



Alaska Responsible Fishery Management (RFM) Certification

3rd Surveillance Report

For The

US Alaska Salmon Commercial Fisheries

Facilitated by

Alaska Seafood Marketing Institute (ASMI)

Client

Alaska Fisheries Development Foundation (AFDF)

Assessors: Dr. Ivan Mateo, Lead Assessor
Dr. Brian Allee, Assessor
Mr. Scott L. Marshall, Assessor
Dr. Marc A. Johnson, Assessor

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SAI Global
3rd Floor, Block 3,
Quayside Business Park,
Mill Street, Dundalk,
Co. Louth, Ireland.
T: + 353 42 932 0912
www.saiglobal.com



Foreword

The Alaska Responsible Fisheries Management (RFM) Standard Version 1.3 is composed of Conformance Criteria and is based on the 1995 FAO Code of Conduct for Responsible Fisheries and the FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Marine Capture Fisheries adopted in 2005 and amended/extended in 2009. The Standard also includes full reference to the 2011 FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Inland Fisheries which in turn are now supported by a suite of guidelines and support documents published by the UN FAO. Further information on the Alaska RFM program may be found here:

<http://www.alaskaseafood.org/rfm-certification/certified-fisheries>

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Glossary

ABC	Allowable Biological Catch
AC	Advisory Committee
ACC	Alaska Administrative Code
ADFG	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFDF	Alaska Fisheries Development Foundation
AFSC	Alaska Fisheries Science Center
AS	Alaska Statue
ASMI	Alaska Seafood Marketing Institute
AWT	Alaska Wildlife Troopers
AYK	Artic Yukon Kuskokwim
BC	British Columbia
BEG	Biological Escapement Goal
BOF	Board of Fisheries
BSAI	Bering Sea and Aleutian Islands
CCRF	Code of Conduct for Responsible Fisheries
CIAA	Cooke Inlet Aquaculture Association
CMA	Chignik Management Area
CDQ	Community Development Quota
CFEC	Commercial Fisheries Entry Commission
COAR	Commercial Operators Annual Report
CPUE	Catch per Unit Effort
CWCS	Comprehensive Wildlife Conservation Strategy
CWT	Coded Wire Tags
DEC	Department of Environmental Conservation
DIPAC	Douglas Island Pink and Chum Inc.
DNR	Department Natural Resources
EIS	Environmental Impact Statement
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FAO	Food and Agriculture Organization of United Nations
FDA	Food Drugs Administration
FMP	Fishery Management Plan
FSB	Federal Subsistence Board
GOA	Gulf of Alaska
GHL	Guideline Harvest Level
HAPC	Habitat Area of Particular Concern
HCD	Habitat Conservation Division
IFQ	Individual Fishing Quota
IJC	International Joint Commission
IMS	Institute of Marine Sciences
IRFA	Initial Regulatory Flexibility Analysis
IRIU	Improved Retention/Improved Utilization
IUCN	International Union of Conservation of Nature
IUU	Illegal Unreported and Unregulated
KSMSC	Kodiak Seafood and Marine Science Center
MMPA	Marine Mammal Protection Act
MOU	Memorandum of Understanding
MSFCMA	Magnuson-Stevens Fisheries Management and Conservation Act

MRA	Maximum retainable allowances
MT	Metric tons
MSY	Maximum Sustainable Yield
Ne	Effective Population
NEPA	National Environmental Policy Act
NGO	Non-governmental Organization
NIH	US National Institute of Health
nm	Nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NPRB	North Pacific Research Board
NRSEAA	Northern Southeast Aquaculture Association
OEG	Optimal Escapement Goal
OFL	Overfishing Level
OLE	Office for Law Enforcement
OY	Optimum Yield
PAR	Permit Alteration Request
PNP	Private Non Profit
PSMFC	Pacific States Marine Fisheries Commission
PSC	Pacific Salmon Commission
PSC	Prohibited Species Catch
PWS	Prince William Sound
PWSAC	Prince William Sound Aquaculture Center
PWSS	Prince William Sound Science Center
RAC	Regional Advisory Council
RACE	Resource Assessment and Conservation Engineering
REFM	Resource Ecology and Fisheries Management
RFM	Responsible Fisheries Management
SAFE	Stock Assessment and Fishery Evaluation (Report)
SEAK	Southeast Alaska
SEG	Sustainable Escapement Goal
SET	Sustained Escapement Threshold
SOC	Stocks of Concern
SSC	Scientific and Statistical Committee
SSL	Steller Sea Lion
SSSC	Sitka Sound Science Center
TAC	Total Allowable Catch
UCI	Upper Cook Inlet
USCG	U.S. Coast Guard
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife
VFDA	Valdes Fisheries Development Association
YRP	Yukon River Panel

Summary and Recommendations

This report is the 3rd Surveillance report AK/SAL/002.3/2019 for the US Alaska Salmon commercial fishery produced on behalf of the Alaska Fisheries Development Foundation according to the Alaska Responsible Fisheries Management (AK RFM) Certification Program. The fisheries were originally certified on 11th March 2011, and recertified in 9th March 2017.

The objective of this surveillance report is to monitor for, and evaluate the impacts of, any changes to the management regime, regulations and their implementation since the previous reassessment. Having assessed these changes to the fishery (if any) the assessment team determines if these changes materially affect the fisheries' conformance to the AK RFM Standard and whether current practices remain consistent with the overall confidence ratings assigned during either initial certification or subsequent surveillance audits where the original confidence rating(s) have been changed.

In addition to this, any areas reported as "items for surveillance" or corrective action plans in the previous assessment are reassessed and a new conclusion on consistency of these items with the Conformance Criteria is given accordingly. No non-conformances were identified since certification was granted.

The certification covers the United States Alaska commercial salmon [all Pacific salmon species: Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, coho *O. kisutch*, pink *O. gorbuscha*, and chum *O. keta*]. Fisheries employ troll, purse seine, drift gillnet, beach seine, set gillnet and fish wheel (Upper Yukon River only) gear in the four administrative regions of Alaska that are principally managed by the Alaska Department of Fish and Game (ADFG). While certification covers the entire Alaska Exclusive Economic Zone (EEZ), most of the harvest is taken in the internal waters (0-3 nautical miles, and other enclosed waters) of the state of Alaska.

The surveillance assessment was conducted according to SAI Global Certification procedures for Alaska Responsible Fisheries Management Certification using the AK RFM Conformance Criteria (v1.3) fundamental clauses as the assessment framework.

The assessment was conducted by a team of SAI Global appointed Assessors comprising of three externally contracted fishery experts and SAI Global internal staff. Details of the assessment team are provided in Appendix 1.

The main outcomes have been summarized in Section 5 "[Assessment Outcome Summary](#)".

Assessment Team Details

Dr. Ivan Mateo, Lead Assessor

SAI Global/Global Trust Certification Ltd.
Quayside Business Centre,
Dundalk, Co. Louth, Ireland.
Email: ivan.mateo@saiglobal.com

Scott L. Marshall, Assessor

Address: Eagle ID, USA
Email: scott.softail.marshall@gmail.com

Dr. Marc A. Johnson, Assessor

Address: Corvallis, Oregon, USA
Email: marc.aaron.johnson@gmail.com

Dr. Brian Allee, Assessor

Independent fishery expert,
Gilroy, California, USA.
Email: allee.keta@gmail.com

Niamh Connor, Program Administrator

SAI Global/Global Trust Certification Ltd.
Quayside Business Centre,
Dundalk, Co. Louth, Ireland.
Email: Niamh.Connor@saiglobal.com

1. Introduction

This surveillance report documents the 3rd Surveillance Assessment of the US Alaska Salmon Commercial fishery originally certified on 11th March 2011, and recertified in 9th March 2017 and presents the recommendation of the Assessment Team for continued Alaska RFM Certification.

Unit of Certification

The unit of certification covers the United States Alaska commercial salmon fisheries including all Pacific salmon species employ troll, purse and beach seine, drift and fixed gillnet, dipnet and fish wheel gears in the four administrative regions of Alaska that are principally managed by the Alaska Department of Fish and Game (ADFG). While certification covers the entire Alaska Exclusive Economic Zone (EEZ), most of the harvest is taken in the internal waters (0-3 nautical miles, and other enclosed waters) of the state of Alaska.

This surveillance report documents the assessment results for the continued certification of commercially exploited Alaska Salmon Commercial fisheries to the Alaska RFM Certification Program. This is a voluntary program that has been supported by Alaska Seafood Marketing Institute (ASMI) who wish to provide an independent, third-party certification that can be used to verify that these fisheries are responsibly managed.

The assessment was conducted according to the SAI Global procedures for Alaska RFM Certification using the fundamental clauses of the Alaska RFM Conformance Criteria Version (v1.3) in accordance with ISO 17065 accredited certification procedures.

The assessment is based on 6 major components of responsible management derived from the FAO Code of Conduct for Responsible Fisheries (1995) and Guidelines for the Eco-labelling of products from marine capture fisheries (2009); including:

- A. [The Fisheries Management System](#)
- B. [Science and Stock Assessment Activities](#)
- C. [The Precautionary Approach](#)
- D. [Management Measures](#)
- E. [Implementation, Monitoring and Control](#)
- F. [Serious Impacts of the Fishery on the Ecosystem](#)

These six major components are supported by 12 fundamental clauses (+ 1 in case of enhanced fisheries) that guide the AK RFM Certification Program surveillance assessment.

A summary of the site meetings is presented in Section 5. Assessors included both externally contracted fishery experts and SAI Global internal staff (Appendix 1).

1.1. Recommendation of the Assessment Team

The assessment team recommends the continued certification of the applicant fisheries, the United States Alaska commercial salmon [Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, coho *O. kisutch*, pink *O. gorbuscha*, and chum *O. keta*] fisheries employing troll , purse seine, drift gillnet, set gillnet, fish wheel, dip net and beach seine gears in the four administrative Regions of Alaska that are principally managed by the Alaska Department of Fish and Game (ADFG).

2. Fishery Applicant Details

Table 1. Fishery applicant details.

Organization/Company Name:	Alaska Fisheries Development Foundation
Date:	2/4/2019
Correspondence Address:	P.O. Box 2223, Wrangell, AK 99929-2223
Street:	
City:	Wrangell
State	Alaska
Country:	USA
Postal Code:	99929-2223
Phone:	907-276-7315
Web:	https://www.afdf.org/
E-mail Address	jdecker@afdf.org

3. Units of Assessment and Certification

The applicant Units of Assessment (UoAs) (i.e., what is to be assessed) are described in Table 2 below.

Table 2. Unit(s) of Assessment (UoA(s)).

Units of Assessment (UoAs)		
Common across all UoAs		UoA
Geographical Area(s)		State and Federal waters of US state of Alaska in FAO major fishing area 67
Management System		Alaska Department of Fish and Game (ADFG)
Principal Management Authorities		Alaska Department of Fish and Game (ADFG) and Board of Fisheries (BOF)
Unique to each UoA		UoA
Species	Common name:	1 King/Chinook
	Latin name:	
	Common name:	2 Sockeye/Red
	Latin name:	
	Common name:	3 Coho/Silver
	Latin name:	
	Common name:	4 Pink/Humpback
	Latin name:	
Common name:	5 Keta/Chum	
Latin name:		<i>Oncorhynchus keta</i>
Fishery Location:		1 ADFG Admin Region 1: Southeast & Yakutat
		2 ADFG Admin Region 2: Central
		3 ADFG Admin Region 3: Arctic-Yukon-Kuskokwim
		4 ADFG Admin Region 4: Kodiak, Chignik, Alaska Peninsula, Aleutian Islands
Fishing gears/methods		1 Troll Region 1
		2 Purse Seine Regions 1, 2 and 4
		3 Drift Gillnet Regions 1, 2, 3 and 4
		4 Set Gillnet Regions 1, 2, 3 and 4
		5 Fish Wheel Region 3
		6 Dip net Region 3
		7 Beach seine Regions 3 and 4

The applicant Unit of Certification (UoC) (i.e., what is covered by the certificate) is as described above with the exception that only those entities included on the most up-to-date client group list for this fishery are entitled to use this fishery's certificate to enter fish from the certified fishery into certified chains of custody.

The most up-to-date client group list for this fishery may be accessed via the Alaska RFM website here: <https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-salmon/>.

4. Fishery Observations

4.1. Stock status, landings and TAC update

The ADFG Area and Regional staff publish reports each year that detail the catch and escapements of stocks in their area of responsibility. These reports also detail the times and areas open to fishing and the rationale for when fishing was allowed. Copies of these detailed reports can be found at <http://www.adfg.alaska.gov/index.cfm?adfg=fishingcommercialbyarea.main>. All escapement data in this report is from Munro (2018).

The Alaska Board of Fish reviewed escapement goals for Upper Cook Inlet, Lower Cook Inlet, and Kodiak management areas leading up to the 2016/2017 Board of Fisheries meeting cycle. As a result of these reviews, there were 53 escapement goal changes in 2017, including the elimination of 2 goals, establishment of 2 new goals, and the replacement of the Kenai River early- and late-run Chinook salmon goals based on all fish with escapement goals based on large fish only. In addition, two Optimal Escapement Goals were removed from management plans by the Alaska Board of Fisheries. In 2017, 83% of the escapement goals were met or exceeded and 17% of the stocks did not meet their minimum escapement goal.

The 2017 commercial harvest in Southeast Alaska and Yakutat was 50.1 million salmon¹ (Table 3) with an estimated ex-vessel value of \$169 million. Harvest, by species was 173,000 Chinook salmon, 801,000 Sockeye salmon, 2.9 million Coho salmon, 34.8 million Pink Salmon, and 11.4 million Chum salmon. Hatchery organizations harvested 4.0 million salmon for cost recovery, including 3.1 million chum salmon.

Escapement goals for Pink and Chum salmon were met or exceeded. Four of twelve escapement goals for Sockeye salmon were not met while goals in three systems were exceeded. Goals for Coho salmon were met or exceeded in twelve of thirteen systems. Very small runs of Chinook salmon throughout Southeast (except for the Situk River in Yakutat) resulted in escapements below targets in ten of twelve systems despite restrictive management measures.

The 2017 Prince William Sound and Copper – Bering area commercial salmon harvest was 56.12 million fish² (Table 3) with an estimated ex-vessel value of \$127.98 million. The harvest was composed of 48.73 million Pink salmon, 1.43 million Sockeye salmon, 5.42 million Chum salmon, 554,000 Coho salmon, and 13,600 Chinook salmon. The 2017 harvest included 50.34 million (90%) commercial common property fishery, and 5.82 million (10%) hatchery cost recovery and broodstock fish. Chum salmon goals were met in PWS. Pink Salmon goals were met or exceeded in all districts except Eshamy. The Sockeye salmon goal for the Copper River was met, and goals for PWS were met. Analysis is was not yet completed for the Chinook salmon escapement estimate into the Copper River at the time the statewide report was published. Coho salmon goals were met in the Copper and Bering rivers.

The estimated 2017 Lower Cook Inlet Area commercial salmon harvest, was 2.5 million salmon. The total harvest was composed primarily of Pink salmon (1,993,857) and Chum salmon (199,108)³ (Table 3). The harvest included 203,000 (8.1%) hatchery cost recovery fish. The preliminary estimated ex-vessel value of the common property fishery was \$4.5 million. The three Chinook salmon escapement goals were met. All twelve Chum salmon goals were met. Of the 17 Pink salmon goals, two were under goal, seven were over goal while the remaining eight met their goal. All eight of the Sockeye salmon goals were met or exceeded.

¹ <http://www.adfg.alaska.gov/FedAidPDFs/FMR18-01.pdf>.

² <http://www.adfg.alaska.gov/static/applications/dfnewsrelease/871807302.pdf>

³ <http://www.adfg.alaska.gov/static/applications/dfnewsrelease/873188898.pdf>.

The 2017 Upper Cook Inlet commercial harvest was approximately 2.7 million salmon⁴ (Table 3). The estimated ex-vessel value was approximately \$23.7 million. Sockeye salmon are the most abundant and valuable species harvested accounting for about 72 percent of the catch. There are 18 Chinook salmon goals and 12 goals were not met. All eight Sockeye salmon goals were met as was the one Chum salmon goal. All four Coho salmon goals were exceeded.

The 2017 inshore Bristol Bay Sockeye salmon run of 56.5 million fish is the second largest in the last 20 years and was 62 % above the 34.9 million average run for the same period. The run to the Nushagak District was the largest in the history of the fishery. The commercial harvest included 38.8 million Sockeye salmon 38,835 Chinook salmon, 1.8 million Chum salmon, 239,980 Coho salmon and 35,352 pink salmon⁵ (Table3). The ex-vessel value of \$214.6 million almost double the 20-year average. All nine Sockeye salmon goals were met or exceeded. The Chinook salmon goal for the Nushagak was met but the Alagnak goal was not met. The Chum salmon goal for the Nushagak was met.

The Kodiak area harvest of 21 million salmon was much higher than the previous 10-year average⁶ (Table 3). Included in this harvest, was a Kodiak Regional Aquaculture Association harvest of 32,178 individuals. The commercial harvest (excluding personal use and ADF&G Test Fishery) by species was; 7,094 Chinook salmon, 2,467,246 Sockeye salmon, 359,823 Coho salmon, 27,103,276 Pink salmon, and 1,891,226 Chum salmon. The estimated ex-vessel value of \$53.8 million was well above the previous 10-year average. The two Chinook salmon escapement goals on Kodiak were not met. Pink salmon goals were exceeded and the one Chum salmon goal was met. Coho salmon goals were met in three of four the systems. Sockeye salmon goals were met or exceeded in all 12 systems.

The Chignik River watershed supports two genetically distinct Sockeye salmon runs which traditionally provide the majority of directed harvest opportunities within the area. In 2017, the early-and late-run Chignik River Sockeye salmon combined total run was well below the recent 10-year average as was the commercial catch of 890,000. In contrast, the commercial catches of Pink salmon (7.1 million) and Chum salmon (609,000) were well above the recent ten-year average harvests. The ex-vessel value of \$15.8 million is above the recent 10-year average⁷ (Table 3). The Sockeye salmon goals for both the early and late runs were met or exceeded. The Pink and Chum salmon goals were met or exceeded. The Chinook salmon goal in the Chignik River was not met.

The 2017 commercial salmon harvest in the Alaska Peninsula, Aleutian Islands, and Atka-Amlia Islands Management areas totaled 12,683 Chinook salmon, 7,103,315 Sockeye salmon, 358,967 Coho salmon, 21,830,532 Pink salmon, and 2,031,987 Chum salmon⁸ (Table 3). The estimated ex-vessel value was \$66 million.

Pink and Chum salmon goals were met or exceeded. Of the 14 Sockeye salmon goals 11 stocks were over goal, 2 met goal and one goal was not met. Of the two Coho salmon goals, one was met, and one was not met. The one Chinook salmon goal was not met.

⁴ <http://www.adfg.alaska.gov/static/applications/DCFnewsrelease/871731538.pdf>.

⁵ <http://www.adfg.alaska.gov/static/applications/DCFnewsrelease/865497019.pdf>.

⁶ <http://www.adfg.alaska.gov/static/applications/DCFnewsrelease/877507219.pdf>.

⁷ <http://www.adfg.alaska.gov/static/applications/DCFnewsrelease/877081712.pdf>.

⁸ <http://www.adfg.alaska.gov/static/applications/DCFnewsrelease/877737944.pdf>.

The commercial catch in the Artic-Yukon-Kuskokwim Region was composed primarily of Chum salmon⁹¹⁰ (Table 3). The Yukon River fishery accounted for 555,000, Norton Sound 163,000 and Kuskokwim 464,000. The Kuskokwim harvest was the second highest in over 25 years.

Of the 20 Chinook salmon systems surveyed in the region, only three goals were not met or exceeded. Of the 16 Chum Salmon systems surveyed, 12 exceeded goals and four met goals. All Pink, Coho and Sockeye salmon goals were met or exceeded.

Table 3. 2017 commercial catch in thousands of fish, by area.

Fishing Area	Chinook	Sockeye	Coho	Pink	Chum	Total
Southeast	173	801	2,854	34,807	11,428	50,063
Prince William Sound	14	1,430	554	48,730	5391	56,119
Lower Cook Inlet	1	294	15	1,998	199	2,507
Upper Cook Inlet	8	1,849	304	168	244	2,573
Bristol Bay	39	38,800	240	35	1,800	40,914
Kodiak	7	2,468	360	27,103	1,891	31,829
Chignik	4	898	227	7,078	609	8,816
Ak Peninsula – Aleutians	13	7,103	359	21,831	2,032	31,338
AYK Total	0	3	330	19	1,182	1,534
Statewide Total	259	53,646	5,243	141,769	24,776	225,693

Stocks of Concern

The ADFG and the BoF have a process to designate and classify a salmon stock as a “Stock of Concern” (SOC). A SOC designation may be appropriate if a stock is not meeting expectations for harvest, and/or escapement. If a stock is not consistently meeting harvest levels even though escapement levels are being met, it may be classified as a “Stock of Yield Concern”. If a stock has not met its escapement goal in three of five years it may be classified as a “Stock of Management Concern”.

The BOF makes the designation based on a recommendation by ADFG. The SOC designation triggers the requirement to identify factors likely causing the decline, and to develop a plan to increase abundance and/or harvests. When a stock is classified as one of Yield Concern, research is typically directed at the run to better understand limiting factor(s) while ensuring management action continues to provide for escapements to remain with the goal range.

In 2017 there were 18 stocks of concern in the state (Table 4). McNeil River chum salmon was added as a stock of management concern in the 2016/2017 BOF cycle. During the 2017/2018 BOF cycle, 3 Southeast Alaska Chinook Salmon stocks were listed as management concerns and McDonald Lake sockeye salmon was relisted as a stock of management concern after being delisted in 2012.

⁹ <http://www.adfg.alaska.gov/static/applications/dfnewsrelease/873421169.pdf>

¹⁰ <http://www.adfg.alaska.gov/static/applications/dfnewsrelease/878067434.pdf>

Table 4. Alaska salmon Stocks of Concern in 2017.

Region	System	Species	Year Designated	Level of Concern	Year Last Reviewed
Southeast	Chilkat	Chinook	2017	Management	2017
Southeast	King Salmon River	Chinook	2017	Management	2017
Southeast	Unuk River	Chinook	2017	Management	2017
Southeast	McDonald Lake	Sockeye	2017	Management	2017
Cook Inlet	McNeil River	Chum	2016	Management	2016
UCI	Susitna (Yentna) River	Sockeye	2007	Yield	2013
UCI	Chuitna River	Chinook	2010	Management	2013
UCI	Theodore River	Chinook	2010	Management	2013
UCI	Lewis River	Chinook	2010	Management	2013
UCI	Alexander Creek	Chinook	2010	Management	2013
UCI	Willow Creek	Chinook	2010	Yield	2013
UCI	Goose Creek	Chinook	2010	Management	2013
UCI	Sheep Creek	Chinook	2013	Management	2013
Yukon	Yukon River	Chinook	2000	Yield	2015
Norton Sound	Norton Sound Sub- district 5 & 6	Chinook	2003	Yield	2015
Norton Sound	Norton Sound Sub- district 2 & 3	Chum	2000	Yield	2015
Kodiak	Karluk River	Chinook	2010	Management	2013
Peninsula/Aleutians	Swanson Lagoon	Sockeye	2012	Management	2015

4.2. Enforcement update

There were no significant changes to enforcement of Alaska Salmon commercial fishery in the last year.

4.3. Ecosystem Update

There were no significant changes to the ecosystem impacts of the Alaska Salmon commercial fishery in the last year.

4.4. Relevant changes to Legislation and Regulations

There were no significant changes to the legislation and/or regulations that govern the Alaska Salmon commercial fishery in the last year

4.5. Relevant changes to the Management Regime

There were no significant changes to the management regime that governs the Alaska Salmon commercial fishery in the last year.

5. Surveillance Meetings

For the 3rd surveillance audit, conference calls were held on December 11, 2018.

Date	Organization and Location	Representative	Main Topics of Discussion
12/11/2018	KRAA and AFDF (Client)	Tina Fairbanks and Julie Decker (KRAA / AFDF)	<ul style="list-style-type: none"> ▪ Discussion why no cost-recovery fishery of pink salmon was conducted near Kitoi Bay in 2018, despite stronger-than-forecast run size and run deficits of other stocks. ▪ Current status of saltwater otolith marking in terms of production and research findings on the efficacy of these marks from Kitoi Hatchery pink salmon. ▪ Update on the otolith marking of Pillar Creek sockeye. ▪ Update on marine survival estimates of pink, chum and sockeye for the 2017 and 2018 adult return. ▪ Update on meeting the milestones on the Corrective Action Plan in 2017 and prospects for 2018.
12/11/2018	ADFG Chinook Initiative	Ed Jones	<ul style="list-style-type: none"> ▪ Update on work currently being conducted under the Chinook Salmon Research Initiative. ▪ Efforts being made by ADFG and other institutions to improve Chinook salmon escapement and productivity in Alaska. ▪ Update on Chinook Salmon Research Initiative to include the early marine life history studies.
12/11/2018	DIPAC	Eric Prestegard	<ul style="list-style-type: none"> ▪ Status of age-4 return of chum salmon relative to 3 and 5 year-olds, at hatcheries other than DIPAC. ▪ Discussion DIPAC Plan for petition for increased production of any stock in 2019. ▪ Update on estimates of marine survival for hatchery returns by species in 2017 and preliminary results from 2018 in tabular form.
12/11/2018	ADFG Juneau	Forrest Bowers	<ul style="list-style-type: none"> ▪ Discussion on how changes in run timing affect management and harvest by the commercial fisheries and on factors are believed to best explain the shortfalls in harvest and escapement. ▪ Discussion of expected effect of NOAA's recently announced purse-seine permit buyout program in Southeast AK, particularly amid increased hatchery production of pink and chum salmon.

6. Assessment Outcome Summary

6.1. Fundamental Clauses Summaries

Fundamental Clause 1: Structured and legally mandated management system

Evidence adequacy rating: High

Alaska's commercial salmon fisheries are managed in accordance with a transparent structure of laws, regulations, treaties, and other legal mandates at the international, national, and local (state) levels. Alaska's state Constitution and the Magnuson-Stevens Act Fisheries Management Conservation Act (MSFMCA) provide broad policy guidance codified by state laws and regulations that structure the Alaska commercial salmon fishery.

Salmon management in Alaska necessarily considers the whole stock over its entire area of distribution, as the primary management goal is to maintain adult escapement at levels that support viable populations and sustained yield, as influenced by survivorship at all life stages. Management measures also consider past and existing agreements, including those designed to coordinate with neighbouring states in cases of transboundary management. Alaska Department of Fish and Game (ADFG) and Federal management representatives (National Oceanic and Atmospheric Administration NOAA) participate within international and multistate organizations, such as the Pacific Salmon Council (PSC), the Pacific States Marine Fisheries Commission (PSMFC) and the North Pacific Anadromous Fish Commission (NPAFC), to effectively coordinate and develop salmon conservation and management throughout the species' range. These organizations are supported through national and international agreements and funding from participant states. Together with the Board of Fisheries (BoF), ADFG adapts management of the commercial salmon fishery in a transparent manner that considers adult escapement, population productivity, and viability.

Every three years each Alaska management region updates its escapement information and submits a salmon stock status report to the BoF. This report (mandated in Alaska's Policy for the Management of Sustainable Salmon Fisheries) reviews the status of all stocks within each management area, recommends escapement goals based on the past three years' data, identifies stocks of concern, and develops management and action plans to address relevant issues. Management measures, regulations and the regulatory process are developed and organized in a very transparent manner that allows opportunity for public engagement and review.

Fundamental Clause 2: Coastal area management frameworks

Evidence adequacy rating: High

The salmon fishery management organizations in Alaska (principally ADFG and NOAA) participate in coastal area management-related institutional frameworks processes that safeguard biological species and their habitats. These frameworks include decision-making processes and activities relevant to the fishery resource and its users that support sustainable and integrated use of living marine resources, and limit or avoid conflict among users. ADFG is responsible for the protection, management, conservation, and restoration of Alaska's fish and game resources. The Board of Fisheries (BoF) is responsible for considering and adopting regulations to allocate resources among user groups; establishing fish reserves and conservation areas, fishing seasons, quotas, bag limits and size restrictions; habitat protection; stock enhancement; and developing commercial, subsistence, sport and personal use fisheries.

All fishery management plans include a description and identification of Essential Fish Habitat (EFH), adverse impacts, and actions to conserve and enhance habitat. Finally, NOAA Fisheries' Habitat Conservation Division (HCD) works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on EFH and living marine resources in Alaska.

Multi-state and international organizations, such as NPFAC, PSC, PFMSC, develop and provide mechanisms that promote coordinated conservation and management plans and actions relevant to Alaskan commercial salmon fisheries. Representatives from fishery management organizations and fishing communities participate in coastal area management planning through the federal National Environmental Policy Act (NEPA) processes. This includes decision-making processes and activities relevant to the fishery resource and its users in support of sustainable and integrated use of living marine resources and avoidance of conflict among users.

The BoF process, which establishes gear types and seasons for Alaska's commercial salmon fisheries and provides a forum for public hearings, also serves to provide a forum for fishery conflict resolution. Fisheries regulations are made available through diverse public fora, publications and online resources. The Alaska Commercial Fisheries Entry Commission (CFEC) helps conserve and maintain the economic health of Alaska's commercial salmon fisheries by structuring and managing the limited entry program that restricts the number of participants in these fisheries. ADFG actively collaborates with federal, state and international agencies and institutions in diverse research and monitoring programs that assess physical, chemical, biological, economic and social parameters associated with Alaskan salmon fisheries. Findings from this research are regularly published in technical reports, scientific literature and online. Finally, because numerous salmon-bearing rivers in southeast Alaska are transboundary with Canada, Alaska State, U.S. federal and Canadian agencies, as well as tribal (i.e. First Nations) governments cooperatively participate in planning and decision-making processes that affect salmon, their habitats and reliant fisheries.

Fundamental Clause 3: Management objectives and plan

Evidence adequacy rating: High

The principal role of the Board of Fisheries (BoF) is to conserve and develop the fishery resources of Alaska. The Board achieves its mission in part by setting seasons and regulations for the state's subsistence, commercial, sport, guided sport, and personal use fisheries. The BoF also establishes policy and provides management direction for the state's commercial salmon fishery resources. The BoF is charged with making allocative decisions, and ADFG is responsible for management based on those decisions. General precepts are established by the BoF and incorporated into regulation. Alaska has successfully managed sustained yield of its salmon fisheries since implementation of the limited entry permit system in 1973. While the BoF and ADFG continue to set and adjust biologically-based escapement goals to conserve Alaska's salmon stocks, the limited entry permitting process of the CFEC serves to safeguard the economic viability of the dependent fisheries. The BoF develops regulation proposals, evaluate proposals, debates conservation, advises regional councils and consults with interested parties—providing opportunity for input from all interested parties and prioritizing subsistence uses of salmon in Alaska.

Conservation of the biodiversity of aquatic habitats and ecosystems is the responsibility of Habitat Division within ADFG. The Policy for the Management of Sustainable Salmon Fisheries directs ADFG to provide the BoF with reports on the status of salmon stocks and identify any stock that presents a concern. In consultation with ADFG, the BoF may designate, amend, or discontinue Stocks of Concern. Alaska's Policy for the Management of Sustainable Salmon Fisheries provides explicit protection for essential habitats of salmon, including freshwater spawning, estuarine and marine habitats. This policy also provides direction for salmon fishery enhancement, restricting the use of hatchery supplementation to levels that minimize adverse impacts to naturally spawning salmon populations and the function of aquatic ecosystems.

Fundamental Clause 4: Fishery data**Evidence adequacy rating: High**

ADFG maintains programs at the area, regional and state-wide levels to collect harvest statistics. In commercial fisheries, a record of the transaction each time fish are sold is mandated by a state statute (AS 16.05.690 Record of Purchase) that includes species, areas fished, number and weight of fish sold. In sport fisheries, creel surveys are used when required for in-season management purposes. A state-wide survey of recreational anglers provides an annual estimate of the number, by species, caught and retained in each area (Romberg *et al.*, 2018). Household surveys and/or numbers recorded on permits are used for subsistence and personal use fisheries. The number of salmon caught in groundfish fisheries is obtained by on-board observers (NPFMC, 2014). Catch sampling to determine age, sex and size composition is routinely conducted state-wide. The stock composition of catches in many mixed stock fisheries is determined with a variety of methods including genetic analysis, scale pattern analysis, otolith analysis, and coded micro-wire tags (Marshall *et al.*, 1987; Guthrie *et al.*, 2016). Data collected is shared with relevant federal and international organizations (PSC Chinook Tech. Comm., 2015), and various reports with this information are available to the public.

Fundamental Clause 5: Stock assessment**Evidence adequacy rating: High**

ADFG has established a strong hierarchal structure of professional managers, researchers and biometrics staff to support management at the local level. The core research and management functions are conducted by professional staff deployed to 23 area offices located throughout the state. Overarching the area office structure, are four specialized Divisions within the Department that have responsibilities for fisheries issues.

The Commercial Fish Division has the primary responsibility for research and management of stocks that are harvested commercially and for personal use. Within each Division, administrative regions were established. Staff at the regional offices provide administrative, biometric, computer hardware and software, research and management support to the area office staff. At the Division level, senior staff provide overall guidance to the regional staff in management, research and biometrics as well as providing statewide technical services, such as the Gene Conservation Laboratory.

At the core of the ADFG's scientific program is a requirement for peer reviewed planning. Scientific research and applied stock assessment activities undertaken is rigorously reviewed at the area and regional level, and may also be reviewed at the headquarters level to ensure relevance to management, and scientific rigor (Regnart and Swanton, 2012). Examples of stock assessment operational plans are Richards *et al.*, (2013) and Bernard and Jones (2010). Each year, the area management staff prepares a detailed report on the results of harvest, effort and escapements and other stock assessment activities undertaken in their area (Shields and Dupuis, 2015). The quality, quantity and relevance of ADFG's reports publications is outstanding. ADFG's efforts are supported by federal research and graduate level research at educational institutions.

Fundamental Clause 6: Biological reference points and harvest control rule**Evidence adequacy rating: High**

Escapement goals are the primary reference points for Alaska salmon management. The Policy for State-wide Salmon Escapement Goals (5AAC 39.223) defines the types of escapements goals that may be established and the role of the ADFG and Board of Fisheries in setting and reviewing goals. ADFG sets one of three types of escapement goals depending upon the type and quality of the available data:

1. A Biological Escapement Goal (BEG) is defined as an escapement range that provides the greatest potential for maximum sustained yield.

2. A Sustainable Escapement Goal (SEG) is defined as a level of escapement, indicated by an index or a range of escapement estimates; that is known to have provided for sustained yield over a 5 to 10-year period.
3. A Sustained Escapement Threshold (SET) is defined as a threshold level of escapement below which the ability of the salmon stock to sustain itself is jeopardized.

Escapement goals within a management area are reviewed every three years (see for example Erickson *et al.*, 2015). Details about how escapements were determined each year are typically provided in annual management report (Wilburn and Stump, 2016). Each year ADFG publishes a summary of adopted escapement goals and a 10-year history of performance in meeting these goals (Munro, 2018).

Fundamental Clause 7: Precautionary approach

Evidence adequacy rating: High

Alaska State Regulation, the Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222 (a) (1); (a) (5) (A, B),) codifies the precautionary approach in State regulation of salmon fisheries and habitats. This policy states that in the face of uncertainty, salmon stocks, fisheries, artificial propagation, and essential habitats shall be managed conservatively as follows; a precautionary approach, involving the application of prudent foresight that takes into account the uncertainties in salmon fisheries and habitat management, the biological, social, cultural, and economic risks, and the need to take action with incomplete knowledge, should be applied to the regulation and control of harvest and other human-induced sources of salmon mortality; a precautionary approach requires consideration of the needs of future generations and avoidance of potentially irreversible changes; prior identification of undesirable outcomes and of measures that will avoid undesirable outcomes or correct them promptly; initiation of any necessary corrective measure without delay and prompt achievement of the measure's purpose, on a time scale not exceeding five years, which is approximately the generation time of most salmon species; that where the impact of resource use is uncertain, but likely presents a measurable risk to sustained yield, priority should be given to conserving the productive capacity of the resource; appropriate placement of the burden of proof, of adherence to the requirements of this subparagraph, on those plans or ongoing activities that pose a risk or hazard to salmon habitat or production; a precautionary approach should be applied to the regulation of activities that affect essential salmon habitat.

Fundamental Clause 8: Management measures

Evidence adequacy rating: High

The Alaska State Constitution Section 4 states "Sustained Yield. Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses. The Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.22), directs management measures to ensure sustainability of yield. The Policy is implemented through the various fishery management plans for different fisheries in different regions and areas of the state

Fundamental Clause 9: Appropriate standards of fisher's competence

Evidence adequacy rating: High

The Alaska Institute of Technology (formerly called Alaska Vocational Training & Education Center), is within the Department of Labor Workforce Development, operates the Alaska Maritime Training Center. The goal of the Alaska Maritime Training Centre is to promote safe marine operations by effectively preparing captains and crew members for employment in the Alaskan maritime industry. The Alaska Maritime Training Centre is a USCG approved training facility located in Seward, Alaska, and offers USCG and international Standards of Training, Certification, & Watchkeeping -compliant maritime training.

The University of Alaska Sea Grant Marine Advisory Program provides education and training in several sectors, including fisheries management, in the form of seminars and workshops. In addition, the program conducts sessions of their Alaska Young Fishermen's Summit. Each Summit is an intense, 3-day course in all aspects of Alaska fisheries, from fisheries management & regulation (e.g. MSFCMA), to seafood markets & marketing. The target audience for these Summits is young Alaskans from coastal communities. ASMI provide educational information across a whole range of fishery and fish related matters, including quality, hygiene, food safety, sustainability, and environmental protection. ADFG publishes a variety of documents, booklets and pamphlets that provide information on Alaska salmon, including regulations, educational items, and news stories.

Fundamental Clause 10: Effective legal and administrative framework

Evidence adequacy rating: High

The structure of ADFG, with management authority instilled at the area office level, allows it to monitor, control and enforce compliance with fishery regulations and emergency orders. Area Management Biologists are on site to oversee the prosecution of the commercial salmon fishery in their area through aerial surveys and on-the-ground observations. Area and regional staff biologists are deputized law enforcement officers trained to assist Alaska Wildlife Troopers (AWT) with law enforcement activities. Under Alaska's limited entry program, only legally permitted vessels can operate in commercial salmon fisheries.

The U.S. (representing Alaska and other states) participates as a member of the NPAFC, which promotes the conservation of anadromous fishes and ecologically-related species, including marine mammals, sea birds, and non-anadromous fishes, in the high seas area of the North Pacific Ocean, beyond national boundaries. The U.S. also abides by the UN FAO's International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing and has developed additional policies to prevent illegal fishing of salmon and other marine species, both within and beyond state and Federal waters.

Fundamental Clause 11: Framework for sanctions

Evidence adequacy rating: High

Alaska's salmon fisheries are managed by ADFG, pursuant to Alaska Statutes Title 16 and Alaska Administrative Code Title 5. Laws and regulations that structure the fishery are enforced by AWT. AWT coordinates with and is supported by law enforcement personnel from the US Coast Guard and NMFS Office of Law Enforcement. In most cases, violations of fish and wildlife regulations are punishable through fines, imprisonment, loss of fishing rights, and/or confiscation of equipment (including fishing vessel). All Alaska salmon fishing vessels are required by law to be licensed by the State of Alaska, and to display their permanent vessel license plate. Fishing gear must also be marked in accordance with state regulations, which are region specific.

Fundamental Clause 12: Impacts of the fishery on the ecosystem

Evidence adequacy rating: High

Alaska's Policy for the Management of Sustainable Salmon Fisheries explicitly recognizes and accounts for the influence of variable environmental conditions on Alaska's salmon stocks. The influences of environmental and ecological factors on salmon growth and survivorship are carefully considered by ADFG during development of annual escapement goals that are then used to manage commercial fisheries and direct recovery efforts for stocks of concern. Alaska's Policy for Management of Sustainable Salmon Fisheries clearly prioritizes the protection of freshwater and marine habitats, such that they not perturbed beyond the boundaries of natural variation. This policy also promotes research to assess impacts to the environment from salmon fisheries and associated hatchery operations.

The most probable ecological impacts from the Alaskan commercial salmon fishery are posed through potential risks from hatchery-reared salmon to wild stocks and overfishing of the same. Hatchery risks are considered by managers and information is obtained through hatchery marking programs and ongoing research designed to measure the extent and effect of hatchery-wild interactions for several Pacific salmon species. Potential impacts from hatchery programs and harvest on wild salmon abundance is routinely monitored through state mandated spawner escapement surveys.

State and federal policies and regulations serve to minimize bycatch of non-target species in Alaskan commercial salmon fisheries, and utilize non-target, incidental catch in a sustainable manner, within the limits of existing state regulations. Alaska's Policy for the Management of Sustainable Salmon Fisheries states that "salmon escapement and harvest management decisions should be made in a manner that protects non-target salmon stocks or species" and ADF&G uses test fisheries and in-season catch information to direct harvest efforts, so as to protect stocks of concern. Incidents of serious injury or mortality to endangered species, although rare, are mandatorily reported and are subject to take limits established by the National Marine Fisheries Service and U.S. Fish and Wildlife Service in accordance with the U.S. Endangered Species Act. The Magnuson-Stevens Fisheries Management and Conservation Act, the Marine Mammal Protection Act and the U.S. Endangered Species Act all provide clear protections to endangered species that might be affected by Alaska's commercial salmon fisheries. Incidental catch in Alaskan commercial salmon fisheries occurs at a negligible level and all catch, including incidental catch of non-target species, must be reported to ADFG and not exceed established harvest limits. ADFG's escapement-based management serves to protect the ecological role of salmon in marine, aquatic and terrestrial environments. Alaskan waters, including those used by salmon and salmon fisheries, are protected by the International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL 73/78). Moreover, essential fish habitats (EFHs) for Alaskan salmon are designated and protected by the North Pacific Fishery Management Council, NMFS and ADFG, and described in all fishery management plans. Finally, in accordance with the state's constitution, fisheries in Alaska must be managed on the principle of sustained yield, such that commercial salmon fisheries and associated hatcheries cannot undermine the structure, processes and function of salmon in marine and aquatic ecosystems.

Fundamental Clause 13: Fisheries enhancement activities (where applicable)

Evidence adequacy rating: Medium

Alaskan commercial salmon fisheries harvest wild- and hatchery-produced salmon, the latter being produced by private non-profit hatcheries that are permitted and regulated by the ADFG. In accordance with Alaska's Policy for the Management of Sustainable Salmon Fisheries and the State's Finfish Genetics Policy, hatcheries are typically sited away from major natural production areas, yet use locally-sourced fish to found and, in some cases, supplement hatchery broodstocks. State, private and federally sponsored research has and continues to focus on potential ecological and genetic effects from Alaskan salmon hatcheries, including investigations of competition, stray rates, and genetic introgression.

Alaska's Alaska Administrative Code 5AAC39.222 Policy for the management of sustainable salmon fisheries¹¹: states that, "salmon escapement should be managed in a manner to maintain genetic and phenotypic characteristics of the stock by assuring appropriate geographic and temporal distribution of spawners as well as consideration of size range, sex ratio, and other population attributes". Accordingly, adult escapement is the first priority of salmon management in Alaska and is routinely monitored through aerial surveys, weirs, in-river sonar and tower-based counts. ADFG reviews the potential ecological, fishery and other impacts of proposed hatcheries before issuing a permit and has authority to revoke or deny permission for alterations to a permit.

¹¹ <http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2016-2017/jointcommittee/5aac39.pdf>

Regulations and conditions governing hatchery operations are readily available online, as are permit application portals. Alaska's Constitution and Policy for the Management of Sustainable Salmon Fisheries provide clear protections for common property salmon fisheries in Alaska, thereby safeguarding the livelihoods of local communities that use salmon as a resource. Public hearings are held at least 30 days before the issuance of a salmon hatchery permit, pursuant to state statute. Before issuing a salmon hatchery permit, ADFG reviews potential ecological, fisheries, habitat and social impacts, and may revoke a permit or deny permission for alterations to a hatchery. ADFG regulates the source, health and transport of hatchery salmon, in accordance with the State's Finfish Genetics Policy. Non-native and genetically modified fish are prohibited by this policy. In most cases, hatchery salmon in Alaska are mass marked, which allows for selective fisheries and evaluations of the impacts from fisheries on wild stocks. Hatchery pink salmon produced by the Kodiak Regional Aquaculture Association (KRAA) are generally not marked, representing a notable exception to standard hatchery practice and basis for the sole minor non-conformance issued during the 2017 US Alaska Commercial Salmon Reassessment. Through coordination with AFDF, KRAA has developed a Corrective Action Plan to address this minor non-conformance that includes fundraising for construction of infrastructure to begin marking hatchery salmon at its facilities. Significant progress has been made toward the implementation of this plan and will continue to be monitored.

Salmon management in Alaska requires international coordination and cooperation, because some salmon-bearing rivers in southeast Alaska are transboundary with Canada. The Pacific Salmon Treaty provides clear policy direction for responsible management of salmon fisheries and related enhancement along such rivers, and state policy prohibits the introduction of non-native stocks into these or other rivers. Alaska has developed and contributes to numerous databases that assist with management of salmon fisheries and hatchery operations. These include a variety of genetic databases, the regional coded-wire tag database (RMIS), and an otolith mark database. Alaska's Finfish Genetics Policy mandates the conservation of diversity, disease control and protection of the environment, as related to salmon fisheries enhancement in Alaska, and encourages the use of local stocks for hatchery brood. Finally, Alaska's Policy for the Management of Sustainable Salmon Fisheries clearly prohibits overfishing of naturally reproductive components of Alaskan salmon stocks. This policy is implemented through state and federal harvest regulations. Mass marking of hatchery fish and focused research efforts have investigated stray rates, competition effects and genetic introgression from hatchery salmon in Alaska. Escapement estimates produced annually by ADFG strongly suggest that wild salmon populations in the state are, on the whole, stable and productive.

7. Conformity Statement

The assessment team recommends the continued certification of the applicant fisheries, the United States Alaska commercial salmon [Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, coho *O. kisutch*, pink *O. gorbuscha*, and chum *O. keta*] fisheries employing troll , purse seine, drift gillnet, set gillnet, fish wheel, dip net and beach seine gears in the four administrative Regions of Alaska that are principally managed by the Alaska Department of Fish and Game (ADFG).

8. Evaluation of Fundamental Clauses

8.1. Section A. The Fisheries Management System

8.1.1. Fundamental Clause 1

There shall be a structured and legally mandated management system based upon and respecting International, National and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.

Number of Supporting clauses	13
Supporting clauses applicable	10
Supporting clauses not applicable	3
Overall level of conformity	Full
Non Conformances	0

Summarized evidence:

1.1. There shall be an effective legal and administrative framework established at local and national level appropriate for the fishery resource and conservation and management.

As described in detail by the 2017 US Alaska Commercial Salmon Reassessment Report¹², Alaska’s commercial salmon fisheries are managed in accordance with a transparent structure of laws, regulations, treaties, and other legal mandates at the international, national, and local (state) levels. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) is the principal domestic legislation governing the management of American fisheries. For the State of Alaska, Section 4 (Sustained Yield) of Article VIII of Alaska’s Constitution states that, “fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the state shall be utilized, developed and maintained on the sustained yield principle, subject to preferences among beneficial uses”. ADFG’s Commercial Fisheries Division is responsible for conservation of Alaska’s salmon stocks and for management of commercial fisheries. ADFG’s area fishery managers produce annual management reports and related documents, taking into account all previously-agreed management measures. Representatives from ADFG and NMFS routinely participate in several international fora and organizations [i.e. North Pacific Anadromous Fish Commission (NPAFC), Pacific Salmon Commission (PSC)]. These organizations strive for compatibility in their management and promote cooperation among states in the areas of salmon fisheries research, development and management. ADFG performs routine review and revision of conservation and management measures within the Commercial Fisheries Division, and between the latter and the BoF. ADFG’S management approach and decision-making processes for Alaska commercial salmon fisheries are made available to the public through the agency’s website¹³.

1.2. Management measures shall take into account the whole stock unit over its entire area of stock distribution.

ADFG’s priority for salmon management is to maintain adult escapement levels that ensure adequate natural spawning, long-term viability of stocks and, consequently, sustainability of associated fisheries. Measures taken to meet escapement goals consider each stock over its entire distribution, taking into account the cumulative effect of those factors that can influence survivorship at all life stages in diverse habitats, including freshwater spawning and rearing habitats, and expansive marine environments. In each management area, ADFG’s fishery managers produce annual reports that describe how commercial salmon fisheries were conducted and managed for that year¹⁴. Fishing regulations, including allocation criteria and subsistence determinations, also consider past use and management. Accordingly, Alaska’s commercial salmon fishery management system is informed and abides by all previously- agreed management measures.

¹² <http://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-ReportMarch-2017.pdf>

¹³ <http://www.adfg.alaska.gov/index.cfm?adfg=process.main>

¹⁴ <http://www.adfg.alaska.gov/index.cfm?adfg=fishingcommercialbyarea.main>

1.3./1.4/1.5./1.6. Transboundary stocks

Because numerous salmon-bearing rivers in Southeast Alaska are transboundary with Canada, Alaska State, U.S. federal and Canadian agencies, as well as tribal (i.e. First Nations) governments maintain interest in planning and decision-making that may affect salmon and their habitats. Representatives from Alaska's departments of Fish and Game, Natural Resources, Environmental Conservation, the USCG, as well as other public officials and non-public agency experts occasionally participate in Canadian permitting processes. In the past, most review processes have focused on individual BC development projects. In 2015, USA and Canada governments signed a Memorandum of Understanding regarding transboundary waters. While the MOU is not a legally binding document, it is a firm commitment by both governments to continue working together where possible. The MOU identifies the broad areas of continued or new activity by Alaska and British Columbia, including:

- Establishing a bilateral working group on the protection of transboundary waters;
- Sharing best practices on workforce development and training;
- Advancing marine transportation reliability and safety;
- Reinforcing emergency management mutual aid response through the existing Pacific Northwest Emergency Management Arrangement;
- Fostering continued growth of existing and increased transportation links;
- Continuing joint visitor industry promotion;
- And exploring other areas for cooperative action, including natural resource development, fisheries, ocean acidification, border management, trade and investment, and climate change adaptation.

ADFG and NMFS representatives routinely participate in several relevant Pacific salmon management organizations designed to resolve transboundary fishery management issues¹⁵¹⁶¹⁷

Management agreements and arrangements for promoting research have been developed for Pacific salmon throughout the range of all five North American species. Conservation and management measures include a prohibition of high seas fishing for salmon by all nations involved (Japan, Canada and the United States); the Bilateral Pacific Salmon Treaty (PST¹⁸) and supporting this, research that furthered understanding of marine range and distribution of Pacific salmon. Multi-agency and -state organizations, such as PSC, PSMFC and NPAFC, of which ADFG and NMFS salmon scientists and managers participate, strive for compatibility in their salmon fishery management measures. These organizations recognize sustained yield and conservation as their highest priority, even in cases where different states (i.e. US and Canada) compete for the same fishery resource.

Representatives of ADFG and NMFS routinely and actively participate in several relevant forums and organizations including, but not limited to, North Pacific Anadromous Fish Commission (NPAFC); Pacific Salmon Commission (PSC); Pacific States Marine Fisheries Commission (PSMFC). These organizations actively foster cooperation among States with regard to salmon fisheries research and management. ADFG and various federal agencies participate in numerous organizations that collect information about aquatic and marine ecosystems, and status and management of Alaskan salmon fisheries. Management bodies such as NPAFC, PSC and PSMFC and their activities, which can affect Alaskan commercial salmon fishery management, are supported through national and international agreements¹⁹²⁰²¹.

¹⁵ <http://www.npafc.org/new/index.html>

¹⁶ <http://www.psc.org>

¹⁷ <http://www.psmfc.org>

¹⁸ <https://www.nwcouncil.org/history/Trilateral>

¹⁹ <http://www.npafc.org/new/publications/HandBook/Handbook%203rd%20E%20English.pdf>

²⁰ <http://www.psc.org/pubs/About/OrientationGeneralJune2015.pdf>

²¹ <http://www.psmfc.org/psmf-info>

1.7. Review and Revision of conservation and management measures

Alaska's salmon fisheries are managed by ADFG, and the agency's Division of Commercial Fisheries²² manages commercial harvests and, in conjunction with the Division of Subsistence²³, removals by subsistence fishermen.

The Division of Sport Fisheries²⁴ manages sport and personal use resource removals. Every three years (based on the Board of Fisheries (BoF) schedule) each Alaska Region updates its escapement information and submits a salmon stock status report to the BoF. This report (mandated in the Policy for the Management of Sustainable Salmon Fisheries, 5AAC 39.222²⁵ reviews the status of all stocks within each management area, recommends escapement goals based on the past three years' data, identifies stocks of concern, and develops management and action plans to address relevant issues.

1.8. Transparent management arrangements and decision making

The management arrangements and decision-making processes for Alaska commercial salmon fisheries are organized in a very transparent manner, and are made available to the public through ADFG's website²⁶.

Both annual (pre-season) and in-season management arrangements are employed in Alaskan commercial salmon fisheries. Similarly, BoF and ADFG use both pre- and in-season decision-making processes that involve and consider public comment, to manage Alaskan salmon fisheries

1.9. Compliance with international conservation and management measures

NOT APPLICABLE. Staff from US agencies participates within several international organizations responsible for high seas fisheries management.

²² <http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main>

²³ <http://www.adfg.alaska.gov/index.cfm?adfg=fishingSubsistence.main>

²⁴ <http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main>

²⁵ http://www.housemajority.org/coms/jcis/pdfs/Sustainable_Salmon_Fisheries_Policy.pdf

²⁶ <http://www.adfg.alaska.gov/index.cfm?adfg=fishingcommercialbyarea.main>

8.1.2. Fundamental Clause 2

Management organizations shall participate in coastal area management institutional frameworks, decision-making processes and activities related to the fishery and its users, in support of sustainable and integrated resource use, and conflict avoidance.

Number of Supporting clauses	10
Supporting clauses applicable	9
Supporting clauses not applicable	1
Overall level of conformity	Full
Non Conformances	0

Summarized evidence:

2.1./2.2./2.3./2.4. Policy, legal and institutional frameworks adopted to achieve sustainable and integrated use of marine resources along with mechanisms to avoid conflict shall be in place. Representatives of the fisheries sector and fishing communities shall be consulted in decision making processes and information related to management measures shall be disseminated.

An appropriate policy, legal and institutional framework shall be adopted in order to achieve sustainable and integrated use of living marine resources, taking into account 1) the fragility of coastal ecosystems and finite nature of their natural resources; 2) allowing for determination of the possible uses of coastal resources and govern access to them, 3) taking into account the rights and needs of coastal communities and their customary practices to the extent compatible with sustainable development. In setting policies for the management of coastal areas, 4) States shall take due account of the risks and uncertainties involved.

The salmon fishery management organizations in Alaska (principally, ADFG and NOAA participate in coastal area management-related institutional frameworks processes that safeguard biological species and their habitats (i.e. NEPA, EFH). These frameworks include decision-making processes and activities relevant to the fishery resource and its users that support sustainable and integrated use of living marine resources, and limit or avoid conflict among users. ADFG is responsible for the protection, management, conservation, and restoration of Alaska's fish and game resources. The BoF is responsible for considering and adopting regulations to allocate resources among user groups; establishing fish reserves and conservation areas, fishing seasons, quotas, bag limits and size restrictions; habitat protection; stock enhancement; and developing commercial, subsistence, sport and personal use fisheries. ADFG has the statutory responsibility for protecting freshwater anadromous fish habitat and providing free passage for anadromous and resident fish in fresh water bodies (AS 16.05.841871)²⁷. The Department of Environmental Conservation (DEC) implements statutes and regulations affecting air, land and water quality. DEC is the lead state agency for implementing the federal Clean Water Act and promotes high quality fish and wildlife habitat through pollution prevention.

Through collaboration with other state, federal and local agencies, ADFG protects estuarine and marine habitats in Alaska. ADFG has legislative jurisdiction over streams that have been designated as anadromous fish streams. Some marine species also receive special consideration through the state Endangered Species program. The Department of Natural Resources (DNR) manages all state-owned land, water and natural resources except for fish and game. The MSFCMA include provisions concerning the identification and conservation of Essential Fish Habitat (EFH). The MSFCMA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

²⁷ <http://www.adfg.alaska.gov/index.cfm?adfg=habitatregulations.main>

NMFS and regional Fishery Management Councils (Councils) must describe and identify EFH in fishery management plans (FMPs), minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH. Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NMFS, and NMFS must provide relevant habitat conservation recommendations. All fishery management plans include a description and identification of EFH, adverse impacts, and actions to conserve and enhance habitat. Finally, NOAA Fisheries' Habitat Conservation Division (HCD) works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on Essential Fish Habitat (EFH) and living marine resources in Alaska.

Multi-state and international organizations, such as North Pacific Fisheries Management Council (NPFAC), PSC, PFMSC, develop and provide mechanisms that promote coordinated conservation and management plans and actions. Historically, salmon management in Alaska has been implemented by several agencies, including the ADFG, and the National Oceanographic and Atmospheric Administration (NOAA). Networking among these groups has been critical to the conservation of Alaska's salmon fishery resource. Alaska Department of Fish and Game's Habitat Division is delegated by the Commissioner to implement the state's Title 16 authority for Fish Habitat and Special Area permitting. Unlike many of ADFG's regulations, which are developed through the Board process and address harvest, Fish Habitat and Special Area laws address land use activities in fish-bearing streams and in the State's legislatively designated refuges, critical habitat areas, and sanctuaries through a project review and permitting process. NOAA Fisheries' Habitat Conservation Division (HCD) works in coordination with industries, stakeholder groups, government agencies, and private citizens to avoid, minimize, or offset the adverse effects of human activities on Essential Fish Habitat (EFH) and living marine resources in Alaska.

The public shall also be kept aware on the need for the protection and management of coastal resources and the participation in the management process by those affected. Representatives from fishery management organizations and fishing communities participate in coastal area management planning through the federal National Environmental Policy Act (NEPA) processes. This includes decision-making processes and activities relevant to the fishery resource and its users in support of sustainable and integrated use of living marine resources and avoidance of conflict among users. The review process requires participation by the project applicant; State resource agencies including the Alaska Departments of Environmental Conservation (DEC), Fish and Game (ADFG), and Natural Resources (DNR); the affected local coastal district office; and other interested members of the public, including and other interested members of the public, including fishermen's organizations and private individuals²⁸.

The BoF process, which establishes gear types and seasons for Alaska's commercial salmon fisheries, also serves to provide a forum for fishery conflict resolution. Further, the NEPA review process²⁹, deliberately takes into account all marine and fishery resources and users of those resources in order to resolve potential conflicts among users before project approvals are given. Members of the commercial and recreational fishery, the environmental community, and the public at-large are encouraged to testify at Council meetings and hearings. This involves speaking in a public forum. Public testimony to the Advisory Panel may lead to a proposal to the Council, which may then lead to a discussion paper and Council development of alternatives to address the problem or situation identified.

²⁸ <http://www.adfg.alaska.gov/index.cfm?adfg=uselicense.main>

²⁹ <https://alaskafisheries.noaa.gov/fisheries/nepa-guidance>

Fisheries management agencies such as ADFG, NOAA, and NPMFC have developed and host websites that clearly describe salmon management and conservation measures. ADFG offers public education programs focused on the importance of salmon to Alaska's culture, economy and ecosystems. This agency also provides educational materials to educators and regularly participates in public Sportsman Shows, Commercial Fisheries Trade shows and Gear Group meetings for the purposes of outreach and public education. In 2007, ADFG Sport Fish Division developed an Aquatic Resources Implementation Plan for Alaska's Comprehensive Wildlife Conservation Strategy (CWCS). This plan is intended to initiate and expand partnerships with other agencies and non-governmental organizations (NGOs) that will conserve, improve, and manage Alaska's habitats for aquatic species, as well as developing education.

2.5. The economic, social and cultural value of coastal resources shall be assessed in order to assist decision-making on their allocation and use.

The economic, social and cultural value of coastal resources shall be assessed in order to assist decision making on their allocation and use. The value of coastal salmon resources from economic, cultural and social perspectives is regularly assessed to inform allocation and use decisions. The Alaska Commercial Fisheries Entry Commission (CFEC) helps conserve and maintain the economic health of Alaska's commercial fisheries by limiting the number of participating fishers. The National Environmental Policy Act (NEPA) processes provide the public with information and an opportunity for involvement at both state and federal levels.

Decisions are made through public processes and involvement by fishery managers and stakeholders is encouraged through public advertisement and announcement of scheduled meetings. Assessment of the social and cultural value of coastal resources is integral to the decision-making process for fishery resource allocation and use in Alaska. The 2016 US Alaska Commercial Salmon AK RFM Reassessment Report³⁰ further describes the history and processes associated with merging economic, social and cultural values with resource allocation decisions that are relevant to Alaska's commercial salmon fishery.

Management organizations like the North Pacific Anadromous Fish Commission (NPAFC), the Pacific Salmon Commission (PSC) and the Pacific States Marine Fisheries Council (PSMFC) derive their technical capacities from member parties and are funded by annual dues paid by participant governments (PSC), as well as federal grants and contracts (PSMFC). ADFG has an annual operating budget of approximately \$200 million, supported by a variety of funding sources, including federal receipts, general fund receipts, and fish and game fund receipts.

2.6./2.7/2.8. Research and monitoring of the coastal environment, mechanisms for cooperation and coordination, appropriate technical capacities and financial resources, conflict avoidance amongst user groups

Management organizations like the North Pacific Anadromous Fish Commission (NPAFC), the Pacific Salmon Commission (PSC) and the Pacific States Marine Fisheries Council (PSMFC) derive their technical capacities from member parties and are funded by annual dues paid by participant governments (PSC), as well as federal grants and contracts (PSMFC). ADFG has an annual operating budget of approximately \$200 million, supported by a variety of funding sources, including federal receipts, general fund receipts, and fish and game fund receipts.

ADFG participates with federal, state and international agencies and institutions in numerous research and monitoring programs that assess physical, chemical, biological, economic and social parameters of the coastal area. ADFG regularly publishes their findings in agency technical reports that can typically be accessed online, through their website³¹. One of the functions of the NPAFC is to provide a venue for coordinating the collection,

³⁰ <http://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-Report-2017.pdf>

³¹ http://www.adfg.alaska.gov/index.cfm?adfg=librarypublications.publications_reports#fisheries

exchange, and analysis of scientific data regarding anadromous fishes, primarily Pacific salmon, and other ecologically-related species³². The NPAFC's scientific research focuses on trends in marine production of salmon stocks, their population structure and diversity in marine ecosystems of the North Pacific, and impacts from climate change.

³² <http://www.npafc.org/new/publications/HandBook/Handbook%203rd%20E%20English.pdf>

8.1.3. Fundamental Clause 3

Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.

Number of Supporting clauses	7
Supporting clauses applicable	7
Supporting clauses not applicable	0
Overall level of conformity	Full
Non Conformances	0

Summarized evidence:

3.1. Long-term management objectives shall be translated into a plan or other management document and be subscribed to by all interested parties.

The principal role of the Board of Fisheries (BoF) is to conserve and develop the fishery resources of Alaska. The Board achieves its mission in part by setting seasons and regulations for the state’s subsistence, commercial, sport, guided sport, and personal use fisheries. The BoF also establishes policy and provides management direction for the state’s fishery resources. The BoF is charged with making allocative decisions, and ADFG is responsible for management based on those decisions. General precepts are established by the BoF and incorporated into regulation. The long-term objectives for Alaska’s commercial salmon fisheries are primarily established through three policy statements, incorporated into state regulation, Title 5 Alaska Administrative Code, by the BoF: 39.220 Policy for the Management of Mixed Stock Salmon Fisheries³³ 39.222 Policy for the Management of Sustainable Salmon Fisheries³⁴ 39.223 Policy for State-wide Salmon Escapement Goals³⁵.

3.2. Management measures should limit excess fishing capacity, promote responsible fisheries, take into account artisanal fisheries, protect biodiversity and allow depleted stocks to recover.

Alaska has successfully managed sustained yield of its salmon fisheries since implementation of the limited entry permit system in 1973³⁶. The Alaska Commercial Fisheries Entry Commission (CFEC) regulates the number of participating fishers, thereby conserving the resource and safeguarding the economic viability of the fishery³⁷. Entry into regional salmon fisheries is controlled by the Commission, and the number of permits issued is regulated in accordance with the projected value of each fishery.

While the BoF and ADFG continue to set and adjust biologically-based escapement goals to conserve Alaska’s salmon stocks, the limited entry permitting process of the CFEC serves to safeguard the economic viability of dependent fisheries. The separation of allocative and conservation responsibilities of the BoF and ADFG promotes responsible fisheries by balancing resource use and conservation needs.

³³ <http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/findings/ff93145x>.

³⁴ http://www.housemajority.org/coms/jcis/pdfs/Sustainable_Salmon_Fisheries_Policy.pdf

³⁵ <http://www.touchngo.com/lglcntr/akstats/aac/title05/chapter039/section223.htm>

³⁶ <https://www.cfec.state.ak.us/pregs/Homan30YrsLimitedEntrySummary.pdf>

³⁷ <http://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=1288&context=alr>

8.2. Section B. Science and Stock Assessment Activities

8.2.1. Fundamental Clause 4

There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.

Number of Supporting clauses	13
Supporting clauses applicable	10
Supporting clauses not applicable	3
Overall level of conformity	Full
Non Conformances	0

Summarized evidence:

4.1. All fishery removals and mortality of the target stock(s) shall be considered by management.

To facilitate stock-specific management, state waters have been classified and numbered into regions, areas, districts, sub-districts, individual river systems and sections within rivers when needed (see for example Gray *et al.*, 2014 or the on-line map resources³⁸). A record of sale for each commercial landing provides the location, time, species, number, weight and value of fish caught. In-season, area office staff compile summaries of the catch and effort from these fish tickets. The Division of Commercial Fisheries Computer Services section maintains software and archives the fish ticket data. Historically, the area office staff edited and entered the data from these paper fish tickets. Currently, the state is in the process of developing and deploying an electronic fish ticket system.

Both in-season and historic commercial catch data are readily available on the Commercial Fisheries website (<http://www.cf.adfg.state.ak.us/geninfo/finfish/salmon/salmcatch.php>). Catch and effort data is also available in annual management reports for each area. For sport fisheries, state-wide estimates of harvest (the state-wide harvest survey and guide logbook programs) are administered by the Research and Technical Services section (Romberg *et al.*, 2018). Sport fishery harvest and fishing effort estimates obtained from the state-wide harvest survey are available on the Sport Fish website (<http://www.sf.adfg.state.ak.us/statewide/FishingSurvey/>).

The first buyer of raw fish, persons who catch and process fish, and persons who catch and have fish processed by another business are required to file an annual report of their purchasing and processing activities. This report is called the Commercial Operator's Annual Report (COAR) and is due by April 1 of the following year³⁹.

To promote and support development of applied research and stock assessment necessary for informed management, the ADF&G employs research staff in each region and area office who not only guide local development of information critical to management, but also participate in and advise managers when making in-season management decisions. Specialized services such as decoding micro-wire tags and conducting genetic studies are maintained at the headquarters level and have strong linkages to local programs. Distribution of stock assessment information takes many forms, beginning with real-time summaries being hand delivered to managers as necessary, being entered into regionally maintained databases for rapid access, in-season memoranda's being distributed to area, regional and headquarters staff to final reports being accessible on-line (see <http://www.adfg.alaska.gov/index.cfm?adfg=library.main>). Research results are typically incorporated into reports to the Board of Fisheries to inform the development of Management Plans (see for example <http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.meetinginfo&date=01-31-2014&meeting=uci>).

4.2. An observer scheme designed to collect accurate data for research and support compliance with applicable

³⁸ <http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmonmaps>

³⁹ <http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.coar>

fishery management measures shall be established.

Observers are generally not needed to monitor compliance with regulations, or to collect data needed for management in Alaska's salmon fisheries. Alaska's salmon fisheries occur close to shore or in-river and fish that are harvested are sold in Alaskan ports where the weight, number and location of harvest are reported on fish tickets. Biological samples are typically taken at the port of landing. Additionally, Area Management Biologist and Department of Public Safety personnel often observe the fisheries to ensure compliance with time, area and gear requirements. State regulations (5AAC; 39.140, Inspection of Fishing Establishments and Vessels), allow ADFG and Department of Public Safety personnel unobstructed access to all fishing vessels and processing establishments to inspect catch, gear and compliance with Alaska laws and regulations.

When special needs arise, the ADFG has placed observers aboard salmon fishing vessels. For example, there has been a need to verify estimates of immature Chinook salmon caught and released in Southeast troll fishery (Gaudet, 1991) and to verify estimates of Chinook caught in the Southeast purse seine fishery (Rowse and Marshall, 1988).

4.3. Management entities shall make data available in a timely manner and in an agreed format in accordance with agreed procedures.

Besides the extensive in-season and post-season reporting undertaken by ADFG previously cited, there are process in place to share data with other states through the Pacific States Marine Fisheries Commission (PSMFC) and with Canada through the Pacific Salmon Commission (PSC). The PSMFC maintains a coast wide database of catch needed to interpret recoveries of coded micro-wire tags. A committee within the PSMFC composed of representatives of states, federal and tribal staff guide development and maintenance of the database in accordance with their respective agencies policies and regulations such as confidentiality (see <http://www.psmfc.org/program/regional-mark-processing-center-coded-wire-tag-rmpc?pid=17>). The PSC has established Technical Committees to compile and evaluate stock assessment data and a Data Sharing Committee (see for example the Chinook Technical Committee reports http://www.psc.org/publications_tech_techcommitteereport.htm#TCCHINOOK and PSCJTCDs 1989).

We also note that by Alaska Statute 16.05.815 (Confidential Nature of Certain Reports and Records) strict confidentiality of an individual fisherman's sales data is protected and may not be released to the public. As a working rule, if three or fewer fishermen report sales within a fine scale time, area strata, the data will be redacted from public reports (Weiland *et al.*, 2003).

4.4/4.5. States shall stimulate the research required to support national policies related to fish as food and collect sufficient knowledge of social, economic and institutional factors relevant to the fishery in question to support policy formulation.

State and national policies regarding seafood are guided by the U.S. Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), the U.S. National Institute of Health (NIH), and Alaska Seafood Marketing Institute (ASMI). ASMI⁴⁰ is the state agency primarily responsible for increasing the economic value of Alaskan seafood through marketing programs, quality assurance, industry training and sustainability certification. The powers of the ASMI Board (AS 1651.090) include conducting or contracting for scientific research to develop and discover health, dietetic, or other uses of seafood harvested and processed in the state (see for example Nettleton 2009).

The University of Alaska also operates the Kodiak Seafood and Marine Science Center (KSMSC). Among other

⁴⁰ <http://www.alaskaseafood.org>

things, KSMSC works to discover better methods to preserve, process, and package seafood. It has research kitchens, biochemistry labs and food labs with experimental seafood processing equipment that are used to test production techniques and develop new seafood products and evaluate fish as food (see for example Faber et al. 2010). KSMSC staff work closely with the industry to convey research results and provide educational opportunities that help seafood workers improve efficiency and the quality of their products.

Knowledge of the economic, social and cultural aspects of fish and fishing are critical to management of Alaska's salmon fisheries. The need for these kinds of data is evident in the regulations and statutes. For example:

1. The BoF must (AS 16.05.251(17) (e)) consider seven social, economic and cultural criteria when adopting a regulation that determine how to distribute fishing opportunity among identified user groups.
2. The BoF must (AS 16.05.25) consider 13 socio-economic and cultural factors to determine what areas will be open or closed to subsistence fishing.
3. The Policy for the Management of Sustainable Salmon Fisheries (5AAC 39.222(c)(5)) requires the BoF to consider (among other things) the social, cultural and economic risks and needs of future generations.
4. The Commercial Fisheries Entry Commission (CFEC) uses economic and biological data to establish the number of permits that will be issued to participate in the state's commercial fisheries.

The state relies on several sources of social, cultural and economic information to develop management policy. There are 82 local Advisory Committees composed of interested citizens most of whom are participants in commercial, sport, subsistence or personal use fisheries (or hunting and trapping) to provide local knowledge of the social, economic and institutional factors to the BoF (5AAC 96.010)⁴¹. The Commercial Fisheries Division maintains data on the ex-vessel value of commercial landings⁴² and on wholesale value⁴³.

The Sport Fish Division has published reports on the value of recreational fishing (e.g. Southwick *et al.*, 2008). The Division of Subsistence publishes numerous papers on the history and current use of salmon for subsistence (e.g. Ikuta *et al.*, 2013 and Fall *et al.*, 2015). The ASMI has contracted studies to determine the value of Alaska's Seafood Industry (e.g. McDowell, 2017). The University of Alaska Institute of Social and Economic Research conducts research on the salmon fisheries of Alaska (e.g. Knapp, 2011). The CFEC publishes research on the optimum number of permits that should be issued for a fishery (e.g. Schelle *et al.*, 2004).

4.6. States shall investigate and document traditional fisheries knowledge and technologies, in particular those applied to small scale fisheries, in order to assess their application to sustainable fisheries conservation, management and development.

Essentially all stock assessments used for commercially harvested salmon runs are based on modern fishery science methods. However, the state has conducted research to document traditional knowledge for several commercially fished salmon stocks (Ream and Merriam, 2017; Jones and Kukkonen, 2017). And, in one case, the Alaska Board of Fisheries provided a forum for traditional knowledge to be brought into the management process. The Kuskokwim River Salmon Management Working Group was formed in 1988 in response to requests from stakeholders who sought a more active role in the management of salmon fishery resources⁴⁴.

The Working Group is made up of 14-members, seats are provided for elders, subsistence fishermen, processors, commercial fishermen, sport fishermen, Kuskokwim River Inter-Tribal Fish Commission, member at large, federal

⁴¹ http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2014-2015/pws_finfish/ac_comments_pws_2014.pdf.

⁴² <http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisherySalmon.exvesselquery>

⁴³ http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch_wholesale

⁴⁴ <http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg>

subsistence regional advisory committee, and the Alaska Department of Fish and Game. Agency members participate on a voluntary basis and receive no compensation. Participation in the Working Group process requires a great deal of time from its members and agency staff.

4.7. States conducting scientific research activities in waters under the jurisdiction of another State shall ensure that their vessels comply with the laws and regulations of that State and international law.

The state of Alaska does not conduct salmon research aboard vessels in the waters of other states. There are however cooperative studies in the Transboundary Rivers and ADFG employees may travel into Canada via skiffs to assist in field activities. All such activities are coordinated through the Transboundary Rivers Technical Committee or Yukon River Technical Committee.

4.8. States shall promote the adoption of uniform guidelines governing fisheries research conducted on the high seas.

Coordination of salmon research on the high seas is accomplished through the North Pacific Anadromous Fish Commission (NPAFC)⁴⁵. The NPAFC is an international organization established by the Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean signed in 1992. The member countries are Canada, Japan, Republic of Korea, Russian Federation and United States. The Convention area includes the North Pacific Ocean and its adjacent seas, north of 33 degrees North Latitude beyond 200-miles zones of the coastal States. While key convention measures are aimed at prohibiting directed fishing and retention of incidentally caught salmon in the Convention area, the Convention also authorizes coordinated research on anadromous stocks.

The Convention authorizes fishing for anadromous fish in the Convention Area for scientific purposes under national and joint research programs approved by the NPAFC. The taking of anadromous fish for scientific purposes must be consistent with the needs of the research program and provisions of the Convention and be reported to the Commission. Scientific research is conducted under the Commission's Science Plan (Anonymous, 2010). The Commission has developed a consensus long-term research and monitoring plan for Pacific salmon in the North Pacific (Beamish *et al.*, 2009). The member countries cooperate in collecting, reporting and exchanging biostatistical data, biological samples, fisheries data and organizing scientific communications, such as seminars, workshops, exchanges of scientific personnel and publications (e.g. Farley *et al.*, Eds. 2009). The members provide catch, enhancement and other technical information and material pertaining to areas adjacent to the Convention Area from which anadromous stocks migrate into the Convention Area^{46 47}.

4.9/4.10/4.11. States shall promote and enhance the research capacities of developing countries, support (upon request) States engaged in research investigations aimed at evaluating stocks which have been previously un-fished or very lightly fished.

These clauses are not relevant.

⁴⁵ <http://www.npafc.org/new/index.html>.

⁴⁶ <http://wgosm.npafc.org/>

⁴⁷ http://www.npafc.org/new/science_statistics.html

8.2.2. Fundamental Clause 5

There shall be regular stock assessment activities appropriate for the fishery, its range, the species biology and the ecosystem, undertaken in accordance with acknowledged scientific standards to support its optimum utilization.

Number of Supporting clauses	5
Supporting clauses applicable	5
Supporting clauses not applicable	0
Overall level of conformity	Full
Non Conformances	0

Summarized Evidence:

5.1 States shall ensure that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science. The research shall be disseminated accordingly. States shall also ensure the availability of research facilities and provide appropriate training, staffing and institution building to conduct the research, taking into account the special needs of developing countries.

Alaska salmon resources are abundant, diverse and spread over an immense landscape. To develop the scientific knowledge and management expertise needed to successfully implement sustained yield, as required by the state's constitution, the ADFG is organized into a hierarchal scheme. The core research and management functions are conducted by professional staff deployed to 23 area offices located throughout the state⁴⁸ Overarching the area office structure, are four specialized Divisions within the Department that have responsibilities for fisheries issues.

1. Commercial Fish Division – primary responsibility for research and management of stocks that are harvested commercially⁴⁹.
2. Sport Fish Division – responsible for research and management of stocks of primary interest to recreational fishermen, and also takes the lead role in research on several stocks that are shared between commercial and recreational fishers⁵⁰.
3. Habitat Division – conducts applied research to develop methods and means to minimize impacts of development projects on fish and wildlife resources, issue permits for activities that may impact fish and maintains a catalogue of waters that salmon inhabit⁵¹.
4. Subsistence Division – compiles and analyzes existing data and conducts research on subsistence fishing by Alaskans⁵².

Within each Division, administrative regions have been established. Staff at the regional offices provide administrative, biometric, computer hardware and software, research and management support to the area office staff. At the Division level, senior staff provide overall guidance to the regional staff in management, research and biometrics as well as providing statewide technical services, such as the Gene Conservation Laboratory⁵³ and coded micro-wire tag laboratory⁵⁴.

⁴⁸ <http://www.adfg.alaska.gov/index.cfm?adfg=contacts.main>

⁴⁹ <http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main>

⁵⁰ <http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main>

⁵¹ <http://www.adfg.alaska.gov/index.cfm?adfg=divisions.habmission>

⁵² <http://www.adfg.alaska.gov/index.cfm?adfg=divisions.submission>

⁵³ <http://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.main>

⁵⁴ <https://mtalab.adfg.alaska.gov/CWT/>

Educational and experience standards for all ADFG employees are maintained by the State's Department of Administration; the standards are rigorous and specific to help ensure that only appropriately educated and experienced people qualify for the professional and technical positions within the ADFG (see for example specifications for a Biometrician IV <https://www.governmentjobs.com/careers/alaska/classspecs/889586>).

At the core of the ADFG's scientific program is a requirement for peer reviewed planning and reporting. Scientific research and applied stock assessment activities undertaken is rigorously reviewed at the area and regional level, and may also be reviewed at the headquarters level to ensure relevance to management and scientific rigor (Regnart and Swanton, 2012). Examples of stock assessment operational plans are Richards *et al.*, (2013) and Bernard and Jones, (2010). Each year, the area management staff prepare a detailed report on the results of harvest, effort and escapements and other stock assessment activities undertaken in their area (e.g. Shields and Dupuis, 2015). The scope of research programs that support management of Alaska's salmon resources is impressive. It includes:

1. The ADFGs Area, Regional and Headquarters research staff are actively involved in many fishery research programs. For example, the Gene Conservation Laboratory staff work in understanding the structure of salmon stocks and provide estimates of the stock composition of mixed stock fisheries (Lewis *et al.*, 2015), the Fish Pathology Laboratory's work on health of cultured fish (Meyers, 2007), headquarters staff research the accuracy of sonar to measure fish size (Burwen *et al.*, 2010) and work to understand methods for setting escapement goals (Clark *et al.*, 2014). The Department's publications are accessible via <http://www.adfg.alaska.gov/index.cfm?adfg=library.main>.
2. The National Marine Fisheries Service Auke Bay Laboratory conducts research into the early marine life history of salmon (Hertz *et al.*, 2015), genetics and stock identification (Kondezla *et al.*, 2016) and environmental science and pollution (Farrow *et al.*, 2016)⁵⁵.
3. The University of Alaska⁵⁶ has an extensive undergraduate and graduate program on a broad array of topics including quantitative stock assessment, biology and ecology of marine and freshwater species, molecular genetics, behavioral ecology (e.g. Adkison, M. D., 2010). The University also offers associate degrees and certificates in fisheries technology. Facilities are located across Alaska in Juneau, Seward, Kodiak and Fairbanks.
4. The University of Washington⁵⁷ maintains three field stations in Alaska to study salmon and train graduate students. The program has a distinguished publication history, a recent example of which is Cunningham *et al.*, (2018).
5. The USFWS augments state stock assessment by conducting research on salmon production and habitat on federal lands, (e.g. Tanner and Suresh, 2014).
6. The U.S Forest Service, U.S. Park Service and U.S. Bureau of Land Management perform fisheries research projects and activities associated with management of subsistence fisheries on federal lands⁵⁸.
7. The Prince William Sound Science Center⁵⁹ ([PWSSC](http://www.pwssc.org/)) conducts studies and collaborates with other agencies to answer questions about resource use and sustainability, the impacts of oil development and transportation, food webs that support coastal and inland economies, and about issues associated with the management, harvest and processing of fish and shellfish.

Social and economic data are compiled and research is undertaken by several institutions:

1. The Commercial Fisheries Division maintains data on the ex-vessel⁶⁰ and wholesale⁶¹ value of commercial landings
2. The Sport Fish Division has published reports on the value of recreational fishing (e.g. Southwick *et al.*, 2008).
3. The Alaska Seafood Marketing Institute has contracted studies to determine the value of Alaska's Seafood Industry (e.g. McDowell, 2015).

⁵⁵ <http://www.afsc.noaa.gov/ABL/default.php>

⁵⁶ <https://www.uaf.edu/sfos/>

⁵⁷ <http://depts.washington.edu/aksalmon/>

⁵⁸ http://www.fws.gov/alaska/fisheries/fieldoffice/anchorage/field/program_overview.htm

⁵⁹ <http://pwssc.org/>

⁶⁰ <http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisherySalmon.exvesselquery>

⁶¹ http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch_wholesale.

4. The University of Alaska Institute of Social and Economic Research conducts research on the economics of Alaska's fisheries (e.g. Knapp, 2011).
5. The Commercial Fishery Entry Commission publishes research on the optimum number of permits that should be issued for a fishery (e.g. Schelle *et al.*, 2004).
6. The Division of Subsistence publishes numerous papers on the history and current use of salmon for subsistence (e.g. Hiroko *et al.*, 2013; Fall *et al.*, 2015).

The Kodiak Marine Science and Seafood Center researches the biochemistry and nutritional value of seafood (Oliveira *et al.*, 2005) among other topics.

The ADFG has an outstanding institutional building structure and function. The heart of the system is a structure where students can enter the Department as seasonal employees to gain field or laboratory experience as technicians. Upon graduation with a bachelors' (or higher) degree, entry level positions at the Biologist 1 or 2 level are employed in development positions to assist area management or research biologist. Fishery Biologist 3's are responsible for leading the management activities if the area office, supervising research programs at the area office, or for conducting specialized research at the regional level. Fishery Biologist 4's coordinate and supervises the overall management of research programs at the regional offices and in headquarters. The highest levels are statewide specialized positions such as the statewide Fishery Scientists for Salmon, Chief Biometrician and the Chief Fishery Scientist. In the management track, biologist can rise to be a Regional Supervisor, Deputy Director and Director.

5.2. The state of the stocks under management jurisdiction, including the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration shall be monitored.

Alaska's salmon stock assessment program is extensive and comprehensive. The program to determine the number caught and their composition is explained in Clause 4.1 and 4.1.1. Research capacity in environmental science is also discussed in Clause 5.1.2. The program to estimate escapements and to set goals is explained in Clause 6.1, 6.2 and 6.3.

In addition to its permitting responsibilities, the Habitat Division performs research to monitor or evaluate the potential effects of development projects (e.g. Brewster, 2016). The Sport Fish Division strategic plan (ADFG- SF, 2015) prioritizes habitat research. The Sport Divisions also operates the Katchemak Bay Research Reserve which includes programs related to the effects of climate change, changes in sea level and marine and freshwater temperatures, frequency of storm events, long-term drying trends, rapid loss of coastal glaciers and coastal uplift⁶².

The National Oceanic and Atmosphere Administration's (NOAA) Habitat Conservation Division (HCD) responsibilities include conducting and/or reviewing environmental analyses for a large variety of activities including commercial fishing, coastal development, and large transportation and energy projects. The HCD focuses on activities in habitats (e.g. NOAA, 2013) used by federally managed fish species located offshore, nearshore, in estuaries and in freshwater areas important to anadromous salmon. NOAA administers the Saltonstall-Kennedy grant program for fisheries research and development (to support fisheries research and development⁶³. NOAA also administers the Pacific Coastal Salmon Recovery Fund⁶⁴ that was established by Congress to provide funding to states and tribes of the Pacific Coast Region to protect, restore, and conserve Pacific salmon and steelhead populations and their habitats.

⁶² http://www.adfg.alaska.gov/index.cfm?adfg=kbr_r_research.home

⁶³ http://www.nmfs.noaa.gov/mb/financial_services/skhome.htm

⁶⁴ <http://www.nwr.noaa.gov/Salmon-Recovery-Planning/PCSRF/Index.cfm>

The U.S. Fish and Wildlife Service has recognized climate change as a potential driver in aquatic systems and supports research into the possible effects (e.g. Prucha *et al.*, 2012). The University of Alaska's Climate Research Center⁶⁵ conducts basic climate research useful for understanding potential impacts on aquatic systems (e.g. Wendler *et al.*, 2016).

The North Pacific Research Board (NPRB)⁶⁶ distributes monies from the earnings of the Environmental Improvement and Restoration Fund, created by congress to "...conduct research activities on, or relating to the fisheries or marine ecosystems in the North Pacific Ocean, Bering Sea, and Arctic Ocean (including any lesser related bodies of water)... [With]...priority on cooperative research efforts designed to address pressing fishery management or marine ecosystem information needs." The Bering Sea Integrated Ecosystem Research Program⁶⁷ which is a partnership between the NPRB and the National Science Foundation, funds research and ecosystem modelling to understand the impacts of climate change and dynamic sea ice cover on the eastern Bering Sea ecosystem. The Gulf of Alaska Integrated Ecosystem Research Project⁶⁸ seeks to understand how environmental and anthropogenic processes, including climate change, affect trophic levels and dynamic linkages among trophic levels, with emphasis on fish and fisheries, marine mammals and seabirds within the Gulf of Alaska.

Over time, many factors (i.e. climate or environmental change, habitat alteration or pollution) can affect the state of a stock. Even if specific causal relationships cannot be determined for such changes, there is a very strong stock assessment program and a process in place to periodically review and update the status of the stocks and escapement goals every three years through the BoF.

5.3. Management organizations shall cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources.

The State of Alaska participates in the three international organizations that support and encourage research on salmon in and around Alaska to ensure optimum utilization.

The North Pacific Anadromous Fish Commission (NPAFC)⁶⁹ is an international, inter-governmental organization established by the Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean. The member countries are Canada, Japan, Republic of Korea, Russian Federation and United States of America. To promote conservation and sustainability of anadromous stocks, the NPAFC conducts regular meetings and communications in the areas of fisheries enforcement and scientific research.

The Pacific Salmon Treaty between Canada and the United States was signed in 1985 and established a Commission, Panels and Technical Committees to develop agreed fishing regimes and monitor performance. The Commission and Panels meet two times a year⁷⁰. In Southeast Alaska, the harvest of Chinook Salmon by all gear groups, catches at the mouths of the Transboundary Rivers and in the Northern boundary area are subject to terms of the Treaty⁷¹. The treaty process provides for policy guidance by sanctioning Panels to address management issues in each covered fishing area and for Joint Technical Committees to provide annual stock assessment and enhancement information. Alaskans serve on the Commission, Panels and Joint Technical Committees. Stock assessment and research activities of the Joint Technical Committees are reported to the Panels and Commission each year (e.g. TCBN, 2016).

⁶⁵ <http://climate.gi.alaska.edu/Climate>

⁶⁶ <http://www.nprb.org/index.html/>

⁶⁷ <http://bsierp.nprb.org/>

⁶⁸ <http://gulfofalaska.nprb.org/index.htm>

⁶⁹ http://www.npafc.org/new/about_npafc.html

⁷⁰ http://www.psc.org/meetings_schedule.htm

⁷¹ <http://www.psc.org/pubs/treaty/treaty.pdf>

The Yukon River Panel was established to develop and implement agreed research and management programs for shared salmon resources of the Yukon River. Specifically, the Panel;

- makes annual recommendations to the respective responsible management agencies of both countries concerning conservation and management coordination;
- sets and adjusts the annual salmon spawning escapement objectives, if necessary, based on pre-season projections, stock status and recommendations from the Joint Technical Committee and;
- oversees the use and administration of the Research and Enhancement Fund.

The Panel acts independently from other annexes under the Pacific Salmon Treaty, includes six representatives from Alaska and meets twice a year⁷². The Panel sponsors active stock assessment and research programs (e.g. N. DeCovich and Borba, 2014).

Alaska's salmon stock assessment program is extensive and comprehensive. The program to determine the number caught and their composition is explained in Clause 4.1 and 4.1.1. Research capacity in environmental science is also discussed in Clause 5.1.2. The program to estimate escapements and to set goals is explained in Clause 6.1, 6.2 and 6.3.

5.4. The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programs to improve understanding of the biology, environment and status of trans-boundary aquatic stocks.

The Pacific Salmon Commission's Technical Committees, Yukon Panel Technical Committee and NPAFC develop collaborative technical and research programs to improve understanding of the biology, environment and status of transboundary aquatic stocks, see Clause 5.3 for details.

5.5. Data generated by research shall be analyzed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate.

By Alaska Statute (16.05.815 Confidential Nature of Certain Reports and Records), except for certain circumstances, all records obtained by the state concerning the landing of fish, shellfish, or fishery products and annual statistical reports of fishermen, buyers, and processors may not be released. To ensure confidentiality, fishery data are routinely redacted from ADFG reports if the data for a time/area strata were obtained from a small number of participants (e.g. Weiland *et al.*, 2003).

5.6. The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programs to improve understanding of the biology, environment and status of trans-boundary aquatic stocks.

The Pacific Salmon Commission's Technical Committees, Yukon Panel Technical Committee and NPAFC develop collaborative technical and research programs to improve understanding of the biology, environment and status of transboundary aquatic stocks, see Clause 5.3 for details.

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⁷² <http://yukonriverpanel.com/salmon/about/organizational-structure>

8.3. Section C. The Precautionary Approach

8.3.1. Fundamental Clause 6

The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded.

Number of Supporting clauses	4
Supporting clauses applicable	4
Supporting clauses not applicable	0
Overall level of conformity	Full
Non Conformances	0

Summarized Evidence:

6.1/6.2/6.3/6.4 States shall determine for the stock both safe targets for management (Target Reference Points) and limits for exploitation (Limit Reference Points), shall measure the status of the stock against these reference points and agree to actions to be undertaken if reference points are exceeded.

6.1 States shall establish safe target reference point(s) for management

Escapement Goals are the primary reference points for Alaska salmon management. The Policy for State-wide Salmon Escapement Goals (5AAC 39.223) defines the types of escapements goals that may be established and the role of the ADFG and Board of Fisheries in setting and reviewing goals.

1. A Biological Escapement Goal (BEG) is defined as an escapement range that provides the greatest potential for maximum sustained yield. Once established, a BEG becomes the primary management objective unless the Board of Fisheries establishes an optimal escapement or in-river run goal. A BEG is developed with age specific data for a stock's catch and escapement over a series of years. Typically, a Ricker type stock – recruitment function is used to establish the BEG. A BEG is stated as a range that takes into account data uncertainty. ADFG seeks to maintain evenly distributed salmon escapements within the range.
2. A Sustainable Escapement Goal (SEG) is defined as a level of escapement, indicated by an index or a range of escapement estimates that is known to have provided for sustained yield over a 5 to 10-year period. A SEG is used in situations where a BEG cannot be estimated because there is no stock-specific catch estimate. Once established, a SEG becomes the primary management objective unless an optimal escapement or in-river run goal has been adopted by the Board of Fisheries. An SEG is stated as a range that takes into account data uncertainty. The ADFG seeks to maintain escapements within the bounds of the SEG.
3. A Sustained Escapement Threshold (SET) is defined as a threshold level of escapement below which the ability of the salmon stock to sustain itself is jeopardized. In practice, a SET can be estimated based on the lower range of historical escapement levels for which the salmon stock has consistently demonstrated the ability to sustain itself. A SET is lower than the lower bound of the BEG and lower than the lower bound of the SEG. A SET is established by the ADFG, in consultation with the Board of Fish, as needed, for salmon stocks of management or conservation concern.
4. In special circumstances, the BoF may determine it is appropriate to establish an optimum escapement goal (OEG). If the board establishes an OEG, it must provide an explanation of the reasons, and with the assistance of the department, an estimate of expected differences in production relative to maximum sustained yield.
5. The BoF may also establish an in-river escapement goal to provide for harvest in addition to escapement.

Escapement goals may be established for individual stocks when stock-specific catch and escapement data are available. Bristol Bay sockeye provide a good example of where goals have been set for individual stocks (Erickson *et al.*, 2015). In cases where catches cannot be assigned to a stock, an escapement goal for a group of stocks in a management area may be developed. A good example of where an escapement goal has been set for a geographic area is for pink salmon along the south side of the Alaska Peninsula (Schaberg *et al.*, 2015).

A variety of methods are used to develop escapement goals (Munro and Volk, 2015). A brief description of each is summarized below. The most commonly used methods are listed first, followed by the less common methods.

1. Spawner-Recruit Analysis: Analysis of the relationship between the number of fish in the escapement and subsequent production of adults in the next generation. The Ricker type production model is almost exclusively used.
2. Percentile Method: This method is used for establishing sustainable escapement goals and contrasts observed annual escapements (largest escapement divided by smallest escapement) and the exploitation rate of a stock to select percentiles of observed escapements for estimating lower and upper bounds of the goal.
3. Risk Analysis: Risk Analysis evaluates the magnitude of management error in future years around a precautionary reference point established using past observations of escapement (Bernard *et al.*, 2009). This method is primarily used to guide establishment of a lower-bound SEG for non-targeted stocks of salmon.
4. Yield Analysis: Graphical or tabular examination of yields produced from observed escapement indices from which the escapement range with the greatest yields is identified (Hilborn and Walters, 1992).
5. Theoretical Spawner-Recruit Analysis: This method is used in situations where there are few or no stock specific harvest estimates and/or age data. Information from nearby stocks, or generalizations about the species, are used in a spawner-recruit production model to estimate the number of spawners needed to achieve maximum sustained yield (Clark, 2005).
6. Empirical Observation: Goals are based on observed escapements over time and may be calculated as the average escapement or the value of a low escapement for which there is evidence that the stock is able to recover (ADFG, 2004).
7. Zooplankton Model: This model estimates the number of sockeye salmon smolts of a threshold or optimal size that a lake can support based upon measures of zooplankton biomass and surface area of the lake. Adult production is then estimated from marine survival rates over a range of smolt sizes (Koenings and Kyle, 1997).
8. Spawning Habitat Model: Estimates of spawning capacity or number of spawners that produce maximum sustained yield (e.g. Burgner *et al.*, 1969).
9. Euphotic Volume Model: Measurement of the volume of a lake where sufficient light penetrates to support primary production is used to estimate sockeye salmon smolt biomass carrying capacity from which adult production is then estimated using marine survival rates (Koenings and Burkett, 1987).
10. Lake Surface Area: Similar to spawning habitat models, the relationship between the lake surface area and escapement are used to estimate adult sockeye salmon production (Nelson, 2006).
11. Conditional Sustained Yield Analysis: Observed escapement indices and harvest are used to estimate if, on average, surplus production results from a particular goal range (Nelson *et al.*, 2005). Estimated yields are conditioned on extreme values of measurement error in the escapement indices.
12. Brood Interaction Simulation Model: This model simulates production using a spawner–recruit relationship that modifies the simulated production for the year of return using an age-structured sub-model and estimates resulting catches and escapements under user-specified harvest strategies (Carlson *et al.*, 1999). This is a hybrid of a theoretical SRA and yield analysis that has only been used to develop the escapement goal for Kenai River sockeye salmon.

Recognizing the variety of methods used and quality of data available to establish an escapement goal, ADFG developed a rating system to convey their confidence in each goal (Munro and Volk, 2015).

- The highest rating is given when accurate estimates of escapement (by age) and stock-specific catch (by age) are available to develop a BEG.
- A good rating is given when fair to good accuracy and precision of estimates of escapement from mark-recapture experiments or multiple foot/aerial surveys and escapement and age estimates are available (but may have gaps) to develop a BEG or SEG.
- A fair rating is given when fair to good accuracy of escapement estimates are available but some estimates are missing or inadequate, and age estimates are missing or incomplete, but sufficient data exists to estimate a sustainable escapement goal.
- A poor rating is given when fair accuracy in escapement counts or index data (e.g., single foot/aerial survey) is available, but no harvest or age data is available to allow development of a SEG.

The Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222) directs ADFG to provide the BoF with reports on the status of salmon stocks and identify any salmon stock that is not producing at the expected level. The policy defines three levels of concern.

1. Yield Concern: A stock of yield concern is defined as "a concern arising from a chronic inability, despite the use of specific management measures, to maintain specific yields or harvestable surpluses above a stock's escapement needs.
2. Management Concern: A stock of management concern is defined 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, OEG, or other specified management objectives for the fishery.
3. Conservation Concern: A stock of conservation concern is defined as "a concern arising from a chronic inability, despite the use of specific management measures, to maintain escapements for a stock above a SET.

Among other things, the Sustainable Salmon Policy (5AAC 39.222) requires fisheries be managed in a precautionary manner to strive for escapements within ranges necessary to conserve and sustain potential salmon production and maintain normal ecosystem functioning as follows:

1. Salmon spawning escapements should be assessed both temporally and geographically; escapement monitoring programs should be appropriate to the scale, intensity, and importance of each salmon stock's use.
2. Salmon escapement goals, whether sustainable escapement goals, biological escapement goals, optimal escapement goals, or in-river run goals, should be established in a manner consistent with sustained yield; unless otherwise directed, the department will manage Alaska's salmon fisheries, to the extent possible, for maximum sustained yield.
3. Salmon escapement goal ranges should allow for uncertainty associated with measurement techniques, observed variability in the salmon stock measured, changes in climatic and oceanographic conditions, and varying abundance within related populations of the salmon stock measured.
4. Salmon escapement should be managed in a manner to maintain genetic and phenotypic characteristics of the stock by assuring appropriate geographic and temporal distribution of spawners as well as consideration of size range, sex ratio, and other population attributes.

Escapement goals for a management area are reviewed every three years (e.g. Erickson *et al.*, 2015). Details about how escapements were determined each year are typically provided in annual management report (e.g. Wilburn and Stump, 2006). Each year ADFG publishes a summary of adopted escapement goals and a 10-year history of performance in meeting these goals (Munro, 2018). There are currently about 325 escapement goals in the state.

6.2 States shall establish safe limit reference point(s) for exploitation (i.e. consistent with avoiding recruitment overfishing or other impacts that are likely to be irreversible or very slowly reversible). When a limit reference point is approached, measures shall be taken to ensure that it will not be exceeded. For instance, if fishing mortality (or its proxy) is above the associated limit reference point, actions should be taken to decrease the fishing mortality (or its proxy) below that limit reference point.

Almost all of Alaska's escapement goals (whether BEGs, SEGs, or OEGs) are established as a range (see Clause 6.1). A few stocks with SETs have only a lower limit. The lower end of each range, or SET is essentially a limit reference point, because all fisheries must, by regulation (5AAC 39.222) be managed to provide escapements that are above the lower end of the escapement goal range.

Prior to each season, the ADFG publishes management plans that outline expectations of run size and the management strategy for the upcoming season. The Management Plan for Southeast Alaska's District 15 gillnet fishery (Gray *et al.*, 2016) illustrates the intent to manage the fishery so as to obtain escapement goals.

"In 2016, ADF&G intends to manage the summer Lynn Canal drift gillnet fishery to obtain escapements within the established escapement goal ranges for all salmon stocks. Area, time, and gear restrictions will be in place during the first two or three weeks of the summer season to protect projected poor returns of Chilkat River king salmon. The department intends to manage the fishery to minimize harvest of wild stock summer chum salmon while harvesting returns of hatchery chum salmon in Section 15-C. The fall Lynn Canal drift gillnet fishery will be managed to conserve Klehini River (early-run) fall chum salmon while providing opportunity to harvest Chilkat River fall chum and coho salmon if run strength indicates a harvestable surplus based on the size of the run as measured in the lower Chilkat River fish wheels."

Post season, annual management reports detail how the season unfolded as stock assessment data became available. A summary of the early sockeye season at Chignik in 2015 illustrates how ADFG uses stock assessment data to ensure escapement goals are met (Wilburn and Stumpf, 2016).

"The Chignik weir was completed on May 18 at approximately 6:00 PM, with the first full day of escapement enumeration on May 19. Sockeye salmon escapement into the Chignik River in early to mid-June was below average and began tracking near the upper mid-range of the escapement goal around June 20 (Tables 1, 3, and 4). Results from 4 test fisheries conducted on June 12, 14, 17 and 19 in Chignik Lagoon also indicated that there was no build-up of sockeye salmon in the lagoon. Fish harvested in the test fish were predominately males and smaller than average. Based on the test fisheries results and that escapement numbers were not increasing as anticipated, the Chignik Bay and Central districts remained closed to commercial salmon fishing during most of June. After several days of strong escapement, the Chignik Bay and Central districts opened to commercial salmon fishing on June 24 at 9:30 AM for 48 hours. In addition, an increase in the female proportion of the run was observed from escapement samples taken at the weir. This initial fishing period was extended an additional 72 hours and then closed for 48 hours to allow additional escapement into the Chignik River."

Perhaps the best evidence that the ADGF takes management action to achieve escapement goals is the fact that escapement goals are generally attained state-wide (Munro, 2018).

6.3 Data and assessment procedures shall be installed measuring the position of the fishery in relation to the reference points. Accordingly, the stock under consideration shall not be overfished (i.e. above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, taking into account that long term changes in productivity can occur due to natural variability and/or impacts other than fishing.

Alaska has a large and ongoing stock assessment program to obtain the extensive scientific information necessary to measure the status of the stocks being fished in relation to their escapement goals and allow managers to impose any needed management actions to alter fisheries so as to achieve those escapement goals, (see Clauses 4.1, 4.1.1, 5.1.2, 5.2, 5.3 and 6.1). These stock assessment programs collect:

1. escapement data using counting towers, weirs, aerial and foot surveys, sonar or mark-recapture abundance estimates;
2. age, sex, size, data from escapements and well as marks and tags to help determine stock and year of origin;
3. catch and effort by gear, time and area;
4. age, sex and size of the harvest, and recovery marks, tags and biological samples to determine the stock of origin;
5. environmental data such as river discharge and water quality.

Data needed to manage the fisheries is obtained, synthesized and interpreted in-season by area, management, and management staff. Emergency Orders are issued to describe the area, time and gear allowed for fishing if surplus production is identified. Every three years, escapement goals are reviewed to account for any changes in productivity.

6.4 Management actions shall be agreed to in the eventuality that data sources and analyses indicate that these reference points have been exceeded.

The state-wide Sustainable Salmon Policy (5AAC 39.222) mandates, among other things, that escapement goals must be established for all exploited salmon stocks and that fisheries shall be managed to allow escapements within ranges necessary to conserve and sustain potential salmon production and maintain normal ecosystem functioning. This basic policy sets the expectation among fishers that the ADFG will, as needed, exercise its statutory responsibility to manage the time and areas where fishing is allowed so as to achieve escapement goals. This policy also requires ADFG to provide the BoF, on a regular basis, a stock status report, a review of escapement goals and action plans that include management directives to promote recovery of any stock of concern. Examples of recent stock status and escapement goal reports include Schaberg *et al.*, (2015) for the Alaska Peninsula stocks, Conitz *et al.*, (2015) for the Arctic-Yukon-Kuskokwim stocks and Heintz *et al.*, (2014) for SE Alaska.

Further guidance and expectations for the ADFG's in-season management actions is found in the Policy for the Management of Sustainable Salmon Fisheries, "in the face of uncertainty, salmon stocks, fisheries, artificial propagation and essential habitats shall be managed conservatively" This regulation further defines the "precautionary approach" to involve consideration of; a) the uncertainties in salmon fisheries and habitat management, b) biological, social, cultural, and economic risks, c) consideration of the needs of future generations, and d) placement of the burden of proof on those activities that pose a risk to salmon habitat or production.

Often the BoF determines it is in the state's best interest to lay out specific management plans to guide the ADFG to achieve not only its biological goals but also to meet BoF allocation decisions. When this occurs, the BoF develops specific management plans. There are over 100 salmon management plans that detail the specific management actions that are to be taken to ensure that management targets are met⁷³. For example, the Situk-Ahrnklin Inlet and Lost River King Salmon Management Plan (5AAC 30.365) includes specific management actions that are to be implemented for each fishery based on the projected in-river run at the weir. The BEG for Situk River Chinook Salmon is 450 – 1050 three ocean-age or older fish. The management plan calls for a stepwise procedure for closing/opening the fisheries depending upon the projected run size of Chinook Salmon as follows:

⁷³ <http://www.adfg.alaska.gov/index.cfm?adfg=fishregulations>

- Closure of all fisheries (subsistence, sport, personal use, commercial set gillnet, and near-shore troll commercial troll fishery) if the projected in-river escapement (based on weir counts and historic run timing) is below 350 fish.
- If the projected in-river escapement is 350 – 450 Chinook salmon, the sport fishery will be closed by emergency order (EO), the commercial troll fishery may be closed by EO, the set-net fishery may be limited to “non-sale” of Chinook salmon, and weekly fishing periods for the set-net fishery may be restricted. These regulations are designed to minimize the harvest of Chinook salmon while allowing the harvest of the Sockeye salmon and retention of Chinook salmon for subsistence use.
- If the project return is 451-730 Chinook Salmon, portions of the Situk River may be closed to sport fishing for Chinook Salmon or the entire river may be restricted to catch and release fishing for Chinook Salmon, the commercial troll fishery may be closed by EO, the set-net fishery may be limited to “non-sale” of Chinook Salmon, and weekly fishing periods for the set-net fishery may be restricted. These actions will be taken, as needed to ensure a minimum escapement of 730 Chinook salmon.
- If the projected Chinook salmon escapement is 730 – 1,050 fish, the set-net fishery will be managed based on Sockeye Salmon run strength, and the sport, subsistence, and commercial troll fishery will be managed based on normal fishing regulations. If the projected escapement of Chinook salmon is greater than 1,050 fish, ADFG will implement liberalized regulations to harvest the surplus of Chinook salmon above the escapement goal range.

Other examples of fishery management plans that contain pre-determined fishery management actions to meet escapement goals or other fishery targets are:

- The Southeast Alaska King salmon Management Plan (5AAC 47.055) contains numerous potential restrictions to the sport fishery to achieve the abundance-based allocation to the sport fishery;
- The Kenai River Late-Run Sockeye salmon Management Plan (5AAC 21.360) contains numerous potential regulatory actions to the commercial set gillnet fishery;
- The Tanana River salmon management plan (5AAC 05.367) provides guideline harvest limits for Chinook, Summer Chum and Fall Chum salmon and options for commercial fisheries based on escapement status of the runs;
- The Southern district management plan for the Alaska Peninsula (5AAC 09.360) provides management directives for the mainland fishery based on harvestable surplus of Chignik River Sockeye salmon.

8.3.2. Fundamental Clause 7

Management actions and measures for the conservation of stock and the aquatic environment shall be based on the precautionary approach. Where information is deficient a suitable method using risk assessment shall be adopted to take into account uncertainty.

Number of Supporting clauses	5
Supporting clauses applicable	5
Supporting clauses not applicable	5
Overall level of conformity	Full
Non Conformances	0

Summarized Evidence:

7.1. The precautionary approach shall be applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment.

Alaska’s policies for Sustainable Fisheries Management, embodied in the State Constitution and regulations includes, key elements of the precautionary approach for salmon fisheries and habitats. Faced with various uncertainties current evidence provided by ADFG is consistent with a conservative approach to the management of salmon stocks, fisheries, artificial propagation, and essential salmon habitats.

The Alaska Hatchery program has been operated in a highly precautionary manner as demonstrated by;

- The scope of regulations adopted to ensure that wild stocks are given a priority in management;
- That fisheries are based on wild stock abundance, not hatchery stock abundance;
- that local brood stocks are used;
- that hatchery brood stock diversity practices (fish selected at random and not on external trait basis such as size, color or shape, 1 to 1 mating ratio, effective population sizes extremely large – especially true for pink and chum salmon in SEAK and PWS);
- that terminal areas are established where surplus production can be harvested;
- that collection of broodstock for the hatcheries is stratified over spawn/run timing to maximize the heterogeneity of the gene pool;
- That pathological issues are addressed;
- That fish are marked;
- That fish are not transported and released without a permit and;
- That careful planning precedes issuance of a permit.

Previous reports have outlined 2 examples of concern which are:

1. Depressed runs, declining productive, and biological changes in age and size of Chinook populations;
2. And, concern over hatchery origin pink salmon in Prince William Sound (PWS) and hatchery origin chum salmon in Prince William Sound and Southeast Alaska.

Regarding the Chinook issue, ADFG management has limited commercial, sport and subsistence harvests of Chinook to meet escapement goals and international treaty obligations. These restrictions have been effective in increasing escapements (see stock assessment section) ADFG has also undertaken a comprehensive Chinook Stock Assessment and Research Plan involving 12 key stocks. Initial findings show that poor ocean survival has been an important limiting factor in rebuilding populations to harvestable levels. The ADFG has done an excellent job in keeping the public aware of its research findings by publishing an on-line “Chinook News Letter”⁷⁴.

⁷⁴ http://www.adfg.alaska.gov/static/home/library/pdfs/chinooknews/cn_spring2016_n3_fulledition.pdf

To address the extent of straying the ADFG has sampled representative Chum Salmon indicator streams in Southeast, and Pink and Chum indicator streams in Prince William Sound, to estimate the hatchery fraction in natural systems on a district scale (Table 5, Figure 1). No previous study has done this. Combining this information with estimates of relative reproductive success and of hatchery and wild productivities will allow us to assess the influence, if any, of hatchery strays on wild production.

Table 5. Preliminary estimates of the region-wide proportions of hatchery-origin spawners in streams. Source: State of Alaska Hatchery Research Project: Project Synopsis 2018.

Area	Species	Hatchery Proportion		
		2013	2014	2015
Prince William Sound	Pink	4%	15%	10%
	Chum	3%	3%	3%
Southeast Alaska	Pink	7%	5%	9%

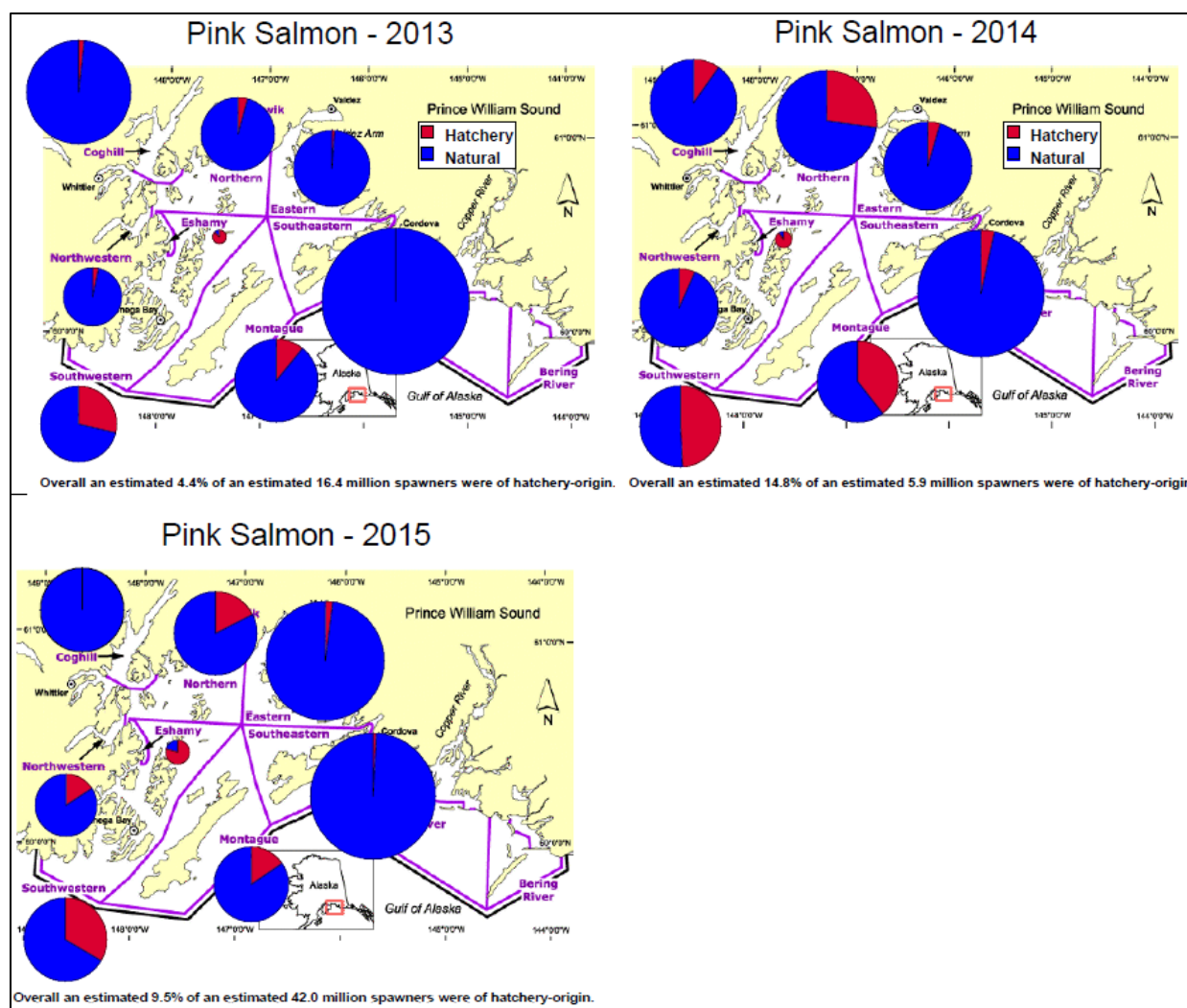


Figure 1. Estimated fractions of hatchery- and natural-origin pink salmon in spawning streams within ADF&G commercial fishing districts in Prince William Sound, 2013 – 2015. Pie size represents relative size of the population as per the ADF&G aggregate abundance index in a year. Source: State of Alaska Hatchery Research Project: Project Synopsis 2018.

To address whether or not fitness of wild stocks is being impacted, samples have been collected from 6 pink salmon pedigree streams in Prince William Sound and 4 chum salmon streams in Southeast for studies of potential relative difference in survival of offspring between hatchery and wild fish spawning in wild stock streams. This information will allow assessment of the ecological and genetic consequences of hatchery strays on fitness of wild spawners at the drainage scale. Evaluation of this scale is important because it will provide insight into how much these consequences can vary locally (and, potentially, why). The analysis has not been initiated as data continues to be collected yet pending more funding and selection of the SNPs (single nucleotide polymorphisms) that are used to determine parentage. The SNPs are now developed and the state's Gene Conservation Lab has submitted requests for two grants to conduct initial work on PWS pink salmon fitness studies. A more detailed synopsis of the current findings can be found at:

http://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/research/alaska_hatchery_research_project_synopsis_june_2018.pdf

Alaska State Regulation, the Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222 (a) (1); (a) (5) (A, B),) codifies the precautionary approach in State regulation of salmon fisheries and habitats. This policy states that in the face of uncertainty, salmon stocks, fisheries, artificial propagation, and essential habitats shall be managed conservatively as follows; a precautionary approach, involving the application of prudent foresight that takes into account the uncertainties in salmon fisheries and habitat management, the biological, social, cultural, and economic risks, and the need to take action with incomplete knowledge, should be applied to the regulation and control of harvest and other human-induced sources of salmon mortality; a precautionary approach requires consideration of the needs of future generations and avoidance of potentially irreversible changes; prior identification of undesirable outcomes and of measures that will avoid undesirable outcomes or correct them promptly; initiation of any necessary corrective measure without delay and prompt achievement of the measure's purpose, on a time scale not exceeding five years, which is approximately the generation time of most salmon species; that where the impact of resource use is uncertain, but likely presents a measurable risk to sustained yield, priority should be given to conserving the productive capacity of the resource; appropriate placement of the burden of proof, of adherence to the requirements of this subparagraph, on those plans or ongoing activities that pose a risk or hazard to salmon habitat or production; a precautionary approach should be applied to the regulation of activities that affect essential salmon habitat.

7.2. For new and exploratory fisheries, procedures shall be in place for promptly applying precautionary management measures, including catch or effort limits.

Alaska State Regulation, the Policy for the Management of Sustainable Salmon Fisheries specifies "The principles and criteria for sustainable salmon fisheries shall be applied... using the best available information... ADFG will... provide the BoF with reports on the status of salmon stocks and salmon fisheries under consideration for regulatory changes, which should include... identification of any ... management actions needed... such as the ... identification of a new fishery or expanding fishery" (5 AAC 39.222 (d)(1)(D)(I)) and that the reports will be the basis for "developing a management plan...[that] will ... (A) contain goals and measurable and implementable objectives that are reviewed on a regular basis and utilize the best available scientific information; (B) minimize the adverse effects on salmon habitat caused by fishing; (C) protect, restore, and promote the long-term health and sustainability of the salmon fishery and habitat; (D) prevent overfishing; and (E) provide conservation and management measures that are necessary and appropriate to promote maximum or optimum sustained yield of the fishery resource...[and]...if any new fisheries or expanding fisheries, or yield concerns, stock management concerns, or stock conservation concerns exist.. The BoF will... amend or develop salmon fishery management plans" ((5 AAC 39.222 (d) (2) and (3). Also, 5AAC 39.210, the Management Plan for High Impact Emerging Fisheries requires that high impact emerging fisheries be closed until an interim management plan and associated regulations are developed.

The fundamental objective of Alaska salmon fishery management is that escapement goals must be achieved. When stock status justifies allowing a fishery, ADFG local biologists specify a time and area for the fishery to occur. The contingency plan to respond to an adverse environmental change or depressed stock status determination is simply to not open the fishery. The state wide Sustainable Salmon Policy (5AAC 39.222) mandates that escapement goals must be established for all exploited salmon stocks. This policy also requires ADFG to provide the Board of Fish on a regular basis, a stock status report, a review of escapement goals, and action plans that include management directives to promote recovery of any stocks of concern.

8.4. Section D. Management Measures

8.4.1. Fundamental Clause 8

Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery and be based upon verifiable evidence and advice from available scientific and objective, traditional sources.

Number of Supporting clauses	17
Supporting clauses applicable	15
Supporting clauses not applicable	2
Overall level of conformity	Full
Non Conformances	0

Summarized evidence:

8.1. Conservation and management measures shall be designed to ensure the long-term sustainability of fishery resources at levels which promote the objective of optimum utilization, and be based on verifiable and objective scientific and/or traditional sources. In the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact shall be considered.

The Alaska State Constitution Section 4 states “Sustained Yield. Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses. The Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.22), directs management measures to ensure sustainability of yield. The Policy is implemented through the various fishery management plans for different fisheries in different regions and areas of the state.

The BoF has the power to develop management plans and allocate fishery resources among personal use, sport, guided sport, and commercial fisheries under state law (AS 16.05.251). Management plans are developed in an open public process that permits all citizens the opportunity to propose alternative schemes. When developing such plans and deciding how the conservation burden will be shared, the Board uses the following criteria:

- The history of each personal use, sport, and commercial fishery;
- The characteristics and number of participants in the fisheries;
- The importance of each fishery for providing residents the opportunity to obtain fish for personal and family consumption;
- The availability of alternative fisheries resources;
- The importance of each fishery to the economy of the state;
- The importance of each fishery to the economy of the region and local area in which the fishery is located;
- The importance of each fishery in providing recreational opportunities for residents and non-residents.

Legislation was passed in 1973 to establish a “limited entry” system to allow the state to limit the number of Participants in a specific fishery. State statute AS 16.43.140 states, “After January 1, 1974, a person may not operate gear in the commercial taking of fishery resources without a valid entry permit or a valid interim-use permit issued by the commission.

The Commission established an “Optimum Number” of permits for each salmon fishery through its research on the economics of the individual and management needs of that fishery. Various reports prepared by the Commission can be found at:

<https://www.cfec.state.ak.us/Publications/salmon.htm>

Since implementation of limited entry, other actions have been taken to improve economic viability of the fishing fleet, for example, in 2008, the Southeast Revitalization Association conducted a permit buy-back program in the Southeast Alaska salmon purse seine fishery which resulted in the purchase and subsequent relinquishing of 35 limited entry permits to CFEC.

8.2. States shall prohibit dynamiting, poisoning and other comparable destructive fishing practices.

Under Alaska regulations (5AC39.150), the use of an explosive, chemical or poison in the taking of fish or shellfish is prohibited, except for the use of chemical baits or lures to attract shellfish

8.3. States shall seek to identify domestic parties having a legitimate interest in the use and management of the fishery.

Four general classes of salmon users have been identified; commercial, subsistence recreational, and personal use. Both state (AS 16.05.258 (b)) and federal (ANILCA Title VIII) laws prioritize subsistence uses over all other consumptive uses of fish and game. State law (16.05.251(e)) requires that “allocation decisions deal with identifying parties with a legitimate interest in the use and management of the fishery. Allocation of the harvest among users is the responsibility of a citizen panel comprised of a membership representative of all users—the BoF. The BoF receives formal proposals and advice from 82 Advisory Committees that representative all classes of resource users in local communities. Fishery management plans, based on scientific research and fishery data conducted by ADFG, are not adopted by the BoF until it also considers effects on the various domestic parties with a legitimate interest in the use and management of the affected fisheries. This information is obtained from Advisory Councils, public testimony, and information provided by ADFG. Criteria used by the BoF when making decisions regarding how the conservation and utilization of resources will be shared is outlined in Supporting Clause 8.1

8.4. Mechanisms shall be established where excess capacity exists, to reduce capacity. Fleet capacity operating in the fishery shall be measured. States shall maintain, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations and a record of all authorizations to fish allowed by them.

See supporting clause 8.1

8.5. Technical measures shall be taken into account, where appropriate, in relation to: fish size, mesh size or gear, closed seasons, closed areas, areas reserved for particular (e.g. artisanal) fisheries, protection of juveniles or spawners.

Types of legal gear for Alaska fisheries are listed in regulation (5 AAC39.105). Specific requirement for gear (i.e. gillnet length, depth, and mesh sizes) are defined for each management area as well as in specific management plans and regulations. Within each management area, zones are established, typically near the mouths of streams that are permanently closed to fishing. Likewise, within each management area, times when fishing may be permitted. Size of fish that may be retained is generally not implemented for commercial fisheries. One notable exception is that a minimum size of 28 inches is established for the troll caught Chinook salmon in Southeast. Harvest of juveniles is not permitted. Waters near spawning grounds are closed to fishing. In addition, state law (AS 16.10.010) prohibits Interference with salmon spawning streams and water regulation activities in and or around streams in either fresh or salt water. The regulations for Southeast are good example of the scope of these types of regulations⁷⁵.

⁷⁵http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2015_2018_se_yakutat_salmon_regulations.pdf.

8.6. Fishing gear shall be marked.

By statute, (AS16.05.510 and AS 16.05.520)) salmon fishing vessels are required to be licensed by the State of Alaska, and to display their permanent vessel license plate. The fishing gear itself must be marked in accordance with state regulations (5AAC 06.334). Also, there are region-specific regulations which require how salmon fishing gear must display their names and permit numbers. All Alaska salmon fishing, except for a very small troll fishery in Southeast Alaska, is conducted in state waters (“internal waters”). This means it is very unlikely that any fishing gear deployed by Alaskan salmon fishers will be encountered by vessels of other nations.

8.7. Measures shall be introduced to identify and protect depleted resources and those resources threatened with depletion, and to facilitate the sustained recovery/restoration of such stocks. Also, efforts shall be made to ensure that resources and habitats critical to the well-being of such resources which have been adversely affected by fishing or other human activities are restored.

The Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222) outlines the process for identifying a depleted resource and the process to facilitate recovery. It also identifies actions to address habitat issues critical to the fishery resources. In part, the policy states the following:

1. At regular meetings of the board, the department will, to the extent practicable, provide the board with reports on the status of salmon stocks and salmon fisheries under consideration for regulatory changes, which should include:
 - a. A stock-by-stock assessment of the extent to which the management of salmon stocks and fisheries are consistent with the principles and criteria contained in the policy under this section;
 - b. Descriptions of habitat status and any habitat concerns;
 - c. Identification of healthy salmon stocks and sustainable salmon fisheries;
 - d. Identification of any existing salmon escapement goals, or management actions needed to achieve these goals, that may have allocative consequences such as the:
 - i. Identification of a new fishery or expanding fishery;
 - ii. Identification of any salmon stocks, or populations within stocks, that present a concern related to yield, management, or conservation; and
 - iii. Description of management and research options to address salmon stock or habitat concerns.
2. In response to the department's salmon stock status reports, reports from other resource agencies, and public input, the board will review the management plan, or consider developing a management plan, for each affected salmon fishery or stock; management plans will be based on the principles and criteria contained in this policy and will:
 - a. Contain goals and measurable and implementable objectives that are reviewed on a regular basis and utilize the best available scientific information;
 - b. Minimize the adverse effects on salmon habitat caused by fishing;
 - c. Protect, restore, and promote the long-term health and sustainability of the salmon fishery and habitat;
 - d. prevent overfishing; and
 - e. Provide conservation and management measures that are necessary and appropriate to promote maximum or optimum sustained yield of the fishery resource.
3. In the course of review of the salmon stock status reports and management plans described in (1) and (2) of this subsection, the board, in consultation with the department, will determine if any new fisheries or expanding fisheries, stock yield concerns, stock management concerns, or stock conservation concerns exist. If so, the board will, as appropriate, amend or develop salmon fishery management plans to address these concerns; the extent of regulatory action, if any, should be commensurate with the level of concerns and range from milder to stronger as concerns range from new and expanding salmon fisheries through yield concerns, management concerns, and conservation concerns.

4. In association with the appropriate management plan, the department and the board will, as appropriate, collaborate in the development and periodic review of an action plan for any new or expanding salmon fisheries, or stocks of concern; action plans should contain goals, measurable and implementable objectives, and provisions, including:
 - a. Measures required to restore and protect salmon habitat, including necessary coordination with other agencies and organizations;
 - b. Identification of salmon stock or population rebuilding goals and objectives;
 - c. Fishery management actions needed to achieve rebuilding goals and objectives, in proportion to each fishery's use of, and hazards posed to, a salmon stock;
 - d. Descriptions of new or expanding salmon fisheries, management concern, yield concern, or conservation concern; and
 - e. Performance measures appropriate for monitoring and gauging the effectiveness of the action plan that are derived from the principles and criteria contained in this policy.
5. Each action plan will include a research plan as necessary to provide information to address concerns; research needs and priorities will be evaluated periodically, based on the effectiveness of the monitoring described in (4) of this subsection

8.8/8.9/8.10/8.11/8.12/8.13. States shall encourage the development and implementation of technologies and operational methods that reduce waste and discards and reduce the loss of fishing gear. The implications of the introduction of new fishing gears, methods and operations shall be assessed and the effects of such introductions monitored. New developments shall be made available to all fishers and shall be disseminated and applied appropriately.

The traditional gear used in the Alaska salmon fishery includes purse seines, gill nets (drift and set) and hook and line troll. These gear types are generally environmentally benign except in the rare cases when a drift net is lost; it can entangle many types of fish and wildlife. Concern for the status of Chinook salmon in the Yukon River has led to the use of fish wheels to harvest Chum Salmon while permitting the release of Chinook. In addition, dip nets have become an alternative gear in the lower river to replace gillnets to save chinook. Finally, non-retention regulation for Chinook salmon in Kodiak purse seine fisheries has permitted harvest of comingled Sockeye and Pink Salmon.

The use of the above mentioned gear types coupled with specific time and area openings to target salmon stocks where surplus production exists has led to very low incidence of by-catch of non-target species.

In addition to the practical aspects of why by-catch is low, ADFG regulation (5 AAC 93.310.) requires operators of all salmon fishing gear to minimize incidental harvest of non-target species.

The potential for lost or abandoned fishing gear and subsequent effects of ghost fishing due to this lost gear would seem to be very small for purse seines, troll gear, and fish wheels. Gill nets would appear to have the greatest potential for both loss and ghost fishing. Lost or abandoned salmon gill net gear has been addressed in the Bristol Bay salmon fishery, where a regulation (5 AAC 06.331(t) requires permit holders to report a lost a gillnet, or portion of a gillnet, to the local ADFG office within 15 hours of the loss.

Fishery regulations in Alaska are extremely detailed with regard to the configuration of acceptable gear for use in each fishery, as well as how to deal with impacts on fishery resources and other users due to gear selectivity and fishing. For example, see the Southeast regulations regarding gear specifications⁷⁶.

⁷⁶http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2015_2018_se_yakutat_salmon_regulations.pdf

It would be extremely difficult to circumvent this regulation, and even if such a situation occurred, the regulatory and management system would be able to effectively respond. In the two fisheries where selective fishing practices are in place, circumventing the definition of a legal purse seine or fish wheel gear appears to be nearly impossible.

ADFG has participated in research programs on an international basis on issues such as fishing gear selectivity and improvements to fishing methods and strategies.

The NPAFC is the primary international venue for promoting the conservation of anadromous stocks and ecologically-related species, including marine mammals, sea birds, and non-anadromous fish, in the high seas area of the North Pacific Ocean. The NPAFC encourages research programs such as fishing gear selectivity and fishing methods. It also serves as a venue for coordinating the collection, exchange, and analysis of scientific data regarding these species and coordinates high seas fishery enforcement activities by member countries

Overall there has been little need for new research undertaken on the selectivity of traditional salmon gear types with regard to non -target species because by-catch has been demonstrated to be very low. However, research into the selectivity by size and sex of gillnet gear of the target species has been undertaken on several occasions.

8.14. Policies shall be developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures.

Supporting Clause NA

For Information on developments in other fisheries: The placement of artificial structures in marine waters of Alaska is limited to pilot research projects in Prince William Sound near Whittier and in Lynn Canal near Juneau, and to the sinking of two old vessels for scuba diving recreational purposes, also near Juneau. These structures have had little to no impact on salmonid fishes in the area and are likewise unlikely to affect salmon fishing.

8.4.2. Fundamental Clause 9

Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards and guidelines and regulations.

Number of Supporting clauses	3
Supporting clauses applicable	2
Supporting clauses not applicable	1
Overall level of conformity	Full
Non Conformances	0

Summarized evidence:

9.1./9.2./9.3. Education and training programs.

The Alaska Institute of Technology (formerly called Alaska Vocational Training & Education Center), is within the Department of Labor Workforce Development, operates the Alaska Maritime Training Center. The goal of the Alaska Maritime Training Centre is to promote safe marine operations by effectively preparing captains and crew members for employment in the Alaskan maritime industry. The Alaska Maritime Training Centre is a USCG approved training facility located in Seward, Alaska, and offers USCG and international Standards of Training, Certification, & Watchkeeping -compliant maritime training.

The University of Alaska Sea Grant Marine Advisory Program provides education and training in several sectors, including fisheries management, in the form of seminars and workshops. In addition, the program conducts sessions of their Alaska Young Fishermen’s Summit. Each Summit is an intense, 3-day course in all aspects of Alaska fisheries, from fisheries management & regulation (e.g. MSFCMA), to seafood markets & marketing. The target audience for these Summits is young Alaskans from coastal communities. ASMI provide educational information across a whole range of fishery and fish related matters, including quality, hygiene, food safety, sustainability, and environmental protection. ADFG publishes a variety of documents, booklets and pamphlets that provide information on Alaska salmon, including regulations, educational items, and news stories. Data on fishers is held in a number of agencies, including Alaska Fisheries Information Network and CFEC. Some of the information is confidential, while a substantial amount is published in summary form annual.

8.5. Section E. Implementation, Monitoring and Control

8.5.1. Fundamental Clause 10

An effective legal and administrative framework shall be established and compliance ensured through effective mechanisms for monitoring, surveillance, control and enforcement for all fishing activities within the jurisdiction.

Number of Supporting clauses	6
Supporting clauses applicable	6
Supporting clauses not applicable	0
Overall level of conformity	Full
Non Conformances	0

Summarized evidence:

10.1. Enforcement agencies and framework:

The salmon management program conducted by ADFG is a responsive and adaptive program that monitors salmon abundance during the fishing season and makes continual adjustments in fishing effort and area based on observed escapements, commercial fishery performance (e.g., catch per unit of effort), test fishing, demographics, historical run timing curves and other data. The structure of ADFG, with management authority instilled at the area office level, allows it to monitor, control and enforce compliance with fishery regulations and statutes. Alaska Wildlife Troopers (AWT) are primarily responsible for enforcement of Alaska's fish and wildlife-related statutes and regulations.⁷⁷ ADFG Area Management Biologists are on site to monitor prosecution of the commercial salmon fishery in their area through aerial surveys and on-the-ground observations. They, as well as regional staff biologists, are deputized law enforcement officers trained to assist AWT with law enforcement activities⁷⁸. ADFG has instituted ongoing training and refresher classes to keep deputized staff up-to-date on enforcement techniques. Citizens can also report fish and wildlife violations in Alaska through AWT's Safeguard organization.⁷⁹

During 2017, Alaska Wildlife Troopers boarded 1309 commercial salmon fishing vessels to conduct routine compliance checks. This number does not include boarding's where an Alaska Wildlife Trooper made contact with the vessel to investigate a violation. Information related to violation rate and overall level of compliance were obtained from reports of daily activities from commercial fishing patrol from June 1, 2017 through August 1, 2017. It is noteworthy to say that in most areas of Alaska, during this period of time, commercial fishing enforcement activity is primarily focused on salmon fisheries. The reports documented 4,833 contacts with commercial fisheries participants, 231 warnings given during these contacts, and 337 persons charged with offenses. Calculating a violation rate from these statistics indicates violations discovered during commercial fishing contacts occurred at a rate of 6.97 % (Pers. Comm. Doug Massey, Director AWT). Finally, In July of 2018, Alaska Wildlife Troopers seized 16 tons of illegally harvested pink and chum salmon and cited four individuals involved with the offense.⁸⁰ Additional AWT law enforcement activities can be queried online through their daily dispatch records.⁸¹

⁷⁷ <http://www.adfg.alaska.gov/index.cfm?adfg=enforcement.main>

⁷⁸ <http://www.dps.state.ak.us/AWT/mission.aspx>

⁷⁹ <https://dps.alaska.gov/awt/safeguard>

⁸⁰ <https://www.ktuu.com/content/news/Salmon-seized-by-Troopers-sold-to-processors-state-holds-harvest-ticket-490311371.html>

⁸¹ <https://dps.alaska.gov/dailydispatch/>

10.2./10.3/10.4. Fishing permit requirements:

In 1973, Alaska's legislature established a "limited entry" system to control the number of participants in designated fisheries. State statute AS 16.43.140 states, "After January 1, 1974, a person may not operate gear in the commercial taking of fishery resources without a valid entry permit or a valid interim-use permit issued by the commission." Under the limited entry system, only legally permitted vessels can operate in commercial salmon fisheries⁸². The CFEC helps to conserve and maintain the economic health of Alaska's commercial fisheries by limiting the number of participating fishers. CFEC issues permits and vessel licenses to qualified individuals in both limited and unlimited fisheries, and provides due process hearings and appeals for those individuals denied permits. A permit holder database and portal for permit application is accessible through CFEC's website.⁸³

The NPAFC⁸⁴, composed of representatives from Canada, Japan, Korea, Russia, and the United States (including Alaska), serves as a forum for promoting the conservation of anadromous fishes and ecologically-related species, including marine mammals, sea birds, and non-anadromous fishes, in the high seas area of the North Pacific Ocean that are beyond national boundaries. The NPAFC coordinates salmon high seas fishery enforcement activities by member countries⁸⁵, because directed fishing for salmonids is prohibited in the area and agreements have been made to minimize the incidental take of salmonids in other area fisheries. The NPAFC's scientific research⁸⁶ focuses on trends in marine production of salmon, their population structure and diversity in marine ecosystems of the North Pacific, and on climate change impacts. Alaska, along with other U.S. states, the U.S. federal government and Canada, also participates in the Pacific Salmon Treaty process through its membership in the PSC⁸⁷, with focus to resolve difficult salmon management problems shared by neighbour states.

Under the auspices of the Food and Agriculture Organization of the United Nations (FAO), a concerted effort was made to develop a comprehensive "toolbox" of measures that States could use to confront the issues of illegal, unreported and unregulated (IUU) fishing. Ultimately, the FAO adopted the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA) in 2001.⁸⁸

The objective of the IPOA is to prevent, deter and eliminate IUU fishing by promoting: (1) broad participation and coordination among States, as well as representatives from industry, fishing communities and non-governmental organizations; (2) the phasing in of action to implement the IPOA on the earliest possible timetable; (3) the use of a comprehensive and integrated approach, so as to address all impacts of IUU fishing; (4) the maintenance of consistency with the conservation and long-term sustainable use of fish stocks and the protection of the environment; (5) transparency; and (6) non-discrimination in form or in fact against any State or its fishing vessels. The IPOA calls upon all States to develop and adopt national plans of action to achieve the objectives of the IPOA and to give full effect to its provisions as an integral part of their fisheries management programs and budgets. The U.S. National Plan of Action is organized along the same lines as the IPOA.

The United States is party to most significant international agreements in this field and was among the first to ratify the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea (10 December 1982) Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, which entered into force on December 11, 2001.⁸⁹

⁸² <http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.main>

⁸³ <https://www.cfec.state.ak.us/>

⁸⁴ <https://npafc.org/>

⁸⁵ <https://npafc.org/enforcement-activities/>

⁸⁶ <https://npafc.org/science/>

⁸⁷ <http://www.psc.org/about-us/history-purpose/pacific-salmon-treaty/>

⁸⁸ http://www.nmfs.noaa.gov/ia/iuu/iuu_nationalplan.pdf

⁸⁹ http://www.un.org/depts/los/convention_agreements/convention_overview_fish_stocks.htm

The IPOA calls upon flag States to adopt measures to ensure that no vessel be allowed to fish unless authorized. Many provisions of the MSFCMA⁹⁰ and other fishery laws of the United States prohibit unauthorized fishing by both U.S. and foreign flag vessels in waters under the jurisdiction of the United States and provide a basis for imposing penalties for such illegal fishing. Moreover, the United States has implemented the FAO Compliance Agreement⁹¹, which requires all U.S. vessels fishing on the high seas to possess a permit and conditioning such permits on observation of all internationally agreed conservation and management measures recognized by the United States. Permit holders are required to fish in accordance with the provisions of these agreements and U.S. regulations.

The High Seas Fishing Compliance Act (HSFCA) authorizes a system of permitting for U.S. fishing vessels that operate on the high seas to satisfy the obligation of Parties to the Compliance Agreement that requires fishing vessels flying their flags to obtain specific authorization to operate on the high seas. The HSFCA requires the Secretary of Commerce to establish conditions and restrictions on each permit issued under HSFCA as necessary and appropriate to carry out the obligations of the United States under the Compliance Agreement (see 16 U.S.C. 5503 (d)⁹²). At a minimum, such conditions and restrictions must include the marking of the permitted vessel in accordance with the FAO Standard Specifications for the Marking and Identification of Fishing Vessels⁹³, and reporting of fishing activities. Parties are also responsible for ensuring that their authorized vessels do not undermine conservation and management measures, including those adopted by international fisheries management organizations, or by treaties or other international agreements. The HSFCA prohibits the use of fishing vessels on the high seas in contravention of international conservation and management measures recognized by the United States.

⁹⁰ http://www.nmfs.noaa.gov/sfa/laws_policies/msa/

⁹¹ http://www.nmfs.noaa.gov/ia/agreements/LMR%20report/agreement_to_promote_compliance_.pdf

⁹² <https://www.law.cornell.edu/uscode/text/16/5503>

⁹³ <http://www.fao.org/docrep/pdf/008/t8240t/t8240t01.pdf>

8.5.2. Fundamental Clause 11

There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.

Number of Supporting clauses	3
Supporting clauses applicable	3
Supporting clauses not applicable	0
Overall level of conformity	Full
Non Conformances	0

Summarized evidence:

11.1/11.2/11.3. Enforcement policies and regulations, state and federal:

Alaska's salmon fisheries are managed by ADFG, pursuant to Alaska Statutes Title 16⁹⁴ (AS16) and Alaska Administrative Code Title 5⁹⁵ (AAC5). Laws and regulations that structure the fishery are enforced by AWT. AWT coordinates with, and is supported by, law enforcement personnel from the United States Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE). US Forest Service and USFWS enforcement also work with AWT on the enforcement of fish and game regulations (both state and federal) on federal public lands. In most cases, violation of fish and wildlife regulations is punishable through fines, imprisonment, loss of fishing rights, and/or confiscation of equipment (including fishing vessel).

The AWT is charged with protecting the state's natural resources through law enforcement aimed to eliminate or limit illegal harvest, waste and illegal sale of fish, and by safeguarding fish and wildlife habitats. ADFG's management structure, which lends authority to area offices, allows it to monitor, control and enforce compliance with fishery regulations and emergency orders. Area Management Biologists can directly observe the prosecution of the commercial salmon fishery in their area through aerial surveys and on-the-ground surveillance. Listed below are those state statutes that allow the government to fine, imprison, revoke fishing rights and confiscate fishing equipment as punishment for conviction of regulatory violations:

- AS 16.05.165. Form and issuance of citations
- AS 16.05.170 Power to execute warrant
- AS 16.05.180 Power to search without warrant
- AS 16.05.190 Seizure and disposition of equipment
- AS 16.05.195 Forfeiture of equipment
- AS 16.05.332 Wildlife Violator Compact
- AS.16.05.410 Revocation of license
- AS 16.05.710 Suspension of Commercial License and Entry Permit
- AS 16.05.722 Strict liability commercial fishing penalties
- AS 16.05.723 Misdemeanour commercial fishing penalties
- AS 16.05.896 Penalty for causing material damage
- AS 16.05.901 Penalty for violations of AS 16.05.871 – AS 16.05.896.
- AS 16.05.030 Penalty for violation of 16.10.010-16.10.050
- AS 16.10.090 Penalty for violation of AS 16.10.090
- AS 16.10.220 Penalty for violation of AS 16.10-200-16.1-.210
- AS 16.10.790 Fines
- AS 16.40.290 Penalty

⁹⁴ <http://www.touchngo.com/iglcnr/akstats/Statutes/Title16.htm>

⁹⁵ <http://www.touchngo.com/iglcnr/akstats/aac/title05.htm>

- AS 16.34.850-895 Point system for commercial fishing violations in salmon fisheries
- AS 16.43.960 Commission revocation or suspension of permits
- AS 16.43.970 Penalties

Alaska's salmon fisheries are managed by ADFG, pursuant to Alaska Statutes Title 16 (AS16) and Alaska Administrative Code Title 5 (AAC5). See references provided in Supporting Clause 11.1. These laws and regulations are enforced by the AWT. AWT coordinates with, and is supported by, law enforcement personnel from USCG and NMFS.

All Alaska salmon fishing vessels are required by law to be licensed by the State of Alaska, and to display their permanent vessel license plate. Fishing gear must also be marked in accordance with state regulations, which are region specific. Local regulations also require how salmon fishing vessels must display their names and permit numbers.

Relevant state statutes include:

- AS 16.05.510. Unlicensed vessel unlawful
- AS 16.05.520. Number plate
- AAC 06.334. Identification of gear
- AAC 06.343. Vessel identification

ADFG and AWT regularly inspect the catch and landing records of both harvesters and processors, and monitor the fishing permits required of harvesters and their crew members. The presence of ADFG and AWT in all major and many minor communities of the state have opportunity to directly monitor fishing activities where they occur. ADFG and AWT inspect the catch and landing records of both harvesters and processors, and verify compliance with fishing permits required of harvesters and their crew members.

8.6. Section F. Serious Impacts of the Fishery on the Ecosystem

8.6.1. Fundamental Clause 12

Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts on the fishery on the ecosystem shall be appropriately assessed and effectively addressed.

Number of Supporting clauses	16
Supporting clauses applicable	16
Supporting clauses not applicable	0
Overall level of conformity	Full Conformance
Non Conformances	0

Summarized evidence:

12.1. Assessment of environmental effects on target stocks and ecosystem

Alaska's Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222)⁹⁶ explicitly recognizes and accounts for the influence of variable environmental conditions on Alaska's salmon stocks. This policy states that "salmon escapement goal ranges should allow for uncertainty associated with measurement techniques, observed variability in the salmon stock measured, changes in climatic and oceanographic conditions, and varying abundance within related populations of the salmon stock measured". The influences of environmental and ecological factors on salmon growth and survivorship are carefully considered by ADFG during development of annual escapement goals that are then used to manage commercial fisheries and direct recovery efforts for stocks of concern. ADFG publishes annual reports of harvest and run size forecasts for significant salmon stocks in harvest regions⁹⁷, which explicitly consider the effects of environmental variables on salmon survivorship and production.

Since 2004, researchers from NOAA Fisheries' Auke Bay Laboratory have produced pre-season forecasts of pink salmon, based on oceanographic and surface trawl data, the latter being a measure of marine abundance of juvenile pink salmon⁹⁸. These forecasts are provided to ADFG to assist with forecasting for management of harvest and escapement. Generally, NOAA's pink salmon forecasting models have performed exceptionally well, providing estimates within 10% of actual harvest in 10 of 14 years. However, anomalous (warm) ocean conditions in recent years are thought to be responsible for major harvest over-estimates in 2015 and 2016 (i.e. harvest was significantly less than expected). Pink salmon harvest in 2018 closely reflected the low forecast produced in 2017. In 2018, NOAA and ADFG collaborated to produce, for the first time, a single joint forecast for pink salmon harvest, which indicated a modest improvement in 2019 over 2018, but still classified as "weak" at an estimated harvest of 18 million fish (80% confidence interval 15-26 million fish).⁹⁹

12.2 Research and Institutional capacity for environmental impact assessment

Alaska's Policy for Management of Sustainable Salmon Fisheries prioritizes the protection of freshwater and marine habitats by declaring that:

- Salmon habitats should not be perturbed beyond natural boundaries of variation.
- Scientific assessments of possible adverse ecological effects of proposed habitat alterations and the impacts of the alterations on salmon populations should be conducted before approval of a proposal.
- Adverse environmental impacts on wild salmon stocks and the salmon's habitats should be assessed.

⁹⁶ <http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2016-2017/jointcommittee/5aac39.pdf>

⁹⁷ <https://www.adfg.alaska.gov/FedAidPDFs/SP16-07.pdf>

⁹⁸ <https://www.fisheries.noaa.gov/alaska/commercial-fishing/forecasting-pink-salmon-harvest-southeast-alaska>

⁹⁹ <https://www.adfg.alaska.gov/static/applications/dfnewsrelease/1002259599.pdf>

This policy is codified by Alaska Statutes 16.05.841-871¹⁰⁰ and implemented through regulations enforced by ADF&W that protect the freshwater habitats of anadromous fishes. MARPOL and U.S. policies and law provide necessary protection to marine habitats used by Pacific salmon.

12.3./12.4/12.5/12.6. Fishery Interaction with the ecosystem, non-target catches, discards associated, dependent or endangered species

The most probable impacts from the Alaskan commercial salmon fishery are posed through potential risks from hatchery-reared salmon to wild stocks and overfishing of the same. Information on harvest of wild stocks is obtained through hatchery marking programs¹⁰¹ and reporting of harvest by mark type. Annual wild salmon escapement goals and estimates, which are set, monitored and reported by ADFG, allow managers to evaluate the impacts of harvest on wild stocks and adjust efforts accordingly¹⁰².

Research designed to measure the extent and effect of hatchery-wild interactions for several Pacific salmon species is being conducted through partnerships between ADFG and non-governmental research centers^{103 104 105}, with financial support from Alaska, Private Non Profit hatchery operators, the Pacific Seafood Processors Association and U.S. government. Results from this ongoing research are reported annually¹⁰⁶ and considered by fisheries managers. As stated on ADFG's website, "As good stewards of wild salmon stocks and the natural resources of the state, ADF&G believes strongly this work should be undertaken. It recognizes that the results will likely have some ambiguity and may even be interpreted differently by some groups. Nonetheless, this information will likely guide future decisions and will greatly advance the understanding of the ecological and evolutionary dynamics of wild and hatchery interactions."¹⁰⁷

The potential ecological and genetic risks posed by hatchery salmon to wild populations is the subject of several ongoing research projects that are evaluating the stray and genetic introgression rates of hatchery pink and chum salmon, as described in Supporting Clauses 12.3 and 13.1. Potential impacts from hatchery programs and harvest on wild salmon abundance is routinely monitored through harvest reporting and state mandated spawner escapement surveys.

State and federal policies and regulations serve to minimize bycatch of non-target species in Alaskan commercial salmon fisheries, and utilize non-target, incidental catch in a sustainable manner. Alaska's Policy for the Management of Sustainable Salmon Fisheries states that "salmon escapement and harvest management decisions should be made in a manner that protects non-target salmon stocks or species" and ADF&G uses test fisheries and in-season catch information to direct harvest efforts, so as to protect stocks of concern. Management of gear type, season and location are strictly enforced by ADFG to target specific salmon stocks. Although some impacts from the Alaskan commercial salmon fishery on endangered species, including marine mammals, are expected to occur, incidents of serious injury or mortality are mandatorily reported and are subject to take limits established by the NMFS and USFWS in accordance with the U.S. Endangered Species Act¹⁰⁸.

¹⁰⁰ <http://www.adfg.alaska.gov/index.cfm?adfg=fishpassage.regulations>

¹⁰¹ <https://mtalab.adfg.alaska.gov/OTO/Default.aspx>

¹⁰² <http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmonforecast>

¹⁰³ http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.current_research

¹⁰⁴ <http://www.sitkascience.org/research/chum-project/>

¹⁰⁵ <http://pwssc.org/hatchery-wild/>

¹⁰⁶ http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.findings_updates#reports

¹⁰⁷ http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.findings_updates#results

¹⁰⁸ <https://www.fisheries.noaa.gov/topic/laws-policies#marine-mammal-protection-act>

Several federal policies and associated laws establish management guidelines and legal protections for endangered species that might be affected by the Alaskan commercial salmon fishery. These policies include the MSFCMA, the Marine Mammal Protection Act (MMPA) and the U.S. Endangered Species Act (ESA). Under the MMPA, all Category I and II fisheries¹⁰⁹ must be registered in the Marine Mammal Avoidance Program and report any injuries or mortalities of marine mammals to NMFS within 48 hours. All MMPA category fisheries are liable for incidental take of any ESA-listed species. In addition to federal regulations, ADFG provides additional state-level protections for endangered species and stocks of concern¹¹⁰.

Incidental catch in Alaskan commercial salmon fisheries occurs at a negligible level and all catch, including incidental catch of non-target species, must be reported to ADFG and not exceed established harvest limits. Allowable harvest of bycatch in commercial salmon fisheries is regulated by limits, season, species, region and gear as described in annual fishery management plans¹¹¹ and ADFG regulations. Commercial catch of target and non-target species must be reported to ADFG, which has developed and uses electronic “fish tickets” and “elandings” reporting tools, in addition to traditional paper catch records¹¹².

12.7. Role of the “stock under consideration” in the ecosystem

Pacific salmon in Alaska have been the subject of extensive study, and their role in marine, freshwater and terrestrial foodwebs is well understood^{113 114}. Although salmon are not typically considered a key prey species in marine environments, they may serve as keystone species in some riparian and terrestrial environments, where diverse predators and scavengers feed on adult spawners¹¹⁵. Escapement goals and management by ADFG serve to protect the ecosystem services provided by salmon in Alaska’s freshwater and terrestrial environments.

12.8. Pollution – MARPOL

MARPOL 73/78, the "International Convention for the Prevention of Pollution from Ships", applies to and is enforced in Alaskan waters.

12.9. Knowledge of the essential habitats for the “stock under consideration” and potential fishery impacts on them.

EFHs for Alaskan salmon include marine and freshwater environments designated and protected by the North Pacific Fishery Management Council, NMFS and ADFG¹¹⁶. Fishing and gear restrictions are in place to protect designated marine areas of EFH, as described in Fisheries Management Plan for the Salmon Fisheries in the EEZ off Alaska¹¹⁷. Alaska’s Policy for the Management of Sustainable Salmon Fisheries provides guidelines for the protection of freshwater habitats used by salmon, and this policy is implemented through the regulatory capacity of ADFG, which restricts human activities and works in rivers and streams occupied by anadromous fishes in accordance with Alaska Statutes 16.05.841-871. The Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes, maintained by ADFG, specifies which streams, rivers and lakes are important to anadromous fishes, including salmon.

¹⁰⁹ <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-authorization-program>

¹¹⁰ <http://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.akendangered>

¹¹¹ <http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesPlanning.annual>

¹¹² <http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.reporting>

¹¹³ <http://www.nrcresearchpress.com/doi/abs/10.1139/cjfas-2015-0555#.XEDLzM17nIU>

¹¹⁴ <http://www.nrcresearchpress.com/doi/abs/10.1139/cjfas-2014-0413#.XEDMDM17nIU>

¹¹⁵ http://www.sfu.ca/biology/faculty/palen/Wendy_Palen/Home_files/Schindler%20et%20al%202003-Frontiers.pdf

¹¹⁶ <https://www.afsc.noaa.gov/HEPR/efh.htm>

¹¹⁷ <http://www.npfmc.org/wp-content/PDFdocuments/fmp/Salmon/SalmonFMPfinal1212.pdf>

12.10. Research shall be promoted on the environmental and social impacts of fishing gear and, in particular, on the impact of such gear on biodiversity and coastal fishing communities.

Recent peer-reviewed research identified Alaskan commercial salmon fisheries as high-ranking with respect to the “triple bottom line” of community, ecological and economic sustainability¹¹⁸. Salmon produced by hatcheries are released into open waters and are subject to common property fisheries, allowing diverse user groups access to fisheries resources. Research on coexistence theory suggests that conflict among user groups of Alaskan salmon is likely alleviated by state fisheries regulations that promote equity¹¹⁹.

Recent support for the resiliency of Alaska’s commercial salmon fishery amid changing social and environmental conditions was provided by Powell *et al.*, (2018)¹²⁰, which found that polycentric and adaptive fishery management, based on the principal of sustained yield, had served to limit entry into the Kenai commercial fishery, prohibit commercial fish traps, and provide a framework for continued success.

12.11. Outcome indicator(s) and management objectives for non-target stocks.

ADFG sets harvest limits on incidental catch of non-target species and stocks. These limits are communicated through publication of regulations and fisheries management plans. According to the Fishery Management Plan for the Salmon Fisheries in the EEZ off Alaska, “Bycatch in the directed commercial salmon fisheries primarily consists of groundfish species and the incidental catch of immature salmon. State and federal management measures minimize bycatch to the extent practicable and minimize the mortality of bycatch. A combination of factors work together to keep both the number of fish taken as bycatch and the associated mortality of those fish at a negligible amount. First, ADFG fish tickets serve as a standardized reporting method documenting all retained harvest from both state and EEZ waters. ADFG regulations require that fish tickets record the type of gear used as well as the number, pounds, delivery condition, and disposition of fish species harvested and retained for both commercial and personal use (5 AAC 39.130(c)). Maximum retainable allowances (MRAs) of certain non-salmon allow for bycatch to be treated as incidental catch so that those species are able to be utilized. In addition, non-retention requirements when MRAs are achieved create incentives to avoid those species taken as bycatch. Specified closure areas during those times of the year when bycatch is generally highest serves to significantly reduce the amount of bycatch taken. Finally, the nature of the gear utilized in the troll fishery allows for discarded species to be released with limited mortality. Additional management measures are not necessary to document bycatch interactions within salmon fisheries.”

12.12. Outcome indicator(s) and management objectives for endangered species.

NMFS and the USFWS establish limits on “take” (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect or attempt any of these) for all species listed as threatened or endangered under the ESA¹²¹. Exceedance of allowable take by participants in Alaskan commercial salmon fishery is subject to prosecution and severe penalties¹²². In addition to protections for federally listed species, ADFG maintains a state list of endangered species¹²³ and coordinates protection efforts for these species with Federal agencies.

¹¹⁸ <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0122809>

¹¹⁹ <https://link.springer.com/article/10.1007/s10745-016-9806-0>

¹²⁰ <https://afspubs.onlinelibrary.wiley.com/doi/pdf/10.1002/fsh.10022>

¹²¹ <https://www.fisheries.noaa.gov/topic/laws-policies#endangered-species-act>

¹²² <https://www.fisheries.noaa.gov/national/endangered-species-conservation/endangered-species-act-guidance-policies-and-regulations>

¹²³ <http://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.akendangered>

12.13. Outcome indicator(s) and management objectives for avoiding, minimizing or mitigating the impacts of the unit of certification on essential habitats for the “stock under consideration” and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification.

Alaska’s Policy for the Management of Sustainable Salmon Fisheries states that, “salmon spawning, rearing and migratory habitats should be protected” and that “salmon habitats should not be perturbed beyond natural boundaries of variation” such that “wild salmon stocks and the salmon’s habitats should be maintained at levels of resource productivity that assure sustained yields”. This policy is legislatively supported by Alaska Statutes 16.05.841-871¹²⁴, which describe legal protections for essential freshwater salmon habitats. Alaska’s Salmon Fisheries Management Plan¹²⁵ identifies essential marine habitats for salmon and provides clear management guidelines and outcome indicators for the protection of these.

12.14. Outcome indicator(s) and management objectives for dependent predators.

Adult escapement goals¹²⁶ and estimates¹²⁷ serve as performance indicators of management aimed to protect the productivity of wild salmon and safeguard their role as keystone species in riparian environments.

12.15. Outcome indicator(s) and management objectives that seek to minimize adverse impacts of the unit of certification, including any enhancement activities, on the structure, processes and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible..

In accordance with the State’s constitution, Alaskan salmon fisheries are managed on the principle of sustained yield¹²⁸. Management is required to maintain adult escapement at levels adequate to ensure the viability of wild populations, and escapement serves as the primary outcome indicator for salmon management in Alaska. Salmon escapement is monitored and estimated both in-season and on an annual basis¹²⁹. By law, commercial fisheries and associated hatcheries cannot, therefore, undermine the structure, processes and function of salmon in marine and aquatic environments.

¹²⁴ <http://www.adfg.alaska.gov/index.cfm?adfg=fishpassage.regulations>

¹²⁵ <http://www.npfmc.org/wp-content/PDFdocuments/fmp/Salmon/SalmonFMPfinal1212.pdf>

¹²⁶ <http://www.adfg.alaska.gov/FedAidPDFs/FMS15-04.pdf>

¹²⁷ <http://www.adfg.alaska.gov/sf/FishCounts/>

¹²⁸ <http://www.adfg.alaska.gov/index.cfm?adfg=process.commissioner>

¹²⁹ <http://www.adfg.alaska.gov/FedAidPDFs/FMS15-04.pdf>

8.6.2. Fundamental Clause 13

Where fisheries enhancement is utilized, environmental assessment and monitoring shall consider genetic diversity and ecosystem integrity.

Number of Supporting clauses	19
Supporting clauses applicable	19
Supporting clauses not applicable	0
Overall level of conformity	Medium Conformance
Non Conformances	1

Summarized evidence:

13.1. States shall promote responsible development and management of aquaculture, including an advanced evaluation of the effects of aquaculture development on genetic diversity and ecosystem integrity, based on the best available scientific information.

Alaskan commercial salmon fisheries harvest wild- and hatchery-produced salmon, the latter mostly being produced by private non-profit hatcheries that are permitted and regulated by ADFG. In accordance with Alaska’s Policy for the Management of Sustainable Salmon Fisheries and the State’s Finfish Genetics Policy¹³⁰, hatcheries are typically sited away from major natural production areas, yet use locally-sourced fish to found and, in some cases, supplement hatchery broodstocks.

A suite of state led plans, permitting processes and policies all aim to protect wild salmon stocks from hatchery operations¹³¹. State, Federal and privately sponsored research has and continues to focus on potential ecological and genetic effects from Alaskan salmon hatcheries, including investigations of competition, stray rates, and genetic introgression¹³². Noteworthy among these are two large-scale research projects being conducted by ADFG in partnership with the Prince William Sound Science Center¹³³ and the Sitka Sound Science Center¹³⁴, which are designed to evaluate genetic and ecological impacts from stray hatchery pink and chum salmon in Alaska. This work began in March, 2012, receives funding from hatchery operators, was awarded significant (Federal) Saltonstall-Kennedy¹³⁵ and North Pacific Research Board funding¹³⁶, is expected to continue through 2023, and has generated numerous publications^{137 138}.

Most recent findings are available through ADFG’s website¹³⁹. The percentage of hatchery origin chum salmon on spawning grounds ranged from 5% to 9% in SEAK, and 3% in PWS for run years 2013-2015. Hatchery pink salmon comprised 4%-15% of naturally spawning populations in PWS study streams during the same time period. Preliminary results suggest that naturally spawning salmon populations in PWS and SEAK continue to be productive in the presence of hatchery straying, which tends to be localized around hatchery operations and away from areas of major natural production (Brenner *et al.*, 2012)¹⁴⁰.

¹³⁰ http://www.adfg.alaska.gov/static-f/fishing/PDFs/research/genetics_finfish_policy.pdf

¹³¹ <http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/ws/SP18-12.pdf>

¹³² <http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.main>

¹³³ <http://pwssc.org/hatchery-wild/>

¹³⁴ <http://www.sitkascience.org/research/chum-project/>

¹³⁵ <https://www.fisheries.noaa.gov/grant/saltonstall-kennedy-grant-program>

¹³⁶ <http://www.nprb.org/>

¹³⁷ <https://link.springer.com/article/10.1007/s10641-012-9975-7>

¹³⁸ http://www.adfg.alaska.gov/static-f/fishing/PDFs/hatcheries/research/pwssc_hw_2015_report_withappendices.pdf

¹³⁹ http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.findings_updates

¹⁴⁰ <https://link.springer.com/article/10.1007/s10641-012-9975-7>

Alaska's Constitution, Policy for the Management of Sustainable Salmon Fisheries and Finfish Genetics Policy all serve as guiding documents for the sustainable management of Alaska's commercial salmon fisheries and associated hatchery programs. To achieve sustainability, adult escapement is the first priority of salmon management in Alaska and is routinely monitored through aerial surveys, weirs, in-river sonar and tower-based counts. Alaska's state constitution explicitly states (Section 4, Article 8) that "salmon escapement should be managed in a manner to maintain genetic and phenotypic characteristics of the stock by assuring appropriate geographic and temporal distribution of spawners as well as consideration of size, range, sex ratio, and other population attributes". Accordingly, hatchery broodstocks are established with native stocks and sited away from areas of major natural production, so as to minimize genetic and ecological impacts to wild fish¹⁴¹. Hatchery management in Alaska is based upon and supported by scientific research, like that described in the previous subclause, which considers the health, structure and function of natural populations and ecosystems.

13.2. State shall produce and regularly update aquaculture development strategies and plans, as required, to ensure that aquaculture development is ecologically sustainable and to allow the rational use of resources shared by aquaculture and other activities.

ADFG maintains authority to issue permits for the construction, operation and modification of salmon hatcheries in Alaska¹⁴². ADFG also reviews the potential impacts of proposed hatcheries before issuing a permit and has authority to revoke or deny permission for alterations to a permit. An outline of the permitting process and criteria is available through the ADFG website¹⁴³ and reviewed by Evenson *et al.*, (2018)¹⁴⁴. Finally, hatcheries must submit annual reports of their activities to ADFG. These reports are also available through the agency's website¹⁴⁵.

Alaska's Constitution and Policy for the Management of Sustainable Salmon Fisheries provide clear protections for common property salmon fisheries in Alaska, thereby safeguarding the livelihoods of local communities. Public hearings are held at least 30 days before the issuance of a salmon hatchery permit, in accordance with Alaska Statute 16.10.410¹⁴⁶. State and federal fishery management plans provide protections for common use of and maximum social benefit from Alaskan salmon fisheries. For example, the fourth objective of the FMP for Salmon Fisheries in the EEZ off Alaska¹⁴⁷ is to "maximize economic and social benefits to the nation over time".

13.3. Effective procedures specific to aquaculture of fisheries enhancement shall be established to undertake appropriate environmental assessment and monitoring, with the aim of minimizing adverse ecological changes (such as those caused by inputs from enhancement activities and related economic and social consequences).

ADFG has the authority to issue permits for the construction, operation and modification of salmon hatcheries in the State of Alaska. See references in previous Supporting Clause. Before issuing a permit, the state reviews the potential impacts that a proposed hatchery might have, and the State reserves authority to revoke or deny permission for alterations to salmon hatchery permits. State statute AS 16.10.420¹⁴⁸ defines the conditions of approval for a salmon hatchery permit, which specifically consider the source, health and treatment of the cultured stock in accordance with Alaska's Finfish Genetics Policy, which also provides additional guidelines for the establishment, maintenance and transport of hatchery salmon in Alaska. ADFG regularly assesses PNP salmon hatcheries for conformance with state regulations designed to minimize adverse ecological effects.¹⁴⁹

¹⁴¹ http://www.adfg.alaska.gov/static-f/fishing/PDFs/research/genetics_finfish_policy.pdf

¹⁴² <http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/ws/SP18-12.pdf>

¹⁴³ <http://www.adfg.alaska.gov/index.cfm?adfg=hatcheries.hatchery>

¹⁴⁴ <http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/ws/SP18-12.pdf>

¹⁴⁵ <http://www.adfg.alaska.gov/index.cfm?adfg=fishinghatcheriesotherinfo.reports>

¹⁴⁶ <http://codes.findlaw.com/ak/title-16-fish-and-game/ak-st-sect-16-10-410.html>

¹⁴⁷ <http://www.npfmc.org/wp-content/PDFdocuments/fmp/Salmon/SalmonFMPfinal1212.pdf>

¹⁴⁸ <http://www.touchngo.com/iglcnr/akstats/Statutes/Title16/Chapter10/Section420.htm>

¹⁴⁹ <http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/ws/SP18-12.pdf>

13.4. Stock assessment of enhanced fisheries consideration of separate contributions from aquaculture and natural production.

In most cases, hatchery salmon in Alaska are mass marked via artificial water temperature oscillations during egg incubation or early embryo stages, inducing otolith thermal bands. This procedure and subsequent sampling of harvested adult salmon allows state managers to evaluate the separate contributions of hatchery and wild salmon to the commercial fishery's catch. A noteworthy exception to this standard practice has been the unmarked hatchery production of pink salmon by the Kodiak Regional Aquaculture Association (KRAA) at its Kitoi Bay facilities.

During the AK-RFM reassessment site visit in 2016, our Team noted that the large numbers of pink salmon produced by the Kitoi Bay facility could not be distinguished from naturally produced salmon, either in fisheries or on spawning grounds. As a result, a minor non-conformance was issued¹⁵⁰, requiring that a Corrective Action Plan be developed. KRAA and Alaska Fisheries Development Foundation developed a plan and associated schedule, with guidance from ADFG, which was appended to the 2016 reassessment report. Conformance to this plan is subject to annual review, as documented here. According to their plan, KRAA will conduct cost analyses and work to secure funding in years 2017-2021.

During their 23 September 2016 meeting, the KRAA Board of Directors authorized staff to investigate costs and funding sources for marking salmon at their facilities and encouraging progress has recently been made toward experimental marking of Kodiak hatchery pink salmon. During a meeting with the Assessment Team on 12 December 2017, KRAA Executive Director, Ms. Tina Fairbanks, reported that 10% of the 2017 Kitoi Bay Hatchery pink salmon production had been otolith micro marked via a novel saltwater exposure technique. Photographs of the otolith marks from several specimens were provided and marks were clearly visible.

Following upon authorization from the KRAA Board of Directors and in accordance with the RFM Corrective Action Plan, a benefit-cost analysis of mass marking at KRAA facilities was developed and shared with our Assessment Team. KRAA is now assessing potential impacts that saltwater shock marking might have on survivorship of hatchery salmon, before implementing this technique *en mass*. The progress made to date by KRAA favourably demonstrates the organization's interest and ability to comply with the tasks and schedule of their Corrective Action Plan. The assessment team will continue to monitor conformance with this Plan through annual surveillances.

¹⁵⁰ <http://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-Report-March-2017.pdf>

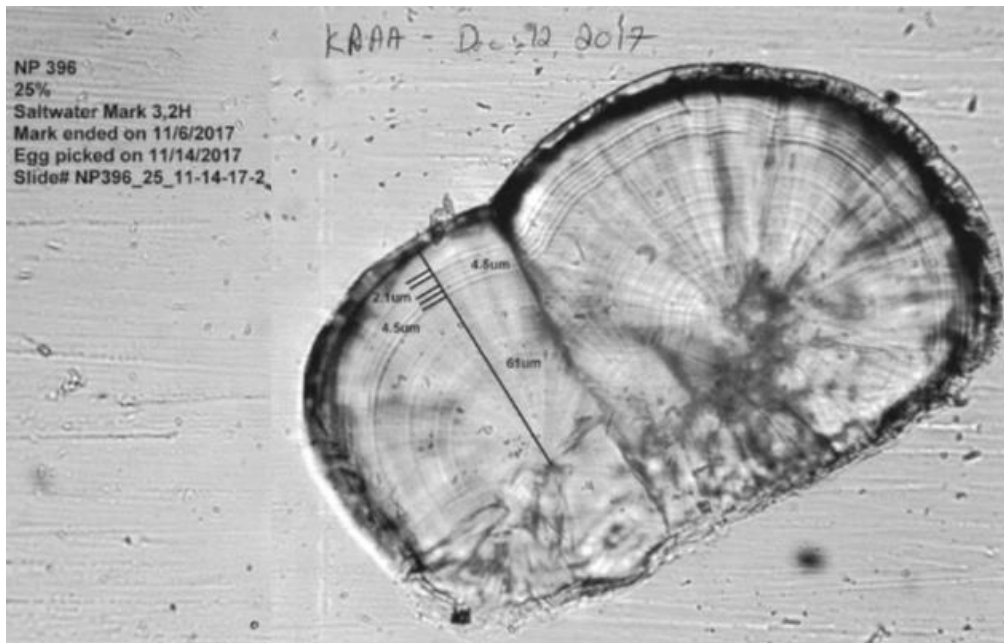


Figure 2. Image of a pink salmon otolith marked via saltwater exposure shock at Kitoi Bay hatchery on 6 November 2017. Image courtesy of T. Fairbanks, KRAA.

13.5. Habitat modifications for the purposes of enhancement do not cause serious or irreversible harm to the natural ecosystem’s structure and function.

In accordance State statutes¹⁵¹, ADFG considers habitat alterations and their potential impacts during its hatchery permit approval and review processes, which are described on the agency’s website¹⁵² and reviewed by Evenson *et al.*, (2018)¹⁵³.

Alaska’s Finfish Genetics Policy furthermore prohibits the use of non-native and genetically altered stocks for salmon fishery enhancement purposes in Alaska. Impacts from hatchery salmon on wild stock are minimized or avoided through the implementation of state statutes that prohibit “fish farming” (AS 16.40.210)¹⁵⁴ and control the source, health and release locations of hatchery-produced salmon. Alaska statute 16.10.420¹⁵⁵ explicitly directs that:

1. Salmon eggs procured by the hatchery must be from the department or a source approved by the department;
2. Salmon eggs or resulting fry may not be placed in waters of the state other than those specifically designated in the permit;
3. Salmon eggs or resulting fry, sold to a permit holder by the state or by another party approved by the department, may not be resold or otherwise transferred to another person;
4. Salmon may not be released by the hatchery before department approval, and, for purposes of pathological examination and approval, the department shall be notified of the proposed release of salmon at least 15 days before the date of their proposed release by the hatchery;
5. Diseased salmon be destroyed in a specific manner and place designated by the department

¹⁵¹ http://www.adfg.alaska.gov/static-f/fishing/PDFs/hatcheries/hatchery_statutes.pdf

¹⁵² <http://www.adfg.alaska.gov/index.cfm?adfg=hatcheries.hatchery>

¹⁵³ <http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/ws/SP18-12.pdf>

¹⁵⁴ <http://codes.lp.findlaw.com/akstatutes/16/16.40/03./16.40.210>

¹⁵⁵ <http://codes.findlaw.com/ak/title-16-fish-and-game/ak-st-sect-16-10-420.html>

Alaska's Finfish Genetics Policy recommends research with focus to assist rehabilitation and enhancement of salmon stocks. Notwithstanding these recommendations, no salmon stocks in Alaska are currently listed as endangered or threatened under the U.S. Endangered Species Act¹⁵⁶.

13.6/13.7/13.8. Aquaculture practices and transboundary ecosystems including introduction of non-indigenous species.

The Pacific Salmon Treaty has been in effect since 1985 and provides clear policy direction for the responsible management of salmon fisheries and related fishery enhancement activities along transboundary rivers of Alaska and Canada¹⁵⁷. Alaska's Finfish Genetics Policy prohibits the introduction of non-indigenous species into transboundary aquatic ecosystems.

13.9. State shall establish appropriate mechanisms, such as databases and information networks to collect, share and disseminate data related to their aquaculture activities to facilitate cooperation on planning for aquaculture development at the national, sub-regional, regional and global level.

Alaska has developed or contributes to a number of databases designed to assist with the management of Pacific salmon fisheries management, including hatchery operations. These include a variety of genetic databases¹⁵⁸, the regional coded-wire tag database (RMIS)¹⁵⁹, and an otolith mark database¹⁶⁰.

13.10. State shall cooperate in the elaboration, adoption and implementation of international codes of practice and procedures for introductions and transfers of aquatic organisms.

Alaska's Finfish Genetics Policy includes guidelines for the transport and release of salmon that restrict the importation and inter-regional translocation of stocks. These guidelines are detailed in the 2016 US Alaska Commercial Salmon Reassessment Report¹⁶¹, and are based on widely-accepted theories of local adaptation in Pacific salmon.

13.11. Practices/procedures/national codes of practice and procedures in the selection and genetic improvement of broodstocks, introduction of non-native species, and production, sale and transport of eggs, larvae, fry, broodstock or other live materials.

Alaska's Finfish Genetics Policy provides restrictive guidelines for the transfer of salmon stocks into and within the State of Alaska. This policy justifies its guidelines through the importance of local adaptation for translocation success, and the need to protect wild stocks from hatchery transplants. See the 2016 US Alaska Commercial Salmon Reassessment Report, referenced in the previous Supporting Clause, for additional details at <https://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-Report-March-2017.pdf>

13.12. Management of aquaculture production for stocking purposes.

Alaska's Finfish Genetics Policy and Meyers' (2014) "Policies and Guidelines for Alaska Fish and Shellfish Health and Disease Control"¹⁶² mandate the conservation of diversity, disease control and protection of the environment, as related to salmon fisheries enhancement activities in Alaska. Also see Supporting Clause 13.11.

¹⁵⁶ <https://www.fws.gov/endangered/species/us-species.html>

¹⁵⁷ <http://www.psc.org/about-us/history-purpose/pacific-salmon-treaty/>

¹⁵⁸ <http://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.main>

¹⁵⁹ <http://www.rmpec.org/>

¹⁶⁰ <https://mtalab.adfg.alaska.gov/default.aspx>

¹⁶¹ <http://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-Report-March-2017.pdf>

¹⁶² <http://www.adfg.alaska.gov/FedAidPDFs/RIR.5J.2014.04.pdf>

13.13. Where applicable, enhanced fisheries shall meet the following criteria:

- the species shall be native to the fishery's geographic area or introduced historically and have subsequently become established as part of the "natural" ecosystem;
- there shall be natural reproductive components of the "stock under consideration";
- the growth during the post-release phase shall be based upon food supply from the natural environment and the production system shall operate without supplemental feeding.

In Alaska, salmon produced by hatcheries for harvest in the commercial fishery are typically native to the region, supplement naturally produced components of the stock and grow in open ocean environments without supplemental feeding. All of these conditions are in accordance with state statutes, policies and regulations. Of those state statutes that govern salmon production by hatcheries, AS 16.10.445 states, "Where feasible, salmon eggs utilized by a hatchery operator shall first be taken from stocks native to the area in which the hatchery is located, and then, upon department approval, from other areas, as necessary"¹⁶³. Alaska's Finfish Genetics Policy provides additional guidance for the selection of hatchery broodstock, stating that "Live salmonids, including gametes, will, not be imported from sources outside the state" and that "Stocks will not be transported between major geographic areas". Accordingly, non-native species are not produced by Alaskan salmon hatcheries.

13.14. In the context of avoiding significant negative impacts of enhancement activities on the natural reproductive components of "stock under consideration":

- naturally reproductive components of enhanced stocks shall not be overfished;
- naturally reproductive components of enhanced stocks shall not be substantially displaced by stocked components. In particular, displacement shall not result in a reduction of the natural reproductive stock component below abundance-based target reference points (or their proxies) defined for the regulation of harvest.

Alaska's Policy for the Management of Sustainable Salmon Fisheries clearly prohibits overfishing of naturally reproductive components of Alaskan salmon stocks. This policy is implemented through state and federal harvest regulations. Mass marking of hatchery fish and focused research efforts have investigated stray rates, competition effects and genetic introgression from hatchery salmon in Alaska. These results have provided evidence that some hatchery salmon stray onto wild spawning grounds¹⁶⁴¹⁶⁵ and in some cases may interbreed¹⁶⁶ ¹⁶⁷. Nevertheless, escapement estimates produced by ADFG strongly suggest that wild salmon populations in the state are, on the whole, stable and productive¹⁶⁸.

¹⁶³ https://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/hatchery_statutes.pdf

¹⁶⁴ <https://link.springer.com/article/10.1007/s10641-012-9975-7>

¹⁶⁵ <https://www.int-res.com/articles/aei2018/10/q010p099.pdf>

¹⁶⁶ http://www.adfg.alaska.gov/static-f/fishing/PDFs/hatcheries/research/alaska_hatchery_research_project_synopsis_may_2017.pdf

¹⁶⁷ http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.findings_updates

¹⁶⁸ <http://www.adfg.alaska.gov/FedAidPDFs/FMS15-04.pdf>

9. Performance specific to agreed corrective action plans

During the spring of 2016, SAI Global (then Global Trust) conducted the first reassessment of conformance to the Alaska Responsible Fisheries Management Program (RFM) by the Alaska commercial salmon fishery. As described in their reassessment report¹⁶⁹, SAI Global identified a single Minor Non-conformance with the RFM by the salmon fishery. This Minor Non-conformance was associated with ASMI RFM v1.3 sub-clause 13.4, which states that “*with due regard to the assessment approach employed, stock assessment of fisheries that are enhanced through aquaculture inputs shall consider the separate contributions from aquaculture and natural production*”, not met in full due to releases of unmarked hatchery pink salmon by the Kodiak Regional Aquaculture Association (KRAA).

In response to the minor non-conformance, KRAA and the Alaska Fisheries Development Foundation (AFDF) developed a Corrective Action Plan (CAP) to evaluate and address measures necessary to achieve full RFM conformance. This Plan was appended to the 2016 RFM report and includes a timeline of actions to be taken by KRAA, beginning in 2017.

As recognized in the current surveillance report (see Sub-clause 13.4), KRAA has made significant progress toward implementation of their CAP. With authorization from their Board of Directors, KRAA contracted a third party to perform a cost-benefit analysis of otolith marking pink salmon at their Kitoi Bay Hatchery facility. This work was completed in April of 2018, in accordance with the Plan timeline, and presented to the KRAA Board of Directors.

KRAA has also made noteworthy progress toward meeting RFM conformance through experimental otolith marking of pink salmon through a novel, saltwater shock methodology. Experimental marking of pink salmon at Kitoi Bay began in 2017, well in advance of scheduled mass marking of pink salmon at Kitoi Bay Hatchery (in 2023) per the Plan timeline.

This is the third surveillance assessment following the re-assessment in March 2017. The actions described above, taken by KRAA in accordance with the Corrective Action Plan, represent significant progress toward full conformance with ASMI RFM v1.3 Sub-clause 13.4. However, these actions are not yet sufficient to meet full RFM conformance. This Minor Non-conformance will remain open throughout the period of certificate (5 years) until the “medium” confidence rating transitions to “high” as the corrective actions take effect.

10. Unclosed, new non-conformances and new corrective action plans

No new non-conformances (NC) were identified during this 3rd surveillance assessment of the fishery and progress was identified on the unclosed NC aligned to the accepted Client Action Plan (CAP).

11. Future Surveillance Actions

Next assessment will be the 4th surveillance assessment that will be conducted on the anniversary of the US Alaska Salmon commercial fishery re-certification in 2017.

12. Client signed acceptance of the action plan

The signed Client Action Plan, aligned to the previously mention NC was accepted by the assessment Team on 8th December 2016. Complete details are outlined in the full assessment report:

<http://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-Report-March-2017.pdf>

¹⁶⁹ <https://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-Report-March-2017.pdf>

13. Recommendation and Determination

The assessment team recommends the continued certification of the applicant fisheries, the United States Alaska commercial salmon [Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, coho *O. kisutch*, pink *O. gorbuscha*, and chum *O. keta*] fisheries employing troll , purse seine, drift gillnet, set gillnet, fish wheel, dip net and beach seine gears in the four administrative Regions of Alaska that are principally managed by the Alaska Department of Fish and Game (ADFG); therefore, SAI Global has determined that the fisheries should remain certified.

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15. Appendices

15.1. Appendix 1 – Assessment Team Details

Based on the technical expertise required to carry out the above fishery assessment, SAI Global., is pleased to confirm the 3rd surveillance team members for the fishery as follows.

Ivan Mateo, PhD Lead Assessor

Dr. Ivan Mateo has over 20 years' experience working with natural resources population dynamic modelling. His specialization is in fish and crustacean population dynamics, stock assessment, evaluation of management strategies for exploited populations, bioenergetics, ecosystem-based assessment, and ecological statistical analysis. Dr. Mateo received a Ph.D. in Environmental Sciences with Fisheries specialization from the University of Rhode Island. He has studied population dynamics of economically important species as well as candidate species for endangered species listing from many different regions of the world such as the Caribbean, the Northeast US Coast, Gulf of California and Alaska. He has done research with NMFS Northeast Fisheries Science Center Ecosystem Based Fishery Management on bioenergetics modelling for Atlantic cod. He also has been working as environmental consultant in the Caribbean doing field work and looking at the effects of industrialization on essential fish habitats and for the Environmental Defense Fund developing population dynamics models for data poor stocks in the Gulf of California. Recently Dr. Mateo worked as National Research Council postdoc research associate at the NOAA National Marine Fisheries Services Ted Stevens Marine Research Institute on population dynamic modelling of Alaska sablefish.

Scott Marshall (Assessor)

B.S. Fisheries Science Oregon State University, M.S. Fisheries Science University of Washington 1974 - 1980 Fisheries Scientist and Project Leader at the Fisheries Research Institute, University of Washington. Mr. Marshall's primary emphasis was on researching sockeye salmon productivity in the Chignik Lakes, Alaska, on determining the origins of Chinook salmon harvested by foreign vessels operating in the North Pacific Ocean, and on the population dynamics of sockeye salmon in the Lake Washington watershed of Washington.

1980 - 2001. Alaska Dept. Fish and Game: Mr. Marshall served in three primary capacities, Research Project Leader, Principal Fishery Scientist for Pacific Salmon Commission Affairs and Regional Supervisor. As a Project Leader Mr. Marshall lead research teams in the study of population structure and dynamics of the state's Pacific Salmon and Pacific herring stocks. As a Principal Scientist Mr. Marshall served as a Co-Chairman or as Alaska's senior representative on several international technical teams established by the Pacific Salmon Treaty (e.g. Chinook Salmon, Transboundary Rivers, Canadian/Alaska Boundary Area Fisheries, Interceptions Accounting Committee, Data Sharing Committee, Editorial board). Mr. Marshall served on Scientific and Statistical Committee of the North Pacific Management Council. As the Division of Commercial Fisheries Regional Supervisor for Southeast Alaska, Mr. Marshall represented the Department at Alaska Board of Fisheries meetings, reviewed and/or critiqued numerous regulatory proposals for the fisheries of Southeast Alaska. He oversaw the daily research and management of the Southeast Region's commercial, personal use and subsistence fisheries. He also served as Co-Chairman of the Transboundary Rivers Panel of the Pacific Salmon Commission. Undertook numerous administrative responsibilities, such as budgeting, hiring HR etc.

2000- 2005. Idaho Department of Fish and Game Mr. Marshall served as the Fisheries Bureau's Staff Biologist for Endangered Species Act Affairs. This included developing Biological Assessments, Applications for ESA Section 7 & 10 permits, and writing reports for incidental take of endangered Pacific salmon that occurred during the conduct of research activities, recreational fisheries and hatchery operations. I also served as the Department's representative on the Habitat Committee of the Pacific Fishery Management Council.

2005 - 2013 U.S Fish and Wildlife. Mr. Marshall was a Fisheries Administrator in charge of the Lower Snake River Compensation Plan (a hatchery mitigation program to compensate for construction and operation of four hydroelectric dams on the Lower Snake River in Washington Oregon and Idaho). He developed, presented and negotiated budgets for the program to the Bonneville Power Administration (roughly \$30 million annually). He reviewed and negotiated annual budgets, contracts, annual spending and scientific reports developed by our fish and wildlife agency co-operators who implemented the program (3 states, 3 tribal agencies and several U.S Fish and Wildlife Service field offices). Mr. Marshall developed a series of three Programmatic Reviews (one for each of the primary species raised in our hatcheries) as required by the Northwest Power Planning Council's implementation legislation.

Marc Johnson PhD (Assessor)

Dr. Marc Johnson earned his doctoral degree from Oregon State University in 2009, where he studied and described the genetic structure of Oregon coastal coho salmon among hatchery and wild populations. He also holds a MSc degree in Ecology from the University of Brasilia (Brazil) and a BSc in Zoology, also from Oregon State University. Dr. Johnson has over 15 years of experience evaluating genetic and ecological interactions between hatchery and wild salmon populations and has authored publications on this and other fisheries-related topics in diverse, peer-reviewed journals. Currently, Dr. Johnson serves through a courtesy appointment as Assistant Professor for Oregon State University, and conducts research for the Oregon Department of Fish and Wildlife with particular emphasis on salmon reintroduction efforts, hatchery-wild interactions, induced triploidy effects, and the physiological bases for homing and straying behavior.

Brian Allee, PhD (Assessor)

Dr. Brian Allee attended the University of California Berkeley majoring in zoology. He received his Ph.D. from the University of Washington in fisheries. Dr. Allee has worked extensively with salmonid fish specializing in salmon research, restoration and enhancement of salmon and steelhead in freshwater, estuarine, and marine ecosystems in Alaska, Washington and Oregon.

After working in Washington and Oregon as a fisheries biologist, he first came to Alaska in 1982 and worked for Prince William Sound Aquaculture Association as operations manager and later as president. He subsequently served as Director of the Fisheries Rehabilitation and Enhancement, Development Division (FRED) of the Alaska Department of Fish and Game. His responsibilities included the statewide public hatchery program, the private non-profit permitting and planning program, and oversaw the genetic, pathology, limnology, and coded wire tagging laboratories, fisheries engineering and regional and area FRED staff. While serving as Director he was appointed by the Governor to the Alaska Science and Engineering Commission and the Alaska Science and Technology Foundation.

Dr. Allee returned to Alaska in 2003 to be the Alaska Sea Grant Director at the University of Alaska Fairbanks where he was active in funding fisheries research, education and extension for coastal Alaska. He more recently worked for the National Marine Fisheries Service in Portland on Mitchel Act hatchery funding in the Columbia River and participated on hatchery reform efforts.

In addition, he was past President of the Fish Culture Section of the American Fisheries Society and a member of the Scientific and Statistical Committee of the Pacific Fisheries Management Council. During Dr. Allee's 44 year career as a fisheries scientist and administrator he had broad management experience at the policy and technical level, supervising large and small organizations in public (state, federal and tribal), private and private non-profit sectors.