MATANUSKA-SUSITNA BOROUGH Fish & Wildlife Commission

350 E Dahlia Ave., Palmer, Alaska 99645

CHAIRPERSON
Andy Couch

VICE CHAIR
Pete Probasco

MSB STAFF
Maija DiSalvo

BOARD MEMBERS
Howard Delo
Larry Engel
Tim Hale
Gabe Kitter
Bill Gamble
Kendra Zamzow
Ex officio: Jim Sykes

Regular Meeting

May 9, 2024

Meeting Packet - Table of Contents

***Pg.* = *Item*:**

Physical Location of Meeting: Lower Level Conference Room, DSJ Bldg, 350 E. Dahlia Ave., Palmer
Remote Participation: See attached agenda on p. 1

Planning and Land Use Department - Planning Division

http://www.matsugov.us • planning@matsugov.us

MATANUSKA-SUSITNA BOROUGH
MSB Fish and Wildlife Commission
<u>AGENDA</u>

Edna Devries, Mayor

Andy Couch – Chair
Peter Probasco – Vice Chair
Gabriel Kitter
Howard Delo
Larry Engel
Tim Hale
Bill Gamble
Kendra Zamzow
Jim Sykes – Ex officio member

Maija DiSalvo – Staff

Michael Brown, Borough Manager

PLANNING & LAND USE DEPARTMENT
Alex Strawn, Planning & Land Use Director
Vacant, Planning Services Manager
Jason Ortiz, Development Services Manager
Fred Wagner, Platting Officer

Lower Level Conference Room
Dorothy Swanda Jones Building
350 E. Dahlia Avenue, Palmer

May 9, 2024
REGULAR MEETING
4:00 p.m.

<u>Ways to participate in MSB Fish and Wildlife Commission meetings:</u>

IN-PERSON: Assembly Chambers, DSJ Building

REMOTE PARTICIPATION VIA MICROSOFT TEAMS:

Join on your computer:
Click here to join the meeting
Meeting ID: 253 447 894 224
Passcode: wdaLTS

Or call in (audio only):
1-907-290-7880
Phone Conference ID: 789 320 013#

I. CALL TO ORDER

II. ROLL CALL – DETERMINATION OF QUORUM

III. LAND ACKNOWLEDGEMENT

"We acknowledge that we are meeting on traditional lands of the Dena'ina and Ahtna Dene people, and we are grateful for their continued stewardship of the land, fish, and wildlife throughout time immemorial."

IV. PLEDGE OF ALLEGIANCE

V. APPROVAL OF AGENDA

VI. APPROVAL OF MINUTES

A. April 11, 2024, Regular Meeting Minutes

VII. AUDIENCE PARTICIPATION (*three minutes per person, for items not scheduled for public hearing*)

VIII. STAFF/AGENCY REPORTS & PRESENTATIONS

A. Staff Report
B. Chair's Report
C. Waterbody Setback Advisory Board Report

IX. UNFINISHED BUSINESS

A. ADF&G Game Season Summary Meeting
   i. Draft Agenda
B. NOAA Fisheries
   i. Comments re: Cook Inlet EEZ Proposed 2024 Harvest Specifications
   ii. Gulf of Alaska Chinook – Petition for Endangered/Threatened Status

Items Pending Updates:
a) State Legislative Budget
b) Susitna Basin Recreational Rivers Plan Update
c) Beaver Meadows Subdivision

X. NEW BUSINESS

A. Stock of Concern Designation
B. 2025 CAPSIS Update
C. National Fish Habitat Partnership
   i. Palmer Visit – August 1, 1:00-5:00 pm
D. Susitna Watana Hydro Project
E. House Bill 169 – Fisheries Rehabilitation Permit
F. House Bill 368 – Clean Energy/Skwentna Coal Project
G. Summer FWC Work Group

XI. MEMBER COMMENTS

XII. NEXT MEETING DATE:
ADF&G Game Season Summary – Thursday, June 6, 2024 @ 5:00 pm – Assembly Chambers

XIII. ADJOURNMENT

Disabled persons needing reasonable accommodation in order to participate at a MSB Fish and Wildlife Commission Meeting should contact the borough ADA Coordinator at 861-8432 at least one week in advance of the meeting.

MATANUSKA-SUSITNA BOROUGH
MSB Fish and Wildlife Commission
Regular Meeting: April 11, 2024
DSJ Building, Assembly Chambers/TEAMS
MINUTES

I. CALL TO ORDER
Chair Andy Couch called the meeting to order at 3:58 PM.

II. ROLL CALL – DETERMINATION OF QUORUM
Present:
Andy Couch
Peter Probasco
Gabe Kitter
Bill Gamble – arrived at 4:09
Larry Engel
Howard Delo
Tim Hale
Kendra Zamzow
Jim Sykes – arrived at 4:01

Absent:
None

Quorum was established.

III. LAND ACKNOWLEDGEMENT
AC read the land acknowledgement:
"We acknowledge that we are meeting on traditional lands of the Dena'ina and Ahtna Dene people, and we are grateful for their continued stewardship of the land, fish, and wildlife throughout time immemorial."

IV. PLEDGE OF ALLEGIANCE

V. APPROVAL OF AGENDA
HD moved to approve the agenda; seconded by LE.
Amendment: Move Matt Greening first to discuss the state legislative budget.
No objection, motion passed unanimously as amended.

VI. APPROVAL OF MINUTES
HD moved to approve the February 8th minutes; seconded by LE.
Amendment: Red page 4 strike "allocative decisions or…"

No objection, motion approved unanimously as amended.

LE moved to approve the March 21st minutes; seconded by HD.
No objection, motion passed unanimously.

VII. AUDIENCE PARTICIPATION

Chennery Fife – Trout Unlimited
Mac Minard – MSB fisheries consultant
Neil DeWitt – member of the public
Stephen Braund – Northern District Setnetters
Stefan Hinman – MSB Public Affairs
Bill Stoltz – MSB
Matt Gruening – DeLena Johnson's office

Matt Gruening gave a legislative budget update from DeLena Johnson's office; funding remains in House budget for coho genetic study, Chelatna weir, and Susitna mark recapture study; optimistic it will stay through Senate. Thanks to GK, JS, KZ, and BG for traveling to Juneau.

VIII. STAFF/AGENCY REPORTS & PRESENTATIONS

Staff Report – Maija DiSalvo
Chair's Report – AC

BOF Appointments – Marit Carlson Van Dort and Kurt Chamberlain; staff will be working on a web page update over the summer, FWC feedback will be welcomed; conversations about pike mitigation are ongoing.

Waterbody Setback Advisory Board Report - KZ

IX. UNFINISHED BUSINESS

A. Board of Fisheries After Action Report

Mac Minard discussed recommendations in three core areas; policy, politics, and public relations. Will keep supporting efforts if desired.

HD moved to have AC to bring forward FWC interest in pursuing a stock of concern designation for king salmon on Susitna and coho and kings on the Little Su in his upcoming meeting with the ADF&G commissioner. Additionally, to ask the Commissioner procedurally what he feels the best steps would be; seconded by PP.

No objections, motion passed unanimously.

B. ADF&G Game Season Summary Meeting Planning

PP moved to adopt handout provided by GK of finalized questions to ADF&G for Game Season Summary meeting; seconded by LE.

TH moved to strike K and leave L under Caribou; seconded by PP.
No objections, amendment passed unanimously.

TH moved to strike I and leave J under Sheep; seconded by PP.
No objections, amendment passed unanimously.

KZ moved to add a D to Caribou (L) that said what are trends in subunit 13E; seconded by PP.
No objections, amendment passed unanimously.

LE moved to add one additional question: What in your opinion are the most serious issues facing wildlife resources in the MSB at this time?; seconded by PP.
No objections, amendment passed unanimously.

Main Motion: No objections, motion passed unanimously as amended.

C. 2025 Board of Game

FWC will not submit proposals, but will review final proposals and make a decision on whether there will be actions the FWC could take for the meeting.

D. Seldon Corridor Moose Safety Lighting

GK, Maija, and ADF&G will continue to learn more and keep the FWC informed.

JS moved to extend the meeting to 6:15; seconded by GK.
No objections, motion passed unanimously.

Items Pending Updates:

A. State Legislative Budget

PP moved for staff to draft and send a letter to DeLena Johnson as a thank you to her efforts supporting Mat-Su fisheries over the past two years; seconded by TH.
No objections, motion passed unanimously.

B. NOAA/NPFMC Updates

Preliminary ruling will be released tomorrow – 30 days to comment; only change was to decrease coho TAC from 35,000 to 25,000.

JS moved to establish a work group to research and write a proposal for FWC review at the meeting on May 9th; seconded by KZ (group will stay original EEZ work group of KZ, JS, and PP).
No objections, motion passed unanimously.

C. MSB Resolution 24-031

Request to add House Bill 368 to next agenda; GK and KZ will continue to monitor Gulf of AK Endangered Species Act petition.

D. Susitna Basin Recreational Rivers Plan Update – no updates
E. Beaver Meadows Subdivision – no updates

X. MEMBER COMMENTS

Bill Stoltz – Discussion about House Bill 169, brought up by BG; add to next agenda
KZ – Anything the WBSBAB comes up with will be on website; take a look and come to the meetings
TH – no comment
PP – Thank you all for coming; Stefan, thanks for all you do, look forward to working with you
HD – Echoes PP's comments, thanks to Stefan and Maija; enjoyed the fishery video
LE – no comment
GK – no comment
JS – Thanks for all the work, great group
AC – Will be using stats and booklet for meeting with ADF&G Commissioner next week; appreciates all the work, try to get everyone involved to spread it out
Stefan Hinman – appreciates the group, inspiring work – whole team, with Mac and Maija, MSB was well represented at BOF and beyond

XI. NEXT MEETING DATE: Thursday, May 9, 2024 @ 4:00 pm

XII. ADJOURNMENT

PP moved to adjourn; seconded by LE.
No objections, motion passed unanimously.

Meeting adjourned at 6:24 PM.

MATANUSKA-SUSITNA BOROUGH
MSB Fish and Wildlife Commission
AGENDA

Edna Devries, Mayor

Andy Couch – Chair
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PLANNING & LAND USE DEPARTMENT
Alex Strawn, Planning & Land Use Director
Vacant, Planning Services Manager
Jason Ortiz, Development Services Manager
Fred Wagner, Platting Officer

Assembly Chambers
Dorothy Swanda Jones Building
350 E. Dahlia Avenue, Palmer

June 6, 2024
SPECIAL MEETING: ADF&G GAME SEASON SUMMARY
5:00 p.m.

Ways to participate in MSB Fish and Wildlife Commission meetings:

IN-PERSON: Assembly Chambers, DSJ Building

REMOTE PARTICIPATION VIA MICROSOFT TEAMS:

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Meeting ID: 258 931 148 504
Passcode: bPYgQX

Or call in (audio only):
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Phone Conference ID: 883 406 835#

I. CALL TO ORDER

II. ROLL CALL – DETERMINATION OF QUORUM

III. LAND ACKNOWLEDGEMENT

"We acknowledge that we are meeting on traditional lands of the Dena'ina and Ahtna Dene people, and we are grateful for their continued stewardship of the land, fish, and wildlife throughout time immemorial."

IV. PLEDGE OF ALLEGIANCE

V. APPROVAL OF AGENDA

VI. INTRODUCTIONS

A. FWC Opening Statement
B. ADF&G Opening Statement

VII. AUDIENCE PARTICIPATION (*three minutes per person*)

VIII. PRESENTATIONS

A. Staff Report
B. ADF&G
   i. Game Season Summary Highlights
   ii. Emerging Issues Summary Highlights

IX. ITEMS OF BUSINESS

A. FWC/ADF&G Dialogue on Mat-Su Wildlife & FWC Questions

X. ADF&G/FWC FINAL COMMENTS

XI. NEXT MEETING DATE: Thursday, September 26, 2024 @ 4:00 pm Assembly Chambers

XII. ADJOURNMENT

Disabled persons needing reasonable accommodation in order to participate at a MSB Fish and Wildlife Commission Meeting should contact the borough ADA Coordinator at 861-8432 at least one week in advance of the meeting.

MATANUSKA-SUSITNA BOROUGH

Planning and Land Use Department
Planning Division
Fish & Wildlife Commission
350 East Dahlia Avenue • Palmer, AK 99645
Phone (907) 861-7833
www.matsugov.us

May 9, 2024

Gretchen Harrington
Assistant Regional Administrator
Sustainable Fisheries Division, Alaska Region, NMFS
P.O. Box 21668, Juneau, AK 99802–1668

Re: Fisheries of the Exclusive Economic Zone off Alaska; Cook Inlet Salmon; Amendment 16

Dear Ms. Harrington,

The Matanuska-Susitna Borough (MSB) Fish and Wildlife Commission (FWC) represents the interests of the Borough in the conservation and allocation of fish, wildlife, and habitat. Specifically, the FWC advises borough officials, state or federal agencies and other organizations with interests that may affect conservation of fish, wildlife, and habitat.

We have read the final rule of April 30[1] with the understanding that comments will be accepted through May 13. This letter follows our previous letters of March 31, 2023, December 22, 2023, and January 30, 2024, in addition to testimony provided at the May 2023 and February 2024 NPFMC meetings.

Briefly,

- We support the restricted fishing of one 12-hour period per week from July 16-31.
- We support the 25,000 total allowable catch (TAC) proposed for coho salmon.
- We continue to strongly urge NMFS, through the Secretary of Commerce, to revise the proposed Amendment 16 in the manner we have consistently advocated for:
  - a) maintain the current 150 fathoms net length instead of expanding it to 200 fathoms[2]
  - b) implement the restricted fishery through Aug 15 to provide further protection of weak stocks migrating north.

All salmon bound for the MSB move through Cook Inlet. As described in Amendment 16:

> *As salmon begin to move into Cook Inlet, with the exception of Chinook, they typically group in large tide rips in the middle of Cook Inlet (i.e., the EEZ) to start moving north up the inlet toward their spawning streams, rivers, and lakes. The first commercial fishery that salmon typically encounter when moving up Cook Inlet is the upper Cook Inlet drift gillnet fishery. Commercial salmon fisheries south of this area occur entirely in State waters. In the Cook Inlet EEZ, salmon stocks originating from throughout Cook Inlet are mixed*

[1] Federal Register Vol 89, No 84, April 30, 2024, Rules and Regulations
[2] FMP Amendment 16 § 679.118 Management Measures (f) (1). Federal Register Vol 88 No 201, October 19, 2023, p72339

together. As they move northward up farther into Cook Inlet, individual salmon stocks will eventually move shoreward into State waters to reach their spawning streams. Stocks returning to freshwater systems farther north in Cook Inlet tend to stay close to the middle of the inlet when they move through the Cook Inlet EEZ Area….All salmon returning to the Northern District must first past through fisheries in the Central District before reaching fisheries and spawning grounds in the Northern District.[3]

When salmon move north past the Central District, they become available to Cook Inlet beluga whales, Northern District set-netters, and sport and personal use fisheries in the MSB. A large part of the Conservation Corridor lies within the EEZ. The Environmental Assessment Impact Review of Amendment 16 for the FMP explicitly states that the FMP must contain conservation measures.

Conservative Management

In Amendment 16, NMFS states that they expect conservative management:

Because Federal managers have less administrative flexibility and less salmon management expertise than State managers, NMFS expects initial management of the Cook Inlet EEZ to be conservative to account for the significant uncertainty and minimize the risk of overfishing.

- We continue to have concerns that NMFS is interpreting "conservative management" as solely based on a TAC rather than recognizing the importance of harvest rates in conjunction with net length, run timing, and the Conservation Corridor as components of conservative management.

Gear Length

As we have noted in past comments, the amount caught each fishing period should also be part of conservative management. There is no information on fishing effort in EEZ versus State waters in the past. With set allowable catch numbers in the EEZ and no set limits in State waters, there could be heavy fishing effort early season in the EEZ until a TAC is reached, with a consequent shift to State waters. **By allowing gear length to be increased, more fish will be caught each period.** It is unknown whether this would have population-level impacts on early run northern stocks. Many of these northern stocks, particularly Chinook and coho, are so greatly reduced that they should be listed as stocks of concern. There does not appear to be any reason to change gear length. Indeed, for conservative management, gear length should not be increased.

Fishing Periods

We support the final rule published on April 30 that restricts fishing from July 16-31 to one 12-hour period per week. We strongly recommend extending the one 12-hour period per week through August 15 or until the TAC is reached:

Gillnet gear generally catch all species of salmon in the area and cannot target individual stocks….Therefore, management must consider all stocks that would be harvested by each drift gillnet fishery opening, the conservation status of each stock, and their relative abundance…

The drift gillnet fishery, particularly in the Cook Inlet EEZ, can catch significant quantities of Cook Inlet sockeye and coho salmon stocks bound for the Northern District. These are smaller and less productive stocks that cannot support as much harvest as co-occurring Kenai and Kasilof sockeye salmon stocks.
Fishing at a rate to fully harvest the most abundant stocks would likely result in overfishing on these weaker or less abundant salmon stocks.

[3]Amendment 16. 50 CFR Parts 600 and 679. Federal Register Vol 88, No 201, October 19 2023, p72322

> *Therefore, to support conservation of these Northern District stocks, and to ensure at least some harvestable surplus for Northern District salmon fisheries, the State has reduced the number of drift gillnet fishing periods in Cook Inlet EEZ waters after July 15 to minimize mixed stock harvests. After this date, State management measures in the last decade generally reduced fishing time in the EEZ … during the peak of the run. This management approach was in response to significant declines in coho salmon stocks and long-term yield concerns for Northern District sockeye salmon…*

NMFS recognized that federal management of the EEZ would create "significant new management uncertainty" when they adopted the FMP Amendment 14, closing the EEZ to commercial fishing, in 2021.[4] Also, the NPFMC determined and NMFS agrees that closing the Cook Inlet EEZ to commercial salmon fishing is the management approach most likely to avoid uncertainty and maximize harvest of Cook Inlet salmon stocks while preventing overfishing.[5] The Alaska Department of Fish and Game (ADFG) also supported Amendment 14.[6]

Maintaining the Conservation Corridor as outlined in the State's Central District Drift Gillnet Fishery Management Plan developed by the Board of Fisheries has proven to be a key element in moving fish bound for the Northern Cook Inlet through the Central District. Recognizing the fact that these Northern Cook Inlet stocks are much smaller and in many cases are currently not meeting escapement objectives, necessitates the need to maximize the protections offered through the management plan and the subsequent Conservation Corridor.

The work of the MSB and the Alaska Board of Fisheries to establish a Conservation Corridor is recognized by NMFS and described, although not mentioned by name, in Amendment 16.[7] The crucial period is from July 16-August 15 for moving fish north. Implementing restricted fishing to 12 hours per week during this timeframe considers run timing and the need to move fish north.

- For these reasons, we strongly suggest changing proposed Amendment 16 to limit fishing gear to 150 fathoms, maintain the Conservation Corridor, and implement only one 12-hour fishing period per week through August 15.

Managing for Weak Stocks

Conservative management for weaker stocks was not on display in the SAFE report. We support NMFS reducing the TAC numbers down in the 2024 Harvest Specifications,[8] based on recommendations from the NPFMC Advisory Panel, NPFMC full council, and public comment.

- We agree that the TAC of 25,000 coho is appropriate based on the available, although extremely limited, information.
- We continue to have concerns that the TAC for aggregate sockeye may have a larger impact on the weaker sockeye stocks and is not conservative enough.

The methods applied to develop overfishing limits, as outlined in the SAFE report, do not consider the lower productivity of Susitna stocks. While a pair of Kenai sockeye may produce nine returning fish, a pair of Susitna sockeye will only produce three returning fish. The SAFE report uses a 5-year average run size to determine an annual biological catch (ABC), and the report originally set the ABC = TAC. While the TAC numbers were reduced by the Council, a new SAFE report will be written every year to set the TAC. The method used risks overfishing in years

[4] Amendment 14. Federal Register Vol 86 No. 210, November 3 2021, p60569, p60570
[5] Ibid, p60571
[6] Ibid, p60569
[7] Amendment 16. 50 CFR Parts 600 and 679. Federal Register Vol 88 No. 201, October 19 2023, p72322 – p72323
[8] 50 CFR Part 679. Federal Register Vol 89 No. 72, April 12 2024, Table 1, p25859

when there are small returns. This is an especially important point, again, for stocks headed to the MSB, as the actual returns will not be known until long after fish have (or have not) moved through the Central District.

- We urge NMFS to use the mid-range of escapement goals instead of the low end and consider trends in weak stocks when setting their TAC.
- We urge NMFS to develop a management system that is more responsive in-season than a single “allowable catch” number set before the season starts.

<u>Management Concerns</u>

Cook Inlet is one of the longest marine inlets in the United States where salmon management is difficult and complex. Within the MSB are the largest area of wetlands[9] and longest river systems of Cook Inlet. The State of Alaska has developed large amounts of data, real-time analysis of various salmon runs, and maintains the ability to implement timely emergency closures or openings as the situation demands. NMFS does not currently have these tools or the flexibility that the State enjoys.

NMFS and NOAA should consider a proposal to Congress that would allow them the authority to issue Emergency Orders (EO’s) for opening and closing fishing periods, similar to what the State is able to do now, to provide the needed ability to make critical and timely decisions that are absent in the current proposed plan.

In addition to the unfortunate geography that places the mixed stocks in the path of the Central District area drift gillnet fleet prior to any fisheries further north, monitoring and understanding escapement is different for the different stocks. ADFG tools allow them to quickly understand the strength of salmon returning to the Kenai and Kasilof rivers. By the time salmon reach Northern District weirs, and run strength is determined, it is too late to open or close the EEZ fishery.

> *… reducing Cook Inlet EEZ harvests after July 15 allows for the collection of more data on escapement and realized salmon abundance in order to either avoid overharvesting a given stock or increase harvest to more fully utilize abundant runs. … This issue is exacerbated for Northern District stocks, for which there is significant time lag (relative to Kenai and Kasilof stocks) between harvest in the Cook Inlet EEZ and information on escapement becoming available.*[10]

Unlike the well-monitored Kenai and Kasilof salmon runs, the success of salmon spawning in MSB freshwater is not known until long after the salmon have moved through the Central District. There are not enough weirs to understand run abundance across the multiple streams of the MSB, nor have they been funded consistently. The EEZ closures in July help deal with this uncertainty.

- Until appropriate responsive tools are available, we urge NMFS to maintain the one 12-hour fishing period per week from July 16-August 15 to maintain the Conservation Corridor.

From this summer forward, there will be information on fishing fleet effort, location and catches, since both NMFS and the State will collect fish tickets. This will help with management, but additional research is needed.

<u>Research for Management</u>

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[9] Matanuska-Susitna Borough Wetlands Management Plan, March 2012, ES1
[10] Federal Register Vol 88, No 201, October 19 2023, p72323

Although NMFS proposes that they apply the best science available, the unfortunate fact is that there is very limited science available. The State tracks what is caught in Cook Inlet, but there has been no effort to track what is caught specifically in federal EEZ waters, or when, or how many boats and permits have been applied to the catch effort. This puts both NMFS and the State at a disadvantage when attempting to develop this FMP amendment.

Despite a near decade long dispute over whether the State or NMFS would manage the EEZ, no research has been conducted on fishing effort in the EEZ. All parties have stated that additional research is needed and understand the difficulty of managing this mixed stock fishery.

- NMFS should conduct genetic research on mixed stocks to build a history of what populations are being caught, and when.
- Several Chinook and coho stocks in the Northern District are in extremely low abundance. While the Northern District is outside the EEZ, it is impacted by activities in the EEZ. NMFS needs to invest in research to better understand the productivity of these stocks.
- NMFS should work with ADFG to develop indicator stocks to determine run strength in the Susitna River drainages.

Tribal Fishery

We would support the concept of a Tribal fishery in the EEZ. The two Tribes in the MSB are considered “urban” and not provided with an opportunity to fish at their traditional locations or in a traditional manner. A Tribal fishery would help to rectify past and current injustices.

Summary

A key driver of the move to statehood in Alaska in the 1950’s was the federal mismanagement of salmon fisheries. The federal managers “failed to provide the financial resources needed to manage and research salmon stocks and fisheries such that fishing could be properly regulated and depressed stocks rehabilitated.”[11] The result was years of overfishing resulting in the 1953 disaster declaration by President Eisenhower – a federal disaster that resulted not from what nature could throw at Alaska, but from the actions of poor fishery management.

We hope the federal mindset has changed as they prepare to take over managing the Exclusive Economic Zone (EEZ) in Cook Inlet in 2024. However, they do not appear to be prepared to commit financial resources or research to appropriately regulate the fishery, nor are they managing for weak stocks. Thankfully the EEZ is only a small part of the State’s salmon fishing area. Unfortunately, all the salmon that return to the Anchorage, Eklutna, and MSB streams – supporting multiple fisheries, wildlife, and ecosystems – move through the EEZ. We are entering an era of marine and freshwater impacts of climate change on salmon in multiple areas around the state, which will make management decisions more difficult. We urge you to consider the actions we have outlined prior to the start of the 2024 commercial season.

Sincerely,

Andy Couch, Chair
Matanuska-Susitna Borough Fish and Wildlife Commission

[11] https://www.adfg.alaska.gov/static/home/library/pdfs/afrb/meacv1n1.pdf

Wild Fish Conservancy
NORTHWEST
SCIENCE EDUCATION ADVOCACY

January 11, 2024

U.S. Department of Commerce
Attn: Gina Raimondo
Secretary of Commerce
1401 Constitution Ave NW
Washington, DC 20230
TheSec@doc.gov

NOAA Fisheries Directorate
Attn: Janet Coit
Assistant Administrator for Fisheries
1315 East-West Highway, 14th Floor
Silver Spring MD 20910
janet.coit@noaa.gov

Delivered Electronically (1/11/24)

Dear Secretary Raimondo and Assistant Administrator Coit:

Pursuant to section 4(b) of the Endangered Species Act ("ESA"), Wild Fish Conservancy submits the attached Petition to List Alaskan Chinook salmon as a threatened or endangered species and to designate critical habitat under the ESA. A formal notice letter regarding our request is included in the petition.

Also attached is a copy of the notice letter that Petitioners delivered to the Alaska Department of Fish and Game ("ADF&G") on May 24th, 2023, notifying ADF&G of our intent to file this petition.

The supporting materials for the petition can be found on the following webpage:
https://drive.google.com/drive/folders/1ZPZaaH0t5QE6iQb1TBoNdvACyfytHgt_?usp=sharing

Please contact me if you have any issues accessing these documents.

Thank you,

Emma Helverson

Emma Helverson, Executive Director, Wild Fish Conservancy

emma@wildfishconservancy.org | 484-788-1174 | PO Box 402, Duvall, WA 98019

cc:
douglas.vincent-lang@alaska.gov, Douglas Vincent-Lang, Commissioner of the Alaska Department of Fish & Game
annemarie.eich@noaa.gov, Anne Marie Eich, Assistant Regional Administrator for Protected Resources, Alaska Regional Office, NOAA Fisheries

melissa.hill@alaska.gov, Melissa Hill, Acting Director, Alaska Department of Fish and Wildlife

P. O. Box 402, Duvall, WA. 98019 • 425-788-1167 • Fax 425-788-9634 • www.wildfishconservancy.org
PRESERVE PROTECT RESTORE

Wild Fish Conservancy
NORTHWEST
SCIENCE EDUCATION ADVOCACY

May 24, 2023

Doug Vincent-Lang
Commissioner of the Alaska Department of Fish and Game
P.O. Box 115526
1255 W. 8th Street
Juneau, AK 99811

Submitted Via Email: douglas.vincent-lang@alaska.gov

Dear Commissioner Vincent-Lang:

Pursuant to 50 C.F.R. § 424.14(b), we hereby provide notice that Wild Fish Conservancy intends to file a petition under the federal Endangered Species Act to list and designate critical habitat for Chinook Salmon (Oncorhynchus tshawytscha) in Southern Alaska, including Southeast and Southwest Alaska and Cooke Inlet, no sooner than 30 days from the date that this notice is provided.

We understand this 30-day notice may no longer be legally required under the Endangered Species Act but we are submitting as a courtesy as it is our intent to maintain open communication with the state of Alaska through this petition process about our concerns over the health of Alaska Chinook populations.

Sincerely,

Emma Helverson

Emma Helverson
Executive Director
Wild Fish Conservancy
emma@wildfishconservancy.org

cc:
Melissa Hill, Acting Director, Alaska Department of Fish and Wildlife, melissa.hill@alaska.gov

P. O. Box 402, Duvall, WA. 98019 • 425-788-1167 • Fax 425-788-9634 • www.wildfishconservancy.org
PRESERVE PROTECT RESTORE

Petition to Designate Evolutionary Significant Units and List Alaskan Chinook Salmon (*Oncorhynchus tshawytscha*) under the Endangered Species Act

Wild Fish Conservancy

January 11th, 2024

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Executive Summary

The Wild Fish Conservancy petitions to list one or more "evolutionary significant units" ("ESU(s)") of Chinook salmon (*Oncorhynchus tshawytscha*) in the State of Alaska as a threatened or endangered species under the Endangered Species Act and to designate critical habitat.

Chinook are anadromous, migrating from the ocean upstream to the freshwater streams of their birth to reproduce. Alaskan Chinook exhibit a predominately stream-type life-history, with their juveniles migrating to sea during their second year of life, normally within twelve to fifteen months after emergence from spawning gravels. An important exception is the Situk River Chinook population that exhibits an ocean-type life history, where juveniles migrate to sea during their first year of life. Because Chinook spend more than half of their lives in the ocean, the National Marine Fisheries Service/ National Oceanic and Atmospheric Administration is the responsible party to evaluate this petition and determine whether listing under the ESA is warranted.

Alaskan stream-type (also commonly known as "spring") Chinook generally spawn in July and August. Fry emerge from the spawning gravel the following late spring and rear in their natal waters for a year (occasionally two years if water temperatures are exceptionally cold and/or unproductive) before migrating to marine waters the following spring. Depending on the individual population, marine rearing may predominately take place in nearshore waters, offshore waters of southeast Alaska and the Gulf of Alaska, or further offshore in the North Pacific. (See sections on individual populations below for details on marine rearing behaviors.)

Recent work on the genetics of ocean- and stream-type Chinook in the west coast south of the Canadian border have shown that the stream-type life-history is largely controlled by a few regulatory genes that result in mature Chinook migrating to their natal rivers several months prior to spawning. This behavior has been termed "premature migration". In contrast, ocean-type (commonly referred to as "fall") Chinook return to their natal rivers to spawn very near the time of spawning (days or weeks) and thus do not exhibit premature migration behavior. It is not (yet) known if the spawning migration timing of Alaska stream-type Chinook is controlled by premature migration regulatory genes as southern US stream-type Chinook. Regardless, there is evidence that these unique life histories are being rapidly lost, and further species decline will follow the current loss of not only abundance, but spatial structure, productivity, and diversity.

Alaska stream-type Chinook have unique habitat requirements for migration, spawning, juvenile rearing, and adult residence in the ocean. Suitable spawning habitat is in mainstem rivers and tributaries, and requires cold water, cool resting pools in which to hold, clean spawning gravels, and optimal dissolved oxygen levels, water velocities, and turbidity levels. Chinook access to spawning habitat is threatened by interception in fisheries, habitat disturbance from mining and logging, and in some cases anthropogenic barriers to migration. During upstream migration, adult Chinook are in a stressed condition due to their reliance on stored energy to complete their journey upstream, leaving them highly susceptible to additional environmental stressors. During their ocean residence, adults need nutrient-rich, colder waters that are associated with high productivity that results in sufficient rates of salmonid growth and survival.

Additional information on the life history of Alaska Chinook is provided in ADF&G's 2013 Chinook salmon stock assessment and research plan (ADF&G 2013). We include excerpts from that document below:

> *"Much of what is known about the general life history of Chinook salmon in Alaska has been summarized by Healey (1991) and Morrow (1980) and is briefly summarized here with extensions to their summaries as cited. With some rare exceptions, Chinook salmon*

in Alaska exhibit the stream-type life history where adult runs occur during spring and summer, spawning occurs during summer and fall, the majority of juveniles spend one year in freshwater before smolting, and make extensive ocean migrations to feed and mature."

"Run timing of adults varies across the state, with migrations into freshwater beginning as early as April or as late as July. Chinook salmon in large river systems such as the Yukon River may have a protracted run timing due to wide variation in distances fish must migrate to disparate spawning areas. In some instances there may be two runs of Chinook salmon in a single drainage where, for example, earlier arriving fish spawn in smaller tributary habitats and later arriving fish spawn in larger mainstem habitats. The Kenai and Kasilof rivers, in Southcentral Alaska support such multiple runs of Chinook salmon."

"Spawning of Chinook salmon primarily occurs between July and September, with capacity of spawning populations limited by factors related to watershed area (Parken et al. 2006). Unlike the protracted run timing typically seen in many salmon species, timing of spawning appears to be highly synchronized and compressed in most Chinook salmon populations in Alaska. Chinook salmon can spawn in a wide variety of habitats in terms of water depths, substrate type, and current velocities, although they prefer areas of high subgravel flow, specifically found at the heads of riffles and in pools below log jams. This preference for high subgravel flow limits available Chinook salmon spawning area in most rivers of Alaska."

"Fecundity of female stream-type Chinook salmon varies by size and is also thought to vary by population along a latitudinal gradient. For example, fecundity of fish in the Salcha River drainage ranged from 7,400 to 13,400 eggs per female depending on length (Skaugstad and McCracken 1991), which is somewhat higher fecundity than that reported in the general literature for Chinook salmon populations further south (Healy and Heard 1984).

"As with other Pacific salmon, female Chinook salmon deposit eggs into redds dug into the streambed. Within the redd, Chinook salmon ova are susceptible to drying as river levels drop in fall and winter, freezing during winter, and mechanical abrasion due to floods during summer and fall. Time to hatching varies with stream temperature, generally taking 12 or more weeks in Alaska. Fry emerge from the gravel 2 to 3 weeks after hatching"

"After hatching and emergence, fry disperse from spawning areas to feed in mainstem or tributary habitats of large watersheds. Juvenile Chinook salmon favor areas of moderate

current and instream cover for feeding during summer. Some populations exhibit migrations from tributaries into mainstem areas for overwintering. Understanding of overwinter survival rates for juvenile Chinook salmon in freshwater is very limited. Most juvenile Chinook salmon in Alaska overwinter in freshwater and emigrate as age-1 smolt the following spring, although there are juveniles in some Southeast Alaska populations that migrate seaward at age-0 prior to their first winter (e.g., Situk River, Thedinga et al. 1998). Seaward emigration of smolt generally occurs between May and July (King and Breakfield 2002), with smolt ranging in length from approximately 50-100 mm (Pahlke et al. 2010).”

“Very little is known about habitats occupied by juvenile Chinook salmon as they first enter nearshore marine waters of Alaska. As with other populations of stream-type Chinook salmon, it is thought that juveniles in Alaska spend little time in their natal river estuary and rapidly move into the coastal currents along the shoreline where very little biological sampling has been done to date. It has been hypothesized that the first year at sea is a critical period of growth (during summer and fall) and survival (during winter) for juvenile Chinook salmon, a period that is modulated by climatic conditions (Beamish and Mahnkin 2001).”

“As juveniles grow and begin to feed predominately on fish, they migrate further offshore into the shelf areas of the Gulf of Alaska and Bering Sea, where there is information on their distribution from coded-wire tag (CWT) recoveries and genetic analysis of samples from various research cruises and from bycatch in Federal groundfish fisheries. These data indicate that most Chinook salmon originating in the Gulf of Alaska migrate north and west from their natal streams in Southeast and Southcentral Alaska along the Alaska Current, with some populations migrating as far as the Bering Sea (Larson et al. 2012). As an exception, some stocks in Southeast Alaska rear near shore and entirely within the confines of Southeast Alaska. Juvenile Chinook salmon in the Gulf of Alaska represent a complex and highly variable mix of Alaska populations primarily originating in Southcentral and Southeast Alaska, interspersed among populations and hatchery releases originating in Canada and the Lower 48. It appears that western Alaska and Bristol Bay populations of Chinook salmon do not make extensive migrations into the central or eastern Gulf of Alaska. Relative abundance of juvenile Chinook salmon in the Bering Sea tends to be related to distance from their natal river, with western Alaska and Bristol Bay populations making up the bulk of Alaska-origin fish in the Bering Sea, followed by western and central Gulf of Alaska populations, and then Southeast Alaska, Canadian, and Lower 48 populations.”

“As Chinook salmon grow and mature, they are thought to make seasonal migrations in the ocean to feed. For example, a conceptual model of Chinook salmon in the Bering Sea

from high seas tag recoveries and stable isotope analyses suggest seasonal migrations onto the Bering Sea shelf during winter and out into the Bering Sea basin during summer (Myers et al. 2009). After typically spending three to six years feeding in marine waters on a variety of fish, squid, and euphausids, Chinook salmon in Alaska return back to natal systems to spawn. Maturation rate tends to be sex and population specific, with males tending to mature earlier than females and northern populations in Alaska maturing later than more southerly populations. Chinook salmon in Alaska return primarily at an age of five or six years, but can range in age from three to eight years."

Since at least return year 2007, all stream-type populations throughout Alaska and the ocean-type Situk River population in southeast Alaska have experienced significant declines in productivity and abundance compared to levels exhibited in the previous two or more decades (ADF&G 2013, SP13-01; Jones et al. 2020; Heinl et al. 2021). The declines are even greater when compared to more historic levels (e.g., Cobb 1930). While freshwater spawning and juvenile rearing habitats in most Alaska Chinook rivers are in relatively healthy or minimally-disturbed condition, habitats in some rivers are sufficiently disturbed in at least some river reaches and/or associated riparian and upland areas to compromise spawning or rearing success of Chinook (e.g., Jones et al. 2020 and specific cases below). The major causes of the region-wide declines in Chinook productivity and abundance are predominately due to factors in the marine rearing and migratory environment. Global warming and climate change along with massive releases of hatchery pink and chum salmon from Japan, Russia, and Alaska adversely impact marine food webs (Cunningham et al 2018; Ruggerone and Irvine 2018; Springer et al 2014; Springer et al 2018; Cheung and Frolicher 2020; Heneghan et al. 2023, Jones 2023, Ruggerone et al. 2023). However, as noted by Jones et al. 2020, adverse freshwater conditions, particularly those related to climate change impacts, may interact with adverse marine conditions to further depress Chinook population productivity.

Alaska Chinook face increasing threats from rising stream temperatures during spawning, incubation, and/or juvenile rearing; alteration in stream flow at critical times during spawning, incubation, and juvenile rearing caused by changing precipitation patterns due to climate change (e.g., Jones et al. 2020); fish management decisions are changing the food web and associated productivity in the marine environment, exacerbated by ecological interactions with large-scale releases of hatchery pink and chum salmon in Alaska, Japan, and Russia (Cunningham et al. 2018; Ruggerone et al. 2018; Springer et al 2014; Springer et al. 2018; Hennighan et al. 2023).

Existing federal and state regulatory mechanisms have proven unable to protect and recover Alaska Chinook and their habitats. Alaska Chinook have suffered from chronically low abundance for much of the past two decades. In 2013, the Alaska Department of Fish and Game (ADF&G) recognized "Alaska-wide downturns in productivity and abundance of Chinook salmon stocks" and created a scientific research team to evaluate the declines, identify key knowledge gaps, and recommend research to address knowledge gaps in order to improve the management of Chinook stocks and fisheries (ADF&G Chinook Salmon Research Team. 2013, henceforth "report").

Following the 2013 report, beginning in 2017 and 2018, several Chinook populations were designated by ADF&G as "stocks of management concern" and action plans were developed to respond to the declines in abundance and productivity. ADF&G defines a "stock of management concern as a concern arising from a chronic inability, despite the use of specific management measures, to maintain escapements for a salmon stock within the bounds of the SEG, BEG, or OEG ("sustainable", "biological", or "optimal escapement goals", respectively), or other specified management objectives for the fishery; a management concern is not as severe as a conservation concern" (State of Alaska special species fish stocks of concern as of April 2022 (https://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.akfishstocks).
A stock of conservation concern is defined as "a concern arising from a chronic inability, despite the use of specific management measures, to maintain a stock above a sustained escapement threshold (SET); a conservation concern is more severe than a Management concern (5 AAC 39.222(f)(6))". As of April 2022, there are 14 Chinook stocks from the southern end of the Aleutian Islands to the Alaska/British Columbia border listed as stocks of management concern. For at least 7 of the 14 there are recent (2022) "action plans".

Recent spawning escapement data for eleven of these stocks, plus the Alsek and Situk river populations, are listed in Table 1. Figures from the most recent spawning escapement report by Heinl et al. 2021 show recent spawning escapements of four of the stocks and the Situk and Alsek stocks. Figures for the remaining 3 stocks in the three action plan reports include more recent escapements as shown on ADF&G's Chinook research project website, https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative.main.

Table 1 shows that 10 Chinook stocks have failed to meet the lower bound of their ADF&G-designated spawner escapement goals in the majority of the past six years from 2014 to 2019 and the remaining three have failed to meet their goals in a majority of years since 2012. The two largest Transboundary rivers that have the two largest Chinook populations subject to harvest in southeast Alaskan commercial and recreational fisheries (Stikine and Taku) have failed to meet their escapement goals in all seven years from 2016 to 2020.

It is noteworthy that the 13 depleted stocks span a large range of spawning populations sizes, ranging from the King Salmon River (BEG: 120 to 240)) to the Transboundary Taku River (BEG: 19000 to 36000). Thus, Chinook populations of all population sizes from the southern side of the Aleutian Islands (Chignik) to the Alaska/British Columbia border display similar declines in spawner abundance and productivity.

Table 1. Escapement goals and escapements for the most recent years available for 12 representative southeast Alaska Chinook populations. Data from ADF&G sources. Red fill indicates spawning escapements below the escapement goal lower limit. 'BEG': biological escapement goal; 'SEG': sustainable escapement goal. Escapements for the Karluk River for 2019 to 2021 estimated from Figure 10.

Stream	BEG Esc. Goal	2014	2015	2016	2017	2018	2019	2020	2021
Chickamin River	2,150–4,300	3,097	2,760	**964**	**722**	**2,052**	**1,610**	2,280	2,404
Unuk River	1,800–3,800	**1,691**	2,623	**1,463**	**1,203**	1,971	3,115	**1,135**	2,666
Stikine River	14,000–28,000	24,374	21,597	**10,554**	**7,335**	**8,603**	**13,817**	**9,753**	**8,376**
Andrew Creek	650–1,500	1,261	796	**402**	**349**	**482**	698	**470**	**530**
King Salmon River	120–240	**68**	**50**	149	**85**	**30**	**27**	**100**	134
Taku River	19,000–36,000	23,532	23,567	**9,177**	**8,214**	**7,271**	**11,558**	**15,593**	**11,341**
Chilkat River	1,750–3,500	**1,529**	2,452	**1,380**	**1,173**	**873**	2,028	3,180	2,038
Alsek River	3,500–5,300	**3,357**	5,697	**2,514**	**1,741**	4,348	6,319	5,286	5,616
Situk River	450–1,050	475	**174**	**329**	1,187	**420**	623	1,197	1,064
Chignik River	1,300 – 2,700	2,816	1,945	1,743	**1,037**	**725**	1,417	**1,178**	**1,072**
Karluk River	3,000 - 6,000	**1,182**	**2,777**	3,434	**2,600**	3,155	~4000	**~2900**	**~2800**
Alexander Cr	2,100 – 6,000 (SEG)	911	**1,117**	**754**	**170**	**296**	NA	**596**	**288**
Theodore R.	500 – 1,700 (SEG)	**312**	**426**	**68**	**21**	**18**	NA	**111**	**38**

FIGURES

FIGURES (Figures numbers 2, 3, 5, and 7 – 9 from Heinl et al. 2021, Review of salmon escapement goals in southeast Alaska, 2020. ADF&G FM 21-03; figures 1, 4, 6, and 10 from ADF&G's Chinook Research Project web page; https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative.main).

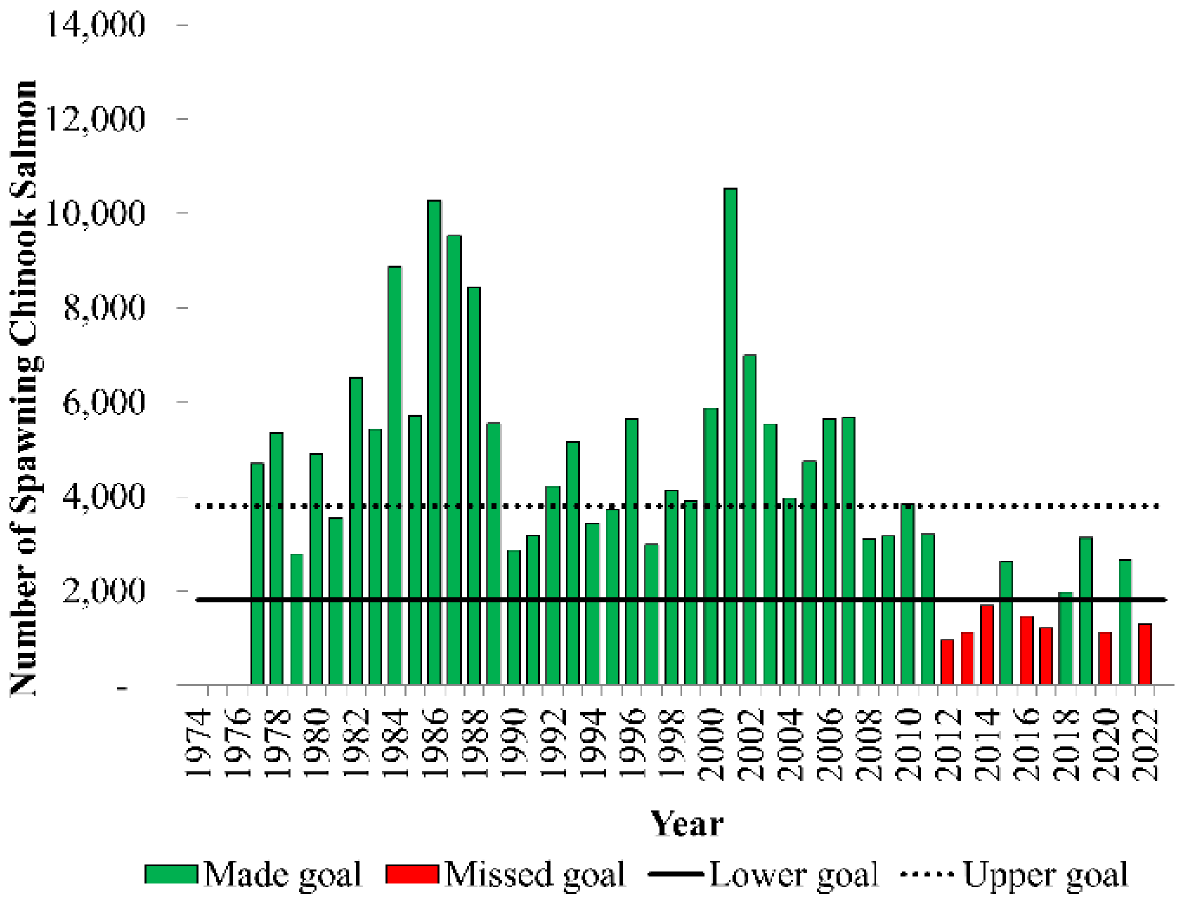

Figure 1. Unuk River Chinook Salmon escapements 1977 – 2022 from ADF&G's Chinook Research Project web page;https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative.main. Accessed July 4, 2023.

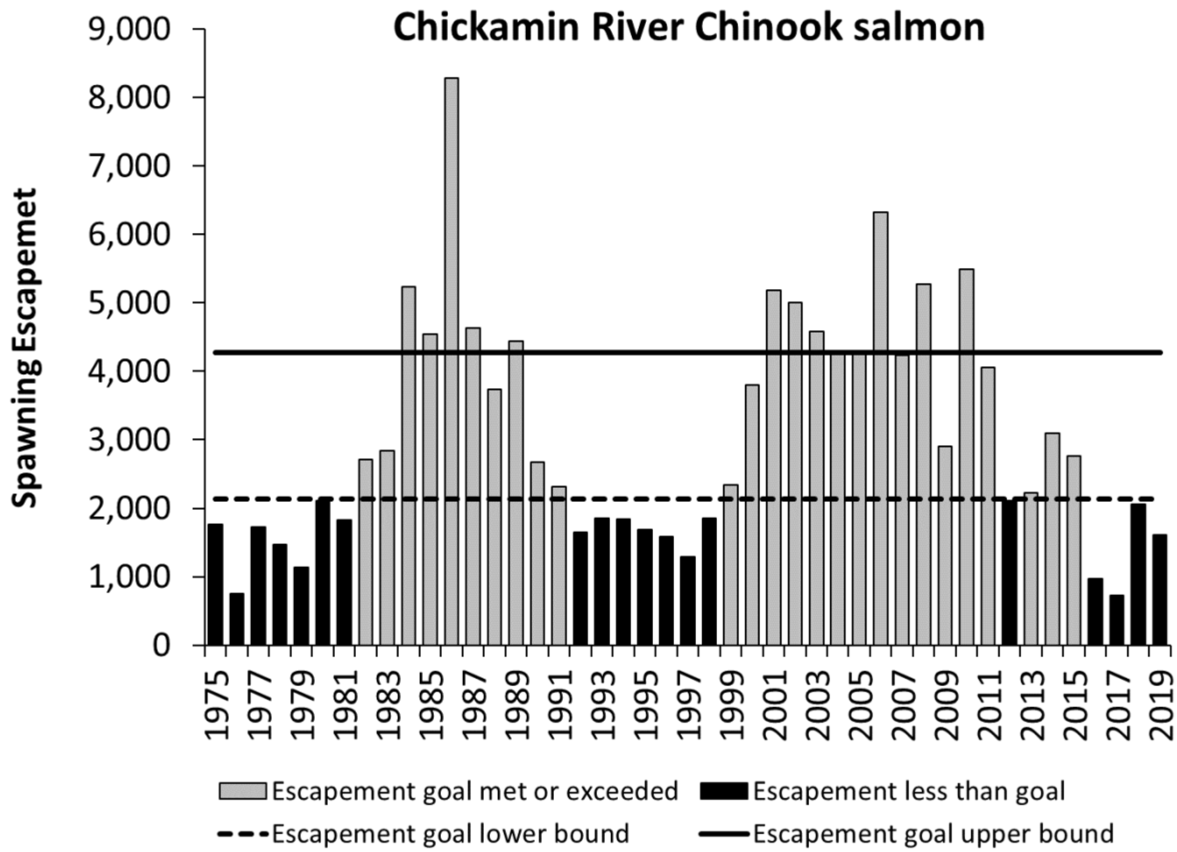

Figure 2.Estimated Chickamin River Chinook salmon escapements, 1975–2019, and biological escapement goal range of 2,150–4,300 large spawners.

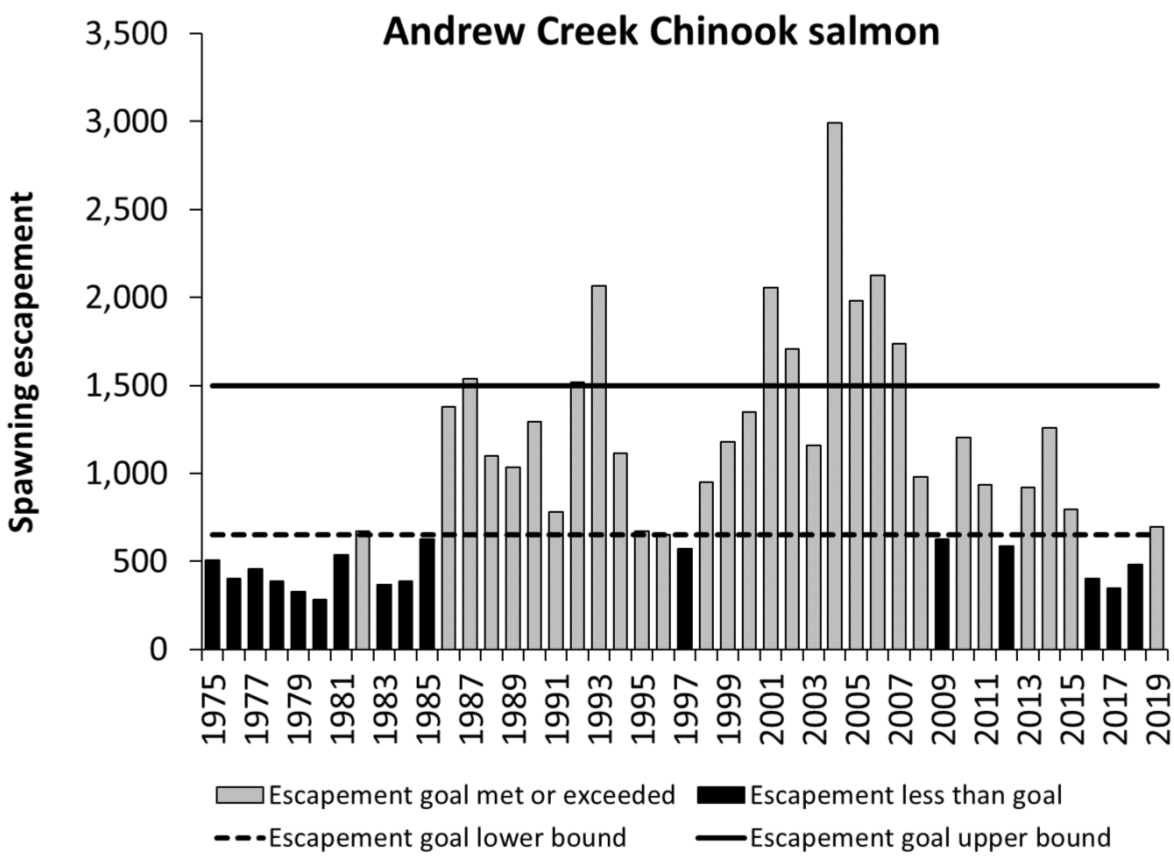

Figure 3.Estimated Andrew Creek Chinook salmon escapements, 1975–2019, and biological escapement goal range of 650–1,500 large spawners.

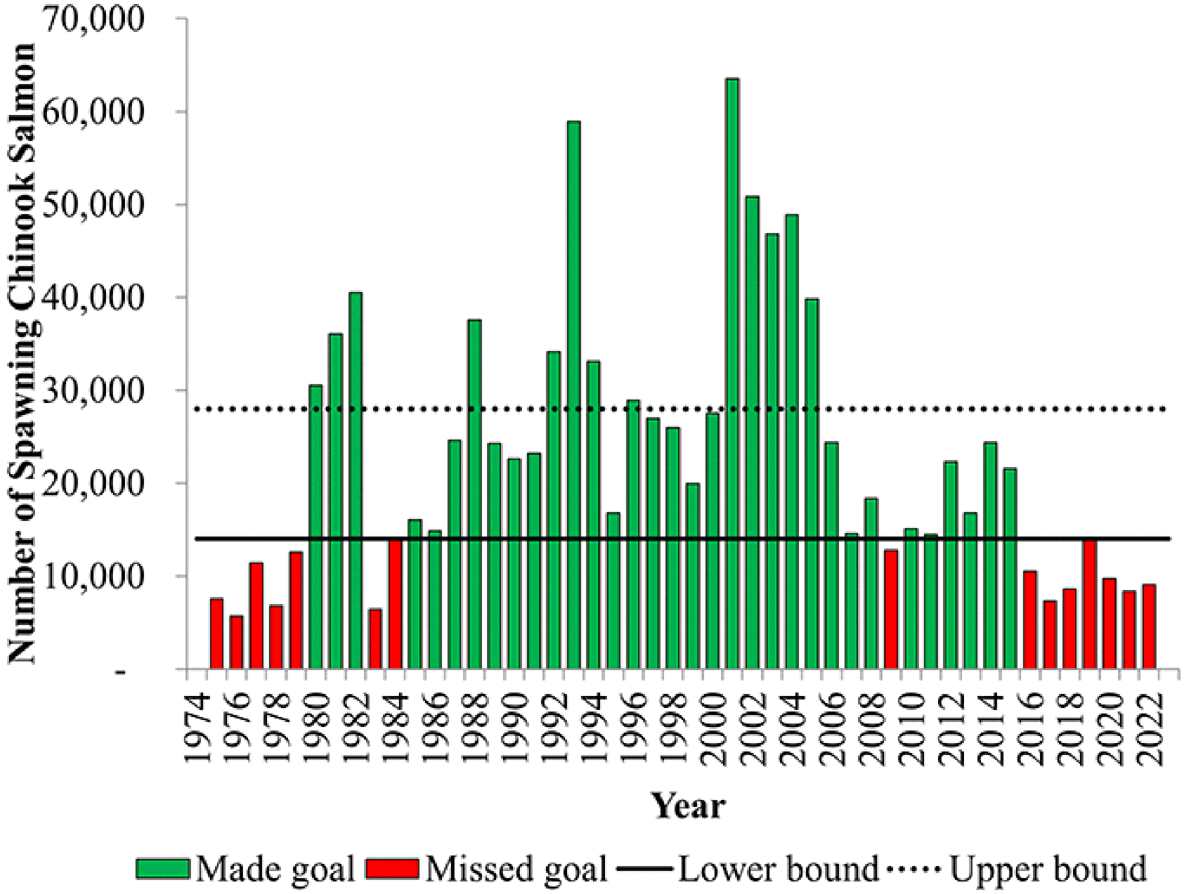

Figure 4. Stikine River Chinook Salmon escapements 1975 – 2022 from ADF&G's Chinook Research Project web page;https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative.main. Accessed July 4, 2023.

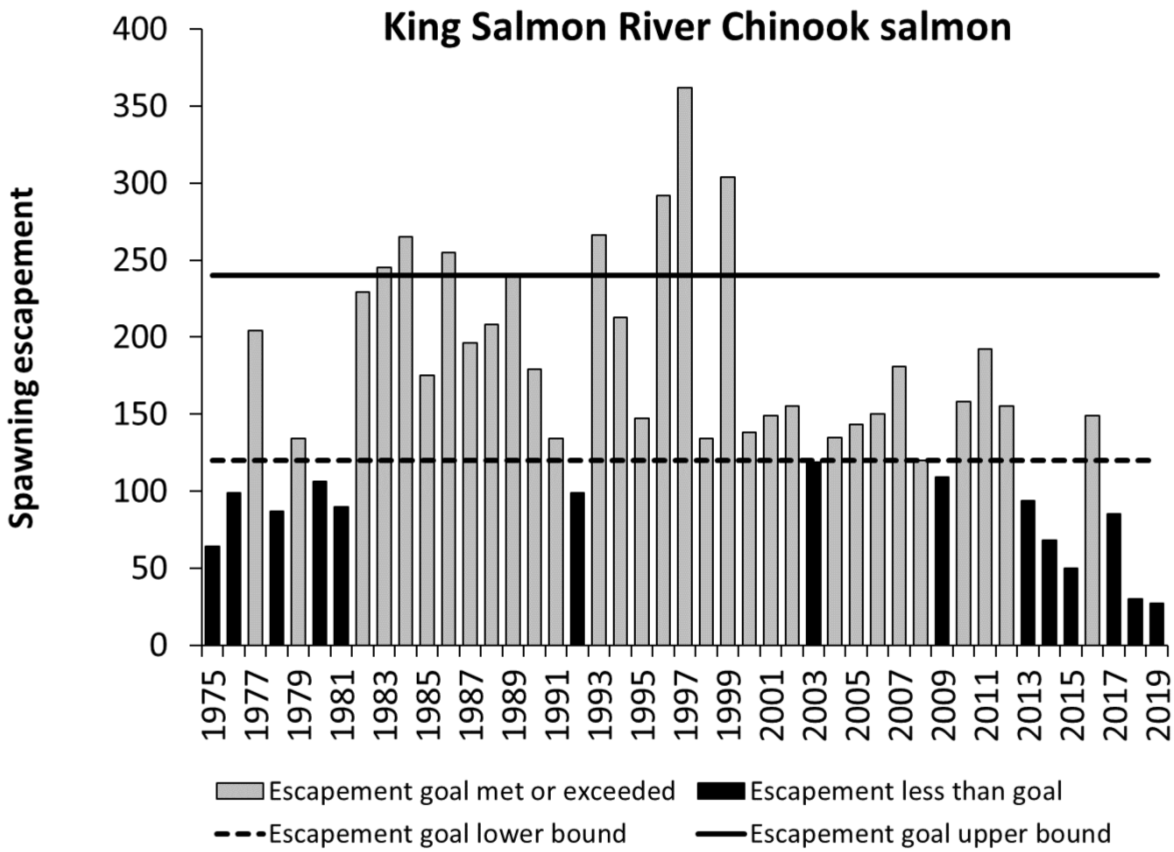

Figure 5.Estimated King Salmon River Chinook salmon escapements, 1975–2019, and biological escapement goal range of 120–240 large spawners.

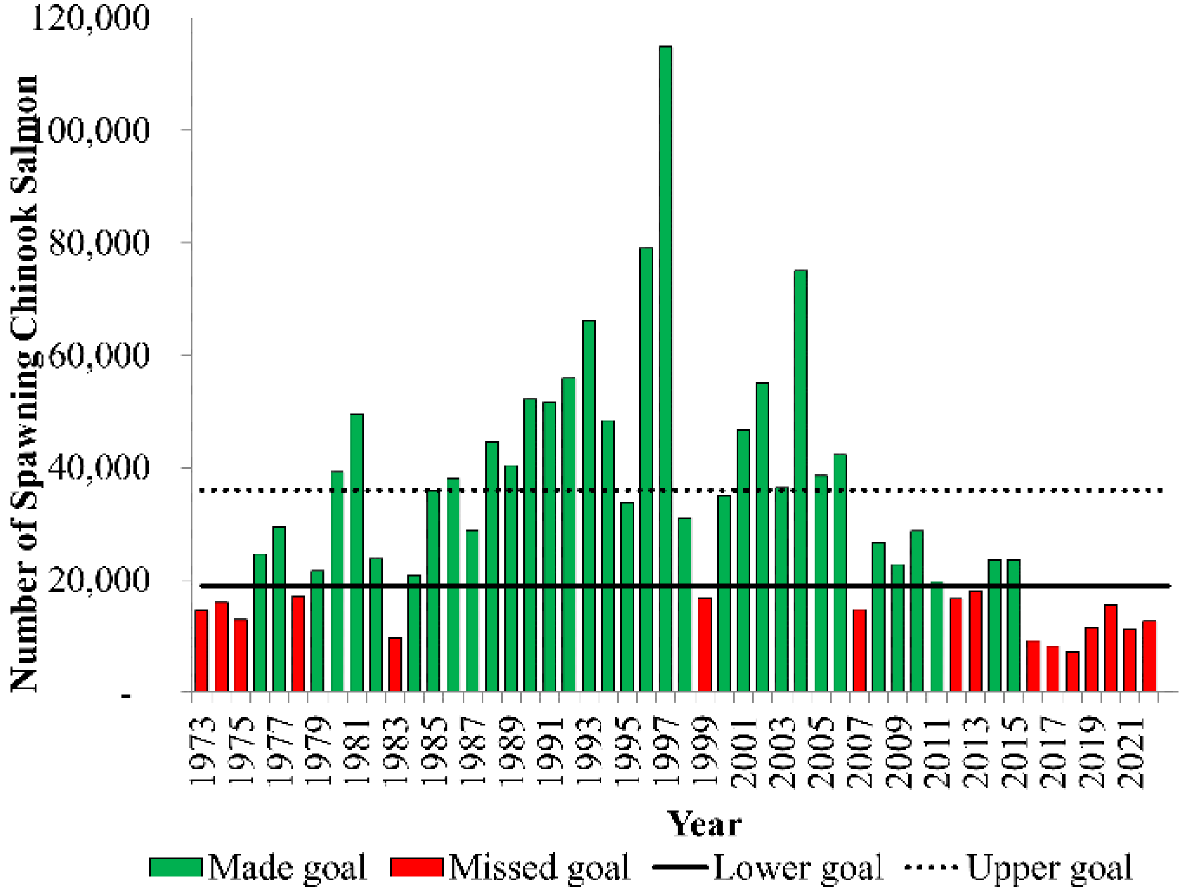

Figure 6. Taku River Chinook Salmon escapements 1975 – 2022 from ADF&G's Chinook Research Project web page; https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative.main. Accessed July 4, 2023.

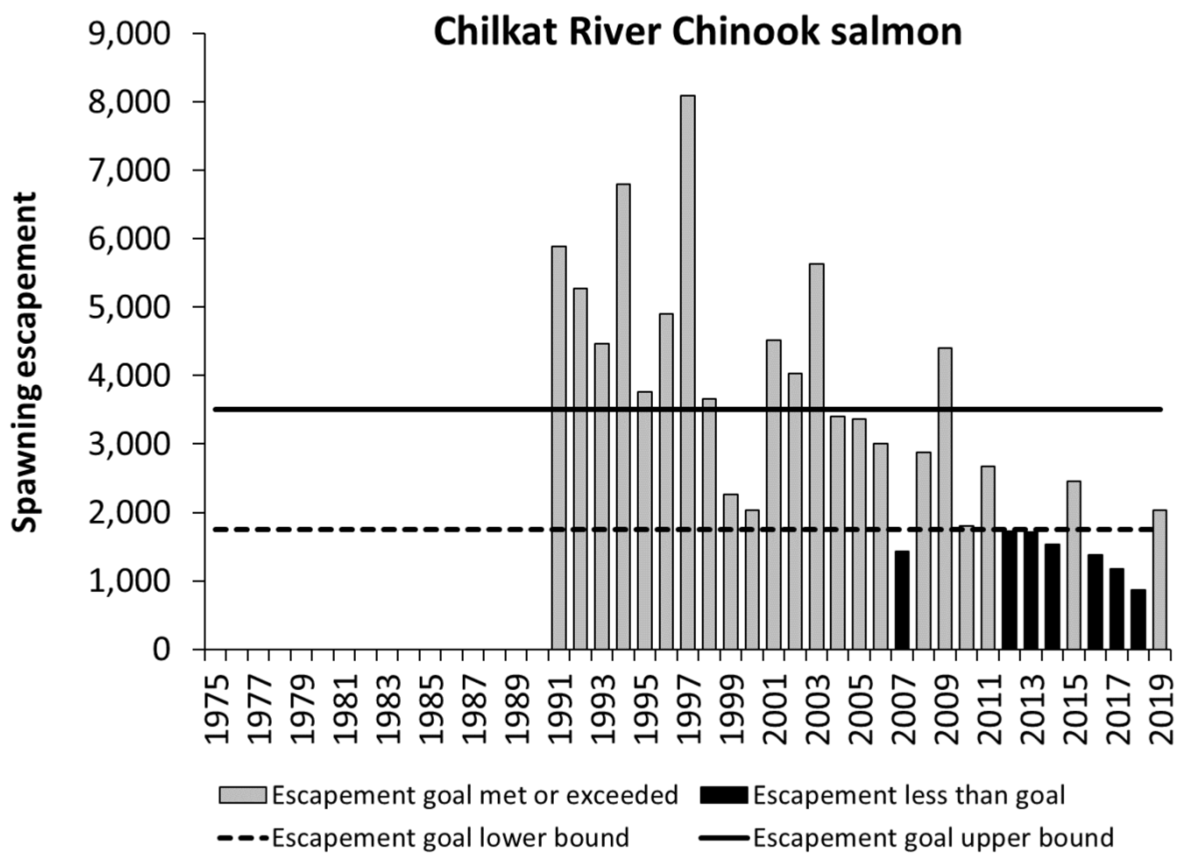

Figure 7.Chilkat River Chinook salmon escapements (mark–recapture estimates), 1991–2019, and biological escapement goal range of 1,750–3,500 large spawners.

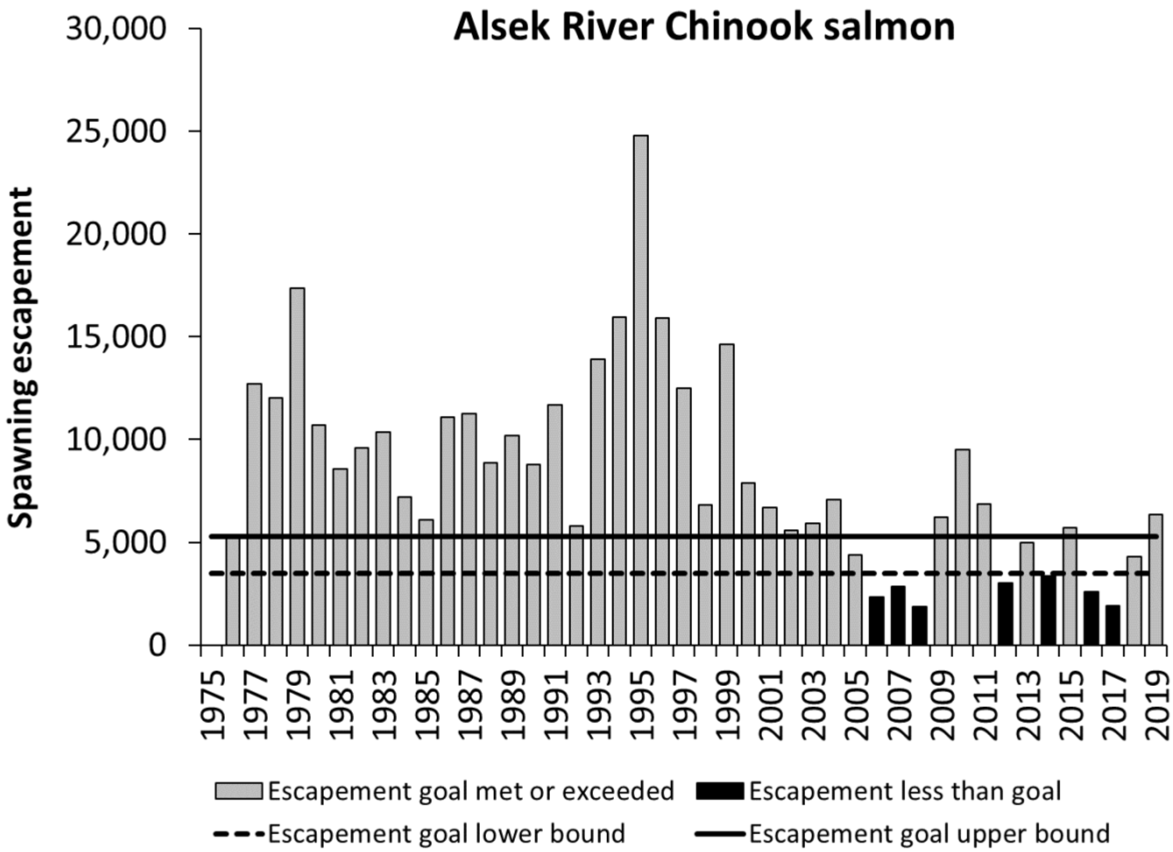

Figure 8.Estimated Alsek River Chinook salmon escapements, 1976–2019, and biological escapement goal range of 3,500–5,300 fish.

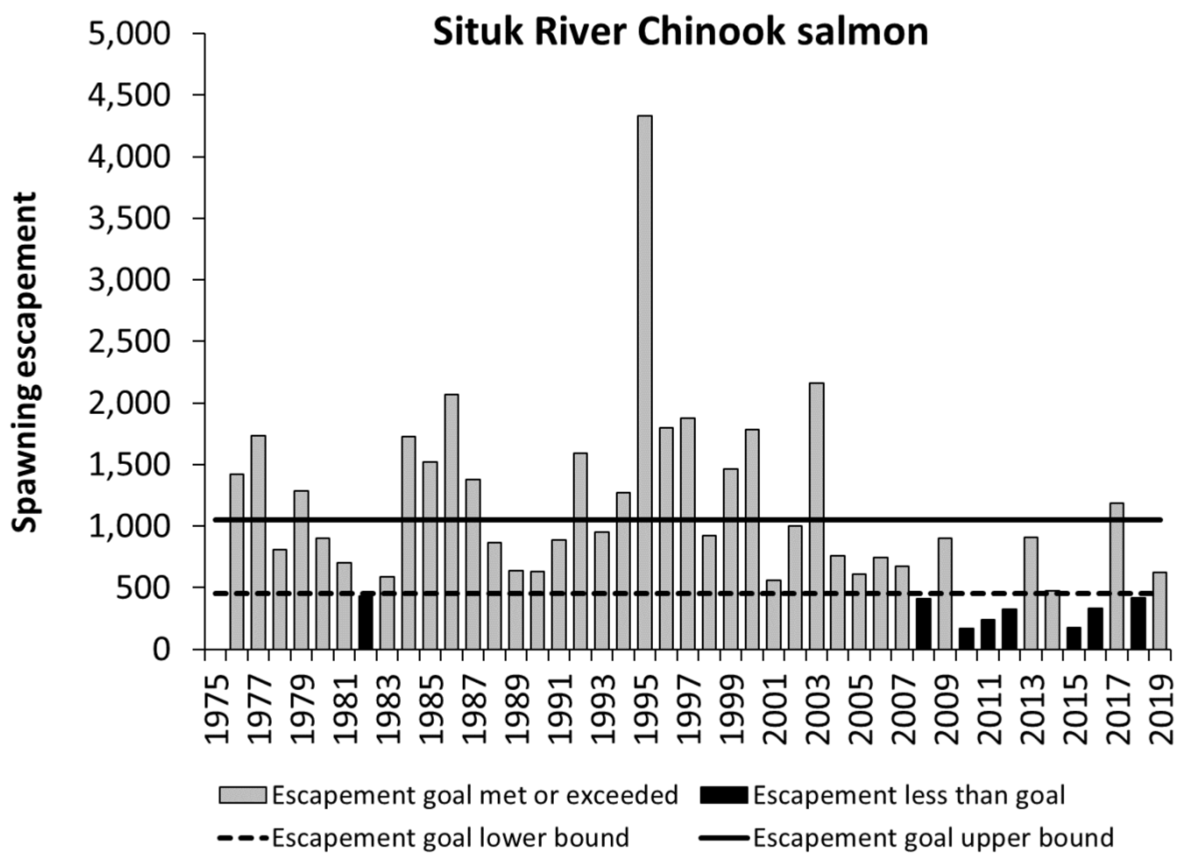

Figure 9.Situk River Chinook salmon escapements (weir counts), 1976–2019, and biological escapement goal range of 450–1,050 large spawners.

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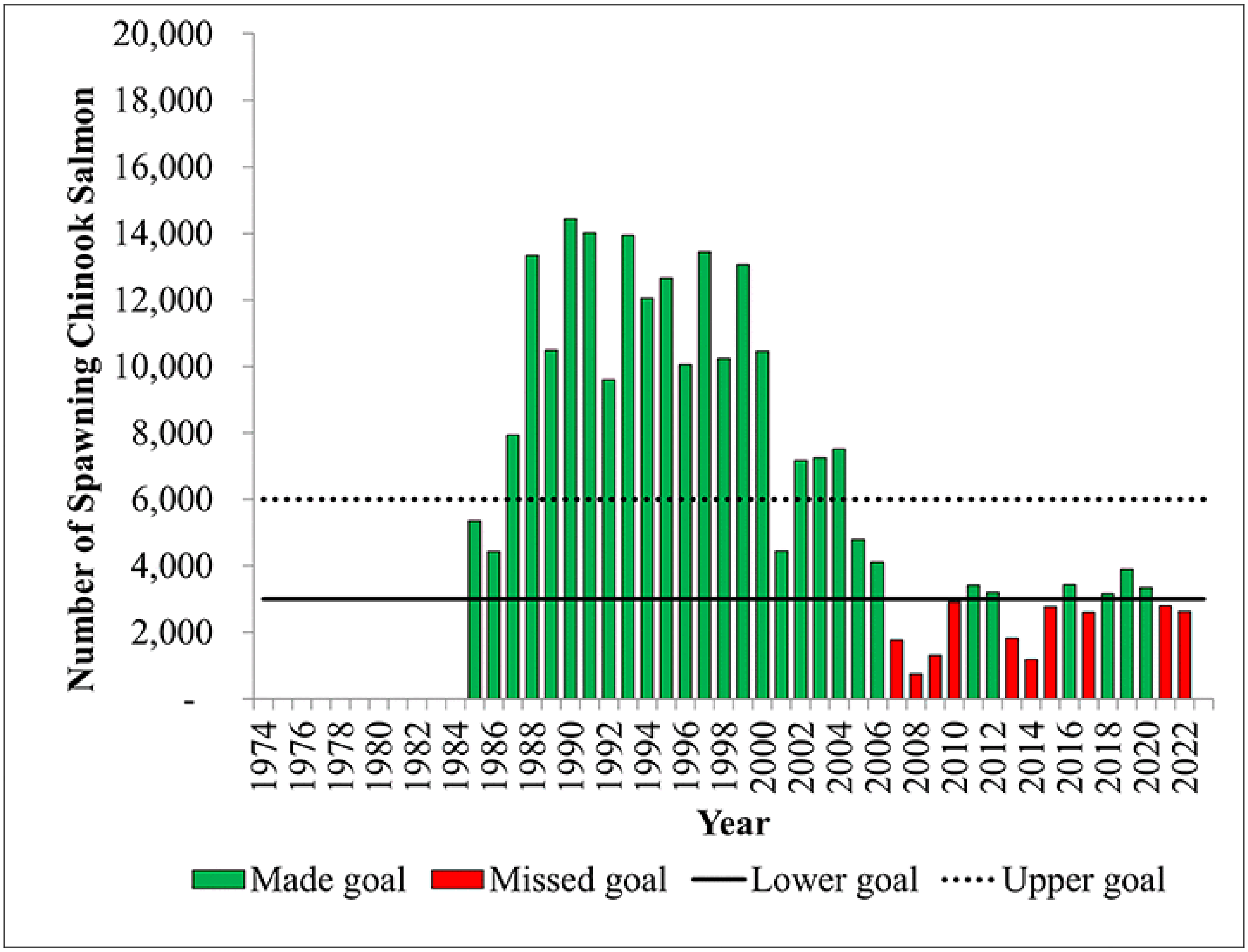

Figure 10. Karluk River spawning Chinook salmon from 1985 to 2022. From Chinook Salmon Research Initiative; https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative_karluk.historical.

The Three 2022 Actions Plan Reports

ADF&G issued three regional information reports for the stock status and action plans in 2022; RIR IJ22-13 for the Unuk River and Chickamin Creek; RIR IJ 22-15 for the Transboundary Stikine River and Andrews Creek, and RIR IJ 22-17 for the Transboundary Taku River, and the Chilcat and King Salmon rivers. Each report repeated several of the research and monitoring recommendations of the 2013 report, including, in particular, monitoring of the annual abundance of outmigrating smolts. This is a critical monitoring variable as it enables estimation of the per-spawner smolt production which in turn enables the estimation of smolt recruit per-spawner stock recruit models, as well as more robust estimation of smolt-to-adult return survival in the marine environment. (see for example, the 2013 report. Pages 9 – 11).

As far as we can determine, this critical recommendation has not been addressed for any of the Chinook populations designated as stocks of management concern and/or listed in the 2013 report. Currently, and at the time of the 2013 report, four rivers are monitored regularly to estimate smolt abundance indirectly by estimating adult recaptures of coded-wire tagged out-migrating smolts. Aside from questions about the accuracy and robustness of the derived smolt abundance from this approach, due to the multiple ages at maturity of Alaska Chinook this method requires several years of returning adult abundance estimates for any given brood year and associated year of smolt outmigration. So, yearly estimates of smolts-per-spawner (or per female spawner) are not possible. Further, the lack of annual estimates of total smolt abundance severely inhibits annual pre-season estimates of adult returns and also reduces the ability to detect annual changes in smolts-per-spawner. These shortcomings all inhibit the ability to manage large-scale fisheries and potential spawning escapements in the science-based precautionary manner that is warranted considering the data (e.g., Table 1 and figures above).

Notice of Petition

Petitioners Wild Fish Conservancy are petitioning to list Alaskan Chinook salmon (*Oncorhynchus tshawytscha*) as a threatened or endangered species and to designate critical habitat under the Endangered Species Act. The petitioners file this petition pursuant to § 553(e) of the Administrative Procedure Act ("APA), 5 U.S.C. §§ 551-559 and § 1533(b)(3) of the Endangered Species Act, and 50 C.F.R. part 424.14, which grant interested parties the right to petition for issuance of a ruling that ESA listing is warranted.

With this document we are requesting that NOAA-NMFS initiate a status review of Chinook in southern Alaska, which encompasses all Chinook populations that enter the marine environment of the Gulf of Alaska (GOA). This includes all populations on the southern side of the Aleutian Peninsula, Cook Inlet, and the coast of Alaska south of Cook Inlet to the southern end of the Alaska/British Columbia border.

A status review is warranted based on recent information concerning the productivity and escapement of numerous Chinook populations, including both stream-type and ocean-type Chinook. Climate change is having detrimental effects on streamflow and water temperature in freshwater and the marine rearing and migration environments. Habitat degradation is occurring through human activities, including logging and mining, and industrial fisheries take Chinook both directly and indirectly through commercial troll, net and trawl fisheries, and in recreational and subsistence fisheries. A lack of fundamental information and monitoring of Chinook smolt and parr abundance, changes in the marine food web due to massive releases of hatchery pink and chum salmon in southeast Alaska and the northwestern Pacific (Japan and Russia) that affect the invertebrate and forage fish populations on which Chinook forage, and a continuing lack of sufficient monitoring information and regulatory mechanisms to ensure effective conservation of these populations, all put these populations at risk of extinction. We summarize the available information below.

Contact information for petitioners:

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Legal Background

Definition of Evolutionary Significant Unit

The Endangered Species Act (ESA) defines "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 USC§ 1533(16), see also California State Grange v. National Marine Fish, 620 F.Supp 2d 1111, 1121 (ED Cal 2008). The ESA does not define the term "distinct population segment." Grange at 1121.

In 1991, the National Marine Fisheries Service ("NMFS") promulgated its "Policy on Applying the Definition of Species Under the Endangered Species Act to Pacific Salmon" or "Evolutionarily Significant Unit ("ESU Policy." (56 Fed.Reg.58612 (Nov. 20, 1991)). The ESU Policy provides that a population (or particular collection of populations) of Pacific salmonids is considered to be an ESU, and therefore considered for listing under the ESA, if it meets the following two criteria: (1) The population must be substantially reproductively isolated from other nonspecific population units; and (2) The population must represent an important component in the evolutionary legacy of the species. Isolation does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue and to be evolutionarily maintained in different population units. The second criterion is met if the population contributes substantially to the ecological and/or genetic diversity of the species as a whole (Waples 1991). Grange at 1123-24. That is, the loss of the population(s) would constitute a material diminishment of the ecological, life-history or genetic diversity of the species as a whole.

NMFS putatively considers all available lines of evidence in applying those criteria, including specifically data from DNA or genomic analyses (" ... data from protein electrophoresis or DNA analysis can be very useful because they reflect levels of gene flow that have occurred over evolutionary time scales."), ESU Policy, 56 Fed. Reg. at 58518; see also Definition of "Species" Under the Endangered Species Act: Application for Pacific Salmon, NOAA Tech Memo NMFS F/NWC-194 (Waples 1991) at p.8 ("The existence of substantial electrophoretic or DNA differences from other conspecific populations would strongly suggest that evolutionarily important, adaptive differences also exist."). The ESU Policy is an interpretation by NMFS of what constitutes an ESA-listable "distinct population segment" (DPS), and is a "permissible agency construction of the ESA." Grange at 1124, citing Alsea Valley Alliance v. Evans, 161 F. Supp 2d 1154, 1161 (D.Or. 2001).

Listing an ESU as an Endangered or Threatened

When considering whether a species or subspecies, including an ESU, is endangered or threatened, NMFS must consider:

i. The present or threatened destruction, modification, or curtailment of its habitat or range;
ii. Overutilization for commercial, recreational, scientific, or educational purposes;
iii. Disease or predation;
iv. The inadequacy of existing regulatory mechanisms; or
v. Other natural or manmade factors affecting its continued existence.

16 U.S.C. § 1533(a)(l). The species shall be listed where the best available data indicates that the species is endangered or threatened because of any one, or a combination of, those five factors. 50 CFR § 424.11 (c).

Best Available Science Supports listing of at least one Alaskan ESU of Chinook Salmon

Southern Alaska Chinook constitute one or more Distinct ESUs

Since no Alaska Chinook populations have previously been petitioned for listing under the ESA, Alaskan Chinook population structure has not been characterized in terms of ESUs. Designation of Chinook ESUs is therefore a first step in the development of a status review on the basis of which the merits of listing one or more ESUs under the ESA can be evaluated. Basic life-history and differences in the spatial structure of Alaska's numerous Chinook populations suggests that populations in southern Alaska are likely to form one or more ESUs distinct from Bering Sea populations from Bristol Bay, Yukon, Kuskokwim, and Norton Sound.

Ecology and Biology of Southern Alaska Chinook Description

Adult Chinook salmon are the largest of all Pacific salmon, typically measuring 36 inches in length and often exceeding 30 pounds at maturity; many adults exceed 40 pounds. Chinook salmon vary in size and age of maturation, with smaller size related to longer distance migration, earlier timing of river entry, and cessation of feeding prior to spawning. As length corresponds to age, two year-old adults tend to be around 40 centimeters long, and six year-old adults often measure one meter in length (Healey 1991).

Chinook salmon have a different appearance depending on location and lifecycle. In the ocean, the Chinook salmon are a robust, deep-bodied fish with bluish-green coloration on the back which fades to a silvery color on the sides and white on the belly. Adult Chinook have black irregular spotting on the back and dorsal fins and on both lobes of the caudal or tail fin. Adults are distinguished from other sympatric salmonid species by the spotting on the caudal fin and the black coloration of their lower jaw (Moyle et al. 2008). When Chinook spawn, their physical appearance changes; colors of spawning Chinook in freshwater range from red to copper to deep gray, depending on the location and degree of maturation. Males typically have more red coloration than females, which are typically gray. Older adult males (4-7 years) are distinguished by their "ridgeback" condition and by their hooked nose or upper jaw. Females are distinguished by a torpedo-shaped body, robust mid-section, and blunt noses.

Juvenile Chinook in fresh water are camouflaged by silver flanks with parr marks (darker vertical bars or spots) which are bisected by the lateral line. Chinook fry are 30-45 mm and fingerlings are 50-120 mm in fork length (Healey 1991). When juvenile Chinook go through smoltification to prepare physiologically for life in the ocean, they change to a more silvery color and their scales and tails lengthen (Healey 1991). Smolts have bright silver sides and their parr marks recede to mostly above the lateral line.

Distribution

Southern Alaska Chinook salmon inhabit coastal river basins in Alaska, from the southern end of the Aleutian Islands south to the Alaska/British Columbia border.

Life Cycle and Physiology

Chinook salmon are anadromous, migrating from the ocean upstream to the freshwater streams of their birth; and semelparous, dying after one spawning episode. Chinook salmon grow through six basic life history stages: eggs, alevins, fry, parr, smolts, and adults. Eggs are laid in stream gravels in spawning beds, or redds. Alevins are yolk sac larvae that hatch from the eggs and remain buried in spawning gravels until the yolk sac is absorbed. Fry are free swimming post-larvae young that emerge from spawning gravels and begin feeding in the stream or migrate from it. Parr are young salmon adapted to freshwater. Smolts are young salmon that have undergone the physiological, biochemical, morphological and behavioral changes, called smoltification, that allow them to live in salt water in the ocean. Chinook salmon reach adulthood in the ocean, typically attaining maturity at the age of 4 - 6 years, then migrating into freshwater to repeat the cycle. For stream-type Chinook having one year of freshwater growth after emerging from the spawning gravel (yearlings), Chinook that mature at ages 4 to 6 experience 3 to 5 years of marine growth, respectively, when age is calculated from emergence from the spawning gravel, instead of from summer/fall egg deposition. Ocean-type Chinook, having only weeks to one or two months of freshwater growth (subyearlings) that mature at ages 4 to 6 experience 4 to 6 years of marine growth, respectively.

Within this general life history Chinook display a broad array of tactics that include: variation in age at seaward migration; variation in length of freshwater, estuarine, and oceanic residence; variation in ocean distribution and ocean migratory patterns; and variation in age and season of spawning migration, and variation in sex-specific age-at-maturity. Differences in Chinook salmon life history are best explained by the timing of their spawning migration (i.e., spring-run, summer-run, fall-run, late fall-run or winter-run), the length of their juvenile residence in freshwater (i.e., subyearling or yearling or older smolt migration), the sizes and ages of mature adults, and the sex ratio of returning adults. These differences result in a variety of smoltification and maturation strategies.

Adult early migrating Chinook typically enter southern Alaskan streams from March through June (ADF&G 2013). Chinook adults require deep holding pools proximate to spawning areas, where they hold for a week or more prior to spawning; this holding period occurs during the summer. Spawning of Alaska Chinook can occur as early as mid-July, but primarily runs from August to September (ADF&G 2013).

Chinook require about 258 square feet or more of well oxygenated gravel per spawning pair (Burner 1951). Female Chinook defend their redd after spawning is begun. Early in the spawning period they can stay on the redds for about two weeks, while their residence late in the season is only 4-5 days. Spawning adults can be chased off redds easily by minor disturbances, which if they occur frequently enough can result in death of the adult prior to successful spawning. Eggs are laid in depressions excavated on the bottom of streams in shallow river reaches. Chinook eggs are the largest of all Pacific salmon species with a small surface-to-volume ratio, making them more sensitive to reduced oxygen levels than other Pacific salmon.

Several months after egg deposition, in the late spring, juvenile Alaska Chinook emerge from the gravel. Adequate water flows through the spawning gravels is essential for egg and alevin survival. Stream conditions, particularly those affecting subgravel flows, can have a dramatic effect on the survival of eggs to hatching and emergence. Any increases in siltation in spawning beds can cause high mortality (Healey 1991). At the time of emergence, fry generally swim or are displaced downstream, although some fry are able to maintain their residence at the spawning site.

Downstream migration of smolts peaks between May and July, depending on stream temperature (Roper 1995). Juveniles rear in estuaries or lower river mainstems, using deep riffles, woody debris and shoreline riparian vegetation for cover and feeding areas (Kostow 1995). Ocean-type Chinook salmon tend to utilize estuaries and coastal areas more extensively for juvenile rearing (Myers et al. 1998). Perhaps the most significant process in the juvenile life history of Chinook salmon is smoltification, or the physiological, morphological, and behavioral changes associated with the transition from freshwater to marine existence.

Alaska Chinook mature and return to natal streams primarily after 3 to 5 (or more) years of rearing in the marine environment at ages of 4 to 6 years, although occasional jack males returning at 3 years of age (after 2 years of marine rearing) are not uncommon.

Importance of age structure for Alaska Chinook

The age structure of adult Chinook is critically important to the productivity and resilience of Chinook salmon populations. This is especially the case for females. For females, fecundity is strongly positively correlated with size (body length and weight), which in turn is strongly positively correlated with age. Older females are generally larger and more fecund than younger females. In addition, older females generally have larger eggs that are better provisioned with energy resources, giving emergent fry and parr higher survival than those from smaller eggs of younger females. (Healy 1991; Quinn 2005). In addition, older, larger-bodied females are the only spawners capable of spawning in deep, fast water habitats with large substrates; thus, loss of these spawners is a direct loss of population capacity and productivity. With climate change, these life history strategies are important to the resilience, life-history and genetic diversity, and rebuilding potential of Alaska Chinook.

The body size and age-at return of Alaska Chinook have been declining across most populations for more than two decades (Lewis et al. 2015). Data from the Taku River from Richards and Williams (2018) provide particularly concerning data. The size of age 6 females has declined dramatically since 2008. Up to 2008, age-6 females had a mean mideye-to-fork (MEF) length of 850 millimeters (mm). From 2009 to 2016, the average MEF declined to 800 mm. Similar but weaker trends were observed for age 4 and 5 female spawners (Richards and Williams 2018, slides 22 and 23). Exacerbating the significant declines in mean body length of age 6 females is a strong decline in the proportion of the spawning population composed of age 6 females. During the period from 1988 to 2011: from 30% to 55% up until the late 1990s to 20% and less in the mid-2000s (Richards and Williams 2018, slide 23).

The declines in the size and age of females spawners in the Taku is likely to be similar for many, if not most, of Alaska's Chinook population, including those that have been identified by ADF&G as stocks of management concern.

These declines indicate that during the past two decades or more there has been a continuing decline in the total egg deposition represented by large females. This implies that spawner escapement goals related to maximum sustainable yield (MSY) or other management targets determined in the recent past are not achieving target egg deposition. This further implies that escapement goals need to be increased in order to achieve the requisite expected total egg deposition that may achieve management total adult return targets. To achieve recovery under the ESA, it is likely that spawner escapement goals may need to be further increased above estimated MSY levels (see, e.g., Lichatowich and Gayeski 2020).

Habitat Requirements

Because of the variety and large array of habitats Chinook salmon utilize, they require a number of particular conditions in order to survive and reproduce. Chinook salmon habitat use and requirements are best studied for their time spent in freshwater, although estuarine and ocean conditions are also significant to survival and viability. Human activities can significantly degrade freshwater and estuarine habitat suitability.

Migration and Spawning Habitat

During upstream migration, adult Chinook are in a stressed condition due to their reliance on stored energy to complete their journey upstream, leaving them highly susceptible to additional environmental stressors. Although adult upstream migration distances for Southern Alaska

Chinook are relatively short compared to some salmon migrations in larger river systems, migration can still require considerable effort.

Chinook salmon require access to spawning habitat in mainstem rivers and tributaries, cold water, cool pools in which to hold, clean spawning gravel, and particular dissolved oxygen levels, water velocities, and turbidity levels in order to successfully migrate and spawn. Access to spawning habitat is threatened by migration barriers, dams, and water diversions. Variability in water flows can prevent Chinook salmon access to certain streams for spawning. During migration and spawning, low water temperatures are crucial to the success of Chinook salmon.

According to McCullough (1999), adults are more sensitive to higher temperatures than juveniles, as higher temperatures can increase the adults' metabolic rate and deplete their energy reserves, weaken their immune system, increase exposure to diseases, and slow or prevent migration. Water temperatures at or above 15.6ºC can increase the risk of onset and severity of diseases (Allen and Hassler 1986). Healthy and intact riparian vegetation is critical, as it provides much needed root strength to stabilize stream margins and floodplains, and shade to keep water cool (Moyle 2002) and help create "thermal refugia" in which migrating Chinook salmon can escape high temperatures (Berman and Quinn 1996; Torgerson et al. 1999; Gonia et al. 2006). The presence of cold water is threatened by dams, water withdrawals, and channel alterations, as well as logging and mining which decreases riparian vegetation and alters groundwater dynamics.

Spawning occurs primarily in low gradient habitats with large cobbles loosely embedded in gravel and with sufficient flows for subsurface infiltration to provide oxygen for developing embryos (Healy 1991; Moyle et al. 2008). Optimal spawning temperatures for Chinook salmon are less than 13°C (McCullough 1999). Migrating adults also need dissolved oxygen levels above five mg/l, deep water (deeper than 24 cm), breaks from high water velocity, and water turbidity below 4,000 ppm (NRC 2004). Spawning gravel also must be free of excessive sediment such that water flow can bring dissolved oxygen to the eggs and newly hatched fish. With too much sediment, incubating eggs are smothered and reproductive success rate declines significantly. Logging, mining, and other human activities can increase inputs of fine sediment in Chinook spawning habitat and significantly reduce fry emergence rates and embryo survival.

Juvenile Rearing Habitat

During rearing and juvenile out-migration, Chinook require certain temperatures, habitat diversity, and water quality characteristics. After hatching, juvenile Chinook require rearing habitat before making their migration to the estuary and onto the ocean. Ideal fry rearing temperature is estimated at 13ºC and temperatures above 17ºC are linked with increased stress, predation, and disease. High water temperatures can prevent smoltification, an essential process that prepares fish to leave freshwater habitat (McCullough 1999).

During juvenile rearing and downstream dispersal, Chinook are vulnerable to low flow and high temperature conditions, which can prevent them from reaching their destinations and significantly increase mortality during migration (Moyle et al. 1995; Trihey and Associates 1996). Stream temperature during out-migration is critical, as prolonged exposure to temperatures of 22-24ºC has resulted in high mortality for migrating smolts, and juveniles who transform into smolts above 18ºC may have low survival odds at sea (Baker et al. 1995; Myrick and Cech 2001). Hence, where and when necessary, juvenile Chinook salmon also seek out and exploit localized cool water refugia that offer relief from warm ambient water temperatures in summer (Sauter et al. 2001; Belchik 2003; Ebersole et al. 2003; Sutton et al. 2007)

Riparian vegetation provides relief for juvenile Chinook from high temperatures, as well as shelter from predators (Moyle 2002). Logging, mining (and associated toxic contamination of waters), fossil fuel development, and other extractive industries can all reduce streamside vegetation and negatively affect the quality of juvenile rearing habitats. Habitat diversity is important for juvenile Chinook survival, as juveniles face predation by fish and invertebrates, as well as competition for rearing habitat from other salmonids, including hatchery Chinook (Healey 1991; Kelsey et al. 2002). Chinook require the correct grades of gravel, the right depths and prevalence of deep pools, the existence of large woody debris, and the right incidence of riffles (Montgomery et al. 1999). This allows for a variety of habitats which are required by Chinook at different life stages.

Chinook fry may compete for shallow water rearing habitat with hatchery fish. Increased river flows mitigate this competition and help Chinook survival by increasing habitat on the river's edge, where fry (under 50 mm) feed and hide from predators (NRC 2004).

As juvenile Chinook migrate down river, they prefer boulder and rubble substrate, water velocity slower than 30 cms-1 (Healey 1991). These conditions allow juveniles to use the faster-moving water in the center of the river for drift feeding, while resting in the slower areas (Trihey and Associates 1996). Smaller fish tend to stay in the slower-moving water near the banks of the river. Logging can increase turbidity, and climate trends increase the frequency and size of flood peaks scouring redds and/or prematurely displacing fry and young parr.

Juvenile Chinook require high levels of dissolved oxygen (DO). Low DO levels decrease alevin and fry survival; decrease successful Chinook egg incubation rates; decrease the growth rate for surviving alevins, embryos, and fry; force alevins and juveniles to move to areas with higher DO; and negatively impact the swimming ability of juvenile Chinook (NCWQCB 2010). If DO levels average lower than 3-3.3 mg/L, 50% mortality of juvenile salmonids is likely, while in water above 20°C, daily minimum DO levels of 2.6 mg/L are required to avoid 50% mortality.

Once juvenile Chinook reach the estuary, smolts prefer near shore areas near the mouth of the river (Healey 1991). Juveniles change location with the tide as the salinity of the water changes.

Ocean Habitat

Once Chinook enter the ocean, most reside at depths of 40-80 meters (Healey 1991). Some research suggests that unlike most stream- and ocean-type Chinook further south, Alaska Chinook may exhibit either relatively local, within or near to state marine waters whether stream- or ocean-type or migrate further offshore including regions outside of Southeast Alaska. In the marine environment, Chinook salmon require nutrient-rich, cold waters associated with high productivity and higher rates of salmonid survival. Warm ocean regimes are characterized by lower ocean productivity which can affect salmon by limiting the availability of nutrients regulating the food supply and increasing the competition for food. Climate and atmospheric circulation conditions can affect these conditions (NMFS 1998c). In order to survive in the marine environment, Chinook salmon also require favorable predator distribution and abundance. This can be affected by a variety of factors including large scale weather patterns such as El Niño and more generally, marine heatwaves (e.g., Cheung and Frolicher 2020, Jones 2023). NMFS (1998c) cites several studies which indicate associations between salmon survival during the first few months at sea and factors such as sea surface temperature and salinity.

The role of changing ocean conditions in influencing survival of south Alaska coast Chinook and other salmon is considerable. However, predictive understanding of marine survival of wild Alaska Chinook salmon is elusive, in part due to fluctuating ocean conditions, but also because few data are collected on marine survival of wild populations.

Sharma and Liermann (2010) concluded that change in sea surface temperature anomalies reflected in the El Niño phenomenon in recent decades have produced ocean conditions increasingly hostile to Chinook salmon. Kilduff et al. (2015) reported that survival rates of Chinook and coho salmon released from hatcheries along the Pacific coast of North America have shifted coherence from the Pacific Decadal Oscillation (Mantua et al. 1997) to a geographically different sea surface anomaly, the North Pacific Gyre Oscillation. Inter-annual El Niño events are still seen as the proximal event influencing ocean survival, but the expression of El Niños in relation to North Pacific circulation has apparently changed since the 1980s. These changes also are reflected in the status of other marine species (Kilduff et al. 2015). Changing ocean currents are also reflected in the changing behavior and influence of large-scale atmospheric circulation, which further influences marine food web productivity through advection and ocean deposition of continental dust that changes nutrient dynamics in the North Pacific Gyre (Letelier et al. 2019). Increasingly synchronous marine survival among numerous widely distributed salmon stocks suggests that more volatile Pacific-coast-wide fluctuations in salmon abundance are occurring (Kilduff et al. 2015).

The lack of marine survival and growth data for most wild stocks, including Alaskan Chinook, precludes a fuller understanding of the role their diverse life histories play in conferring resilience to fluctuations in ocean conditions. We do know as a rule that diversity of life history in salmon populations affords a critical buffer against such large-scale environmental variation (Schindler et al. 2010; Moore et al. 2010; Carlson and Satterthwaite 2011; Satterthwaite and Carlson 2015; Brennan et al. 2019).

Diet

Chinook salmon diet varies depending on growth stage. As alevins, young Chinook rely on nutrients provided by the yolk sack attached to the body until leaving the redd after a few weeks. After emerging from the gravel, young Chinook fry begin to feed independently. Juveniles feed in streambeds before gaining strength to make the journey to the ocean. During this time, fry feed on terrestrial and aquatic insects and amphipods. As juveniles migrate toward the ocean, they may spend months in estuarine environments feeding on plankton, small fish, insects, or mollusks. Small fry feed primarily on zooplankton and invertebrates, while larger smolts feed on insects and other small fish (i.e. chironomid larvae, chum salmon fry and juvenile herring; Healey 1991). At sea, where the bulk of feeding and growth is done, adult Chinook typically feed on small marine fish, crustaceans, and mollusks (i.e., squid). Adult Chinook grow quickly in the estuary and gain body mass during their time at sea, building fat reserves that are required for upstream migration and spawning. During the upstream migration and holding in fresh water, adult Chinook do not feed or properly digest food, and thus they rely on stored energy.

Natural Mortality

Alaska Chinook salmon, like other salmon are preyed upon by a wide variety of predators in freshwater and saltwater. However, their presence in freshwater as large-bodied adults during relatively low streamflow conditions makes them especially vulnerable to inland predators. Other natural mortality factors about which little is known include disease, and natural catastrophes such as large natural landslides, earthquakes, forest fires and volcanic eruptions.

Taxonomy

Chinook salmon (*Oncorhynchus tshawytscha*) are in the genus Oncorhynchus (order Salmoniformes, family Salmonidae), which contains all Pacific salmon.

Population Structure and Significance of Life History Variation

Stream-type populations represent a major contribution to life history variation in Chinook salmon at the species level, but also at the level of river-specific stocks. Life history variation within species, and both among and within populations, is now widely recognized as a critical factor in determining salmon viability, productivity, and resilience in the face of environmental fluctuations. Diversity of life history in salmon populations affords a critical buffer against both large-scale and local environmental variation (Schindler et al. 2010; Brennan et al. 2019). The loss of life history diversity in Chinook salmon, whether by decline or extirpation of local populations, or by demographic dominance of hatchery-reared fish, leads to increasing synchronicity of population fluctuations, hence reduced resilience and productivity, and increasing risk of local extinctions (Moore et al. 2010; Carlson and Satterthwaite 2011; Satterthwaite and Carlson 2015).

Chinook with different life histories also face different conditions in the marine environment, so they may be affected much differently by effects of changes in marine currents and temperatures, food web conditions and predation. Moore et al. (2004) identified early and late adult return timing as one of several life history variations that contributed to dampening fluctuations in population abundances and biomass via portfolio effects in steelhead populations in British Columbia. This observation constitutes a specific example of the “portfolio effect” of within-basin diversity that confers stability, spreads risk of stresses and threats, and sustains the productive capacity of salmon populations (Brennan et al. 2019). A critically important component of the within-population portfolio effect is the presence of multiple ages at maturity, which enhances the resilience of a population to environmental variation in marine conditions by spreading the risk of any year’s cohort encountering particularly adverse marine rearing and migratory conditions.

The role of adult salmon carcasses in spawning areas in transferring important marine nutrients to often nutrient-limited freshwater and inland riparian ecosystems is today well-recognized (Cederholm et al. 1999; Gresh et al. 2000; Zabel and Williams 2002; Peery et al. 2003; Scheuerell et al. 2005; Schindler et al. 2010). The increased spatial and temporal dispersion of Chinook salmon furthered by the presence of spring-run ecotypes, particularly in wild populations, supports this natural ecosystem enrichment function. An integral part of this nutrient transfer is the role that spawning and post-spawning spring- and summer-run Chinook play in providing a reliable natural food resource for other animals: guilds of predators and scavengers, including many birds, mammals, fishes, and invertebrates (Cederholm et al. 1999; Minikawa et al. 2002; Peery et al. 2003; Schindler et al. 2010; Field and Reynolds 2013). Some northeast Pacific orcas are strongly selective foragers on Chinook salmon (Ford and Elli 2006), such that the contribution of Chinook salmon to overall stability and abundance of the species at sea could play a significant role in orca health and survival.

Status

Historical baseline

John Cobb, in his summary of Pacific fisheries published in 1930 reports total catch by species in each pacific state in the year 1918. In that year, an estimated 16,010,746 pounds of Chinook salmon were landed, based on an assumed average of 22 pounds per-Chinook (Cobb 1930). Seines, gill nets, pound nets, and hook and line were all gears used to capture the 727,761 Chinook recorded. This important historical baseline regarding the average size of Chinook landed has been shifted towards considerably smaller sizes (weights) in the last several decades, as documented for Alaska Chinook by several recent publications (Lewis et al. 2015, Ohleberger et al. 2018, Oke et al. 2020). The below table summarizes cannery pack of king salmon in Alaska from 1898 to 1919.

PACK OF CANNED SALMON IN ALASKA FROM 1898 TO 1919, BY SPECIES (COBB 1930)

YEAR	King, or spring.	
	Cases	Value
1898	12,862	.....
1899	23,400	.....
1900	37,715	.....
1901	43,069	.....
1902	59,104	.....
1903	47,609	.....
1904	41,956	.....
1905	42,125	$141,999.00
1906	30,834	$116,222.00
1907	43,424	$181,718.00
1908	23,792	$99,867.00
1909	48,034	$207,624.00
1910	40,221	$214,802.00
1911	45,518	$295,088.00
1912	43,317	$243,331.00
1913	34,370	$139,053.00
1914	48,039	$241,105.00
1915	88,251	$408,226.00
1916	65,873	$353,420.00
1917	61,951	$644,447.00
1918	49,226	$485,295.00
1919	151,733	$1,820,796.00

Basin Summaries of Population Status and Threats

Southern Aleutian Island Watersheds

Chignik River

As shown in Table 1, the Chignik population has a BEG (biological escapement goal) range of 1300 to 2700 large (MEF >660 mm Fork length (FL). The lower bound of this goal has been missed in 2 of the 6 years from 2014 to 2019. The Chignik Chinook population was listed as a stock of management concern in 2023 (ADF&G 2023).

Cook Inlet Populations

Jones et al. 2020 provide a detailed examination of spawner escapement and productivity (log recruits-per-spawner) for data for 15 Cook Inlet Chinook populations up to 2015. These are graphically summarized in Jones et al. 2020, figures S1 and S4. Here, we provide escapement data for two of these populations up to 2018, from the most recent ADF&G cook Inlet escapement analysis, McKinley et al. 2020.

Alexander Creek

Alexander Creek was listed as a stock of management concern in 2010 (ADF&G 2023). It has a recommended SEG of 1900-3700. McKinley et al 2020. Fishery Manuscript no. 20-02, page 12. Recent escapements, 2016 to 2018: 754, 170, 296, respectively (McKinley et al 2020, Appendix table A1).

Theodore River

The Theodore River was listed as a stock of management concern in 2010 (ADF&G 2023). It has an SEG of 500 to 1700. Recent escapements (incomplete counts), 2016 to 2018: 68, 21, 18, respectively. (McKinley et al 2020, Table 1). From 2007 to 2015, escapements have all been below the lower bound of the SEG, ranging from a low of 179 in 2012 to a high of 486 in 2007. In only 3 of these years (2007, 2013 and 2015) have escapements been greater than 400. (McKinley et al 2020 Appendix table A-21.

Populations whose status is reported in the three 2022 stock status and action plan reviews:

Unuk River

Unuk River was listed as a stock of management concern in 2017 (ADF&G 2023). It is located near Ketchikan and produces the largest run of Chinook salmon in southern southeast Alaska. It is one of four Chinook stocks "for which a full stock assessment program is conducted annually. Full stock assessment programs include coded-wire-tagging of juveniles, which, in combination with adult monitoring and sampling programs, provides estimates of smolt abundance, parr to smolt overwinter survival rates, marine survival rates (smolt-adult), total annual run size (escapement plus harvest by age), and total return, along with estimates of harvest (calendar year) and exploitation (brood year) rates (Meridith et al. 2022, page 2).

Chinook from this population rear predominately in the inside marine waters of southeast Alaska. Some also rear in the Gulf of Alaska and Bering Sea (ibid, Figure 2, page 23). As shown in Table 1 the lower bound of the BEG has not been attained in the four of the years between 2014 to 2019. Unuk Chinook are harvested in SEAK commercial and sports fisheries. Most of the troll harvest occurs in the spring season and averaged 15% between 2011 to 1917, and 4% in 2018 and 2019. Recently during this period, the winter troll fishery season has closed on March 15 "…to reduce harvest on early run Chinook salmon in all SEAK systems" (ibid. page 8).

Harvest rates in commercial drift net and purse seine fisheries (combined), which occur closer to coastal and terminal marine areas, averaged 11.1% from 2010 to 2017, 12.1% in 2018-19 (ibid, page 3). Thus, the harvest rate in these commercial fisheries appears to have increased during or following the implementation of the action plan in 2018.

Sports harvest occurs primarily from May through July. Since 2014, when restrictive measures in the terminal areas near Ketchikan were implemented, most harvest has occurred in June. Harvest rates averaged 8% "over the past 10 years and 5% over the most recent 5 years" (ibid. page 3).

Many of the non-troll commercial and sports fisheries in marine areas have included periods when Chinook non-retention regulations were implemented, thus requiring the release of all incidentally caught Chinook. However, in all three of these recent stock status and action plan reviews, no mention is given of Fisheries Related Incidental Mortality (FRIM), and hence no estimates provided numbers or rates of incidental Chinook mortality in any fishery when non-retention measures are in effect. Incidental mortality would be expected from multiple fisheries including, but not limited to, the Gulf of Alaska groundfish trawl fishery.

Despite these recent measures directed at reducing harvest rates on Chinook, the lower bound of Unuk escapement goals has not been met in 7 of the 11 years from 2012 to 2022 (Figure 3, page 11 above).

Chickamin River

The Chickamin River was listed as a stock of management concern in 2021. It is located near Ketchikan in south southeast Alaska and produces the second largest run in the region. Similar to the nearby Unuk River, Chinook from this population rear predominately in inside waters of southeast Alaska. Some also rear in the Gulf of Alaska and Bering Sea (Meridith et al. 2022, page 3). The Chickamin Chinook population has a BEG of 2150 to 4300 large females. As shown in Table 1 and Appendix Figure A4 above, the Chickamin has failed to achieve the lower bound of the BEG in the last 4 of the 6 years 2014-2019, despite similar recent reductions in commercial and sports harvest as the Unuk River population.

McKinley et al. 2022 (page 23) note that the "Chickamin River stock is part of the coastwide Chinook salmon genetic baseline (Shedd et al. 2021); however, identifying wild Chickamin River Chinook salmon is convoluted because these fish are used as brood stock for hatchery releases in SEAK. In addition, Chickamin River Chinook salmon cannot be distinguished from other SEAK wild stocks at this time". Such confounding of the genetic identifiability of Chinook populations in the south-southeast region due to the source of local wild populations as hatchery broodstock significantly compounds the ability of managers to identify harvest impacts of southeast Alaska fisheries on population of management/conservation concern.

Stikine River

The Stikine was listed as a stock of management concern in 2021. It is a transboundary river. All Chinook spawning habitat is in Canada. It is an outside rearing stock. Stikine Chinook are managed through the provisions of the Pacific Salmon Treaty. Like the Unuk River, the Stikine is one of four "SEAK Chinook salmon stocks for which a full stock assessment program is conducted annually (Salamone et al. 2022, page 3)." Stikine Chinook "are harvested throughout SEAK in commercial and sport fisheries during their spawning migration in late winter and spring (March to June), though most of the fish enter SEAK waters through Chatham and Sumner Straits…" (ibid. page 3). Commercial troll harvest thus occurs primarily during the spring period may 1 to June 30). Harvest also occurs in marine sport and "in federally managed subsistence fisheries in the freshwaters of the U.S. portion of the Stikine River. In addition, Stikine River Chinook salmon are harvested in Canadian in-river commercial, recreational (sport), and First Nation food (subsistence) fisheries" (ibid.). There are no directed subsistence fisheries for Chinook in these waters; Chinook are harvested (and retained) as incidental (bycatch) in subsistence fisheries primarily directed a sockeye salmon. No information or data are provided by Saloamone et al. (2022) on FRIM in any fisheries that directly or indirectly encounter Stikine Chinook.

As with the other populations with action plans reviewed in 2022, the Stickine has failed to achieve the lower bound of its BEG in the majority of the most recent years for which escapement data is available. In the case of the Stikine, the lower bound of the BEG has not been met the past 7 years 2016 – 2022 (Table 1. Figure X (page 17 above). Salamone et al. (2022) state that since 1996 “Stikine River Chinook salmon escapements averaged 24,450 large fish; however, the recent 10-average escapement of 15,000 fish and recent 5-year average escapement of 10,000 fish are substantially lower than the long-term average, and escapements have been below the BEG range for 5 consecutive years since 2016 (Table 1)” (page 3).

It is noteworthy that although (1) the recent 10-year average escapement was only marginally greater than the lower bound of the BEG of 14000, (2) the decline in productivity of Stikine Chinook was recognized in the 2013 report, and (3) escapements dropped significantly below the lower bound beginning in 2016 Stikine Chinook were not listed as a stock of management concern until 2020.

Andrew Creek

Andrew Creek was listed as a stock of management concern in 2021. It is a Clearwater tributary to the lower Stikine, located entirely in Alaska. Andrew Creek Chinook are an inside rearing population that is “genetically and behaviorally distinct from Stikine River Chinook salmon” (Salamone et al. 2022, page 4). Andrew Creek Chinook “is a significant source of Chinook salmon broodstock in SEAK hatcheries” and therefore “genetic stock identification methods cannot be used to distinguish wild Andrew Creek Chinook salmon from hatchery Chinook salmon produced from Andrew Creek broodstock” (ibid., page 5).

The Andrews Creek Chinook population has not met the lower bound of its BEG in the last 4 of 6 years from 2014 to 2019 (Table 1; Figure X., page 15 above). Recent reductions in commercial and marine sport fisheries in response to declining escapements beginning around 2015 have failed to improve escapements. Recent fisheries management actions include Chinook non-retention regulations for fisheries not directed at Chinook, including subsistence and personal use fisheries (Salamone et al. 2022, page 14-15). In addition, as noted previously for other southeast Alaska Chinook populations, there is no discussion of FRIM nor any FRIM data.

Chilcat River

The Chilcat River was listed as a stock of management concern in 2017. It “is a glacial system that empties into Chilkat Inlet in northern Lynn Canal, near Haines … that supports the fifth largest stock of Chinook salmon in SEAK. Chilkat River Chinook salmon predominantly rear in the inside waters of SEAK….." and "is 1 of 4 stocks for which a full stock assessment is performed annually by the department." (Hagerman et al. 2022, page 2.) The Chignik has a BEG of 1750 to 3500.

The Chlicat has failed to achieve the lower bound of its BEG 4 of the 6 years from 2014 to 2019 (Table 1), and 6 of the past 8 years from 2012 to 2019 (Appendix Figure A9). The Chinook stock was designated a stock of management concern in 2018.

Chilcat Chinook are harvested directly in southeast Alaska commercial mixed-stock troll (primarily during the spring troll season) and drift gill net fisheries, and in mixed stock marine sports fisheries and a small terminal marine sports fishery in Chilcat Inlet. Chilcat Chinook are also harvested incidentally in sockeye salmon subsistence fisheries in Chilcat Inlet and the Chilcat River. Harvest rates on Chilcat Chinook averaged 26% between 2005 and 2015. Harvest restrictions implemented in response to the recent failures to meet the BEG and the 2018 designation have resulted in an average harvest rate of 9% in 2018 to 2020 (ibid., page 3).

Despite the recent harvest reductions, the Chilcat has failed to attain the lower bound of the BEG in most years since 2016. As is the case for most southeast Alaska Chinook populations, marine commercial and sports fisheries directed at Chinook, as well as commercial and sports fisheries targeting other species such as sockeye, encounter immature Chinook (ibid., page 12). Unfortunately, no estimates of the proportion or numbers of immature Chinook encountered or harvested in southeast Alaska marine fisheries appear to have been made or reported. There has been no reported data for FRIM in fisheries that encounter or harvest Chilcat Chinook.

King Salmon River.

"The King Salmon River was listed as a stock of management concern in 2017. It is a clearwater system located about 30 km (19 mi) south of Juneau on Admiralty Island. This river has the only documented island stock of Chinook salmon in southeast Alaska..." (Hagerman et al. 2022, page 4). The Chinook stock is an inside rearing stock. It is the smallest Chinook population among those regularly monitored for spawning escapements (Table 1). "This stock does not support directed fisheries but presumably is harvested incidentally in SEAK marine waters in sport and commercial fisheries. Harvest estimates of the King Salmon River Chinook salmon are not available because the stock contribution in marine fisheries has not been determined." Harvest rates on a nearby hatchery population is used as a surrogate and ADF&G estimates that "since 2011 harvest rates on these Chinook salmon have averaged 46%" (ibid.).

The King Salmon River Chinook population was designated as a stock of management concern in 2017. Management measures directed to reducing harvest impacts in nearby marine commercial and sport fisheries have not improved spawning escapements to the river. Spawning escapements have failed to achieve the lower bound of the BEG (120 large females) in 5 of the 6 years from 2014 to 2019 (Table 1).

Taku River.

"The Taku River was listed as a stock of management concern in 2021. It is a transboundary glacial system that supports an outside rearing stock of Chinook salmon. The Taku River originates in British Columbia and drains over 17,000 square kilometers before its terminus at Taku Inlet, approximately 40 km northeast of Juneau. The Taku River Chinook salmon run spawns entirely in Canada and is managed through provisions of Chapter 1 of the PST" (Hagerman et al. 2022, pages 4-5). This is the largest of all southern Alaska Chinook populations. The lower bound of the BEG is 19000 large Chinook.

Most Chinook are harvested in southeast Alaska marine waters, both directly in commercial troll and net fisheries and indirectly in marine sport fisheries, in-river personal use and subsistence fisheries, and in-river Canadian commercial sockeye fisheries. The majority of harvest impacts occur in Alaskan marine waters.

"Since 1989, escapements averaged 36,400 large fish; however, the recent 10-year average escapement of 15,330 fish and the recent 5-year average of 10,360 fish are substantially lower and have been below the escapement goal range for 5 consecutive years (Hageramn et al. 2022, page 5"). The lower bound of the escapement goal has not been attained in the most recent 6-year period for which data is available (2016 to 2021, Figure X). Of even greater concern, in the 5 most recent years for which data is reported by Hagerman et al. 2022 (2016 to 2020, Table 4, page 33), the total run (harvest plus escapement) was below the lower bound of the BEG, showing that even if there were no harvest of Taku Chinook, the lower bound could not be attained!

Situk River

The Situk River is a clearwater system located near Yakutat, Alaska, that supports an outside-rearing stock of Chinook salmon. Situk Chinook are the most important population of ocean-type population in Alaska, which are generally rare in the state. Situk-origin Chinook salmon are harvested primarily in directed sport, commercial, and subsistence fisheries located in river, in the Situk-Ahrnklin Inlet, and in nearby surf waters. It has a Biological escapement goal (BEG) of 450 to 1050 large Chinook. In recent years there have been total closures of Chinook fishing and/or in-season restrictions of in-river subsistence fisheries.

As shown in Table 1 and Figure 9 between 2014 and 2018, the Situk failed to meet the lower bound of the BEG in 3 of the 5 years. Although the lower bound of the goal was met in 2019 and the upper bound exceeded in 2020 and 2021, there have been conservation closures of Chinook fisheries both before and after 2021.

Alsek River

The Alsek River is a transboundary glacial system that originates in southwestern Yukon and northwestern British Columbia and flows into the Gulf of Alaska approximately 80 km southeast of Yakutat. This river supports an outside-rearing stock of Chinook salmon (Heinl et al., Review of salmon escapement goals in southeast Alaska, 2021. ADF&G FM 21-03). It has a BEG of 3500 – 5300 Chinook, including age-2 spawners, unlike the majority of other Alaska Chinook populations. The Alsek River stock, like other Chinook salmon stocks in Alaska, has recently experienced a decline in productivity. (ibid). As shown in Table 1 and Figure 9, the Alsek failed to meet the lower bound of the BEG in 3 of the 5 years between 2014 and 2018. The goal was met in 2020 and exceeded the upper bound in 2019 and 2021.

Karluk River

The Karluk Chinook stock was listed as a stock of management concern in 2010 (ADF&G 2023). We are unaware of any action plan for the Karluk.

The Karluk River is located on the southwest end of Kodiak Island and supports 1 of only 2 native stocks of Chinook salmon on the Kodiak Archipelago. From its source at the outlet of Karluk Lake, the Karluk River flows 22 miles to its terminus at Karluk Lagoon. Freshwater entry of Chinook salmon occurs during late May through mid-July with 50% of the run typically over by mid-June. All subsistence and commercial inshore harvests are directly reported and sport harvest is estimated by a survey. Karluk River Chinook salmon are harvested incidentally to directed sockeye, pink, chum, and coho salmon commercial fisheries within the Westward Region (ADF&G Chinook Salmon research Initiative web page https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative_karluk.main).

The Karluk has a BEG of 3000 to 6000 large spawners. As shown in Table 1 and Figure 9, the Karluk failed to meet the lower bound of the escapement goal in 5 of the 9 years from 2013 to 2021.

Summary of stock status

The 13 Chinook salmon populations, including the 7 populations with action plans developed in response to their recent designation as stocks of management concern, span the full spatial range from the southern side of the Aleutian Islands and Cook Inlet to the Alaska/British Columbia border, and spawn across a range of recent population (run) sizes from less than 100 to several tens of thousands (approximately two plus orders of magnitude). All have failed to attain the lower bounds of their current ADF&G spawner escapement goals. These failures reflect the decline in productivity of the majority of Alaska wild Chinook populations since about 2007 (2013 report; Jones et al. 2020), reflective of declines in either or both freshwater and marine survival of various life stages.

We next address the primary threats and limiting factors that are likely drivers or contributors to these declines.

Threats to the Species

Current threats can be characterized into 5 main categories: (1) Present or threatened destruction, modification, or curtailment of its habitat or range; (2) Overutilization for commercial, recreational, scientific, or educational purposes; (3) Disease or predation (4) Inadequacy of existing regulatory mechanisms and (5) Other natural or anthropogenic factors affecting its continued existence. Among the most significant of other manmade factors, and a subject of intense public debate is the overutilization for commercial and or recreational/sport fisheries.

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Logging

Clear-cut logging and deforestation can lead to erosion and sedimentation in streams and rivers. Excess sediment can smother salmon eggs and suffocate developing fry. Clear-cut logging and the construction of logging roads increases natural erosion and sedimentation in streams, and exacerbates the risk of landslides. When forests are removed, the soil becomes exposed and vulnerable to erosion, especially during heavy rains. Logging also causes habitat loss by the removal of riparian vegetation, which serves as critical habitat for salmon. Trees and streamside shrubs provide shade, habitat for salmon prey, and help maintain optimal water temperatures for salmon. The removal of these forests can expose streams to direct sunlight, leading to elevated water temperatures. Chinook are sensitive to stream temperature changes, and excessively warm water can stress or even kill them. Elevated stream temperatures can also affect the timing of salmon migrations and spawning.

Other factors, such as habitat fragmentation through undersized road crossings, increased peak streamflow, and chemical runoff resulting from pesticide and herbicide use can also negatively impact Chinook Salmon.

Roads

Building roads for logging, mining, or other purposes can alter stream and river channels, increase sedimentation, and block salmon migration routes. Culverts and bridges can also impede fish passage if not designed to accommodate salmon.

Mining, Pollutants, Other Habitat Degradation

Active mines, exploratory mines, and derelict mining operations can release pollutants into water bodies, impacting water quality and salmon habitat. Contaminants such as heavy metals can be toxic to Chinook salmon. These impacts are often underestimated by resource managers and mining companies often fall short of their own water quality goals (Sergeant et al. 2022). Mining operations in the transboundary region are also out of the jurisdiction of the United States, which puts downstream salmon populations within US waters at risk.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes Harvest in Ocean and Recreational Fisheries

Commercial Fisheries

Overharvest of Alaskan Chinook salmon in commercial fisheries has been a concern in various regions of Alaska at different times. Overharvest occurs when more Chinook salmon are caught than sustainable, leading to declines in populations and potential long-term negative consequences. In many cases, Chinook salmon are caught in mixed-stock fisheries, where multiple salmon species and stocks are harvested together. This can make it challenging to target specific Chinook salmon populations and prevent overharvest of vulnerable stocks. This dynamic can also be exacerbated by the bycatch, or the capture of non-target species in commercial fishing gear. Bycatch of Chinook salmon at different life-cycle stages, such as sub-adult Chinook bycatch from the pollock fishery, is often unaccounted for in total harvest estimates.

In 2022, only 39% of escapement goals were met for Chinook salmon, despite commercial Chinook harvest increasing slightly for 2022. The 5 year- average of escapement goal achievement is only 51%. (Munro, 2023). This figure is alarming since 17 Chinook salmon stocks are listed as stocks of concern within Alaska.

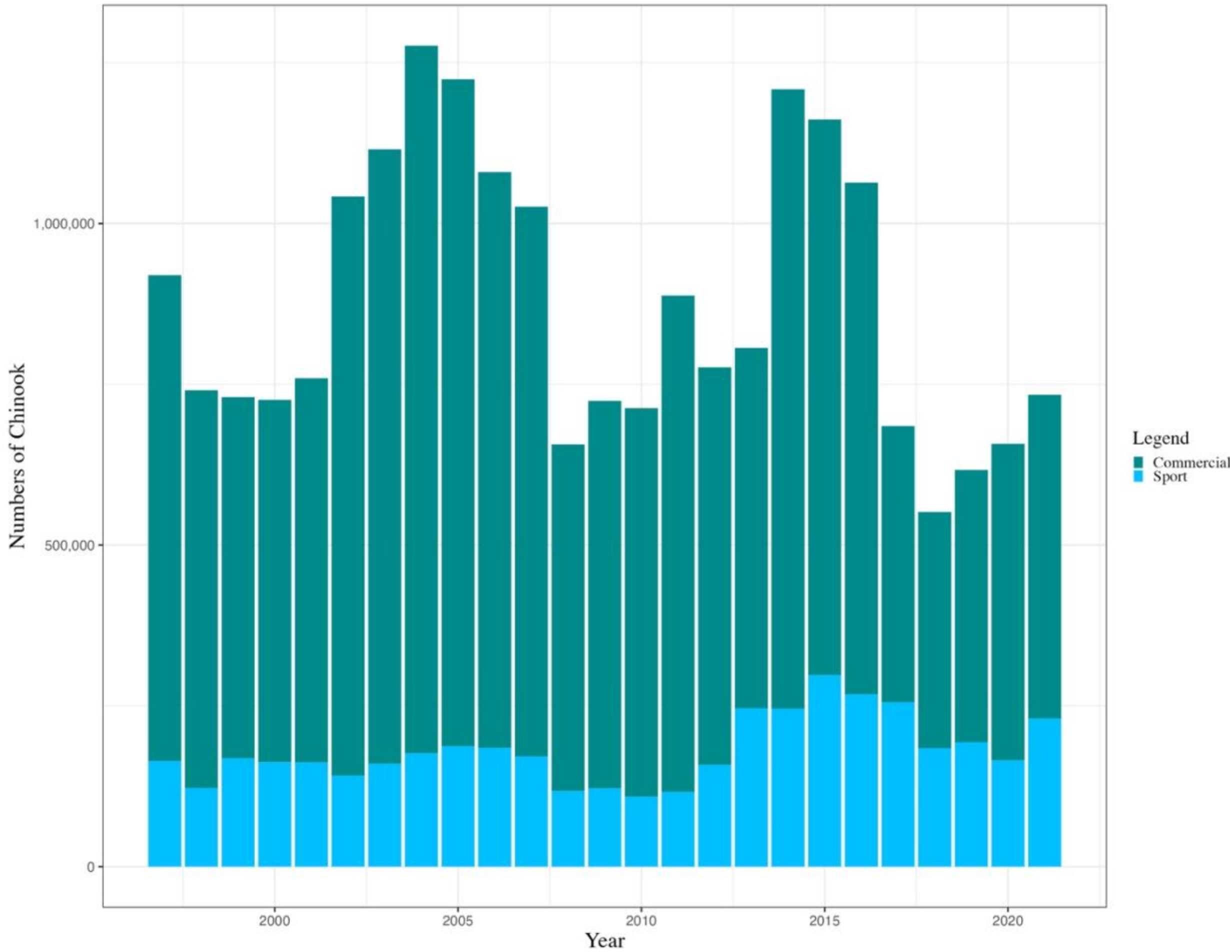

Figure 1. Combined Chinook Salmon Sport and Commercial Catch, South Central Alaska. Catch includes fish kept and fish released from salt and freshwater, Bristol Bay drainages excluded (Nushagak, Wood River, Togiak, and Kvichak Rivers in sport fisheries and all direct fisheries in South Central and Southeast Alaska Commercial Chinook Fisheries). Graph excludes commercial bycatch of Chinook in groundfish fisheries.

Recreational Fisheries

Recreational fisheries have also experienced substantial declines throughout the state of Alaska, from a high of approximately 200,000 fish in 2005 and 2006 to less than a 100,000 fish in 2021, the most recent data that is publicly available from the Alaska Department of Fish and Game.

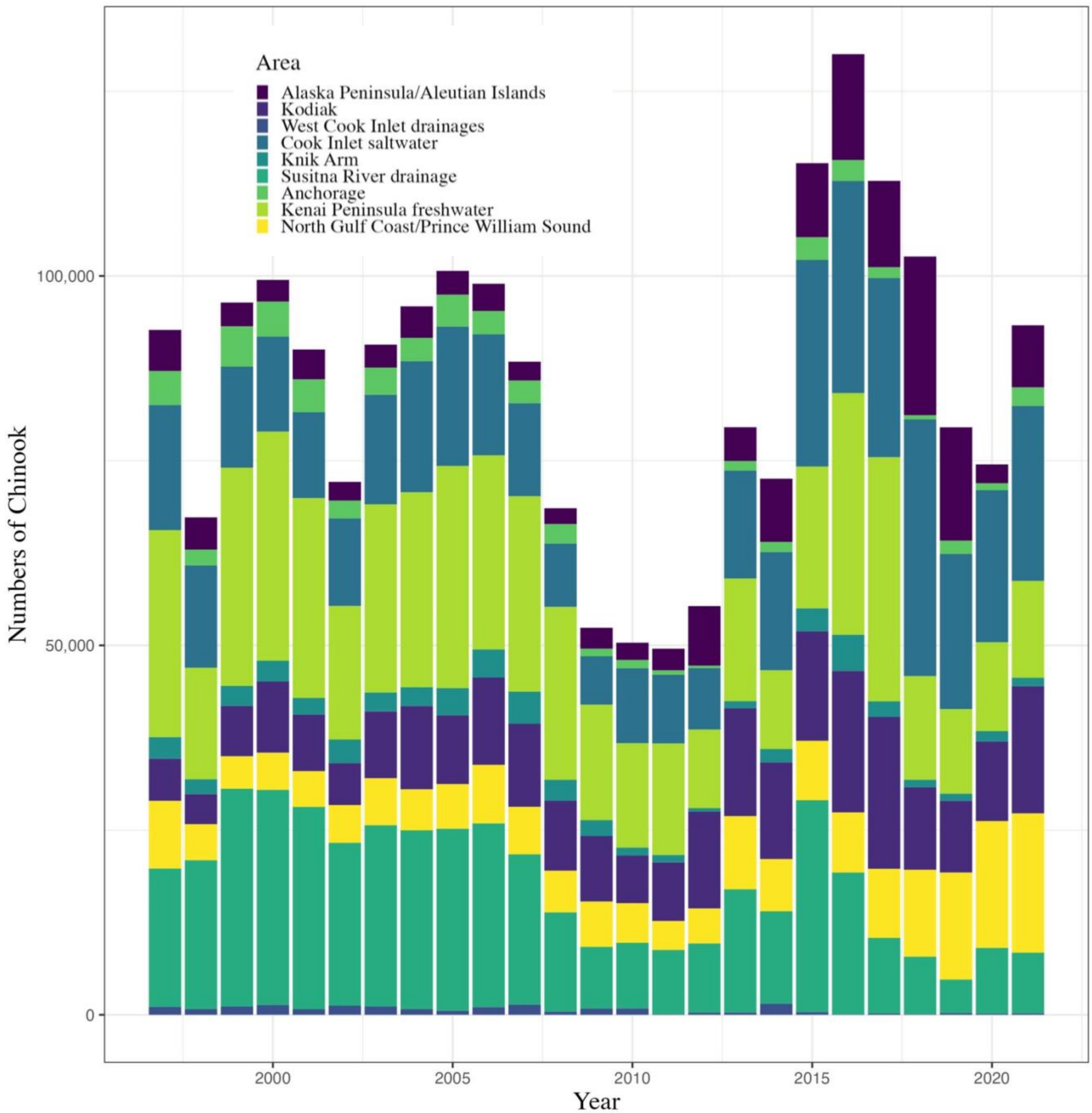

Figure 2. Chinook Salmon Catch, South Central Alaska. Catch includes fish kept and fish released from salt and freshwater, Bristol Bay drainages excluded (Nushagak, Wood River, Togiak, and Kvichak Rivers).

Alaska Sport Fishing Survey database [Internet]. 1996–. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 4, 2023). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

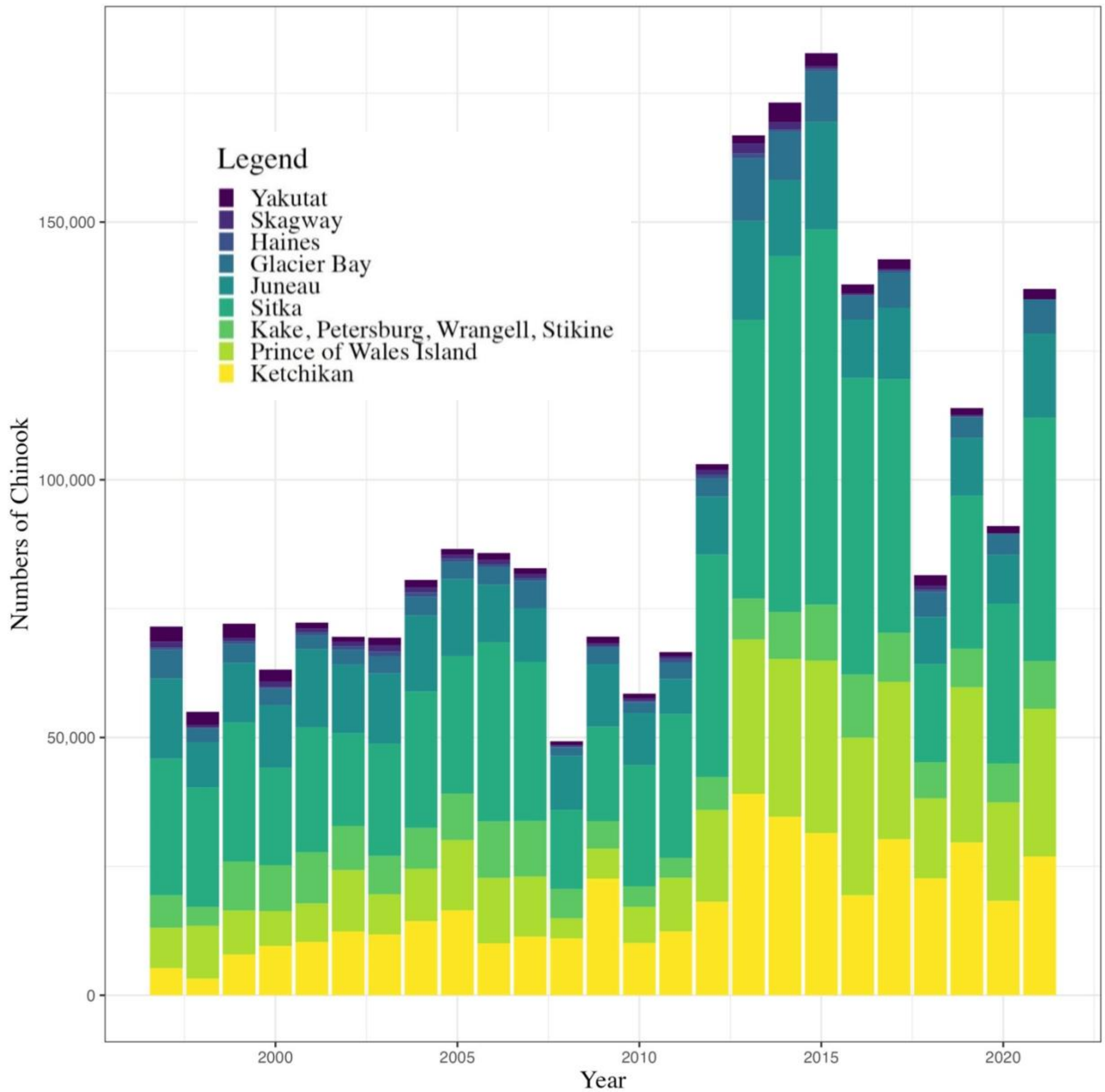

Figure 3. Chinook (King) Salmon Sport Catch, Southeast Alaska. Catch includes fish kept and fish released from salt and freshwater. Alaska Sport Fishing Survey database [Internet]. 1996–. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited October 4, 2023). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/

Disease or Predation

Diseases within Alaska include Furunculosis (*Aeromonas salmonicida),* Piscine Reovirus (PRV), Cold Water Disease *(Flavobacterium psychrophilum), Trichodinids*, bacterial kidney disease (*Renibacterium salmoninarum)*, bacterial gill and kidney disease, among many others. Through regular monitoring conducted by state and federal agencies, we know that disease is a constant problem when artificially rearing fish in high densities (Saunders 1991) and cross-species infection may be occurring through the large releases of Pink and Chum salmon near to Chinook salmon populations. Rearing facilities expose captive fish to increased risk of carrying pathogens because of the increased stresses associated with simplified and crowded environments. It is probable that fish transferred between facilities, adult fish carcasses being outplanted into the watershed, and other fish released from hatcheries, have acted as disease vectors to wild fish and other aquatic organisms. These diseases, amplified within the fish hatchery environment, contribute to the mortality of fish at all life stages and can travel rapidly to areas well beyond where effluent pipes are discharged. The out planting of juvenile and adult fish can transfer disease upstream of the rearing site, and there is the potential for lateral infection through the travel of avian, mammalian, and other terrestrial predators which overlap with the distribution of artificially propagated fish. These dynamics contribute to disease driven mortality at all life stages in wild Chinook populations.

Predation on Chinook Salmon in Alaska has been estimated to be near or below harvest levels, however, increases in marine mammal populations, including northern resident killer whales, consume significant numbers of Chinook (Chasco *et. al*., 2017). While most research has focused on modeling predation on adult salmon, assumptions within these models lead confidence intervals surrounding these estimates to be large. Other portions of the life cycle also have documented predation events, including Humpback whales targeting hatchery releases of juvenile Chinook salmon from hatcheries in Southeast Alaska (Chenoweth et al. 2017).

Inadequacy of Existing Regulatory Mechanisms

Federal

National Environmental Policy Act

The National Environmental Policy Act (NEPA) (42 U.S.C.4321-4370a) requires federal agencies, including the U.S. Forest Service and U.S. Bureau of Land Management, to consider the effects of management actions on the environment. The NEPA process requires these agencies to describe a proposed action, consider alternatives, identify and disclose potential environmental impacts of each alternative, and involve the public in the decision-making process. However, a NEPA analysis does not prohibit these agencies from choosing project alternatives that may adversely affect Alaskan Chinook salmon or their habitats. As a result, the NEPA process often results in the disclosure of impacts but affords little to no protections. The agencies must analyze the impacts of their actions on the species, but are not required to select alternatives that avoid harm to Chinook. Federal land management agencies regularly plan timber sales, maintain and utilize roads, and conduct other actions that harm Chinook. Chinook salmon are not formally listed as a sensitive species by either the Forest Service or the Bureau of Land Management (USWFS and USBLM 2018), impacts to these salmon from agency management actions get less scrutiny under NEPA.

Endangered Species Act

Alaskan Chinook salmon are not currently protected under the federal Endangered Species Act.

The Act offers potential protections through Habitat Conservation Plans (HCP) which cover non-listed species. Several Habitat Conservation Plans exist in Alaska under the U.S. Endangered Species Act that may provide benefits to Alaskan Chinook salmon. A few examples of these include:

- Tongass Land Management Plan HCP
- Alaska Department of Transportation and Public Facilities HCP
- Kensington Gold Mine HCP

Another potential Endangered Species Act protection could be through co-occurrence with other listed species. As of 2021, Stellar Sea Lion (western population), Northern Sea Otter (Southwest Alaska Population), Spectacled Eider, Steller's Eider, North Pacific Humpback Whale, North Pacific Right Whale, and Cook Inlet Beluga Whales are species found in the State of Alaska which are listed as threatened or endangered.

While Chinook could benefit somewhat from protection of these species and indirect benefits to Chinook habitat may occur, none of these listings appear to have slowed the decline of Chinook salmon in Alaska. Existing state and federal programs and regulations have failed to prevent continued high rates of habitat loss, and many threats to Chinook continue unabated.

National Forest Management Act

Under the National Forest Management Act, the Forest Service is required to "maintain viable populations of existing native and desired nonnative vertebrate species" (36 C.F.R. §219.19). As with NEPA, this requirement does not prohibit the Forest Service from carrying out management actions and projects that harm species or their habitat, but merely states that "where appropriate, measures to mitigate adverse effects shall be prescribed" (36 C.F.R.§219.19(a)(1)). This clause does little to limit long term impacts to salmonid habitat in Alaskan coastal watersheds from agency management actions such as logging, road-building, mining and other activities.

Federal Clean Water Act

The Clean Water Act (CWA) establishes the basic structure for regulating the discharge of pollutants into U.S. waters and for regulating quality standards of U.S. surface waters. Under the CWA, the U.S. Environmental Protection Agency) implements pollution control programs and sets wastewater standards for industry and water quality standards for all contaminants in surface waters. The CWA also provides federal funding to restore habitat, clean up toxic pollutants and reduce run-off.

Under Section 404 of the CWA, discharge of pollutants into waters of the U.S. is prohibited absent a permit from the U.S. Army Corps of Engineers. Theoretically, the CWA should provide some protection for stream and estuarine habitats used by Chinook. However, implementation of the CWA, and the Section 404 program in particular, has fallen far short of Congress's intent to protect water quality (e.g., see Morriss et al. 2001).

State

State Fisheries Management:

5 AAC 39.222 is a regulation in Alaska that pertains to the policy for the management of sustainable salmon fisheries. It provides guidelines and principles for managing salmon stocks to ensure their long-term viability while trying to also support commercial, subsistence, sport, and personal use fisheries. Despite the establishment of escapement goals, you can see from the above information that corrective action has not been taken by the state of Alaska to adequately protect Chinook salmon in the region of concern.

Other Anthropogenic or Natural Factors

Artificial Propagation

All hatchery operations within Alaska are for the intended purpose of augmenting commercial and/or recreational fisheries, and are not designed for conservation or reintroduction purposes. According to the North Pacific Anadromous Fish Commission, 12 hatcheries contribute to juvenile release of approximately 9.45 million juvenile Chinook in southeast and southcentral Alaska populations.

Artificial propagation of other species is also impacting Chinook Salmon. Competition with pink salmon in the Pacific Ocean is a growing concern. As stated in the 2020 Hatchery Scientific

Review Group 2020 technical document (HSRG, 2020), density dependence is a concern most commonly attributed to the spawner to smolt stage in the freshwater environment. However, considerable attention is also being paid to competition for prey availability in the ocean environment. The negative consequences of competition on growth and survival have been documented between declining salmon populations and highly abundant species such as pink salmon in the ocean (Ruggerone and Irvine 2018, Ruggerone 2023). The substantial increase in pink salmon abundance over the last four decades is hypothesized to have negatively impacted other species, and is being investigated as a leading cause of the collapse of the 2020 ocean salmon harvests across the North Pacific Ocean. Decreases in Chinook prey, namely forage fish, are correlated with increasing pink salmon abundance and these density-dependent interactions were identified as key drivers of chinook productivity in the ocean ecosystem. Hatchery release data are compiled annually by the North Pacific Anadromous Fish Commission, are attached herein, and should be evaluated for their impact on both Alaskan Chinook and the prey resources they depend on in the marine environment. Assumptions that freshwater productivity is limiting population productivity need to be weighed against the known collapse of their prey resources in the marine environment.

Ocean Conditions

Ocean conditions in the Pacific Northwest exhibit patterns of recurring, decadal-scale variability (including the Pacific Decadal Oscillation and the El Niño Southern Oscillation), and correlations exist between these oceanic changes and salmon abundance in the Pacific Northwest (Stout et al. 2011). It is also generally accepted that for at least 2 decades, beginning about 1977, marine productivity conditions were unfavorable for the majority of salmon and steelhead populations in the Pacific Northwest, but this pattern broke in 1998, after which marine productivity has been quite variable (Stout et al. 2011). NMFS (2011) was concerned about how prolonged periods of poor marine survival caused by unfavorable ocean conditions may affect the population viability parameters of abundance, productivity, spatial structure, and diversity.

Although Chinook salmon have persisted through many favorable-unfavorable ocean/climate cycles in the past, much of their freshwater habitat was in good condition, buffering the effects of ocean/climate variability on population abundance and productivity. It is uncertain how these populations will fare now that the synchrony between ocean cycles is starting to break down, and climate change shifts large scale prey resources dependent upon the offshore environment.

Climate Change

Throughout the life cycle of Alaskan salmonids, there are numerous potential effects of climate change (Stout et al. 2011; Wainwright and Weitkamp, in review). The main predicted effects in terrestrial and freshwater habitats include warmer, drier summers, reduced snowpack, higher summer stream temperatures, and increased floods, which would affect salmonids by reducing available summer rearing habitat, increasing potential scour and egg loss in spawning habitat, increasing thermal stress, and increasing predation risk (NMFS 2011). In estuarine habitats, the main physical effects are predicted to be rising sea level and increasing water temperatures, which would lead to a reduction in intertidal wetland habitats, increasing thermal stress, increasing predation risk, and unpredictable changes in biological community composition (NMFS 2011). In marine habitats, there are a number of physical changes that would likely affect salmonids, including higher water temperature, intensified upwelling, delayed spring transition, intensified stratification, and increasing acidity in coastal waters (NMFS 2011). Of these, only intensified upwelling would be expected to benefit coastal-rearing salmon; all the other effects would likely be negative (NMFS 2011).

Projected changes in regional climatic and weather patterns due to global climate change will have negative effects on Alaskan coastal aquatic ecosystems and salmonids. Long-term warming trends and increasing weather variability in the Pacific Northwest will result in more frequent events (e.g., droughts, intense precipitation, and periods of unusually warm weather) that were considered extreme during the twentieth century, and the magnitude of these events may also exceed recent historical levels (Reiman and Isaaks 2010).

Request for Critical Habitat Designation

The Petitioners request the designation of critical habitat for Alaskan Chinook concurrent with listing. Critical habitat should encompass all known and potential freshwater spawning and rearing areas, migratory routes, estuarine habitats, riparian habitats and buffers, and essential near-shore ocean habitats and important marine nursery areas.

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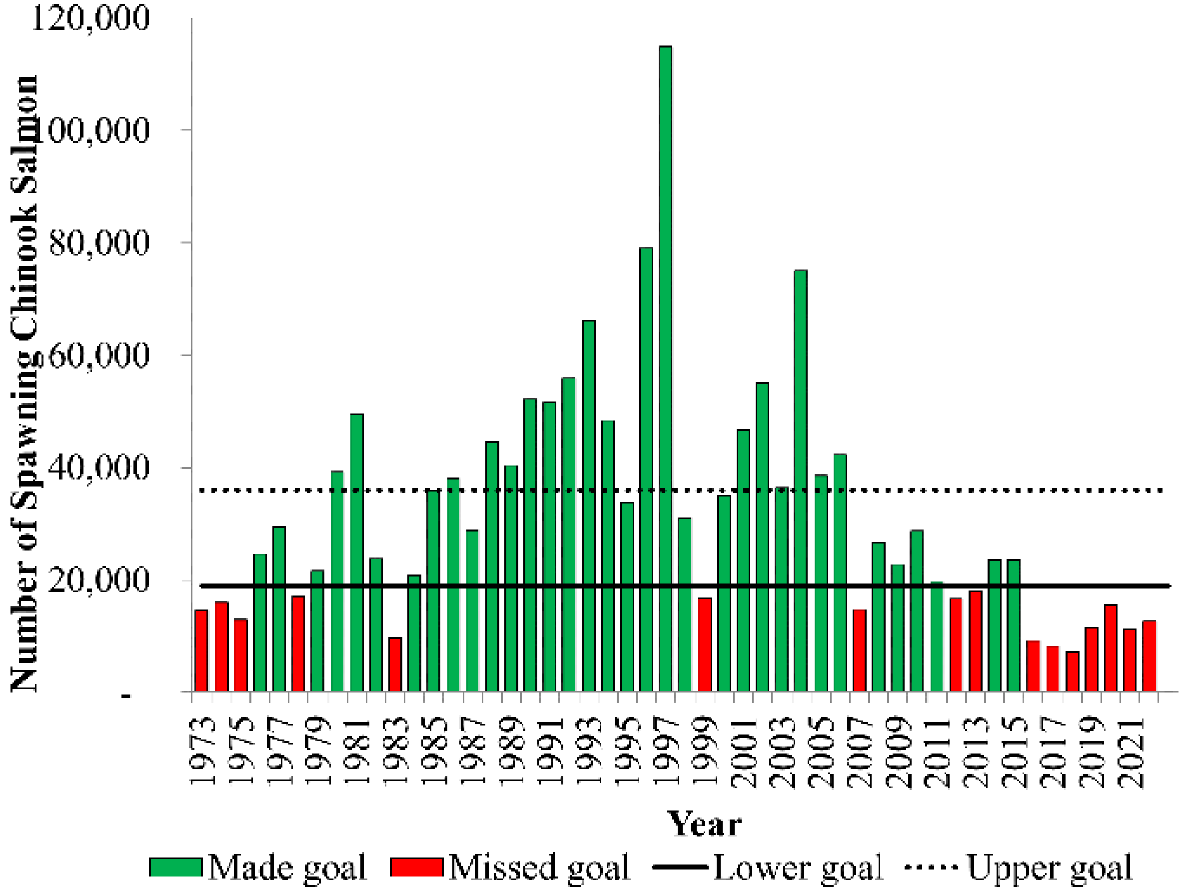
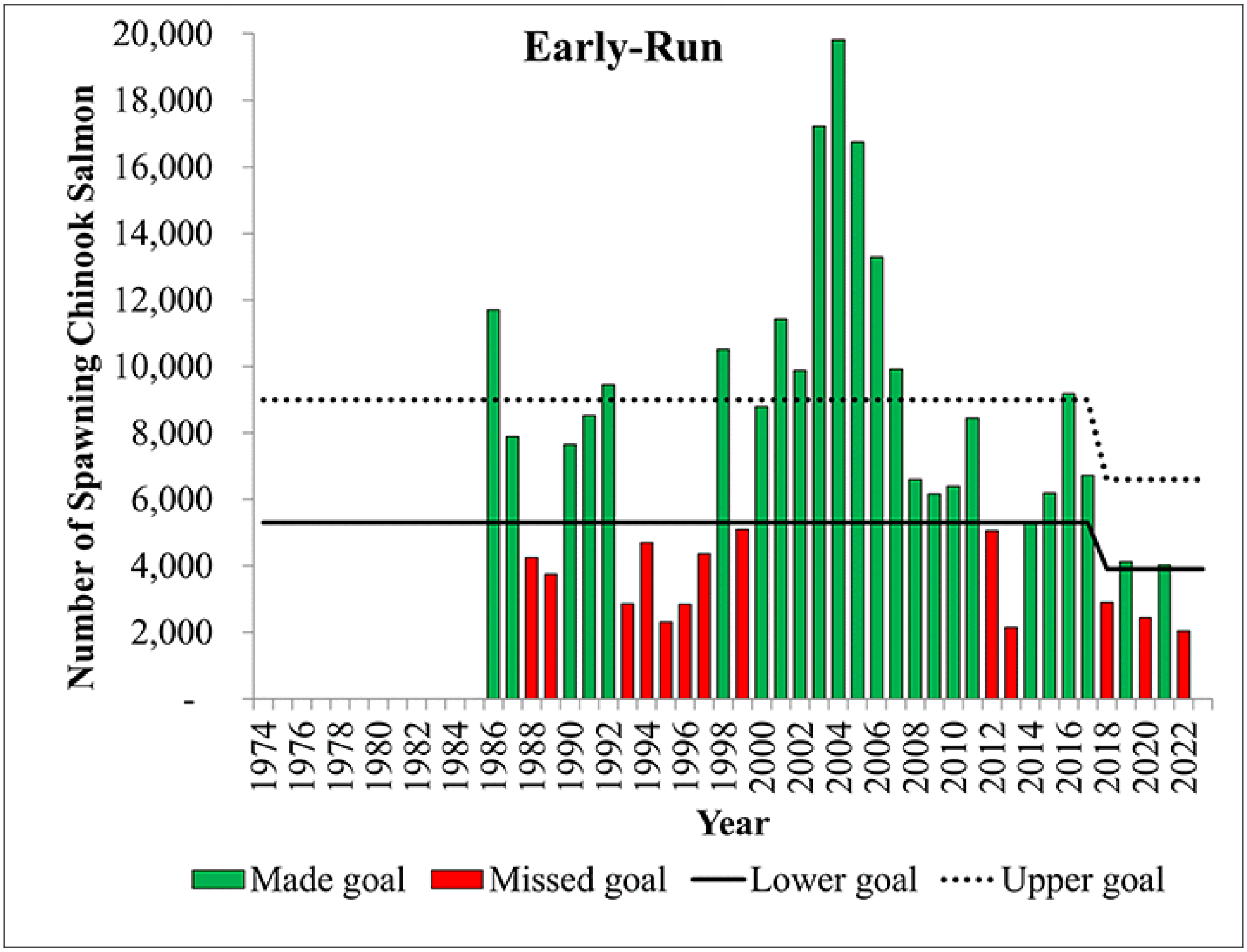
Additional Figures:

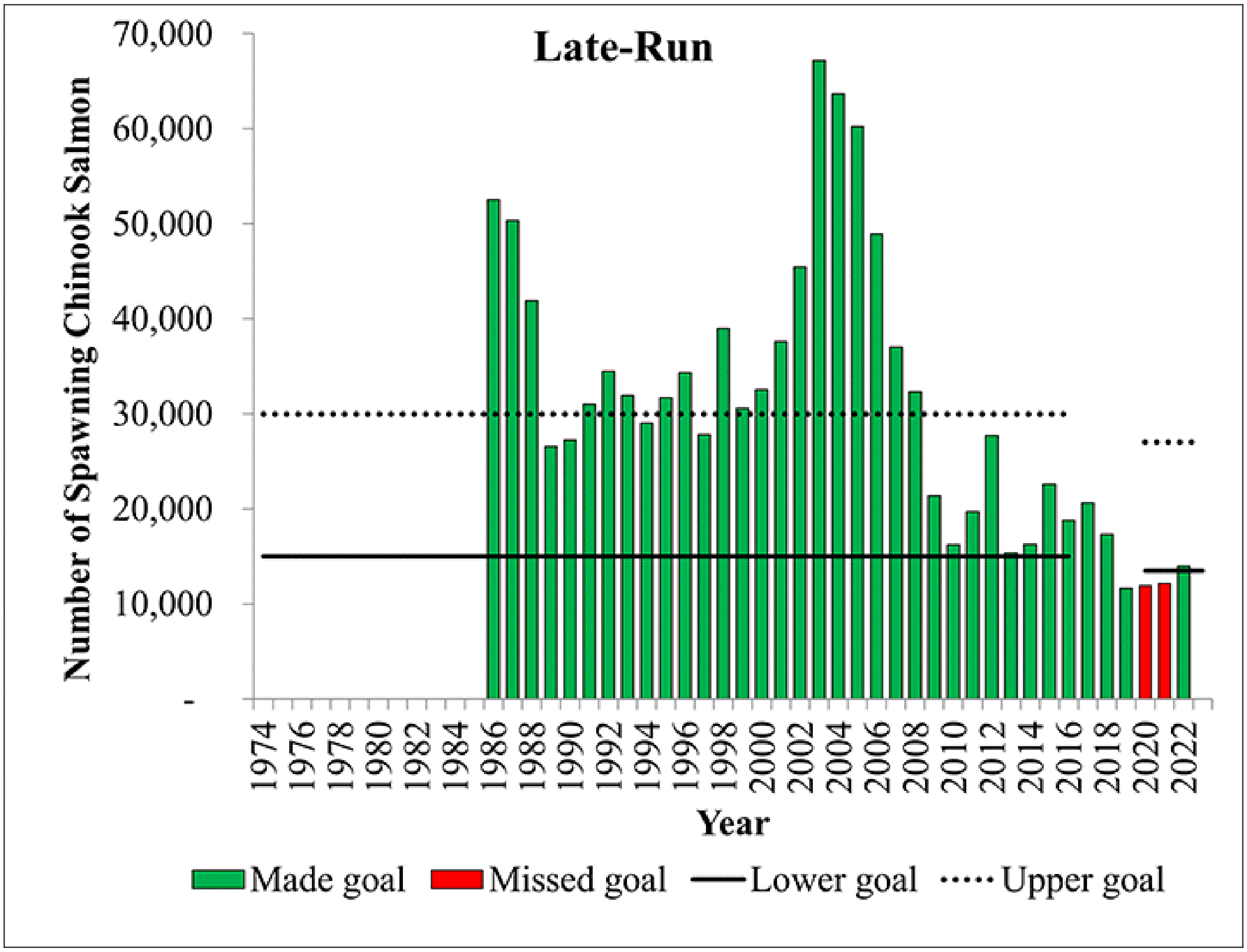
Spawner escapement figures updated thru 2022 from ADF&G https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative.main. Accessed July 4, 2023.



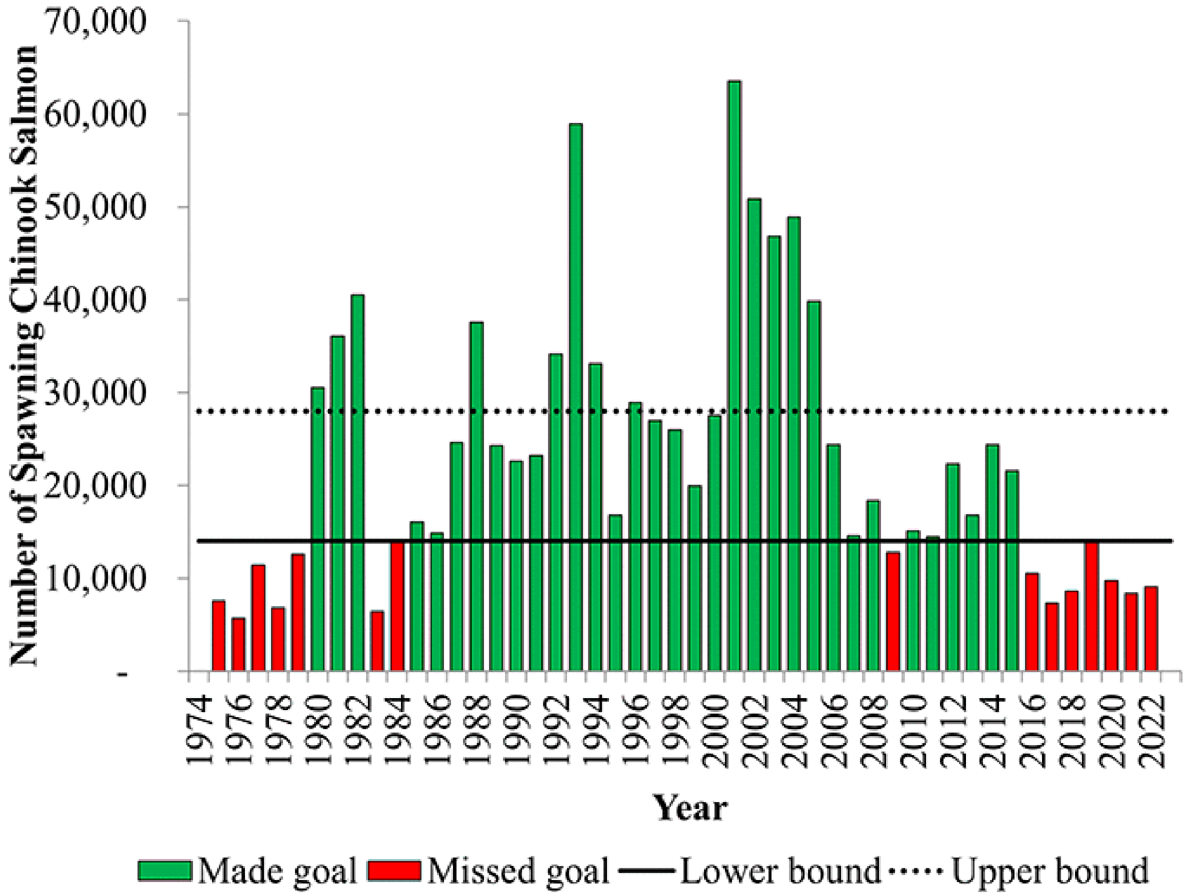
Taku River spawning Chinook salmon from 1973 to 2022



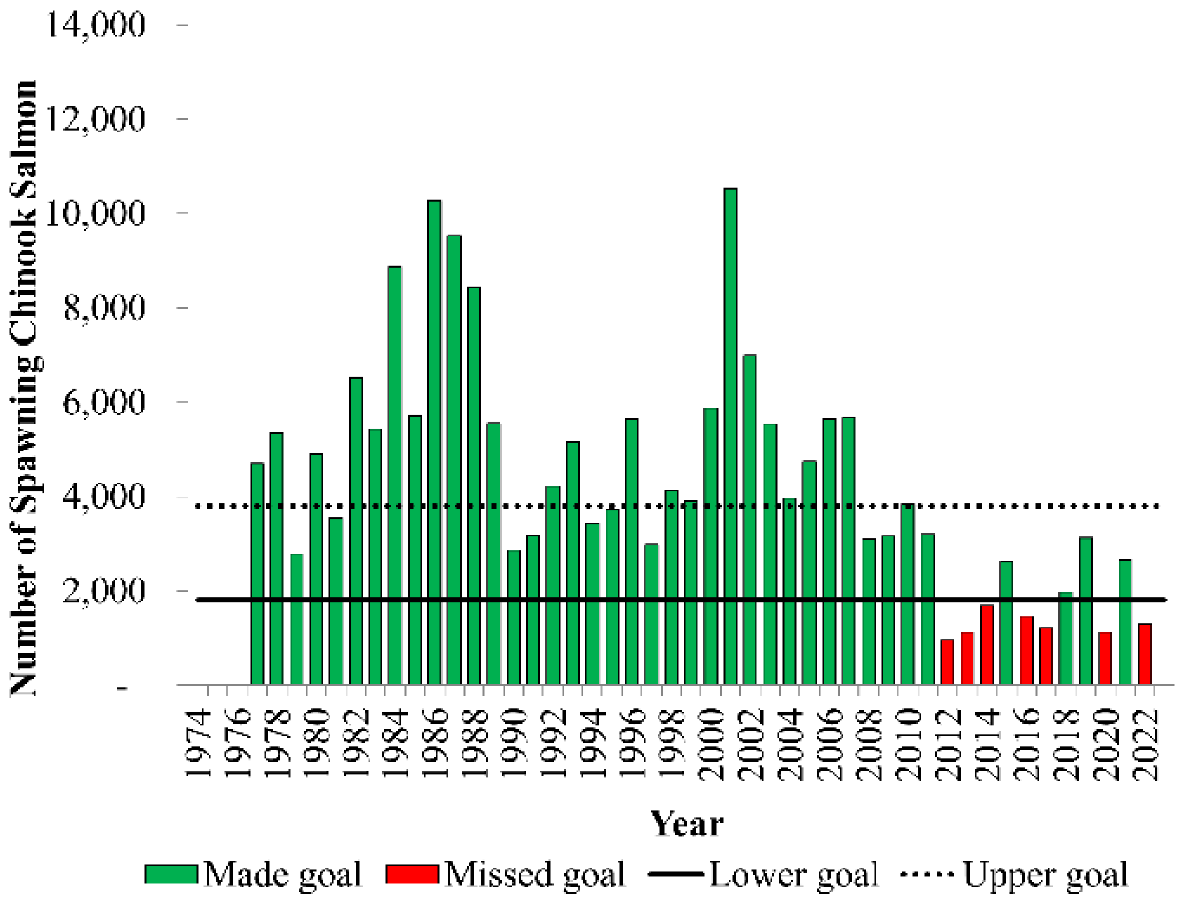
Spawning escapements of early-run Kenai River Chinook salmon, 1986 to 2019. Escapements and goals through 2016 are germane to all fish and thereafter are based on large fish



Spawning escapements of late-run Kenai River Chinook salmon, 1986 to 2019. Escapements and goals through 2016 are germane to all fish and thereafter are based on large fish



Stikine River spawning Chinook salmon from 1975 to 2022



Unuk River spawning Chinook salmon from 1977 to 2022

MATANUSKA-SUSITNA BOROUGH
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The Honorable DeLena Johnson
House of Representatives
Alaska State Capitol
120 4th Street – Room 205
Juneau, AK 99801-1182

April 25, 2024

Dear Representative Johnson:

The Matanuska-Susitna Borough Fish & Wildlife Commission would like to sincerely thank you for your efforts to support Mat-Su fisheries over the past two years. We also thank you for meeting with several of our commissioners to discuss specific challenges to fisheries in Cook Inlet and the Mat-Su.

Your office has paved the way for more dedicated funding for fishery research throughout Cook Inlet, a necessary step in the effective management of the fisheries in our region and throughout Alaska. Our commission relies on data-driven strategies to maintain and enhance salmon returns to Northern Cook Inlet, and your hard work to support this mission has not gone unnoticed.

We will continue tracking the legislative budget process in hopes that support for our mutual priorities is maintained, and we look forward to continued conversations with you and your staff to ensure the health of Mat-Su fisheries and shared opportunities for all users. Please don't hesitate to reach out if you have any questions for the commission and thank you again for your time and dedication.

Sincerely,

Andrew M. Couch

Andy Couch, Chairman
Matanuska-Susitna Borough Fish & Wildlife Commission

Providing Outstanding Borough Services to the Matanuska-Susitna Community.

Project Title: Matanuska-Susitna Borough - Fishery Protection

TPS Number: 66660

Priority: 10

Agency: Commerce, Community and Economic Development
Grants to Municipalities (AS 37.05.315)

Grant Recipient: Matanuska-Susitna Borough

FY2025 State Funding Request: $2,500,000

One-Time Need

Brief Project Description:

Fund Borough fisheries projects that help maintain and enhance local fisheries, especially of anadromous fish.

Funding Plan:

Total Project Cost:	$2,500,000
Funding Already Secured:	($0)
FY2025 State Funding Request:	($2,500,000)
Project Deficit:	$0

Explanation of Other Funds:

N/A

Detailed Project Description and Justification:

A strategic research, monitoring, and evaluation plan for the Upper Cook Inlet (completed in 2015) identified several informational gaps in local fisheries management. Many of the identified gaps resulted in funded projects. These studies have resulted in better resource management and illustrate the need for additional funding of genetic stock analysis, economic impact studies of sport fishing, fishery management weirs, and control of aquatic invasive species. These monies would be utilized to continue funding critical projects identified in the 2015 Gap Analysis, as well as continued support of the Matanuska-Susitna Borough fish passage culvert replacement program that has opened significant habitat to anadromous fish over the last 20 years.

Project Timeline:

2024 through 2027.

Entity Responsible for the Ongoing Operation and Maintenance of this Project:

Matanuska-Susitna Borough

Grant Recipient Contact Information:

Name:	Mike Brown
Address:	350 E. Dahlia Avenue Palmer, AK 99645
Phone Number:	(907)861-8689
Email:	mike.brown@matsugov.us

This project has been through a public review process at the local level and it is a community priority.

Supporting Salmon, Wildlife, and Community

April 30, 2024

Dear MatSu Fish and Wildlife Commission,

Amid state legislation hearings flush with Cook Inlet natural gas supply shortage presentations and bills calling for more "clean" energy alternatives, at a 2024 cost of $7.2 billion, the Susitna Watana Hydroelectric project (Su Dam) is once again being considered as a solution to Alaska's energy challenges. Despite being proposed as far back as 1948, the Su Dam has consistently been rejected due to its impracticality every time it is revisited.

In an era where large hydroelectric dams in the U.S. are being decommissioned to reverse the damage they've caused to rivers and ecosystems, considering the construction of a dam of this magnitude is regressive. This massive 705-ft tall, 42-mile long river-stopping reservoir would be located 87 miles north of Talkeetna on the Susitna River, disrupting the 15th largest river in the U.S. and home to the 4th largest king salmon population in Alaska. The Su Dam would be a load-following operation, which severely alters the natural river flow by dramatically reducing summer flows and increasing winter flows. This destroys salmon spawning and rearing habitats and migration pathways ultimately lowering salmon populations.

If the Su Dam project were to get the green light again, there is a possibility the Federal Energy Regulatory Commission (FERC) licensing process may require repeating or refreshing previous, "stale" data. An entire decade has gone by since the FERC studies on the Dam were last worked on from 2012-2014. Key studies on water quality and river flow, crucial for understanding impacts, are either unfinished or outdated. Given Alaska's increasing extreme weather, new studies are essential. Climate change can alter precipitation patterns, resulting in shifts in the timing, intensity, and distribution of rain and snowfall. This could potentially impact the reliability and efficiency of the power generation.

$2.3 billion has been allocated by the Bipartisan Infrastructure Law (BIL) for improving hydroelectric power. This funding is specifically aimed at enhancing efficiency and safety of

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(907)-733-5400

already established hydroelectric power plants, and not intended for financing new large-scale dam projects like the Su Dam. $800 million of the funding is for dam removal initiatives. Dependence on a single massive renewable energy project like the Su Dam carries significant risks. As highlighted by engineer Bob Butera (an engineer who worked on the Dam project in the 1980's), relying solely on one large hydroelectric project that can't easily adjust to changes in demand is precarious and potentially catastrophic.

Furthermore, hydroelectric dams, often touted as clean energy sources, emit methane, a potent greenhouse gas, due to the decomposition of organic matter in reservoirs. This would significantly offset any potential carbon emissions reductions claimed by the project. The Environmental Protection Agency (EPA) now includes reservoir emissions in their greenhouse gas reports.

A new National Renewable Energy Lab (NREL) cost analysis, released in March fo 2024, reports that 76% of renewable energy generation on the Railbelt can be reached by 2040 with mostly new wind and solar projects, resulting in a savings of about $1.8 billion total compared to a scenario with no new renewables added. The research confirms that opting for the least expensive approach to broaden the state's energy portfolio negates the need for a disastrous hydroelectric project like the Su Dam.

As Alaska moves forward in solving the state's energy issues, it's crucial to make responsible decisions for creating a clean energy system that will benefit Alaskans in the long term. Above all, the Su Dam would embody the immense alteration of Southcentral Alaska's river life, its economy and ecology, the eradication of its unique ecosystems, the destruction of one of Alaska's most valued salmon spawning and rearing habitats, and the flooding of 40,000 acres teeming with wildlife, while costing the state billions of dollars that are needed elsewhere.

Best Regards,

June Okada
Energy Coordinator, Susitna River Coalition
June@susitnarivercoalition.org
907-733-5400

Additional Resources:
Please find attached the following documents to support our opposition to the proposed Susitna-Watana Dam:

- *Dreams, Risks and Realities: An Economic Analysis of Plans to Dam the Susitna River* by Greg Erickson / Erickson & Associates
- *Susitna-Watana Hydroelectric Project Fact Sheet* by the Susitna River Coalition
- *OPINION: A path forward for Alaska's energy security* published in *ADN*, written by Bob Butter / Feb 23, 2023
- *United States Includes Dam Emissions in UN Climate Reporting for the First Time* published in *The Revelator, an initiative of the Center for Biological Diversity*, written by Tara Lohan / Feb 3, 2023
- *The Super Salmon*, a film by Ryan Peterson in partnership with the Susitna River Coalition and supported by Patagonia.
- *Achieving an 80% Renewable Portfolio in Alaska's Railbelt: Cost Analysis* Technical Report by Paul Denholm, Marty Schwarz, and Lauren Streitmatter at the National Renewable Energy Laboratory (NREL) / March, 2024

Susitna River Hydroelectric Project Overview

Prepared for the Susitna River Coalition
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May 2024

Photo by Travis Rummel

SUMMARY

The Susitna Hydroelectric project has been considered as a potential source of power for central Alaska's Railbelt for nearly 80 years. Since the late 1940s, three formal proposals for the project were developed and extensively evaluated for power generation potential and environmental impacts. . In light of the project's extensive history, and at the request of the Matanuska-Susitna Borough's Fish and Wildlife Commission, this report was developed as a cursory summary of the history of past proposals. While by no means exhaustive, the report contains information concerning the politics, economics, regulatory settings, and potential environmental impacts surrounding development a largescale Susitna hydropower project.

The Susitna River watershed, fed by the Alaska Range, is an intact ecosystem without major human development currently impacting it—hydropower, industry, or otherwise. It supports globally significant populations of five species of Pacific salmon, caribou, moose, and other fish and wildlife. It is the 15th largest watershed in the United States. The area has been inhabited for millennia by native Dena'ina who named it "river of sand." Unlike most dammed and developed large rivers in the Lower 48, it is heavily influenced by glaciers and ice, making hydropower development potentially more challenging.

The first proposal to develop hydropower on the mainstem Susitna River originated at the federal level in the 1950s. After years of study and financial investment, the project was abandoned because the demand for power along the Railbelt simply did not equate with the cost and impacts the project would impose. Prompted by Alaska state interests, the federal government revived the conversation about Susitna hydropower development in the 1970s, but when the federal appetite for large dams began dwindling, the State of Alaska took the project over until it too ultimately abandoned the project in the 1980s when conventional (oil and gas based) power sources became more affordable. In part because of a non-binding commitment to produce half of Alaska's power "renewably" by 2025, the Susitna hydropower discussion restarted in the 2010s. That resulted in a third round of costly proposals and studies were halted in 2016.

Susitna hydropower proponents have consistently touted the promise of jobs in dam and infrastructure construction and operations that project development would generate. Conversely, little if any formal analysis has been conducted about job loss that could occur in the tourism, hunting and fishing guiding, or other recreation related jobs. In general, proponents have publicized a positive benefit-cost ratio would result from project development while opponents have documented well-founded flaws in those estimates. However, even project proponents have stated that developing hydropower on the Susitna River would never be profitable. Regardless of opinions, more than the present day equivalent of $1 billion have been invested by the State of Alaska alone for a project that has yet to receive a permit, much less break ground. Even more has been invested by federal agencies and other stakeholders to evaluate project feasibility and impacts.

Meanwhile, in light of relatively recent, climate-driven interests in including renewable energy sources in power production portfolios, a widespread and polarized debate has emerged about what if any role new largescale hydropower should play in the renewable energy landscape. Well-informed arguments abound on all sides, but a consensus has evolved within the scientific community that largescale hydropower in the US is rarely worthy of consideration as renewable amongst other renewable power options, particularly in light of its known ecosystem-scale impacts. Multiple evaluations regarding renewable power sources for Alaska's Railbelt concur that Susitna hydropower is not the "cleanest" of options available.

In the background of each Susitna hydropower proposal over the last eight decades, the regulatory environment has consistently changed. Regulations have increased over time, but they have not always improved. The current federal regulatory process under which Susitna hydropower would most likely be developed has raised documented concerns amongst federal and state agencies, tribal interests, non-governmental organizations, and individuals.

Regardless of the specific regulations, each iteration of Susitna hydropower proposals involved extensive environmental studies intended to inform project design and engineering, evaluation of environmental impacts, and potential mitigation. These studies have resulted in thousands of reports collectively totaling millions of pages. While the studies may never have ultimately caused the abandonment of proposals, they underscore dozens of irreversible impacts Susitna hydropower development would impose on the ecosystem and everything that depends on it. Development of Susitna hydropower would permanently alter what currently remains one of the world's largest unfragmented, relatively undeveloped rivers. The history of large dam construction and operation in the Lower 48 has clearly demonstrated that attempts at mitigation and restoration are limited in their success. To date, the most successful restoration attempts on large rivers have resulted from dam removal.

ABOUT THIS REPORT

In light of recent conversations about the Susitna-Watana Hydropower project the Matanuska-Susitna Borough of Alaska requested the assistance of the Susitna River Coalition (SRC) in documenting the approximately 80-decade, multi-faceted history of the project. SRC contracted the author, Sarah O'Neal, to compile this review.

Sarah has over 25 years of international experience in freshwater ecology of salmon ecosystems. She owns and operates an independent consulting company while completing her Ph.D. with the School of Aquatic and Fisheries Sciences at the University of Washington where she is currently a Ph.D. Candidate. She holds a Master of Science degree in freshwater ecology from the University of Montana's Flathead Lake Biological Station, and a Bachelor of Science degree in ecosystem biology from the University of Washington. She has studied and worked on physical, chemical, and biological aspects of salmon habitat in tributaries to the northern Pacific ranging to the southern Atlantic oceans.

In Alaska, Sarah has worked on freshwater ecological aspects of several proposed development projects for over 15 years. Her work in the Susitna Basin began in 2012. She has also fished commercially for salmon in Cook Inlet near the mouth of the Susitna River.

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LIST OF ACRONYMS

AEA	Alaska Energy Authority (state agency)
ALP	Alternative licensing process
APA	Alaska Power Administration (a federal agency that postdated the Bureau, but predated the state Alaska Power Authority)
Bureau (the)	The US Bureau of Reclamation
Corps (the)	The US Army Corps of Engineers
EA	Environmental assessment (under NEPA)
EIS	Environmental impact statement (under NEPA)
FERC	Federal Energy Regulatory Commission
ILP	Integrated licensing process
ISR	Initial study report
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent—one of the first steps in the FERC dam licensing process
OPEC	Organization of Petroleum Exporting Countries
PAD	Pre-Application Document (describes available information, data gaps, etc.)
RSP	Revised study plan
SPD	Study Plan Determination
SRC	Susitna River Coalition
TLP	Traditional licensing process
USFWS	US Fish and Wildlife Service
USR	Updated study report
WPA	Works Progress Administration

SUSITNA WATERSHED DESCRIPTION

The Susitna River is the sixth largest river in Alaska, originating from the southern slopes of the Alaska Range.[1] It drains about 50,000 km^2 (~20,000 mi^2), making it the 15^{th} largest watershed in the United States (Figure 1).[2] It flows mostly west, then southwest to Cook Inlet just west of Anchorage. The drainage has probably been inhabited by indigenous Dena'ina since glacial recession about 9,000 years ago (Figure 2).[3] The name of the river is derived from a Dena'ina word meaning "river of sand."[4] Russians and other Europeans explored, trapped, and traded in the watershed starting in the 1700s.

In the early 1900s, the Alaska Railroad bordering the lower Susitna River was built, facilitating establishment of towns and other development along its way including Anchorage and Willow.[1] The valley now hosts major road and rail routes between Anchorage and Fairbanks, referred to as Alaska's Railbelt. The basin remains largely undeveloped, with no major industry. Willow is its largest population center with about 2,000 residents, followed by Talkeetna and Trapper Creek.[5] Collectively, those three communities comprise less than 1% of the State's overall population.[5] The Susitna Dam, now under consideration for at least the fourth time, would impose environmental impacts that would far overshadow those resulting from all human activity conducted in the watershed to date.

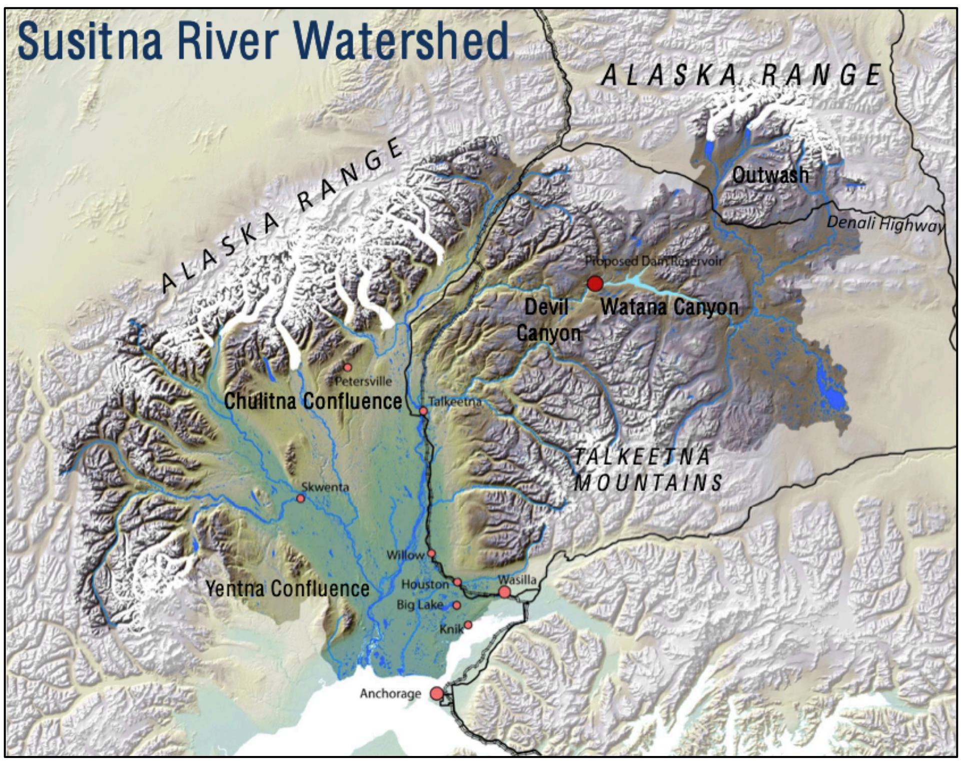

Figure 1. Map of the Susitna River watershed including population centers with red points proportional to population size. Additionally, the 2010s proposed dam site is indicated by the largest bright red point. From Beebe et al. 2011.

[1] Benke and Cushing 2005
[2] USGS 1990
[3] Borass 2004
[4] Boraas and Christian 2024
[5] USCB 2020

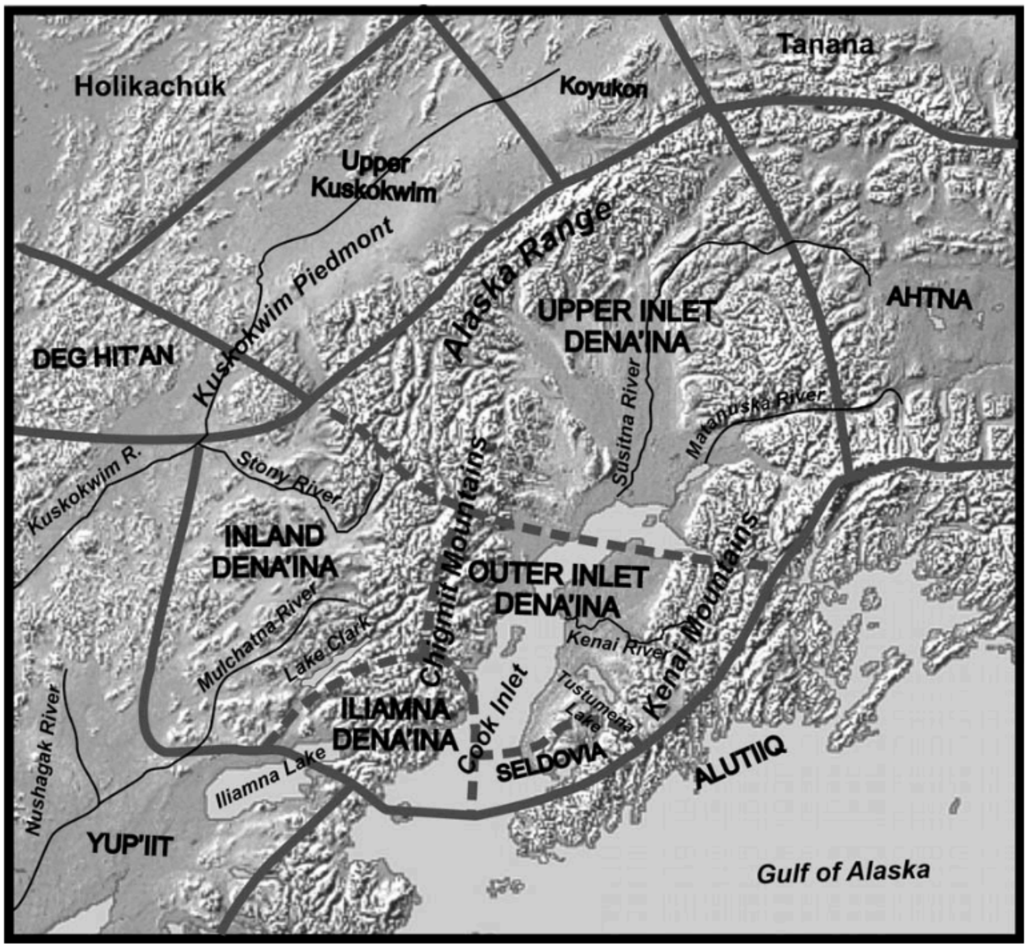

Figure 2. Dena'ina and adjacent cultural areas. From Boraas 2004.

Glaciers cover about 10% of the basin, and more than half of it is considered mountainous (Figure 1).[6] Consequently, streams in the upper tributaries are comprised largely of glacial runoff, while lower tributaries are more influenced by snowmelt, precipitation, and groundwater inputs (Figure 3).[4] Ice formation and breakup exert major influences throughout the watershed, including on the river's hydrology, physical habitat, chemistry, and biology.[7] Vegetation types in the lower, non-glaciated portions of the watershed consist mainly of forest and wetlands.[8]

While hunting and fishing opportunities of all kinds abound and comprise a major source of revenue in the basin, Pacific salmon and the Nelchina caribou herd dominate economically important animal communities. The Susitna supports five species of Pacific salmon, including Alaska's fourth largest king salmon population—placing it amongst the world's largest populations. It also supports one of the world's largest sockeye salmon populations remaining outside of Alaska's Bristol Bay watershed.[9,10]

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[6] Kyle and Brabets 2001
[7] Schoch et al. 1985
[8] Viereck et al. 1992
[9] Ivey et al. 2009
[10] Ruggerone et al. 2010

HISTORY OF THE SUSITNA DAM

1950/60s

The Susitna Hydroelectric Project, initially called the "Devil Canyon Project" (hereon referred to as Devil's Canyon) was originally identified by the Bureau of Reclamation (the Bureau) in the late 1940's as a potential "single-purpose hydroelectric power development [project], designed to meet present and anticipated future power and energy requirements for domestic, municipal, and industrial purposes in south-central Alaska."[11] Although the original mission of the Bureau was to "reclaim" arid land by providing irrigation, the agency acknowledged that the Devil's Canyon Project would not provide water resources for agriculture, or benefit flood control, navigation, recreation, or fish and wildlife."[11,12]

Early in the process, the Bureau considered 19 potential dam sites: 6 on the mainstem Susitna River, 1 on the Tyone River, 3 on the Chulitna River, 5 on the Talkeetna River, 1 on the Sheep River, and 3 on the Skwentna River.[13] The USFWS recommended that only the upper Susitna dams should be considered due to serious fishery impacts that would result from the lower Susitna and tributary dams.[13]

The project design eventually recommended to Congress consisted of two major dams, a 580 MW power plant, and transmission lines to Fairbanks, Anchorage, and "other load centers." The larger dam, at Devil's Canyon, was proposed to stand 635 feet tall, forming a 26 mile long reservoir equivalent in volume to about half that of Lake Coeur d'Alene in Idaho (Figure 4, Table 1). A second dam used to "control the runoff of the Susitna River" was proposed 115 miles upstream of Devil's Canyon near Denali mountain and would stand 219 feet, forming a much larger 25 mile long reservoir, similar in volume to Tustumena Lake on the Kenai Peninsula (Figure 5; Table 1). Construction costs were estimated at $500 million (the present-day equivalent of about $5 billion; Table 1). The Bureau heralded the project as a "catalyst" critical to economic expansion of the Railbelt, as well as increased national defense.[11]

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[11] USBOR 1960
[12] Reisner 1993
[13] USFWS 1952

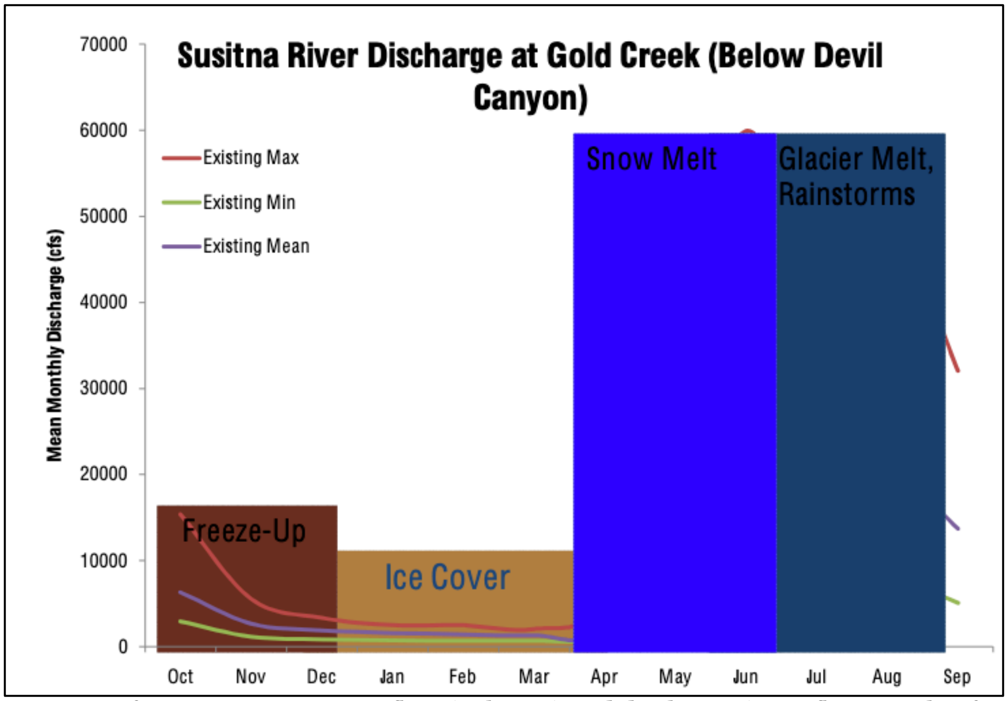
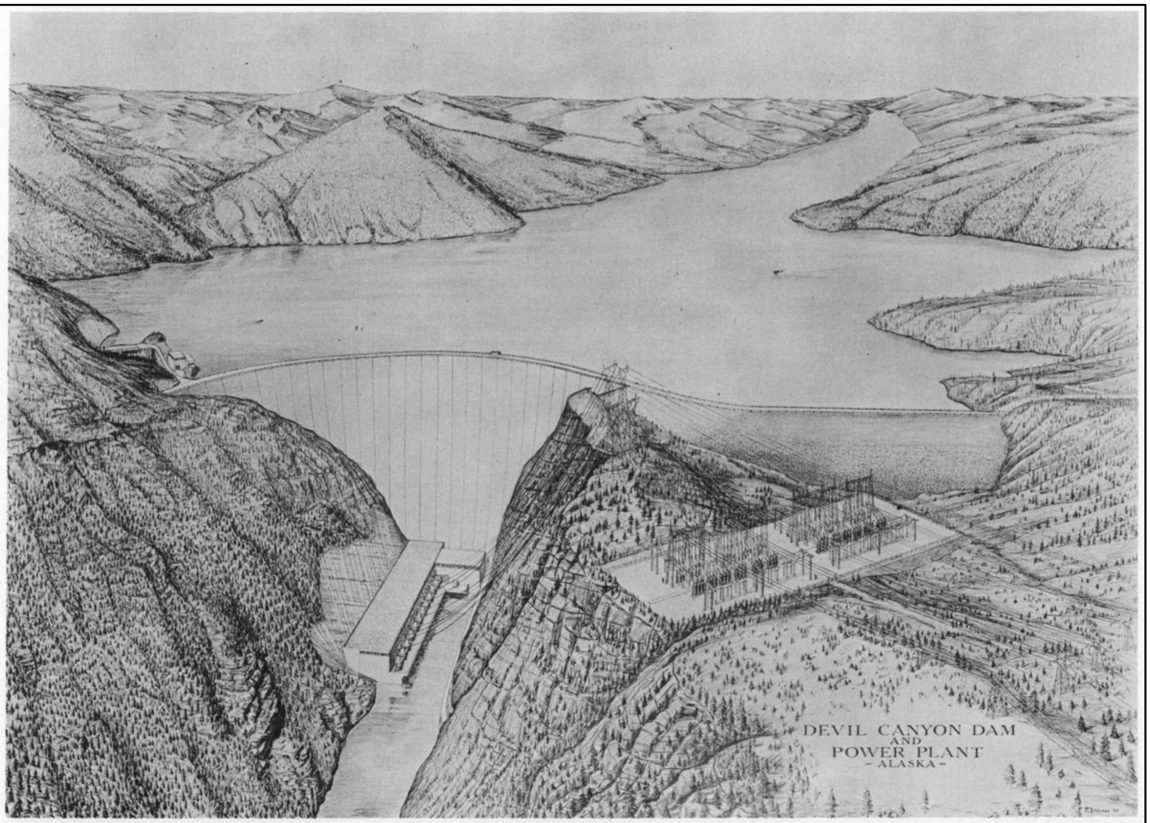


Figure 3. Sources of Susitna River streamflow (in boxes) and discharge (river flow in cubic feet per second depicted by lines). From Beebe et al. 2011.



DEVIL CANYON DAM WILL RISE 635 FEET ABOVE ITS FOUNDATION. ULTIMATE POWERPLANT CAPACITY - 580,000 KILOWATTS.

Figure 4. Schematic of the 1950s proposed lower "Devil Canyon Dam." From the US Bureau of Reclamation 1960 project feasibility report.

The US Fish and Wildlife Service (USFWS) began investigations of salmon use of the proposed project area in 1952 and found all five Alaskan species of Pacific salmon below Devil's Canyon.[14] Although USFWS did not capture salmon above the proposed Devil's Canyon dam site, it reported multiple sightings of salmon skeletons and live fish by sportsman and Bureau employees, suggesting the Canyon was not a perennial barrier to salmon migration.[15]

The 1960 Bureau feasibility report recommending dam construction directly contradicted USFWS reports, stating, "no evidence has been found which would indicate that anadromous fish migrate through or above Devil Canyon."[11] The USFWS also reported that the entire Susitna drainage produced about 40% and 20% of Cook Inlet's sockeye and king salmon respectively, and that the Susitna River system produced about 40% of annual commercial fishing revenue for Cook Inlet.[11,15] The agency stated in an early report that because of their life history, "a period of 7 years of study are required in order that a complete analysis of the Susitna salmon may be made."[14] Many other migratory and resident fish species in addition to the insects they depend on as prey were also described as virtually ubiquitous throughout sites evaluated.[16]

Table 1. Statistics describing Susitna Dam proposals since the 1950s. Note that design specifications changed often during each planning process, so numbers in the table reflect just one of many potential versions of proposals for each era. Note that the first dam listed is the downstream (Devil's Canyon) dam and the second dam is upstream (proposed for different sites in the 1950s/60s compared to the 1970/80s).

Era	Capacity (MW)	Annual energy potential (kw-hrs)	Dam height (ft)	Reservoir length (mi)	Construction cost (approximate 2024 USD)
1950/60s[1]	580	10 billion	1) 635 2) 219	29 25	$5 billion
1970/80s	1600	7 billion	1) 650 2) 900	28 54	$18 billion
2010s	459	3 billion	705	42	$5 billion

Regarding wildlife, one USFWS progress report indicated that the eastern third of the Susitna basin probably encompassed over half the range for the Nelchina caribou herd which was estimated at 40,000 head in 1955.[15] Over a dozen other wildlife species important to hunting, trapping, and overall ecosystem health were also documented.

In addition to fish and wildlife studies, cursory reports reviewing the mining industry, timber and other forest resources, recreation, agriculture, and project potential for flood control were authored by multiple federal and state agencies and appended to the Bureau project feasibility report. While reports generally concluded the project would have minimal impact to natural resources and provide minimal flood control or agricultural benefits, the USFWS noted potential for negative impacts to: 1) fish communities downstream of the project, 2) caribou populations resulting from increased hunting pressure that road access would facilitate, and 3) moose and beaver populations resulting from inundation of critical habitat by reservoirs.[11,13]

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[14] USFWS 1957
[15] USFWS 1959a
[16] USFWS 1959b

Simultaneous to the Bureau's consideration of the Devil's Canyon (Susitna Dam) Project, the US Army Corps of Engineers—whose mission was to accommodate barge and ship traffic and control floods—was pursuing the much larger Rampart Dam proposed for the Yukon Flats. The 5,000 MW Rampart project would have flooded an area the size of Lake Eerie, and with it, critical fish, bird, and wildlife habitat.[12]

Former Alaska Governor and then senator Ernest Gruening was a proponent of the Rampart project while Alaska State House Representative and Natural Resources Committee Chairman Jay Hammond (who would later become Alaska's Governor) was a harsh critic of Rampart.[17] Hammond supported the Susitna project as a less environmentally damaging alternative to Rampart. In addition to Hammond, the USFWS, various chambers of commerce, editorial boards of Alaska's two largest newspapers, and the Alaska Conservation Society all favored the Susitna project over Rampart.[18]

Ultimately, neither project was pursued as Congress "lost its appetite" for financing large hydropower projects where power demand was low and alternative sources were available.[19] At the time these projects were under consideration, Anchorage, Fairbanks, and Kenai Peninsula communities were powered primarily by steam and diesel, and utilized only 40-70% of existing available capacity.[11] In total, all three communities were using about 20% of the power the proposed Devil's Canyon Project would have produced.[11]

Figure 5. Preferred "Denali" location for the 1950s upper dam, located about 115 miles upstream of Devil's Canyon. From USACE 1975.

[17] Hammond 1994
[18] Naske and Hunt 1978
[19] Erickson 2014

1970/80s

In 1972, at the urging of Senator Ted Stevens, the US Senate adopted a resolution requesting a review of the feasibility of providing hydropower to the Southcentral Railbelt.[18] It read (with emphasis added):

> That the Board of Engineers for Rivers and Harbors…is hereby requested to review the reports of the Chief of Engineers on: Cook Inlet and Tributaries…Copper River and Gulf Coast…Tanana River Basin…Yukon and Kuskokwim River Basins, Alaska…and other pertinent reports with a view to determining whether any modifications of the recommendations contained therein are advisable at the present time, *with particular reference to the Susitna River hydroelectric power development system, including the Devil Canyon Project and any competitive alternatives thereto, for the provision of power to the Southcentral Railbelt area of Alaska*.[20]

Shortly after the resolution passed, the oil embargo imposed against the US by Arab members of the Organization of Petroleum Exporting Countries (OPEC) during the 1973 Arab-Israeli War raised urgent concerns about developing domestic sources of energy. This galvanized support for Susitna Dam development by the Alaska congressional delegation, with Senator Ted Stevens and Representative Don Young introducing legislation that would authorize project construction, and Senator Mike Gravel—who at the time was the chairman of the Senate Water Resources Subcommittee—leading the charge to authorize funds for the US Army Corps of Engineers (the Corps) to update the 1960s feasibility studies.[18] Shortly thereafter, the Alaska State Legislature also passed resolutions urging development of the Devil's Canyon Project. Together, these actions initiated another round of detailed evaluations by the Corps regarding economic, social, and environmental conditions in the Susitna basin as they related to existing power infrastructure and anticipated needs.

The Alaska Power Administration (a federal agency established to replace the role of the Bureau in the state, dealing exclusively with Alaska's hydroelectric potential) was responsible for most analyses regarding marketability of power the project would produce. But other organizations involved included: the Federal Power Commission, USBOR, Bureau of Land Management, Bureau of Outdoor Recreation, USFWS, US Environmental Protection Agency, National Marine Fisheries Service, US Bureau of Mines, Soil Conservation Service, Alaska Railroad, Federal-State Land Use Planning Commission for Alaska, Alaska State Clearinghouse, Alaska Department of Fish and Game, Alaska Division of Parks, Cook Inlet Regional Corporation, and Ahtna, Incorporated.[18,20] Interestingly, the Henry J. Kaiser Company concurrently produced a report considering development of a large aluminum plant in the Railbelt area that would depend on power from a dam five miles upstream from the original USBOR Devil's Canyon damsite.[18]

In 1975, the Corps finalized their Interim Feasibility Report summarizing information compiled by those agencies and covering many of the same topics studied in the 1950s and 1960s, though information was updated and in some cases more detailed. One major difference was that after considering 40 different sites along the mainstem, the Corps recommended two dams—one at the 1950s Devil's Canyon location and the second much closer to Devil's Canyon than the originally proposed Denali damsite (Figures 6 and 7). The so-called Watana site was about 30 miles upstream of Devil's Canyon.

Topics of the feasibility report included general descriptions of the study area, fisheries, birds, mammals, agriculture, forestry, minerals, energy, human resources, the local economy, power needs, and power generation alternatives.[21] Unlike the 1950s round of dam considerations,

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[20] USACE 1975

these studies were subject to the National Environmental Policy Act (NEPA) passed by Congress in 1969, in addition to other federal regulations that were not in place until the early 1970s. Accordingly, this report was apparently the first available that required public comment periods resulting in agency, environmental group, and individual comments on the proposed Susitna Dam and related studies.

In general, federal agencies were either neutral or supportive of the project, state and local agencies were largely supportive, and most individuals and recreation groups that commented were opposed to the project in 1975.[21] Many if not most commenters requested a great deal of additional information and study. The ultimate conclusion of the report was that dam development at the Devil's Canyon and Susitna sites were "technically, economically, and environmentally feasible and justified," and recommended Congressional authorization of additional funds for a more complete evaluation.[20,21]

In reaction to the Corps report, Governor Jay Hammond created a task force to review it. While the task force ultimately endorsed the report's conclusions, they did so with the caveat that extensive further studies were needed to address outstanding administrative, biological, environmental, and socioeconomic questions, and that local, state, and federal agencies all needed to participate in future study and project planning.[18] In response, the Corps recommended about 4 years of additional study.[21] While studies were ongoing, Senator Gravel became a chief proponent of the project, attempting to gain federal political and financial support.[18] But local interests—including many that supported the 1950s Susitna proposal—were increasingly expressing opposition. The Fairbanks Environmental Center, the Chugach Electric Association, and the Denali Citizen's Council were plainly opposed, and even newspaper editorial boards expressed doubts.[18]

Figure 6. Preferred "Watana" location for the 1970/80s upper dam and the only dam proposed in the 2010s, located about 30 miles upstream of Devil's Canyon. From the US Army Corps of Engineers 1975.

[21] USACE 1978

In the late 1970s after federal interest in the project again faded, the State of Alaska announced plans to build the dams itself, revising design plans and reinitiating environmental studies in accordance with Hammond's task force recommendations.[12] The state Alaska Power Authority (as opposed to the federal Alaska Power Administration, but the precursor to what is now the Alaska Energy Authority) began additional studies and filed for a project license with the Federal Energy Regulatory Commission (FERC) in 1983 for the lower dam and in 1985 for both dams.

Ultimately, waning enthusiasm and financial support from the Alaska Legislature probably influenced decreasing federal interest in the Susitna project at a time when federal agencies were already diminishing their historic roles in hydroelectric planning and development. As one analysis summarized, the second round of "the Susitna project was not delayed by opposition from the conservationists, but rather by the cumbersome and protracted federal hydropower development process as well as the disinterest of various chief executives to the power needs of Alaska."[18] Additionally, small population sizes requiring little power demand was not commensurate with the project size and cost. Those factors along with decreasing oil prices contributed to waning enthusiasm for the project within the state, prompting the State to withdraw its license application (Figure 8, Table 1).

2010s

In 2009, then Governor Sarah Palin announced a non-binding goal for the State of Alaska to produce 50% of its power through renewable resources by 2025 primarily citing wind, geothermal, tidal, and wave sources.[22] The goal was reinforced with similarly non-binding legislation passed in 2010 under Governor Sean Parnell who replaced Palin after she left office to run as a US vice-presidential candidate.[23]

In addition to Alaska's renewable energy goal, oil prices tripled between 2000 and 2010, and oil resources in Alaska—a major source of revenue for the state—were dwindling (Figure 8). In response, Parnell became a vocal proponent of the Susitna Dam which would single-handedly reach the 2025 goal.[19] After Parnell gathered additional political support for the project, the 2011 Alaska Legislature authorized the Alaska Energy Authority (AEA) to once again pursue what they called the Susitna-Watana Hydro project. Parnell signed a ceremonial copy of the bill at a televised press conference in which he stated, "Go big or go home!" after introducing the Susitna project to the public.

[22] Galbraith 2014
[23] Wilner 2010

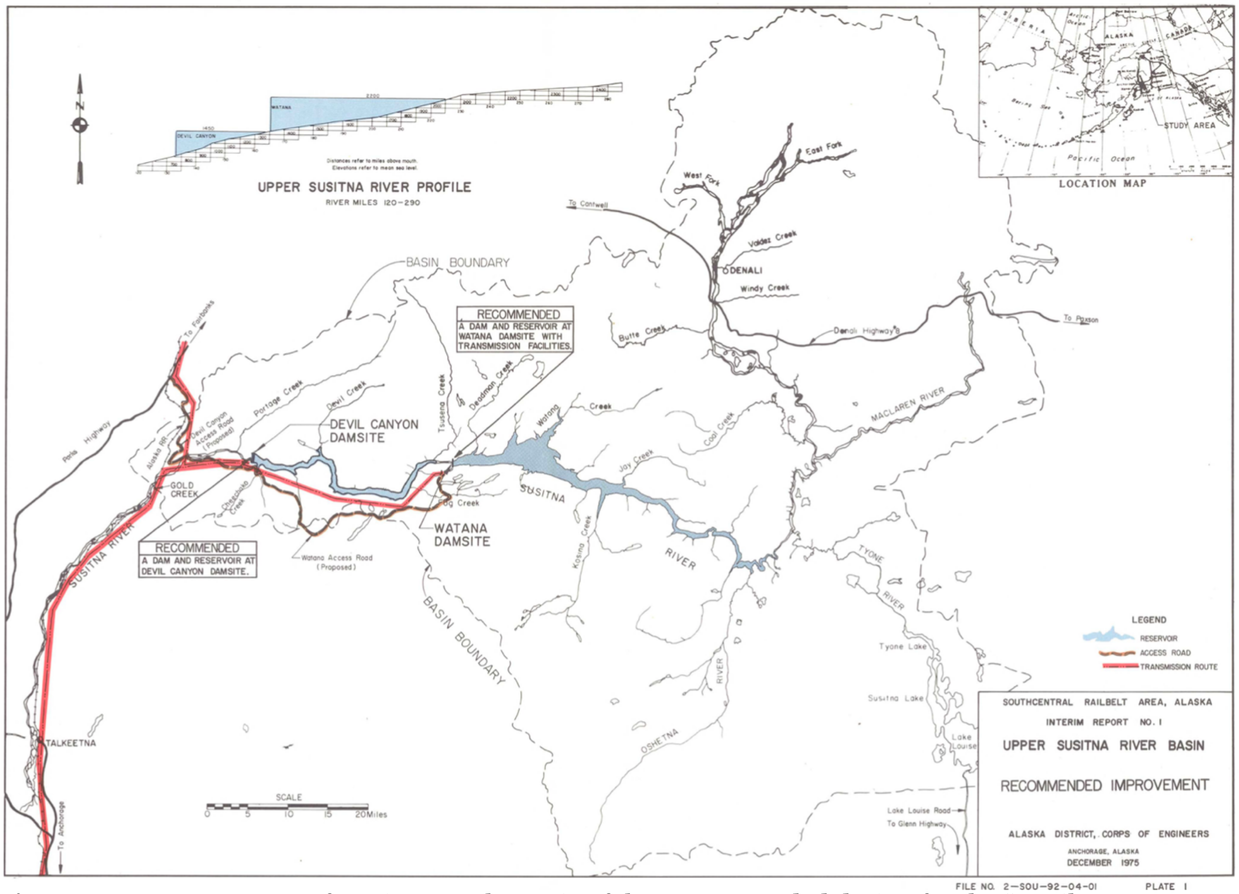

Figure 7. US Army Corp of Engineers schematic of the recommended design for the "Devil Canyon Project" (Susitna-Watana Dam). From the US Army Corps of Engineers 1975.

Unlike previous proposals, the 2010s version evaluated feasibility and environmental conditions and potential impacts for only one dam, located near the 1970s/1980s Watana site about 20 miles upstream of Devil's Canyon (Figure 9). The FERC application process was initiated by the State in 2011 with licensing documents describing known project information including a data gap analysis from the 1980s studies. Environmental and engineering studies commenced again in the summer of 2012 prior to final study plan approval by FERC. By beginning studies prior to approval, a substantial amount of data generated in the 2010s was collected outside of the mandated licensing process.

At that time, the project was supported not only by the State, but also by labor and resource development interests. However, strong and ultimately organized opposition was voiced by many watershed residents, tribes, and environmental groups. By the 2010s, state and federal agencies provided input into study development, but took no formal positions in favor or against development proposals. However, many agencies communicated concerns about the regulatory process used for permitting as well as issues with study plans. Ultimately in 2016, in response to opposition and a lack of financial resources, Governor Bill Walker stopped all discretionary spending on the licensing process which subsequently entered formal abeyance.

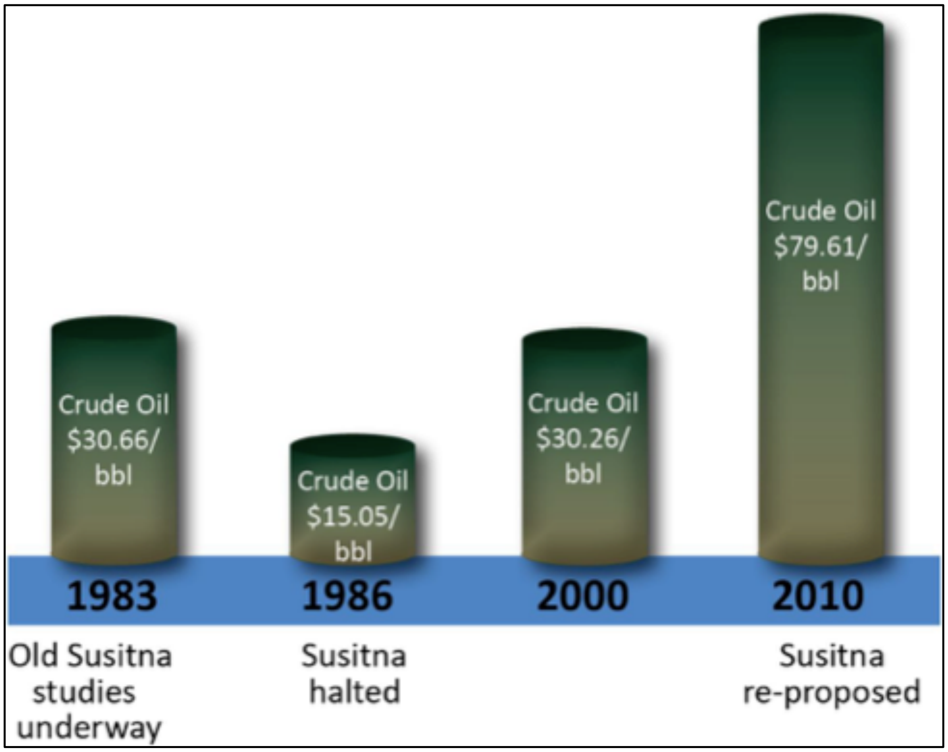

Figure 8. Oil prices per barrel during the last two Susitna River hydropower proposals. From Beebee et al. 2011.

Present Day

Because of continued interest in renewable energy sources and the recent influx of federal infrastructure funding, a renewable energy plan is currently under consideration for the State of Alaska. This has revived conversations surrounding dam construction on the Susitna River. Though no funding has yet been appropriated nor any formal licensing processes undertaken, current Governor Mike Dunleavey rescinded Walker's decision to stop work on the project, thereby removing fiscal constraints.

If AEA decides to move forward with a license application, they may request that the licensing process initiated in the 2010s be resumed, leaving only one year of additional study prior to submission of a license application. Dependent on FERC approval, resuming the process (as opposed to restarting the licensing process) would substantially expedite licensing and risk using out of date and insufficient information for decision making. In a 2017 letter to NMFS regarding re-starting versus resuming the licensing process, the Director of the US Office of Energy Projects stated the following:

> If AEA decides to move forward with developing a license application, FERC may require that the ILP be re-started. Because a process restart will require [FERC] to expend a significant amount of additional staff resources which could affect the processing of other cases, such a request must include a showing that the State of Alaska has a firm commitment to the project. At that time, to the extent that AEA's proposal has not changed and the information has not become stale, AEA would not need to repeat the already completed [licensing process] steps. However, [FERC] may also at that time, request additional scoping and modifications to the approved study plan."

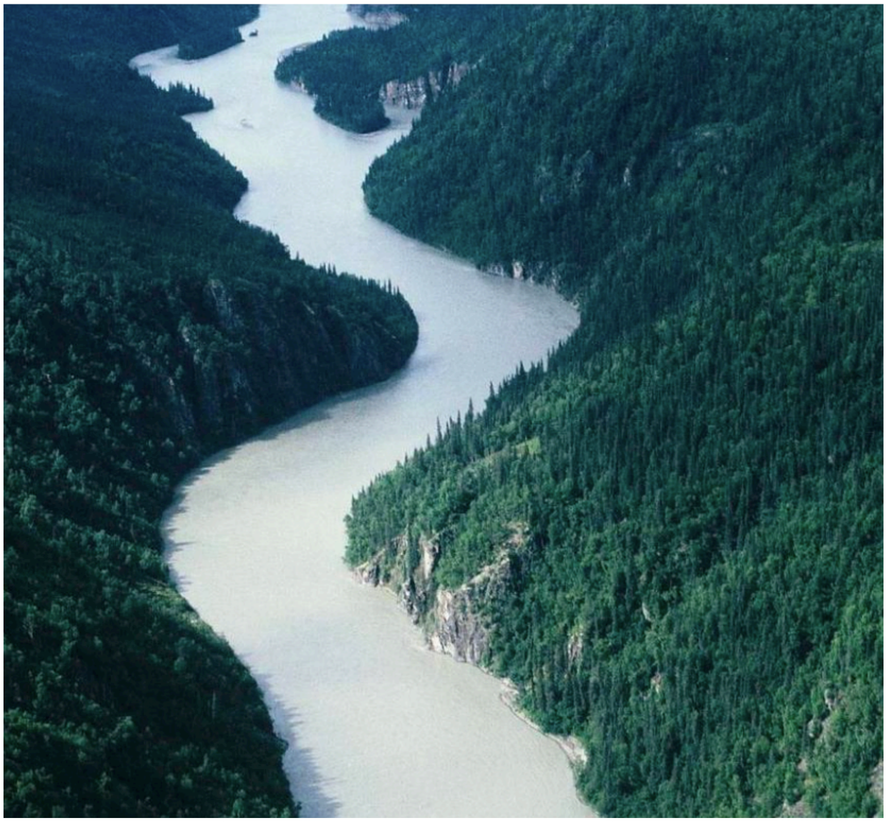

Figure 9. The Watana Canyon of the Susitna River near the site of the dam proposed in the 2010s. Alaska Energy Authority photo obtained from Beebee et al. 2011.

ECONOMICS

Every iteration of the dam proposal has come with promised jobs generated by construction and operation, increased tourism, and even guiding fishermen pursuing lake trout predicted to "replace" salmon upstream of the dam.[12] As previously stated, both the 1970/80s and the 2010s proposals were influenced by oil prices, with high prices instigating proposals and low oil prices and/or a weak general economy halting them (e.g., Figure 8).

All told, the State alone has invested hundreds of millions of dollars on the project. The 1970s/80s proposal cost the state Alaska Power Authority alone to spend $227 million—a present day equivalent of about $800 million.[19] At least an approximate $200 million—a present day equivalent of about $250 million were invested in the 2010s proposal by the state Alaska Energy Authority.[19,24] These figures exclude massive amounts of time and resources also invested by federal agencies and all other stakeholders.

Jobs and associated revenue

The most thorough cost-benefit analyses were conducted for the most recent proposal in the 2010s. The Alaska Energy Authority (AEA) predicted the project would generate 1300 jobs annually during construction, though would require only 24 to 28 permanent year-round staff

[24] Snyder 2016

for for operation once the dam is built.[25,26] In its analysis, AEA neglected to estimate jobs potentially lost as a result of the dam in tourism, recreation, sport and commercial fishing, and other sectors. Talkeetna alone sees nearly 240,000 visitors annually, contributing substantially to the $98 million in direct spending, 1,350 jobs, and $34 million dollars in income estimated for the Matanuska-Susitna Borough in 2016.[27]

In 2017, nearly 30,000 anglers collectively spent over 80,000 days fishing recreationally in the basin, contributing to the over $800 million in economic output, 6,300 jobs, and $270 million in household income that sportfishing generated for the Borough.[28,29] Dozens of commercial setnet permits in the Northern District of Upper Cook Inlet (to which the Susitna River is the major tributary), and hundreds of commercial setnet permits also support jobs and contribute to the over $20 million dollar exvessel value (the value before processing) of the fishery.[30] The Susitna watershed additionally supports one the most popular hunting areas in the state which serves as another source of associated jobs and revenue.

Costs and benefits

In 2011, the Executive Director of AEA, Sara Fisher-Goad, indicated that the project would never "pencil out," or in other words would never pay for itself through power sales.[19] Consequently, the State pursued subsidies for construction from the USDA's Rural Utility Service. On the other hand, a report prepared for by an economic consultant for AEA concluded that reduced energy costs from other forms of power generation would generate $11.5 billion during the first 50 years of project operation resulting in a benefit-cost ratio of 3.07.[26]

Despite the high $5 billion price tag used for that AEA analysis, an independent economic report suggested it was a substantial underestimate citing multiple reasons including: increasing estimates generated by AEA between 2012 and 2014, failure to use best practices for estimating cost, failure to consider transmission line construction and improvement, institutional bias, and historic AEA cost overruns.[19] AEA also ignored operating costs in their estimate including payments to regional Native corporations that own lands under the proposed project and financing costs including interest rates.[19]

A more recent analysis commissioned by current Governor Mike Dunleavey compared the costs of Susitna to the combined "cleaner" energy sources that could be generated for Alaska's Railbelt using pumped energy storage exploiting the existing Eklutna dam and wind. It estimated that those combined cleaner sources would cost approximately 25% less to construct than the Susitna dam and would have virtually no carbon footprint (Figure 10).[31] Regardless of alternatives, unfavorable economics have been a major contributing factor—if not the main reason altogether—that all three previous permitting processes were halted.

HYDROPOWER AS A RENEWABLE ENERGY SOURCE

[25] AEA 2015
[26] Northern Economics 2015
[27] McDowell Group 2017
[28] ADFG data 2024
[29] Southwick Associates 2019
[30] ADFG 2023
[31] Williams et al. 2020

When the Susitna dam project was initially proposed in the 1950s, impacts of largescale hydropower were poorly understood. Today, there is widespread global agreement that depending on their location and surrounding environmental conditions, environmental costs of large dams can vastly outweigh their economic and other benefits.[32,33] This realization combined with the degraded state of aging dams led to a fairly recent movement of dam removal primarily in the northwest hemisphere.[32] Additionally, a highly polarized debate has emerged about whether or not large hydropower dams should still be categorized as renewable compared to other renewable sources of energy (e.g., solar, wind pumped energy storage, etc.). Proponents of large hydropower, including the US Department of Energy, argue that the consistency of their power generation is essential to balance "intermittent" renewable energy sources like solar and wind.[34] Among other points, proponents cite that hydropower is generally produced domestically, protecting it from conflicts with other source countries, supply chain impediments, and price volatility.

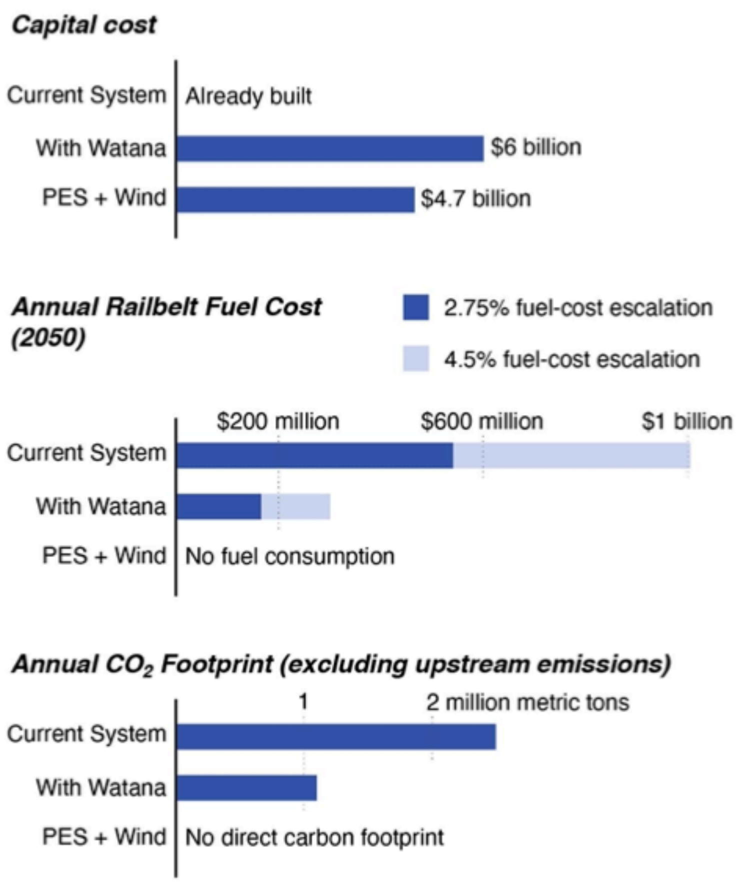

Figure 10. Comparison of costs and carbon footprints between the existing Alaska Railbelt power system, the addition of Susitna Hydropower (referred to as 'Watana'), and pumped energy storage using the existing Eklutna hydroelectric project in combination wind power (referred to as PES + Wind). From Williams et al. 2020.

were once viewed as only impacting upstream habitat, downstream impacts are now widely recognized (e.g., changes to temperature regimes, loss of sediment supply, reductions in critical

[32] McCully 2001
[33] Biswas 2012
[34] USDOE 2024

habitat complexity, and multitudes of cascading effects that impact biota from primary producers to top predators). Recent science also documents that greenhouse gas emissions are not avoided with largescale hydropower. For example, emissions caused by large reservoirs impounded by dams result from decomposition of flooded vegetation.[35,36,37]

Reservoirs release carbon dioxide and methane, both of which contribute substantially to global warming.[35,36,37] Furthermore, natural processes of free flowing (undammed) rivers remove carbon from the atmosphere.[38] Researchers estimate that annually, two hundred million tons of carbon are transported to the ocean by free flowing rivers.[38] In other words, dam construction and operation generates greenhouse gasses that cause climate change. Consequently, some US states consider all hydropower non-renewable; other states define hydropower as renewable according to the amount of electricity generated, the magnitude of their environmental impacts, or the age of the facility; while remaining states consider all hydropower renewable (Figure 11).[39]

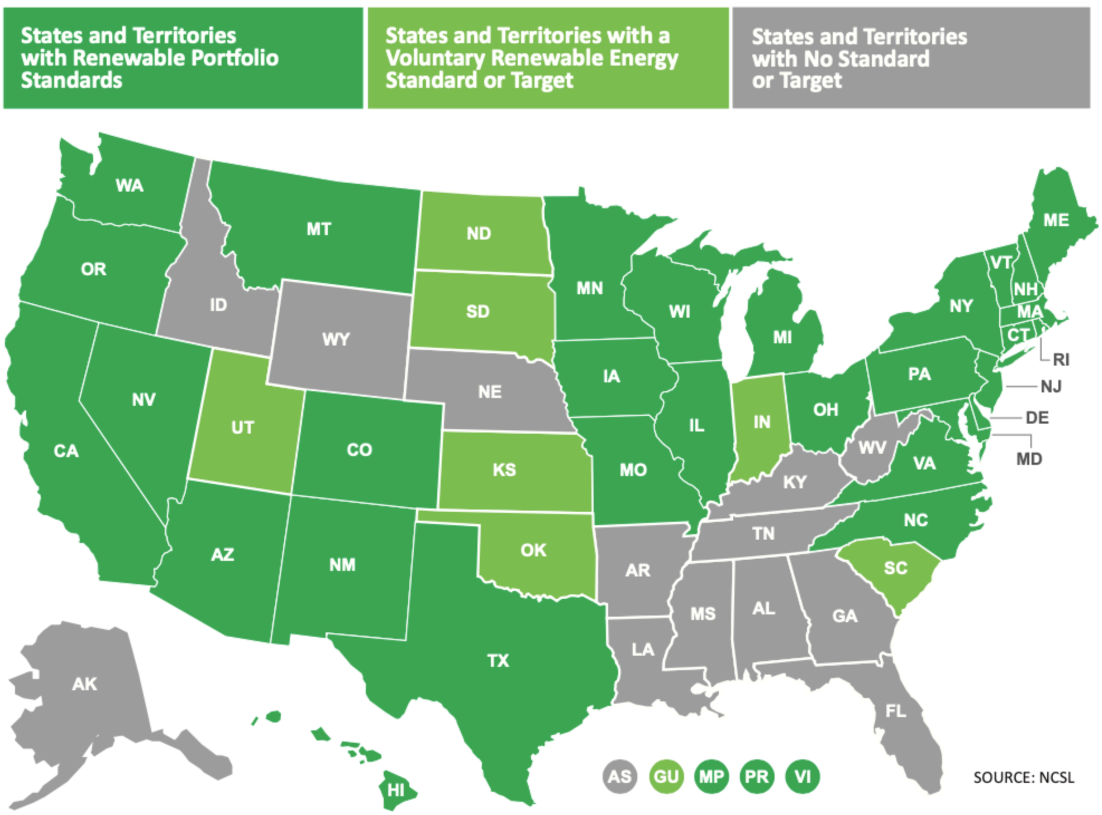

Figure 11. Renewable portfolio standards and targets in US states and territories as of 2020. From Stori 2020.

Climate impacts of Susitna Dam

For the Susitna project specifically, climate benefits remain unevaluated by AEA and the State of Alaska, but are described in independent analyses as minor and/or substantially less than benefits other renewable energy alternatives would provide. One study concludes that Susitna

[35] Lima et al. 2008
[36] Maeck et al. 2013
[37] Deemer et al. 2016
[38] Galey et al. 2015
[39] HRC 2012

dam development, while meeting Alaska's 2025 renewable energy goal would "make only a tiny contribution to abating Alaska's human-caused greenhouse gas emissions" because of the continued need for additional energy produced by coal, oil, and gas.[19,31]

They estimated that the Susitna project would produce over a million metric tons of carbon dioxide, while pumped energy storage and wind would produce no carbon dioxide. Other renewables like solar and tidal energy may also warrant consideration, but as of 2024 are more expensive options for Alaska and specifically for Railbelt power production. A recent federal evaluation comparing renewable options for the Railbelt did not recommend largescale conventional hydropower like Susitna, but instead recommended wind, solar, geothermal, tidal, biomass, smaller hydropower, and landfill gas.[40]

The study concluded that increasing Railbelt renewable energy to about 76% of power generation would produce a net savings of about $105 million/year between 2030 and 2040 using primarily wind, solar, and pumped energy storage (Figure 12).[40]

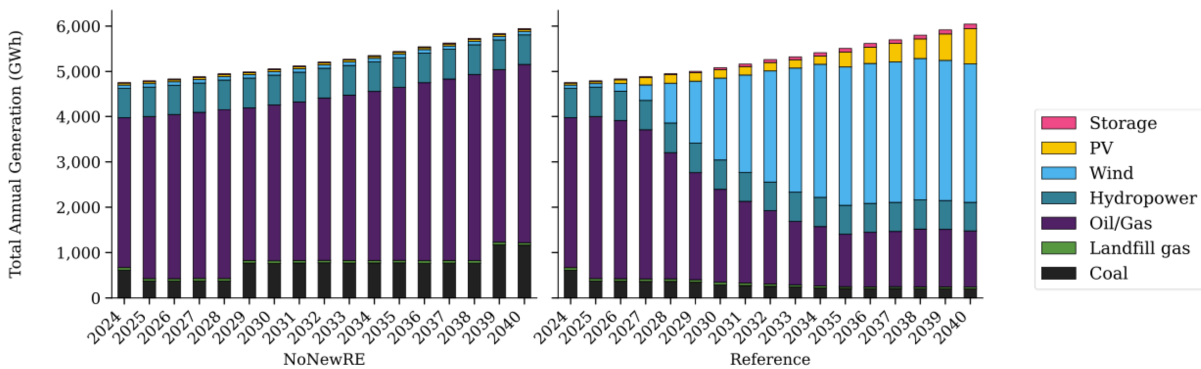

Figure 12. Results of a recent analysis comparing energy generation in Alaska's Railbelt from 2024 to 2040 if only existing sources are exploited (left) versus incorporation of renewable sources (on the right). Note that renewable energy sources (wind, photovoltaics/solar, and pumped energy storage) outweigh existing non-renewables by about two times by 2040 (on the right), and that the plan includes no new large, conventional hydropower. From Denholm et al. 2024.

REGULATING DAM CONSTRUCTION

In addition to the economics and ongoing debate about whether or not hydropower is renewable, each iteration of the Susitna dam proposal has been subject to different licensing processes. Regulations dictating dam construction have changed dramatically between the first formal Susitna Dam proposal in the 1950s compared to the present day. The Great Depression, starting in 1929, instigated the Works Progress Administration (WPA). Among many massive infrastructure projects included in the WPA were construction of some the largest dams in the US. These included the Grand Coulee Dam on the Columbia River which, to this day, remains one of the largest concrete structures ever built.[41]

At the time, hydroelectric dam construction was the purview of the Bureau of Reclamation (the Bureau), in spite of their overarching mission to irrigate naturally dry western lands, which they described as allowing the "desert to bloom".[12] World War II bolstered efforts to generate power

[40] Denholm et al. 2024
[41] NPS 2024

needed to produce aircraft, ships, and artillery. Some parties argued that the Grand Coulee Dam itself was responsible for the ultimate outcome of the war.[12,41]

Throughout the 1950s and 60s, dozens of large dams were built by both the Bureau and the US Army Corps of Engineers (the Corps) who were originally tasked with building projects to assist with floods and navigation. For decades, the two agencies competed with one another for some of the largest dam construction projects in the nation.[12] If permitting and licensing processes were formal at that time, existing documentation is sparse at best.

The Federal Energy Licensing Commission (FERC) was formed in 1977 as a reaction to the 1973 oil crisis. It replaced the much smaller Federal Power Commission that controlled smaller hydropower dams prior to its formation.[42] FERC regulates natural gas, oil pipelines, wholesale electricity rates, and hydroelectric projects. Hydroelectric projects are now permitted by FERC using one of three processes: the original traditional licensing process (TLP), the alternative licensing process (ALP), or the integrated licensing process (ILP; Table 2, Figure 13). All processes begin with a pre-filing stage prior to a license applicant (i.e., project proponent/sponsor) filing a final license application.

Table 2. A comparison of the three hydropower licensing processes as described by FERC. From E. Carter, 2014.

Integrated Licensing Process (ILP)	Alternative Licensing Process (ALP)	Traditional Licensing Process (TLP)
Default process	Available upon request and FERC approval	Available upon request and FERC approval
Projects with complex issues and study needs; FERC oversight in pre-filing	Smaller projects that effectively promote a self-driven collaborative pre-filing process; some FERC involvement in pre-filing	Projects with less complex issues and study needs; no FERC oversight in pre-filing
Predictable scheduling in both pre-filing and post-filing stages	Collaboratively determined schedule in pre-filing stage	Paper-driven process; no set timeframes
Post-filing elements of each process are very similar		

- The TLP lacks set time frames, so generally takes more time (Table 2).[43] It has the least oversight by FERC during the pre-filing process, and is considered by some to be more appropriate for projects with "less complex issues and study needs." FERC and project stakeholders including states, tribes, non-governmental organizations, and others are not formally involved in the TLP until the license application is filed, which is also what triggers the environmental review process required under the National Environmental Policy Act (NEPA).[43,44] The TLP is regarded by some stakeholders to be "adversarial and applicant-driven".[44] Others consider the TLP the

[42] Frontline 2024
[43] Levine et al. 2021
[44] Swiger and Grant 2004

most flexible and thorough process, and the most appropriate for newly proposed largescale dams.

- The ALP has more FERC oversight than the TLP in pre-licensing, but less oversight than the ILP (Table 2). It allows for environmental review and pre-filing consultation with FERC during pre-licensing and involves a collaboratively defined pre-filing schedule.[43] It is generally used for smaller projects for which the applicant can demonstrate consensus among stakeholders.[44]

- The ILP was created with the primary purpose of "streamlining" the relicensing process (Table 2, Figure 13). Approved FERC hydropower licenses are issued for a 30-50 year timeframe. Upon expiration, existing dams require so-called relicensing. Because of the great number of dams built during the WPA, a need for relicensing of more than 500 dams emerged between 1989 and 2004.[32] This prompted interest in a more efficient licensing process. The ILP was thus created in 2005, and—likely because more dams were being relicensed than new dams were being proposed—it became the default process for relicensing as well as new project construction. Since then, the ALP and TLP must be specially requested by project applicants and approved by FERC.[44] The ILP combines several licensing steps and according to FERC, increases collaboration and coordination between government agencies. It was developed with the intent of resolving pre-filing study disputes earlier in the permitting process than the TLP and ALP allowed.[44] The average length of time for FERC to approve a license for a new dam is 5 years under the ILP, but it can take up to 8 years when environmental impacts are more complex.[43] Despite FERC's attempts to streamline the licensing process with the ILP, applicants still complain the process is too long while many agencies and environmental groups indicate the opposite, suggesting 2-3 years of studies is insufficient to adequately characterize environmental baselines and project impacts.[43]

Under the ILP, the applicant files the initial proposal along with a Preliminary Application Document (PAD) with FERC to initiate the process (Figure 13). The PAD describes existing, relevant information about the project, its potential environmental impacts, and a schedule and plan for licensing. Once those are filed, FERC conducts a public scoping process to clarify issues in the PAD and identify additional issues, existing information, and information gaps.

The scoping process is the first opportunity for public comment and formal study requests. After scoping, the applicant develops and proposes a study plan with additional agency, tribal, public, and other stakeholder input including the possibility of a formal "study dispute resolution" process. Once a Revised Study Plan (RSP, typically a two-year plan), is filed and approved by FERC, studies are initiated. Typically after the first year of studies, the applicant files an Initial Study Report (ISR) with FERC and presents it for public comment.

Once studies are complete an Updated Study Report (USR) is issued. After public review and FERC approval of the USR, the applicant prepares and submits the formal license application. Generally, the subsequent post-filing period is on a consistent one and a half year timeline (Figure 13). During that time, several steps are completed including FERC preparing and issuing the environmental impacts document required under NEPA. After the NEPA document is finalized, FERC issues the license.[44]

According to a recent review, disagreements among stakeholders and between stakeholders and applicants regarding environmental studies are a main source of delays to the licensing process.[43] Environmental studies are required under NEPA to evaluate the environmental effects of Federal actions including hydropower licensing. Effects are evaluated by the generation of either Environmental Assessments (EAs) or Environmental Impact Statements (EISs, typically generated for larger projects). According to the review of FERC hydropower licensing:

> There are frequent and sometimes protracted disagreements on what environmental impacts are relevant to the project and whether existing information or studies conducted by outside organizations are appropriate to inform protection, mitigation, enhancement, or other measures. License applicants feel that the value of existing studies is often too quickly discounted, while agencies feel that existing information presented by license applicants may not be current or does not use the best available science.[43]

Figure 13. FERC flowchart describing the integrated licensing process (ILP). From E. Carter, 2014.

The review also reported that stakeholders from all sectors described a lack of trust among one another leading to poor communication and a lack of transparency often causing further delays[43].

Susitna Dam licensing

Early in the 2010s Susitna licensing process, several agencies raised concerns about limitations of the ILP—especially the strict two-year study period which they argued was insufficient for a project of that size and complexity. Agencies and other stakeholders filed formal requests that FERC require the TLP for the Susitna project. But FERC denied those requests, deferring to the default ILP. Objectors included state agencies (Alaska Department of Fish and Game), federal agencies (the US Fish and Wildlife Service and the National Marine Fisheries Service), and non-governmental organizations (the Susitna River Coalition, Trout Unlimited, and many others).

All told, the 2010s licensing process met many delays resulting from access issues, lack of funding, study disputes, and other problems.

ENVIRONMENTAL IMPACTS

Environmental impacts of largescale hydropower are extensively documented in the Lower 48 and around the world. In addition to creating a migration barrier to aquatic species, they inundate vast swaths of riparian and upland habitat critical to all wildlife and avian species. Their impacts reverberate downstream by starving the watershed of channel forming and maintenance flood flows, altering temperatures to which species have adapted over millennia, removing essential upstream sources of sediment and nutrients generated in headwaters, and consequently disrupting biota ranging from microscopic primary producers all the way up to the largest predators.

Throughout the history of Susitna Dam proposals, these and other concerns have been consistently raised by state and federal agencies, watershed residents, and environmental groups. Salmon and their habitat are of great concern because of their economic and ecological value. Five species of salmon are documented at all freshwater life history stages throughout the Susitna Basin (Figure 14). Because the power plant associated with the dam would operate as load-following—meaning that it would alter its output to meet demand—operation would practically reverse the natural hydrology of the river (Figure 15).

Instead of consistently low flows during frozen winter months, dam operators would fluctuate flows throughout the day in accordance with power demand. While flows might resemble current conditions on winter nights when power demand is low, they would increase flow by as much as 5 times during the day when there is a high demand for power (Figure 15). Conversely, in the summer when flows naturally vary under the influence of melting ice and precipitation, dam operations would maintain the flow at levels 2-3 times lower than current conditions (Figure 15). Among other physical impacts this would cause daily fluctuations in winter water depth, velocity, and channel width,[45,46] disrupt ice processes critical to creating and maintaining habitat,[47] and interfere with surface and groundwater interactions that are essential to aquatic life in northern latitudes.

Temperatures—a driving force of all aquatic life—will be altered downstream of the dam and in the reservoir, which will in turn impact oxygen and nutrient dynamics.[46] Algae, the base of the aquatic foodweb, will die or break loose with rapid changes in water levels.[48] Patterns of aquatic insect drift will be altered, interrupting a vital food supply to most fish species.[49] Rapidly changing flows causing either scour or sedimentation may disrupt fish egg incubation, remove fish access to critical off-channel habitats, alter timing of fish spawning and migration.[45,46] Young salmon in Lower 48 rivers often become stranded and die downstream of load following operations.[50]

Ecological impacts of largescale hydropower are not limited to aquatic environments, but extend to riparian and upland areas with impacts to vegetation and the birds and wildlife that depend

[45] Young et al. 2011
[46] Cushman 1985
[47] Prowse and Culp 2003
[48] Hauer and Stanford 1982
[49] Haxton and Findlay 2008
[50] Schilt 2007

on it. Of particular concern in the Susitna drainage are impacts to big game animals important to subsistence and recreation hunting including caribou, moose, bear, and Dall sheep (Figure 14). The formation of a large reservoir behind the Susitna dam would impact documented migration patterns of the Nelchina caribou herd.

Upstream and downstream impacts of the project would impact vegetation consumed by caribou, moose, Dall sheep, and other wildlife that feeds black and grizzly bears. Other impacts of concern include cultural resources, socieconomics (e.g., changes to subsistence and employment opportunities), dam safety and the potential for catastrophic failure, and impacts of project construction and operation to and from climate change.

Susitna environmental studies

Due to those concerns, and more recently because of NEPA requirements, environmental studies were conducted for each iteration of dam proposals. This work resulted in thousands of reports regarding conditions existing during each study period and potential project impacts.[51] The majority of subject matter was common to all three past dam proposals. They addressed physical, chemical, and biological conditions, project cost estimates and engineering, and general project feasibility. Although methods and technology varied, general subjects common to all three proposals include:

- Weather and climate
- Geology including glacial history and tectonics
- Ice processes
- Surface and groundwater hydrology
- Water chemistry
- Vegetation and wetlands
- Fish and other aquatic life
- Wildlife ranging from furbearers to birds to large game
- Recreation
- Project cost and safety

Some differences between proposals included an evaluation of agricultural expansion in the 1950s and consideration of salmon hatchery construction to mitigate fish impacts in the 1970s/80s. The most recent proposal considered fish genetics, potential for mercury contamination, and other issues that were either unknown or for which modern technology was not available for earlier proposals. During the last two proposals, the vast majority of studies were conducted by contractors hired by the state AEA in the 2010s and the state APA in the 1970s/80s, but also included research conducted by various federal and state agencies. Studies for the original proposal were conducted largely by federal agencies.

The most recent round of research consisted of 58 studies intended to collect information to inform NEPA documentation and fill gaps identified from the 1970s/80s studies. Of the 58, 13 were considered insufficiently detailed for FERC approval causing one of the first of many delays in the licensing process. Although AEA commenced studies in 2012, the Final Study Plan was not approved by FERC until February of 2013. Consequently, 18 studies commenced without stakeholder review and input, or FERC approval. Once approved studies started in 2013, they were impeded by a historically late ice break-up and failure to acquire permission to access Native corporation lands which encompassed nearly 2,000 acres of the study area. As a result, researchers could not complete 39 of the 58 study plans approved for the first official

[51] AEA 2024

study year. The research also experienced a major setback with the tragic death of an equipment operator when his bulldozer fell through the ice while conducting related work.[52]

These problems delayed the study process by about a year and brought state funding for the work into question. Of the $110 million dollars AEA requested from the Alaska legislature for 2014 studies, only $10 million was granted.[53] AEA completed its initial study report (ISR) in 2016. While enough studies were complete enough for FERC to issue the subsequent Study Plan Determination (SPD) accepting the ISR and informing a second formal year of studies, funding to continue research ended later in 2016 effectively halting the licensing process.

Because of previously described difficulties executing studies and consequent delays, many commenters doubted the credibility and utility of the studies conducted in the 2010s. Studies raising the most widespread concerns included those describing fish and aquatics, water quality, groundwater, raptors, aquatic fur bearers, water/land/shorebird, recreation, wildlife, geology and soils, slope stability, reservoir seismicity, and climate.[54]

Early in the scoping process before study plans were made, the US Fish and Wildlife Service and the National Marine Fisheries Service (NMFS) submitted a formal study request entitled "Susitna River Project Effects Under Changing Climate Conditions" which argued that an assessment of climate change in the basin is necessary to fully evaluate the project's effects on aquatic and riparian species. Both agencies also recommended the Glacial and Runoff Changes study be modified to include consideration for climate change.

Other stakeholders including local residents and multiple environmental organizations submitted written support for the study request and modification, though both were ultimately rejected by FERC. NMFS and the Center for Water Advocacy filed a Formal Study Dispute which resulted in some study design changes, but did not fulfill all of the federal agency requests. A similar process was pursued in 2016 as part of the ISR process during development of the second year studies, with NMFS requesting that AEA:

1) Update the literature review used for the Glacier and Runoff Changes study,
2) Review the effects of climate change on ecosystems in the Susitna region and the species of interest to NMFS, and
3) Evaluate climate change within the entire Susitna Basin.

Despite widespread support for these changes, FERC again denied NMFS's request and ultimately did not model the effects of project operations under future climate scenarios.

By the time the licensing process was halted in 2016, there was widespread agency and other stakeholder consensus that many studies failed to provide information needed to adequately evaluate the project's effects on resources, or to develop appropriate mitigation measures. Consequently, should the previous ILP resume, a great deal of study planning and execution remains before agencies will have the information needed to produce a NEPA document, much less realistically predict project impacts. Disputes regarding climate change and glacier runoff, in addition to others such as salmon escapement and fish passage feasibility are likely to persist, whether the 2010s ILP resumes or the licensing process restarts in the future. Under either scenario, those disputes will cause further delays to the process and result in the State of Alaska and other interested parties investing even more untold costs and manpower.

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[52] Grove 2013
[53] Hollander 2014
[54] NMFS 2019

Susitna Dam

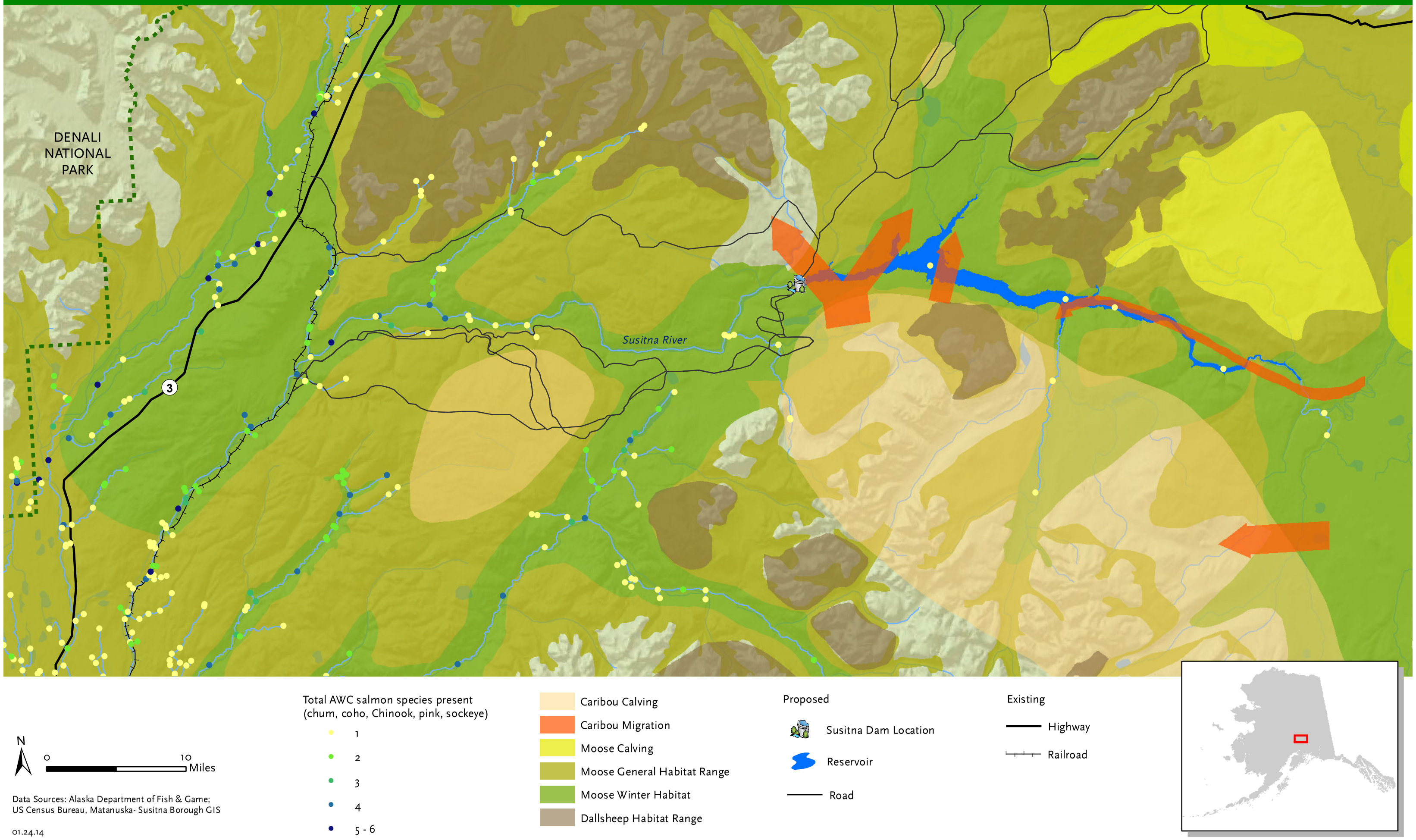

Figure 14. Documented locations of salmon (the number of species documented is indicated by colored points) and three large game species (indicated by colored area and including orange arrows where caribou regularly migrate). Produced by the Wild Salmon Center with data from Alaska Department of Fish and Game, the US Census Bureau and the Matanuska-Susitna Borough.

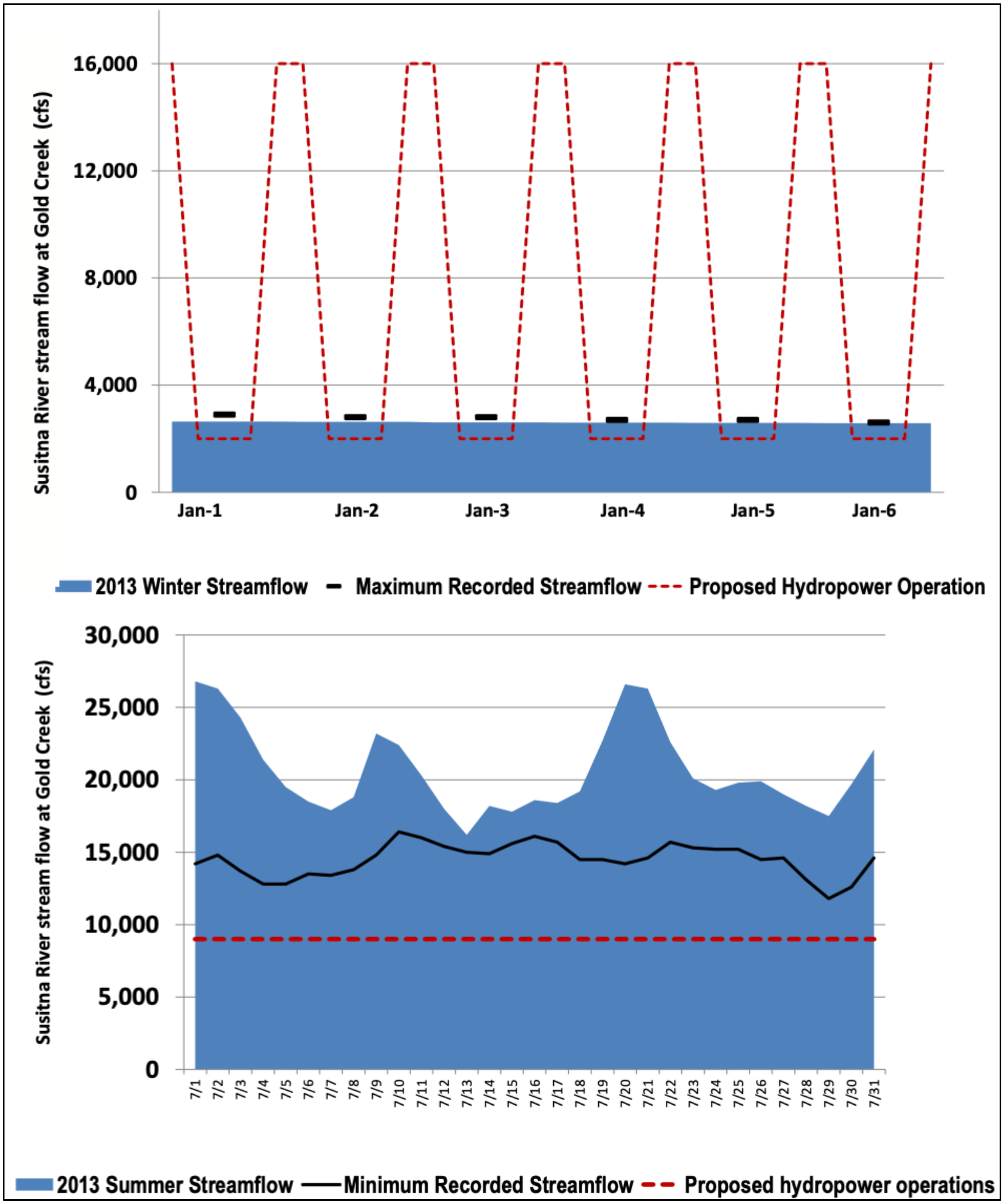

Figure 15. Example sub-daily winter (top) and daily summer (bottom) changes to the Susitna River hydrograph at the proposed dam location. Proposed operations, indicated by the red dashed lines, are estimated using information from AEA's Preliminary Application Document and a State water rights application. Existing flow conditions (indicated in blue for 2013, and in black as the maximum ever recorded in winter and minimum ever recorded in summer) are derived from USGS data.

CONCLUSION

An authoritative text describing large rivers of North America concludes its description of the Susitna River with these words: “It seems safe to say that the threat of damming this pristine wilderness will always be present.”[1] Still, after nearly 80 years of planning and study, and over $1 billion (present day USD) invested by the State alone, the Susitna Dam remains a precarious and costly solution to the problem of powering Alaska’s Railbelt.

Though laws, processes, and agencies regulating largescale hydropower have evolved since the first proposal, the project has been functionally rejected three times in large part due to the excessive financial, ecological, and other costs that outweigh potential benefits. Project proponents have been consistently unsuccessful in demonstrating that jobs or cost savings from power generation from the dam would even equate to, much less exceed current conditions.

Moreover, science that has emerged since earlier proposals indicates not only that large hydropower projects may not produce “renewable” energy, but are even generating the very greenhouse gasses renewable energy projects are intended to mitigate. Global research during that time has by and large come to a consensus that largescale hydropower exerts profoundly negative impacts to natural resources—including to economically important fish and wildlife—both upstream and downstream of dams.

In fact, the most successful large dam mitigation efforts to date involve removing dams altogether. As the legislature, AEA, the Alaskan public, and other stakeholders consider whether to revisit the Susitna Dam proposal for the fourth time, it is worth considering a former AEA Director’s comment that the project will never “pencil out.”

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CSHB 169(FSH): "An Act relating to certain fish; and establishing a fisheries rehabilitation permit."

CS FOR HOUSE BILL NO. 169(FSH)

"An Act relating to certain fish; and establishing a fisheries rehabilitation permit."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

*** Section 1.** AS 16.05 is amended by adding a new section to read:

Sec. 16.05.855. Fisheries rehabilitation permit. (a) Subject to restrictions imposed under this section, the department may issue a fisheries rehabilitation permit that allows a qualified person to

(1) remove anadromous or freshwater finfish from water of the state, collect gametes and fertilize and incubate eggs taken from the fish, and place the fertilized or incubated eggs, larvae, or unfed fry in the same water of the state; and

(2) enhance habitat in water of the state to aid the survival of the fish.

(b) An applicant for a permit under this section shall apply on a form prescribed by the department. The department shall make the application form available on the department's Internet website and at the department's regional and local offices. The department shall charge a fee for printing an application form provided by the department's offices. An application for a permit must include

(1) the name of the applicant;

(2) a statement of the reasons for and feasibility of the proposed project using historical and current data relating to habitat, the food web, and fish populations in the project area;

(3) documentation of

(A) the conditions justifying the project;

(B) any communication, or plan for continued communication, from the applicant with affected persons, relevant organizations with applicable expertise, and stakeholders in the project area; and

(C) any state, local, or federal permits required for the project;

(4) the location of the water from which the applicant will take fish and place fish eggs;

(5) the species and number of fish to be taken and, if applicable, the number to be taken for brood stock;

(6) a management plan that demonstrates the ability of the applicant to carry out and sustain the proposed project, including the applicant's plan for fish propagation or repopulation in permitted water;

(7) the applicant's goals, schedule, planned duration, performance measures, scope of work, budget, means of collecting data, plan for genetics management, and watershed habitat rehabilitation plan, if applicable, for the project; and

(8) an application fee of $100.

(c) The department may issue a permit under this section if the commissioner determines that the project

(1) may restore or increase a population of fish in a body of water in which

(A) subsistence and escapement goals have not been met;

(B) there are no established escapement goals and local stakeholders have identified a decline in the number of the species of fish; or

(C) the population of the species of fish is limited;

(2) will result in public benefits;

(3) will not harm local wild fish stocks;

(4) will not place eggs, larvae, or unfed fry in a body of water in which there are sufficient numbers of the same species of fish for natural propagation of the species to occur;

(5) will not introduce live fertilized eggs, larvae, or fry of nonindigenous fish in violation of AS 16.35.210.

(d) In reviewing an application submitted under (b) of this section and determining whether the department will issue a permit for a proposed project, the commissioner shall consider

(1) the department's assessment of the proposed project;

(2) the capabilities of the applicant;

(3) the degree to which the applicant has reasonably communicated with affected persons, including relevant organizations with applicable expertise, and stakeholders in the project area;

(4) if the proposed project is a salmon rehabilitation project, relevant and applicable comments relating to the proposed project submitted by a regional planning team established under AS 16.10.375 for the region that encompasses the project area;

(5) the consistency of the proposed project with the comprehensive salmon plan developed under AS 16.10.375 for the region that encompasses the project area and with constitutional and statutory requirements and duties imposed on the department; and

(6) whether the proposed project will increase scientific knowledge and understanding of natural resources affected by the project.

(e) A permittee shall

(1) collect and provide project data and reports reasonably requested by the department;

(2) reasonably communicate with affected persons, including relevant organizations with applicable expertise, and stakeholders in the project area.

(f) Within 15 days after the department receives an application for a fisheries rehabilitation permit, the commissioner shall notify an applicant that the application is complete or incomplete. The commissioner may reject an application that is not completed within 30 days after the commissioner notifies the applicant that the application is incomplete. Within 90 days after the date the commissioner notifies an applicant that an application is complete, the commissioner shall approve or reject the application.

(g) The department shall require a permittee under this section to

(1) collect not more than 500,000 eggs for fertilization under a single permit;

(2) implement appropriate controls to avoid the introduction of nonindigenous or invasive pathogens or the increase of indigenous pathogens beyond levels acceptable to the department.

(h) Fish released into the water of the state under a permit issued under this section are available to the people for common use and are subject to applicable law in the same way as fish occurring in their natural state.

(i) A permit issued under this section is valid for five years from the date of issuance and, upon application by the permittee, may be extended by the commissioner.

(j) The commissioner may modify, suspend, or revoke a permit issued under this section for cause. If a permittee violates this section, the commissioner may, after providing the permittee notice and an opportunity to be heard, suspend or revoke a permit issued under this section.

(k) In this section,

(1) "person" means an individual, corporation, business trust, estate, trust, partnership, limited liability company, association, joint venture, tribe, or government; governmental subdivision, agency, or instrumentality; public corporation; or another legal or commercial entity;

(2) "qualified person" means a state resident under AS 43.23.295 or a corporation organized under laws of this state;

(3) "reasonably communicate" means communicating significant

information by a mode of communication likely to provide notice to persons a reasonable person would know are affected by a project or proposed project.

* **Sec. 2.** AS 16.05.871 is amended by adding a new subsection to read:

(e) In making a finding that the plans and specifications for a proposed construction, work, or use sufficiently protect fish and game under (d) of this section, the commissioner shall consider related fisheries rehabilitation projects under AS 16.05.855.

* **Sec. 3.** AS 16.10.375 is amended to read:

Sec. 16.10.375. Regional salmon plans. The commissioner shall designate regions of the state for the purpose of salmon production and have developed and amend as necessary a comprehensive salmon plan for each region, including provisions for **salmon rehabilitation projects conducted under AS 16.05.855 and** both public and private nonprofit hatchery systems. Subject to plan approval by the commissioner, comprehensive salmon plans shall be developed by regional planning teams consisting of department personnel and representatives of the appropriate qualified regional associations formed under AS 16.10.380.

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HOUSE BILL NO. 368

IN THE LEGISLATURE OF THE STATE OF ALASKA

THIRTY-THIRD LEGISLATURE - SECOND SESSION

BY THE HOUSE SPECIAL COMMITTEE ON ENERGY

Introduced: 2/20/24
Referred: House Special Committee on Energy, Finance

A BILL

FOR AN ACT ENTITLED

"An Act relating to clean energy standards and a clean energy transferable tax credit; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* **Section 1.** The uncodified law of the State of Alaska is amended by adding a new section to read:

PURPOSE. The purpose of this Act is to establish a clean energy standard that requires certain electric utilities to derive increasing percentages of the utility's net electricity sales from clean energy sources. Nothing in this Act is intended to constitute implementation by the Regulatory Commission of Alaska of the federal Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2705).

* **Sec. 2.** AS 42.05.381 is amended by adding a new subsection to read:

(p) The rate for transmission of clean energy generated from capacity constructed on or after July 1, 2024, to comply with a clean energy standard under AS 42.05.900 shall be a uniform transmission services rate, developed by the electric

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reliability organization for the Railbelt, subject to review and approval by the commission. A load-serving entity may not charge more than the uniform transmission services rate for energy transmitted to comply with a clean energy standard under AS 42.05.900.

* **Sec. 3.** AS 42.05.780(a) is amended to read:

(a) An electric reliability organization shall file with the commission in a petition for approval an integrated resource plan for meeting the reliability requirements of all customers within its interconnected electric energy transmission network in a manner that provides the greatest value, consistent with the load-serving entities' obligations. An integrated resource plan must contain an evaluation of the full range of cost-effective means for load-serving entities to meet the service requirements of all customers, including additional generation, transmission, battery storage, and conservation or similar improvements in efficiency. An integrated resource plan must include options to meet customers' collective needs in a manner that provides the greatest value, consistent with the public interest, regardless of the location or ownership of new facilities or conservation activities. **An integrated resource plan must identify the most cost-effective strategies for the interconnected electric energy transmission network to satisfy the clean energy standard under AS 42.05.900.**

* **Sec. 4.** AS 42.05.785(a) is amended to read:

(a) A public utility, including a public utility that is exempt from other regulation under AS 42.05.711 or another provision of this chapter, that is interconnected with an interconnected electric energy transmission network served by an electric reliability organization certificated by the commission may not construct a large energy facility unless the commission determines that the facility

(1) is necessary to the interconnected electric energy transmission network with which it would be interconnected;

(2) complies with reliability standards; [AND]

(3) would, in a cost-effective manner, meet the needs of a load-serving entity that is substantially served by the facility**; and**

(4) is not detrimental to a load-serving entity's ability to meet the

<u>**clean energy standard under AS 42.05.900**</u>.

* **Sec. 5.** AS 42.05 is amended by adding new sections to read:

Article 11A. Clean Energy Standard.

Sec. 42.05.900. Clean energy standard. (a) A load-serving entity that is subject to the standards of an electric reliability organization under AS 42.05.760 shall comply with the clean energy standard established in this section. Under the clean energy standard, a load-serving entity's portfolio shall include clean energy in the following percentages:

(1) 35 percent by December 31, 2036;

(2) 60 percent by December 31, 2051.

(b) A power purchase agreement entered into between a load-serving entity and a clean energy producer may be included when calculating the load-serving entity's compliance with the clean energy standard required under this section if

(1) the effective date of the power purchase agreement is before the end of the compliance period;

(2) the power purchase agreement guarantees that the clean electrical energy producer will deliver the clean energy to the load-serving entity not later than two years after the compliance period; and

(3) the power purchase agreement is approved by the commission in accordance with AS 42.05.381 and 42.05.431(a) and (b) before the end of the compliance period.

(c) A load-serving entity may satisfy the clean energy standard through energy produced by distributed energy systems, regardless of whether the energy is acquired by the load-serving entity or used by the customer.

(d) A load-serving entity's compliance with the clean energy standard shall be based on historical data, collected in a manner consistent with industry standards and commission regulations.

(e) A load-serving entity shall design and implement an accounting system to verify compliance with the clean energy standard, to ensure that clean energy is counted only once for the purpose of meeting the clean energy standard, and to track energy consumption displaced because of energy efficiency investments under (g) of this section. The accounting system must be approved by the commission.

(f) The commission shall, by regulation, develop a proxy for the ratio of net energy acquired by a load-serving entity at metered intervals to total energy produced from distributed energy systems. Using the proxy, the commission shall determine an estimate of total energy produced by distributed energy systems available to satisfy a load-serving entity's clean energy standard. The commission shall update the proxy developed under this subsection not less than once every five years.

(g) A load-serving entity may satisfy the clean energy standard with energy consumption displaced because of energy efficiency investments, including investment in consumer efficiency upgrades, if the displaced consumption is documented by the accounting system required under (e) of this section.

(h) The commission shall adopt regulations that establish a mechanism for a load-serving entity to opt out of the clean energy standard if the commission determines that it is impossible for the load-serving entity to comply with the standard using current technology without long-term effects on the load-serving entity's rates. Regulations adopted by the commission must provide the criteria and procedure for a load-serving entity to opt out of each required percentage in (a)(1) and (2) of this section. A load-serving entity is not eligible to apply for clean energy transferable tax credits under AS 42.05.910 if the entity has opted out of the clean energy standard under this subsection.

(i) The commission shall adopt a minimum standard for electric power transmission lines sufficient to ensure seamless end-to-end electrical energy transmission. A load-serving entity may not increase rates paid by ratepayers to fund transmission intertie upgrades required under this subsection, but a load-serving entity may increase rates to fund other required transmission line upgrades. Notwithstanding AS 42.05.900 - 42.05.935, load-serving entities subject to the standards of an electric reliability organization are not subject to the clean energy standard before electric power transmission lines in the interconnected electric energy transmission network served by the electric reliability organization are upgraded to the minimum standard required by this subsection. If the upgrade required under this subsection is not completed before December 31, 2026,

(1) 35 percent of sales in the load-serving entity's portfolio must be from clean energy within 10 years after the upgrade is complete; and

(2) 60 percent of sales must be from clean energy within 25 years after the upgrade is complete, or when electric power transmission lines connect the interconnected electric energy transmission network in the Railbelt to the service area of the Copper Valley Electric Association, whichever is later.

Sec. 42.05.905. Reporting. (a) Beginning March 1, 2025, a load-serving entity subject to the clean energy standard shall submit an annual report to the commission that documents the load-serving entity's progress toward satisfying the clean energy standard in the preceding calendar year. The annual report must document the entity's total production from distributed energy systems and net electricity sales from clean energy for the applicable calendar year and include the information required by the commission.

(b) The commission shall adopt regulations governing the reporting requirements to document compliance and minimize the administrative costs and burden on a load-serving entity.

(c) The commission may investigate a load-serving entity's compliance with a clean energy standard and collect any information reasonably necessary to verify and audit the information provided to the commission by the load-serving entity.

Sec. 42.05.910. Clean energy transferable tax credits. (a) A load-serving entity may apply for the clean energy transferable tax credit under AS 43.98.080 in the amount of 0.2 cents for each kilowatt-hour of clean energy that is

(1) produced by the load-serving entity at a facility that meets the qualifications in (b) of this section; and

(2) sold by the load-serving entity to an unrelated person during the taxable year.

(b) A facility qualifies for the clean energy transferable tax credit under this section if the facility

(1) is owned by the load-serving entity;

(2) is used to generate clean energy;

(3) is placed into service after the effective date of this section; and

(4) has been in service for 10 years or less.

Sec. 42.05.915. Waiver. (a) The commission may waive the requirement that a load-serving entity comply with the clean energy standard if, after notice and opportunity for a hearing, the commission determines that a load-serving entity is unable to meet the clean energy standard because of reasons outside the reasonable control of the load-serving entity as set out in (b) of this section or the entity establishes a good cause as set out in (c) of this section. The commission may grant a waiver under this section for a period of not longer than five years.

(b) The following events or circumstances are outside of a load-serving entity's reasonable control:

(1) weather-related damage;

(2) natural disasters;

(3) failure of clean energy producers to meet contractual obligations to the load-serving entity;

(4) transmission network constraint that prevents the load-serving entity from partially or fully using clean energy for net electricity sales;

(5) global pandemics; and

(6) acts of war.

(c) The following factors may establish good cause for a waiver:

(1) the actions taken by the load-serving entity to procure the clean energy;

(2) the extent of good faith efforts by the load-serving entity to comply;

(3) the lack of past failures to comply;

(4) the likelihood and amount of future clean energy to be procured by the load-serving entity;

(5) the effect of the noncompliance fine on the load-serving entity considering the size or ownership of the load-serving entity;

(6) the good faith effort by the load-serving entity to meet the clean energy standard after an event or circumstance enumerated in (b) of this section.

(d) A load-serving entity is not eligible to apply for the clean energy transferable tax credit under AS 42.05.910 while a waiver under this section is in effect.

Sec. 42.05.920. Exemptions. (a) A load-serving entity is exempt from compliance with the clean energy standard if the aggregate net electricity sales for all load-serving entities on the interconnected electric energy transmission network meets or exceeds the aggregate clean energy standard for all load-serving entities on the interconnected electric energy transmission network.

(b) If an exemption under (a) of this section does not apply, a load-serving entity is exempt from its first noncompliance with a clean energy standard.

Sec. 42.05.925. Net billing. (a) A load-serving entity subject to the clean energy standard shall credit in a tariff the account of a retail customer for the number of kilowatt-hours, at the export credit rate set by the commission in accordance with (b) of this section, of electric energy supplied by the customer's distributed energy system to the load-serving entity. The tariff may not limit the aggregate capacity that customers may install unless the commission, after a hearing, finds that capacity limitation is necessary to protect system reliability.

(b) The commission shall by regulation establish a method to determine annually the amount of a reasonable seasonal and time variant export credit rate for electric energy supplied to a load-serving entity by a customer's distributed energy system. In determining the export credit rate, the commission may consider any relevant factors, including avoided costs of load-serving entities.

Sec. 42.05.930. Additional clean energy resources. At least once every five years, the Alaska Energy Authority shall submit a report to the legislature identifying whether the authority recommends that the legislature add any available technologies to the definition of "clean energy" in AS 42.05.935 for purposes of complying with the clean energy standard. The authority shall submit a report required under this section to the senate secretary and the chief clerk of the house of representatives and notify the legislature that the report is available.

Sec. 42.05.935. Definitions. In AS 42.05.900 - 42.05.935,

(1) "clean energy" means electrical energy that

(A) when generated by a load-serving entity, does not release carbon dioxide or releases carbon dioxide in an amount that is offset by the amount of carbon dioxide the load-serving entity absorbs or removes from the atmosphere;

(B) is generated from coal with a sulfur content of one percent or less by weight;

(C) is generated from renewable energy resources; or

(D) is generated from nuclear energy;

(2) "clean energy standard" means the required percentage of a load-serving entity's net electrical energy sales to customers in the entity's service area that is represented by clean energy as required under AS 42.05.900;

(3) "compliance period" means each period identified in AS 42.05.900(a) or (i);

(4) "distributed energy system" means a renewable energy resource that is located on any property owned or leased by a customer within the service territory of the load-serving entity that is interconnected on the customer's side of the utility meter;

(5) "interconnected electric energy transmission network" has the meaning given in AS 42.05.790;

(6) "load-serving entity" has the meaning given in AS 42.05.790;

(7) "Railbelt" means the geographic region from the Kenai Peninsula to Interior Alaska that is connected to a common electric transmission backbone;

(8) "renewable energy resource" means a resource, other than petroleum, natural gas, or coal, that naturally replenishes over a human, not a geological, time frame, is ultimately derived from solar power, water power, or wind power, comes from the sun or from thermal inertia of the earth, and minimizes the output of toxic material in the conversion of the energy; in this paragraph, "resource" includes

(A) solar and solar thermal energy, wind energy, and kinetic energy of moving water, including

(i) waves, tides, or currents;

(ii) run-of-river hydropower, in-river hydrokinetic;

(iii) conventional hydropower, lake tap hydropower;

(iv) water released through a dam; and

(v) geothermal energy;

(B) waste to energy systems, including

(i) wood;

(ii) landfill gas produced by municipal solid waste or fuel that has been manufactured in whole or significant part from waste;

(iii) biofuels produced in the state; and

(iv) thermal energy produced from a geothermal heat pump using municipal solid waste, including biogenic and anthropogenic factions;

(9) "transmission network constraint" means a lack of transmission line capacity to deliver electricity without exceeding thermal, voltage, and stability limits designed to ensure reliability of the interconnected electric energy transmission network.

* **Sec. 6.** AS 42.45.110(a) is amended to read:

(a) The costs used to calculate the amount of power cost equalization for all electric utilities eligible under AS 42.45.100 - 42.45.150 include all allowable costs, except return on equity, used by the commission to determine the revenue requirement for electric utilities subject to rate regulation under AS 42.05. The costs used in determining the power cost equalization per kilowatt-hour shall exclude any other type of assistance that reduces the customer's costs of power on a kilowatt-hour basis and that is provided to the electric utility within 60 days before the commission determines the power cost equalization per kilowatt-hour of the electric utility. In calculating power cost equalization, the commission may not consider validated costs or kilowatt-hour sales associated with a United States Department of Defense facility **<u>or revenue from the sale of recovered heat</u>**.

* **Sec. 7.** AS 43.98 is amended by adding a new section to read:

Article 5. Clean Energy Transferable Tax Credit.

Sec. 43.98.080. Clean energy transferable tax credit. (a) The department shall provide a clean energy transferable tax credit certificate to a load-serving entity, as defined in AS 42.05.790, for qualified clean energy production under AS 42.05.910. The department shall publish the name and contact information for each person provided a clean energy transferable tax credit certificate under this subsection.

(b) A clean energy transferable tax credit certificate may be sold, assigned, exchanged, conveyed, or otherwise transferred in whole or in part.

(c) A taxpayer acquiring a clean energy transferable tax credit certificate may use the credit or a portion of the credit to offset taxes imposed under AS 10.25 and this title. Except as provided in (e) of this section, any portion of the credit not used may be used at a later period or transferred under (b) of this section.

(d) The department shall adopt regulations necessary for the administration of this section.

(e) A clean energy transferable tax credit certificate, whether sold, assigned, exchanged, conveyed, or otherwise transferred, in whole or in part, must be used within five years after being provided by the department.

(f) A clean energy transferable tax credit certificate may not be applied to reduce a person's tax liability to below zero.

(g) A person acquiring two or more clean energy transferable tax credit certificates may combine the unused amounts of the credits for sale, assignment, exchange, conveyance, or other transfer. At the request of a person holding a clean energy transferable tax credit, the department shall replace a certificate that represents the full amount of tax credits available with multiple certificates that each represent a portion of the total tax credits available for the purpose of sale, assignment, exchange, conveyance, or other transfer under this subsection or, upon request, shall provide one tax credit certificate that represents the combined value of multiple tax credit certificates. A tax credit certificate replaced or provided by the department under this subsection must state the expiration date and the amount of each credit that is included in the certificate. Combining or splitting unused amounts of credits under this subsection does not change or extend the period in which each credit that is included in the combination or split must be used.

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* **Sec. 8.** AS 44.83.940 is amended by adding a new subsection to read:

(b) Not later than the first day of the first regular session of each legislature, the authority shall submit a report to the senate secretary and chief clerk of the house of representatives and notify the legislature that the report is available. The report must identify the authority's progress in developing clean energy in rural regions of the state, evaluate clean energy development in rural regions, identify infrastructure necessary for rural clean energy projects, and evaluate the feasibility and cost of rural clean energy projects.

* **Sec. 9.** This Act takes effect July 1, 2024.