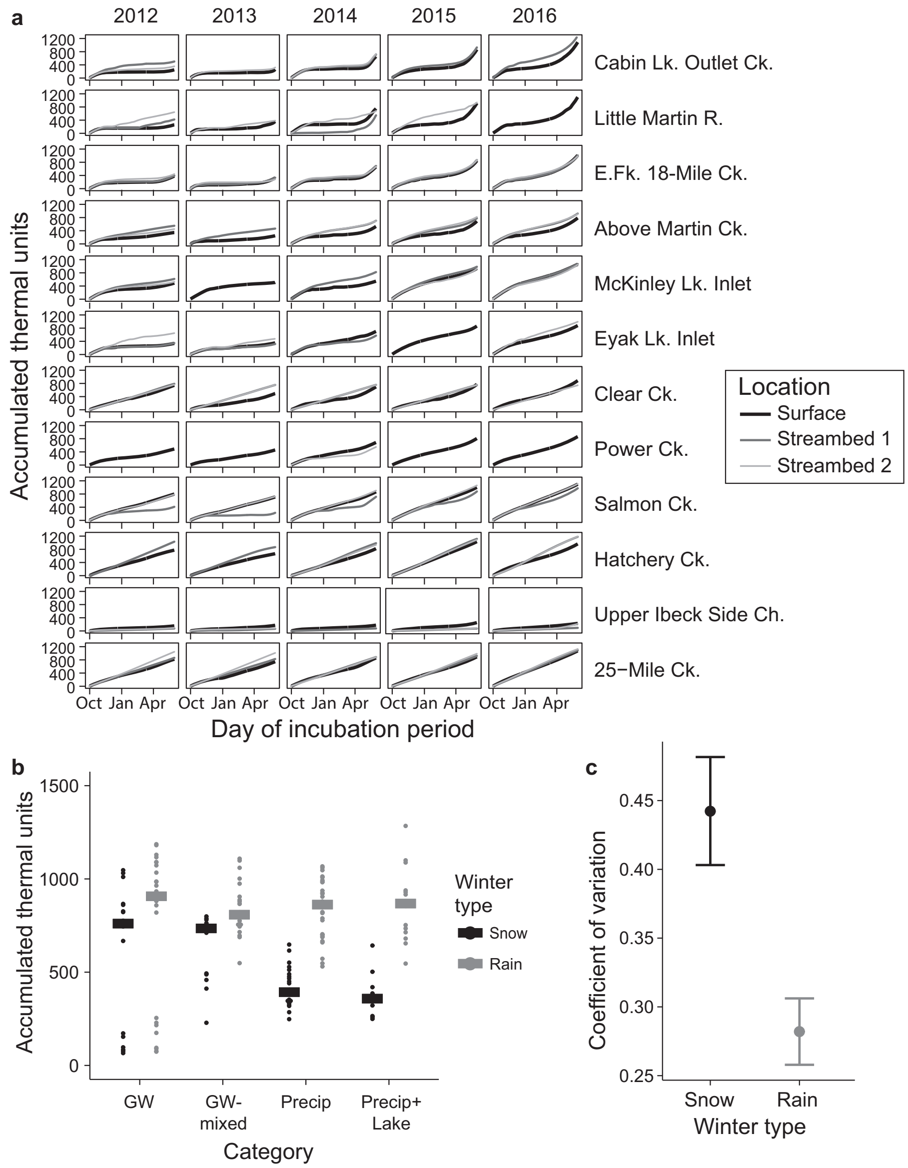


Table 2. Coefficients and fit, as indicated by adjusted r^2 and root mean square error (RMSE), for linear regressions correlating weekly mean air and surface-water temperature at the study sites.

		Linear regression fit			
Thermal sensitivity category	Site name	Slope	*y* intercept	Adjusted r^2	RMSE
Precip+Lake	Cabin Lk. Outlet Ck.	1.29	–1.43	0.90	1.89
	Little Martin R.	1.28	–1.06	0.89	1.93
Precip	E. Fk. 18-Mile Ck.	0.89	0.14	0.86	1.53
	Above Martin Ck.	0.62	0.43	0.73	1.60
	McKinley Lk. Inlet	0.44	2.00	0.56	1.70
	Eyak Lk. Inlet	0.42	1.46	0.52	1.77
GW-Mixed	Clear Ck.	0.42	1.85	0.86	0.72
	Power Ck.	0.32	1.98	0.75	0.80
	Salmon Ck.	0.21	3.22	0.56	0.79
GW	Hatchery Ck.	0.19	2.94	0.45	0.88
	Upper Ibeck Side Ch.	0.18	0.35	0.77	0.42
	25-Mile Ck.	0.16	3.35	0.52	0.64

Fig. 5. (*a*) Accumulated thermal units (ATU) between 1 October and 31 May; (*b*) total (October through May) ATU recorded at each of 12 study sites in each incubation period over 5 years; and (*c*) coefficient of variation for total ATU for all sites by winter type.



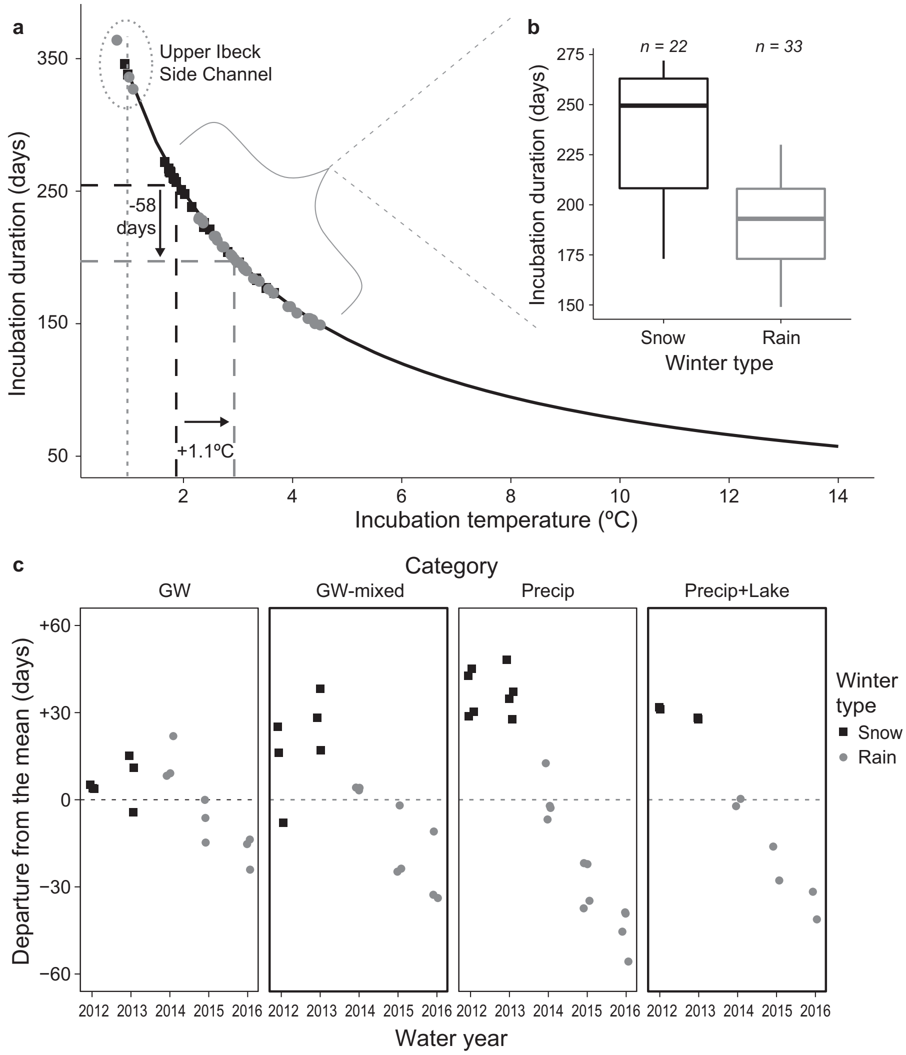
with mixed groundwater, glacial, and precipitation water sources (GW-Mixed) were less sensitive than sites with precipitation water sources (Precip).

Accumulated thermal units

The rate and the magnitude of October–May thermal unit accumulation exhibited spatial and temporal heterogeneity (Fig. 5*a*). Significantly more ATU were acquired during warm–rain-transitional winters, when snowpack was greatly reduced ($p < 0.0001$); however, the magnitude of the changes varied by water source (Fig. 5*b*). The sites with the highest thermal sensitivity had the lowest ATU during the cool–snow-dominant winters, but these sites also warmed the most during the warm–rain-transitional winters.

The greatest differences occurred at the Precip and Precip+Lake sites, where mean ATU was significantly increased ($p < 0.01$) by 98% and 161%, respectively, during warm–rain-transitional winters as compared with cool–snow-dominant winters. In contrast, at GW and GW-Mixed sites, we observed more modest increases in mean ATU (17% and 38%) during the warm–rain transitional winters, and these increases were not statistically significant ($p > 0.59$). As a consequence of these differences, the among-site CV in ATU was significantly higher ($t = 25.04$, df = 2.87, $p < 0.0002$) during the

Fig. 6. Incubation duration in days calculated with the effective value model during two snow-dominant winters (dark squares) and three rain-transitional winters (light circles) (*a*) superimposed on the Beacham and Murray log-inverse model, with a vertical short-dashed line indicating the 1 °C threshold for coho salmon development and long-dashed lines indicating the location of the median for each winter type calculated using all study sites; (*b*) boxplots showing 25% and 75% quantiles, medians (horizontal bars), and range (vertical bars) excluding data from the Upper Ibeck Side Channel; and (*c*) the departure from the 5-year mean duration of incubation in days calculated for each year and site combination, grouped by water-source category.



cool–snow-dominant winters, evidence that landscape-scale variability in mean October through May water temperatures was reduced during warm–rain-transitional winters (Fig. 5*c*). Although we performed significance testing and reported *p* values, we also recognize that this study was observational in nature and there were no experimental manipulations. We presented all of our data in Figs. 5*a* and 5*b*, so readers can assess the magnitude of the variability we observed without depending solely on *p* values (Nuzzo 2014).

Incubation duration modeling

The relationship between water temperature and incubation duration is nonlinear, so fewer ATU are required for coho salmon to reach emergence at cooler water temperatures, especially below 5 °C. Owing to this nonlinear relationship and the variability in water temperature across the study area, we observed a 215-day range in the duration of incubation, demonstrating considerable spatial and temporal variability in the incubation environment used by coho salmon (Fig. 6*a*). The duration of incubation was significantly reduced ($t = 3.29$, df = 52.72, $p = 0.002$) during warm–rain-transitional winters, when we observed a 1.1 °C increase in median water temperature that shortened the median duration of incubation by 58 days as compared with the cool–snow-dominant winters.

The coldest site, regardless of winter type, was Upper Ibeck Side Channel, where the mean temperature during incubation was less than 1 °C and incubation was predicted to take up to 1 year,

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likely exceeding the lower lethal threshold for coho salmon embryo viability (Dong 1981; Beacham and Murray 1990). Upper Ibeck Side Channel was an outlier, and the duration of incubation was predicted to be 3–7 months shorter at the other 11 sites. The range in the duration of incubation across these 11 sites decreased by 18 days during warm–rain-transitional winters, showing less variability across the landscape as compared with cool–snow-dominant winters (Fig. 6*b*).

The mean duration of incubation was shorter for all water-source categories during warm–rain-transitional winters as compared with cool–snow-dominant winters, but the magnitude of the reduction varied by year and by site (Fig. 6*c*). The smallest differences were observed at the GW sites, where water temperature appeared to lag air temperature by 1–2 years and the mean duration of incubation was only 10 days shorter during the warm–rain transitional winters. In contrast, the greatest differences were observed at the Precip sites, where the mean duration of incubation was 61 days shorter during the warm–rain-transitional winters. Intermediate reductions in mean duration of incubation were predicted for the GW-Mixed (32 days) and, interestingly, the Precip+Lake sites (50 days), which had the greatest increases in October through May ATU.

Discussion

Our results show that geomorphology and water-source types mediated interannual water-temperature variability between winters having cool–snow-dominant conditions in WY2012 and WY2013 and warm–rain-transitional winter conditions in WY2014–WY2016. The sensitivity of water temperature to near-surface atmospheric conditions varied by eightfold among our study sites and was correlated with water sources and catchment geomorphology, as captured by four categories: GW, GW-Mixed, Precip, and Precip+Lake. Sites located in small spring creeks, where groundwater contributed most of the streamflow (GW), and sites with precipitation water sources and broad, shallow lakes upstream (Precip+Lake) were at opposite ends of the water-temperature sensitivity spectrum. At GW sites, groundwater not only reduced summer maximum temperatures, but also provided a thermally stable incubation environment that did not freeze. In contrast, thermal sensitivity and interannual variability in ATU over the incubation period were highest at our two Precip+Lake sites.

We observed an 8 °C difference in mean May water temperature at Precip+Lake sites between cool–snow-dominant and warm–rain-transitional winters, coinciding with a 3 °C difference in mean May air temperature and a 2.6 °C difference in mean October through May air temperature. We hypothesize that broad, shallow lakes amplify water-temperature responses to changing weather and snow and ice cover, particularly during the spring (March to May). At these sites, waterbody ice cover at the end of cool–snow-dominant winters substantially reduced solar heating in spring, and springtime snowmelt and ice melt provided a cold input, maintaining low late-spring and early-summer water temperature at our measurement sites that were downstream from lakes. In contrast, meteorological conditions during warm–rain-transitional winters limited the accumulation of snow and prevent ice formation on the CRD, reducing or eliminating springtime meltwater input and exposing the shallow lakes to short-wave radiation with the onset of long, subarctic spring days. The net effect of the observed springtime warming after warm–rain-transitional winters at Precip+Lake sites was captured by the two- to threefold increases in October through May ATU. However, because most of this warming occurred toward the end of the incubation period, the effects on the duration of incubation were not as pronounced, and Precip+Lake sites had smaller reductions in incubation duration than the Precip sites, despite greater thermal sensitivity.

Our observations align with the findings of other studies that have correlated thermal sensitivity with the same catchment characteristics we used to define our water-source categories, notably, area (Hrachowitz et al. 2010), mean elevation (Lisi et al. 2015), groundwater upwelling (Kelleher et al. 2012; Johnson et al. 2014), upstream lake area (Lisi et al. 2013), and perennial ice cover (Fellman et al. 2014). Heterogeneity in thermal sensitivity is important because it suggests that climate change effects on water temperature in cold-water fish habitats will be spatially variable (Lisi et al. 2015), particularly across landscapes with complex geomorphology.

We found that heterogeneity in thermal sensitivity extended into the incubation environment of a fall-spawning cold-water fish. Here, we discuss three of our observations that have important implications for anticipating effects of climate change on Pacific salmon: (*i*) Upwelling groundwater attenuated changes in water temperature during the coldest months of the year. (*ii*) Model-predicted incubation duration varied with the intensity of winter conditions, but the magnitude of variability was controlled by water sources and catchment geomorphology. (*iii*) Landscape-scale variability in the accumulation of thermal units and the duration of incubation were greater during cool–snow-dominant winters than during warm–rain-transitional winters at our CRD study sites.

Upwelling groundwater

At GW sites, upwelling groundwater attenuated thermal sensitivity and variability in ATU during the cool season (October through May), when salmon eggs were incubating. In addition to reducing summer maximum water temperatures, upwelling groundwater provided a thermally stable incubation environment that remained above freezing, even during prolonged cold spells. Further, cool-season water temperature at GW sites did not vary between cool–snow-dominant and warm–rain-transitional winters, suggesting that incubation conditions may remain relatively consistent despite climate variability. Fall-spawning Pacific salmon have been found to concentrate reproductive efforts at upwelling groundwater sites (Lorenz and Filer 1989; Curran et al. 2011), perhaps, in part, because of this cool-season thermal stability.

The effect of upwelling groundwater on stream temperature is influenced by residence time within the ground (Tague et al. 2008), the magnitude of groundwater flux (Middleton et al. 2016), and distance downstream from the zone of upwelling groundwater (Nichols et al. 2014). For example, we observed significantly different incubation-period water temperatures during cool–snow-dominant and warm–rain-transitional winters at GW-Mixed sites, glacially influenced streams in which groundwater augments baseflow. This observation suggests that either changes in the relative amount of water from each source or changes in the temperature of the non-GW source may influence the thermal environment in these streams. We also observed that GW-Mixed sites had the greatest reach-scale spatial variability in water temperature within the shallow streambed, because thermally heterogeneous upwelling groundwater, downwelling surface water, and lateral subsurface stormflows can all influence water temperature patterns in the incubation zone.

The temperature and the volume of groundwater discharge may be influenced by climate change. Persistent surface warming can increase groundwater temperature in small and shallow unconfined aquifers (Kurylyk et al. 2014, 2015). We have not examined groundwater ages at our study sites, but the aquifers that discharge into our study reaches are shallow and unconfined, and we anticipate that groundwater temperatures, which hovered near the mean annual air temperature at most GW and GW-Mixed sites, will rise as the climate warms.

Glacier melt can be disproportionately important for groundwater recharge (Liljedahl et al. 2017). Our Upper Ibeck Side Channel site, located 3 km from the present-day terminus of Scott

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Glacier, was situated in a complex braided stream with precipitation, meltwater, and groundwater sources. However, the hourly shallow streambed water temperature was nearly constant at 0.5 °C throughout the duration of our 5-year study, evidence of a strong glacier melt signature in the upwelling groundwater.

The extremely low year-round water temperatures at the Upper Ibeck Side Channel were likely below the threshold for embryo viability of coho salmon (Dong 1981; Beacham and Murray 1990); nevertheless, adults continued to return to this site to spawn. One possible explanation is that coho salmon had a local adaptation that enabled incubation in extremely cold water. Another plausible explanation is that survival of the embryos near our temperature loggers was low, but spawning adults continued to return to the site because incubation was more successful in the adjacent channels, where subsurface-water temperatures were likely warmer than our monitoring site, allowing for successful incubation.

The high proportion of meltwater recharge suggests this site may be particularly vulnerable to changes associated with a warming climate. If glacial extent is reduced in the future, we anticipate that water temperatures may increase, improving conditions for salmon embryos at this site. However, glacier retreat associated with climate change may also reduce water-table elevation and the spatial extent of groundwater-fed channels on glacial outwashes, as has been observed in Iceland (Levy et al. 2015). If the water table falls at Upper Ibeck Side Channel, the loss of spawning habitat or the loss of eggs to desiccation or freezing may offset any gains in productivity associated with warmer water temperatures.

Incubation duration

Our models showed significant reductions in the duration of incubation at GW-Mixed, Precip, and Precip+Lake sites during warm–rain-transitional winters, predicting that juvenile emergence may have occurred up to 3 months earlier following warm–rain-dominant as compared with cool–snow-dominant winters. In a concurrent study, Campbell et al. (2019) examined timing of hatch and emergence of coho salmon on the CRD, contrasting GW and GW-Mixed streams with Precip streams during 2013, a cool–snow-dominant winter. Their results suggested that spawn timing was locally adapted to water source. Peak coho salmon spawning occurred earlier in Precip streams (~September and October) than in GW-Mixed and GW streams (~November and December). The differences in incubation-period water temperature among these streams during a cool–snow-dominant winter resulted in nearly synchronous peak juvenile emergence across all sites in the summer, which coincided with the greatest abundance of prey species.

Our results suggest that changes in the duration of incubation during warm–rain-transitional winters, which are anticipated to increase in frequency and intensity as the climate warms, may desynchronize juvenile emergence timing if there is not a compensating shift in spawn timing. Thus, rising water temperatures correlated with warming winter climate conditions may have biologically significant impacts on Pacific salmon, even during the coldest months of the year and even when maximum water temperatures remain well below critical thresholds recognized by regulatory agencies (McCullough 1999).

Our confidence in the magnitude of modeled reductions in incubation duration was limited by constraints inherent in our modeling approach. Although spawning almost certainly occurred over several weeks at each site, and the timing of peak spawning is known to vary across the study area, we used the date of 1 October as a standardized spawning date for all sites, enabling a direct comparison of relative changes across water-source categories. Further, the coefficients for our model eq. 1 were fitted for populations of coho salmon outside the study area. Regional variation in the relationship between temperature and the rate of embryo development has been observed in sockeye salmon (*Oncorhynchus nerka*) (Sparks et al. 2017). Our model also did not incorporate family lineage and egg characteristics (Beer and Steel 2018; Fuhrman et al. 2018) or diel variability in water temperature (Steel et al. 2012), variables that can affect the duration of incubation, adding additional uncertainty to our estimates. We suspect this uncertainty was greatest at Precip and Precip+Lake sites, owing to relatively high intra- and interannual thermal variability. Despite these shortcomings, our approach allowed us to assess the relative importance of water source and winter type on the incubation environment.

Integrated hydrologic models (Leppi et al. 2014; Wobus et al. 2015) predicted that the incubation conditions we observed during warm–rain-transitional winters are likely to become more prevalent in coastal Alaska watersheds by 2100. Leppi et al. (2014) used a suite of future climate scenarios to project 1 to 5 °C increases in mean water temperature during the incubation period of coho salmon. Wobus et al. (2015) projected similar increases in mean water temperature at sockeye salmon (*O. nerka*) spawning streams in a Bristol Bay watershed and modeled substantial reductions in the duration of incubation under anticipated future climate scenarios, even despite some groundwater influence at the study sites.

We anticipate that as climate conditions warm, juveniles will either emerge earlier or adults will spawn later in reaches that lack a strong groundwater signature. The net effect of earlier emergence on juvenile viability has been found to depend largely on the condition of the rearing environment. Earlier emergence is generally anticipated to increase the length of the first growing season and overall juvenile growth in streams fed by snowmelt and ice melt (Beer and Anderson 2011; Leppi et al. 2014). Individuals that emerged earlier in the season were more capable of assimilating seasonally abundant large prey items in late summer, increasing growth rates in snowmelt-fed streams in western Alaska (Armstrong et al. 2010). At Carnation Creek, British Columbia, a 6-week reduction in coho salmon incubation duration significantly increased juvenile growth rates (Scrivener and Andersen 1984) and contributed to earlier seaward migration timing; however, earlier outmigration was suspected to decrease overall survival rates for smolts (Holtby 1988).

When life-history traits, such as earlier emergence, are poorly suited for the local environment and viability is reduced, phenotypic responses, such as alteration of spawn timing to ensure a more favorable emergence timing, have been found to occur more rapidly than genetic adaptations that alter embryo development rates (Kinnison et al. 1998). Thus, if earlier emergence reduces viability for coho salmon in streams on the CRD, we anticipate peak spawning may occur later in the year as a short-term response. A longer-term response could involve changes to egg properties such as size and the composition of the yolk (Crozier et al. 2008).

Landscape-scale variability

We observed reduced variability of ATU across our 12 study sites during warm–rain-transitional winters, and as a consequence, our models predicted that the duration of incubation would be more uniform across the landscape. Even after excluding the Upper Ibeck Side Channel site, a cold outlier, the predicted duration of incubation varied by 99 days across the study sites during cool–snow-dominant winters because mean water temperatures during incubation at Precip and Precip+Lake sites were low (1.8 ± 0.2 °C) compared with GW and GW-Mixed sites (2.8 ± 0.6 °C). The Precip and Precip+Lake sites that were the coldest during the cool–snow-dominant winters also warmed the most. In effect, mean water temperature at sites with precipitation water sources "caught up" and, in some cases surpassed, mean water temperature at the groundwater upwelling sites where temperatures remained relatively stable.

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Interestingly, the nonlinear relationship between water temperature and incubation duration (see Fig. 6*a*) contributed to reduced variability in the duration of incubation observed during warm–rain-transitional winters. Owing to this nonlinearity, we anticipate that variability in incubation duration will continue to decline as water temperatures continue to rise under projected future climate scenarios, particularly if GW sites respond to long-term temperature trends with gradual warming. As water temperatures rise, Upper Ibeck Side Channel and similar reaches with historically cooler than optimal temperatures for salmon production may become increasingly important, as these sites will contribute to landscape-scale variability in the duration of incubation.

The loss of variability in the duration of incubation is potentially concerning because thermal heterogeneity in freshwater habitat has been linked to increased life-history diversity (Holtby et al. 1989; Armstrong et al. 2010) and abundance for Pacific salmon (Ebersole et al. 2003), thereby increasing the availability of salmon to predators (Lisi et al. 2013) as well as contributing to population stability (Schindler et al. 2010). Asynchrony in spawn timing is particularly important for terrestrial and avian consumers (Schindler et al. 2013), and based on our observations, we anticipate spawn timing may become more homogeneous within the study area in response to a warming winter climate.

We caution that assessing the potential implications of rising water temperatures during incubation for salmon life-history diversity will be complex (Angilletta et al. 2008; Crozier et al. 2008). Temperature during incubation cannot be considered independently from other factors. In the freshwater environment, temperature changes are inextricable from other important physical habitat alterations related to climate, including changes to streamflow (Shanley and Albert 2014), streambed scour (Goode et al. 2013; Sloat et al. 2017), and dissolved oxygen concentrations (Fellman et al. 2015; Sergeant et al. 2017). Further, climate warming may induce or exacerbate conflicting selective pressures on different life stages (Crozier et al. 2008). For example, pink salmon (*Oncorhynchus gorbuscha*) fry emigration (Taylor 2008) and adult escapement (Kovach et al. 2012, 2013) occurred earlier in response to a warming climate and increasing water temperatures at Auke Creek, southeastern Alaska. Early ocean entry may reduce viability, and early migration may increase prespawn mortality owing to warm water temperatures, suggesting these responses may be maladaptive (Crozier and Hutchings 2014).

Changes in the marine environment may mask or amplify changes in freshwater habitat (Schindler et al. 2008). Climate warming will be superimposed over existing patterns of climate variability, notably the PDO in the native range of Pacific salmon (Mantua et al. 1997). The PDO has been strongly correlated with both marine survival of salmon and winter climate in the study area, including near-surface air temperature and quantity of precipitation, two controls on the snowpack-to-precipitation ratio. Understanding how interactions between large-scale climate oscillations and winter temperature and precipitation have affected Pacific salmon life-history expression in the past, as well as how climate variability may influence long-term trends in climate change in the future, will be important. These patterns are unlikely to be simple. In the freshwater environment, they are modulated by water source and catchment geomorphology. For example, we anticipate Precip+Lake and Precip sites will be highly responsive to changes in the prevailing weather, responding to interannual fluctuations, climate oscillations such as the PDO, and trends driven by anthropogenic climate warming. "Thermal complexity" (Steel et al. 2017) in freshwater habitat likely increases Pacific salmon resilience to perturbations in climate and other disturbances. Our findings suggest that managing landscapes to protect and restore thermal heterogeneity in incubation habitats may enhance Pacific salmon resilience to climate warming in regions where the proportion of winter precipitation that accumulates as snowpack is projected to substantially decline as a result of rising near-surface air temperatures.

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Fall 2020 Regional Advisory Council Meeting Calendar

Last updated on 11/12/19

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* **NS — Point Hope**	*Aug. 19*	*Aug. 20*	*Aug. 21*	*Aug. 22*
Aug. 23	*Aug. 24* **K/A — Unalaska (in conjunction with "Life Forum Conference"**	*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* **K/A — Cold Bay/Sand Point**	*Sep. 11*	*Sep. 12*
Sep. 13	*Sep. 14*	*Sep. 15*	*Sep. 16*	*Sep. 17*	*Sep. 18*	*Sep. 19*
Sep. 20	*Sep. 21*	*Sep. 22* **YKD — St. Mary's**	*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* **SC — Anchorage**	*Oct. 8*	*Oct. 9*	*Oct. 10*
Oct. 11	*Oct. 12* **COLUMBUS DAY HOLIDAY**	*Oct. 13*	*Oct. 14* **WI — Aniak** **EI — Fairbanks**	*Oct. 15*	*Oct. 16*	*Oct. 17*
Oct. 18	*Oct. 19*	*Oct. 20* **SE — Sitka**	*Oct. 21*	*Oct. 22* **AFN — Anchorage**	*Oct. 23*	*Oct. 24*
Oct. 25	*Oct. 26*	*Oct. 27*	*Oct. 28* **SP — Nome** **BB — Dillingham**	*Oct. 29*	*Oct. 30*	*Oct. 31*
Nov. 1	*Nov. 2*	*Nov. 3* **NW — Kotzebue**	*Nov. 4*	*Nov. 5*	*Nov. 6 Window closes*	*Nov. 7*

Winter 2021 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
Jan. 31	*Feb. 1* *Window Opens*	*Feb. 2*	*Feb. 3*	*Feb. 4*	*Feb. 5*	*Feb. 6*
Feb. 7	*Feb. 8*	*Feb. 9*	*Feb. 10*	*Feb. 11*	*Feb. 12*	*Feb. 13*
Feb. 14	*Feb. 15* ***PRESIDENT'S DAY*** ***HOLIDAY***	*Feb. 16*	*Feb. 17*	*Feb. 18*	*Feb. 19*	*Feb. 20*
Feb. 21	*Feb. 22*	*Feb. 23*	*Feb. 24*	*Feb. 25*	*Feb. 26*	*Feb. 27*
Feb. 28	*Mar. 1*	*Mar. 2*	*Mar. 3*	*Mar. 4*	*Mar. 5*	*Mar. 6*
Mar. 7	*Mar. 8*	*Mar. 9*	*Mar. 10*	*Mar. 11*	*Mar. 12* *Window Closes*	*Mar. 13*

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 resourcc 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.

6/15/04

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.

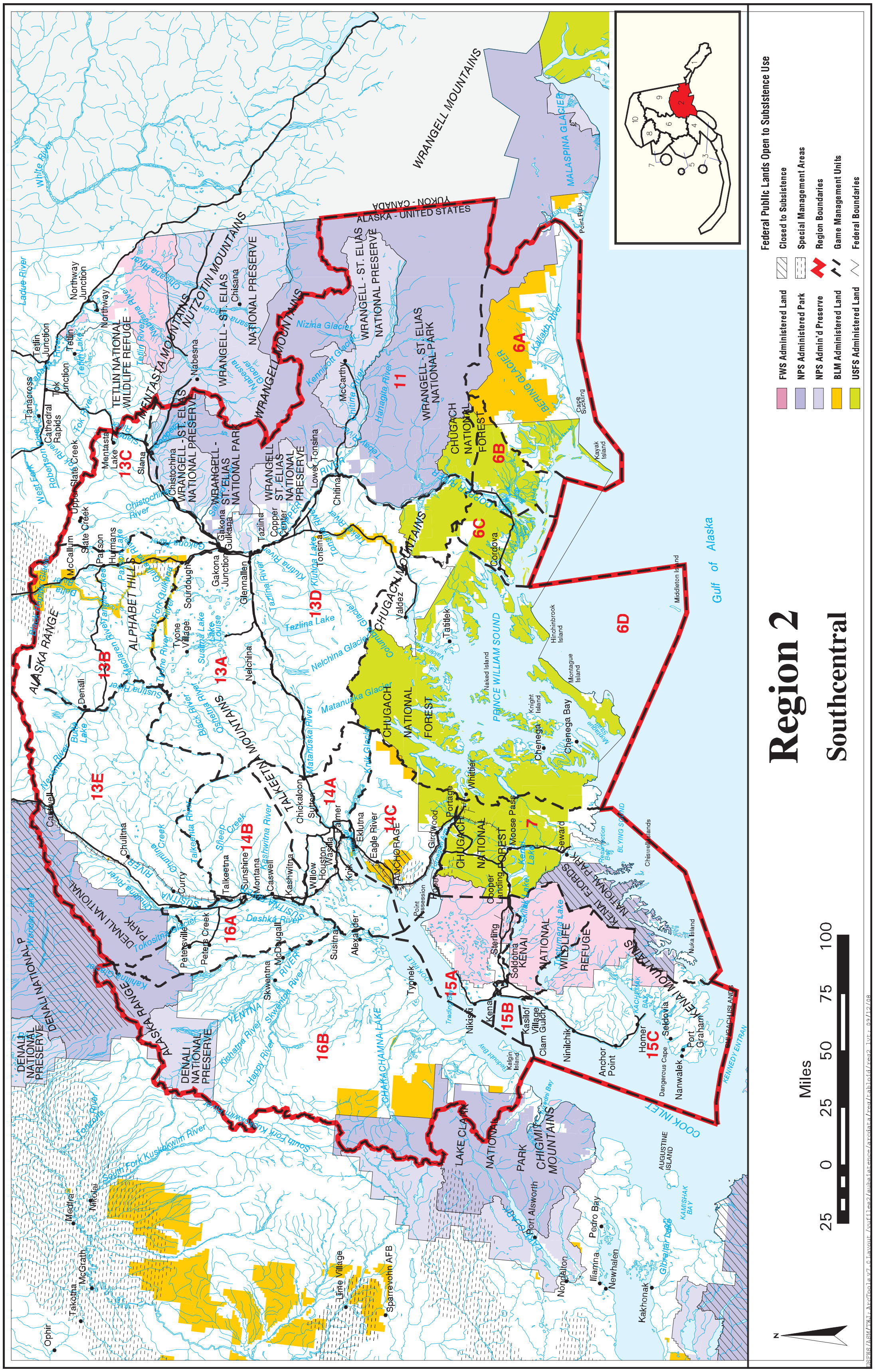
6. Councils may submit written comments requested by federal land management agencies under ANILCA §810 or requested by regional Subsistence Resource Commissions under §808 directly to the requesting agency. Section 808 correspondence includes comments and information solicited by the SRCs and notification 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.


Region 2
Southcentral
Federal Public Lands Open to Subsistence Use
FWS Administered Land
NPS Administered Park
NPS Admin'd Preserve
BLM Administered Land
USFS Administered Land
Closed to Subsistence
Special Management Areas
Region Boundaries
Game Management Units
Federal Boundaries
Miles
25
0
25
50
75
100
Gulf of Alaska
PRINCE WILLIAM SOUND
COOK INLET
WRANGELL MOUNTAINS
ALASKA RANGE
CHUGACH MOUNTAINS
TALKEETNA MOUNTAINS
ALPHABET HILLS
YUKON - CANADA
ALASKA - UNITED STATES
ANCHORAGE
Valdez
Cordova
Seward
Homer
Kenai
Glennallen
Palmer
Wasilla
Whittier
13A
13B
13C
13D
13E
14A
14B
14C
15A
15B
15C
16A
16B
6A
6B
6C
6D
7
11

Department of the Interior
U. S. Fish and Wildlife Service

Southcentral Alaska Subsistence Regional Advisory Council

Charter

1. **Committee's Official Designation.** The Council's official designation is the Southcentral Alaska 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.

(4) Recommendations concerning policies, standards, guidelines, and regulations to implement the strategy.

e. Appoint one member to the Wrangell-St. Elias National Park Subsistence Resource Commission and two members to the Denali National Park Subsistence Resource Commission in accordance with section 808 of the Alaska National Interest Lands Conservation Act (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.

All current and future Executive Orders, Secretary's Orders, and Secretarial Memos should be included for discussion and recommendations as they are released. 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 $170,000, including all direct and indirect expenses and 1.15 Federal 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 11, 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 Council and subcommittee meetings;

(b) Prepare and approve all meeting agendas;

(c) Attend all committee 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:

Thirteen 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 nine of the members (70 percent) represent subsistence interests within the Region and four 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.

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Members will be appointed for 3-year terms. Members serve at the discretion of the Secretary.

Alternate members may be appointed to the Council to fill vacancies if they occur out of cycle. An alternate member must be approved and appointed by the Secretary before attending the meeting as a representative. The term for an appointed alternate member will be the same as the term of the member whose vacancy is being filled.

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 or other subgroups of the Council, must be handled in accordance with General Records Schedule 6.2, and other approved Agency records disposition schedule. These records must be available for public inspection and copying, subject to the Freedom of Information Act (5 U.S.C. 552).

Secretary of the Interior

DEC 12 2019

Date Signed

DEC 13 2019

Date Filed

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