Alaska Responsible Fishery Management Certification

4th 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

Table of contents

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 4th Surveillance report AK/SAL/002.4/2020 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 salmonfisheries [all Pacific salmon species: Chinook *Oncorhynchus tschawytscha*, 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

Elaine O'Donoghue, Program Administrator
SAI Global/Global Trust Certification Ltd.
Quayside Business Centre,
Dundalk, Co. Louth, Ireland.
Email: Elaine.O'Donoghue@saiglobal.com

1. Introduction

This surveillance report documents the 4th 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 that 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 tschawytscha*, 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.

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

3. Proposed Unit(s) of Assessment and Certification

The applicant Unit(s) of Assessment (UoA) (i.e., what is to be assessed) is/are described by the following:

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:		*Oncorhynchus tschawytscha*	
	Common name:	**2**	Sockeye/Red	
	Latin name:		*Oncorhynchus nerka*	
	Common name:	**3**	Coho/Silver	
	Latin name:		*Oncorhynchus kisutch*	
	Common name:	**4**	Pink/Humpback	
	Latin name:		*Oncorhynchus gorbuscha*	
	Common name:	**5**	Keta/Chum	
	Latin name:		*Oncorhynchus keta*	
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 rational for when fishing was allowed. Copies of these detailed reports can be found at http://www.adfg.alaska.gov/index.cfm?adfg=fishingcommercialbyarea.main .

The 2018 Alaska commercial salmon fishery all species harvest was approximately 114.5 million fish with an estimated preliminary exvessel value of $595.2 million, a 13% decrease from the 2017 value of $685.0 million[1]. Sockeye salmon account for approximately 59% of total value at $349.2 million and 44% of total harvest at 49.9 million fish. Chum salmon were the second most valuable species comprising 21% of total exvessel value at $125.0 million and 18% of total harvest at 20.1 million fish. Pink salmon represent approximately 12% of total value at $69.2 million, and 36% of total harvest at 40.7 million fish. Coho salmon account for approximately 6% of total value at $35.5 million and 3% of total harvest at 3.6 million fish. The Chinook salmon harvest was estimated at 234,614 fish with an estimated preliminary value of $16.3 million. The estimates of value are based on preliminary exvessel prices and do not include any post-season adjustments paid to fishermen.

In terms of pounds of fish, the all species salmon harvest of 605.1 million pounds ranks 34th in the 1975-2018 time series, with chum salmon harvest ranking 8th, sockeye salmon harvest ranking 13th, coho salmon harvest ranking 31st, and pink salmon harvest ranking 39th in the 1975-2018 time series. The 2018 total harvest value for Chinook salmon were the lowest since limited entry began in 1975.

SOUTHEAST ALASKA AND YAKUTAT AREAS

Escapement of pink salmon in 2018 was below the parent year in 2016 and the regionwide index was the lowest since 1988. Escapement goals were met in Southern Southeast (SSE) and Northern Southeast Outside (NSEO) subregions but were below goal in the Northern Southeast Inside (NSEI) subregion. The pink salmon harvest of 7.8 million fish was the lowest since 1976.

For summer chum salmon, escapement goals were met in SSE and NSEI subregions, but the escapement in the NSEO subregion was below goal. Fall chum salmon escapement goals will be met for at least three of the five systems with escapement goals. The regionwide chum salmon harvest was approximately 11.2 million fish, which is above the recent 10-year average of 10.3 million. The chum salmon harvest in Southeast Alaska has averaged approximately 87% hatchery produced fish over the most recent 10-year period.

Chinook salmon production in Southeast Alaska continues to be poor and in 2018 escapement goals were achieved in four of the eleven index systems(Table 3). This represents an improvement from 2017 when two of eleven escapement goals were achieved. However, for the Stikine, Taku, and Chilkat rivers, all data suggest the lowest runs on record. Chinook salmon conservation measures were taken in all commercial salmon fisheries in Southeast Alaska.

[1] http://www.alaskafishradio.com/alaska-salmon-season-summaries-by-region-2018/

The total 2018 Yakutat set gillnet harvest of 130,546 salmon was below the recent 10-year average of 337,172 salmon. The commercial harvest was 295 Chinook salmon, 7,174 sockeye salmon, 94,831 coho salmon, 28,114 pink salmon, and 132 chum salmon. Sockeye salmon and coho salmon are the only directed fisheries and all other species are caught incidentally. The sockeye salmon harvest was well below the recent 10-year average harvest of 113,867 fish and coho salmon harvest was also below the recent 10-year average harvest of 140,711 fish.

CENTRAL REGION

PRINCE WILLIAM SOUND /COPPER RIVER

Commercial Common Properrty Fisheries (?) (CCPF) harvest of 20.1 million pink salmon was 14.0 million fish less than the 5-year even year average, and 32% below the 28.3 million CCPF preseason forecast. Total pink salmon harvest was 23.94 million fish; including 3.8 million fish for hatchery cost recovery, broodstock, and raceway sales (2.3 million for Prince William Sound Aquaculture Corporation and 1.5 million for Valdez Fisheries Development Association. Pink salmon escapement goals were met in all districts.

Total commercial chum salmon harvest in Prince William Sound (PWS) was 3.44 million fish, including 456,000 fish for Wally Noerenberg Hatchery broodstock and cost recovery. Chum salmon CCPF harvest was 2.9 million fish compared to a 3.3 million fish recent 10-year average.

Total sockeye salmon harvest for the PWS area was 1.3 million fish. The Copper River sockeye salmon harvest of 44,400 fish was the second lowest in the last 120 years and was 97% less than the recent 10-year harvest average of 1.3 million sockeye salmon. The Copper River District was only open for three short duration fishing periods in May prior to low sockeye salmon abundance indices necessitating a forty-day closure of the commercial fishery. The Miles Lake 2018 preliminary sonar escapement estimate was 701,577 salmon and was within the range of the inriver goal of 644,000– 1,034,000 fish.

Chinook salmon harvest in the Copper River District was 7,200 fish, below the recent 10-year average of 12,900 fish. There is not yet a preliminary estimate of inriver Chinook salmon abundance. Coho salmon returns were strong in both the Copper and Bering River Districts. Coho salmon harvest in the Copper River District is currently 302,000 fish compared to a recent 10-year average harvest of 225,000 fish. In the Bering River District, 120,000 coho salmon have been harvested to date, compared to a recent 10-year average of 58,900 coho salmon.

The 2018 total estimated exvessel value for all salmon species in Prince William Sound was $94.7 million. Of this total, Chinook salmon harvest was valued at $1.3 million, sockeye salmon harvest was valued at $16.1 million, coho salmon harvest was valued at $6.3 million, pink salmon harvest was valued at $45.4 million, and chum salmon harvest was valued at $25.6 million.

COOK INLET AREA :

Upper Cook Inlet

The overall harvest and value of the commercial salmon fishery of Upper Cook Inlet (UCI) was poor in 2018. The 2018 UCI commercial harvest of approximately 1.3 million salmon was 61% less than the recent 10-year average annual harvest of 3.4 million fish. While all five species of Pacific salmon are present in UCI, sockeye salmon are the most valuable accounting for nearly 93% of the total value during the past 20 years. The 2018 total run preseason forecast of sockeye salmon for UCI was 4.6 million fish, while the actual in season run was 3.1 million fish, or 32% less than forecast. The largest deviations from the 2018 forecast occurred with 3-year ocean sockeye salmon of ages 1.3 and 2.3, which returned at 1/10th and ½ of forecasted levels, respectively. The estimated ex-vessel value of the 2018 harvest of all salmon species of approximately $11.0 million was 67% less than the previous 10-year average annual ex-vessel value of $31.0 million. All species-specific ex-vessel values other than coho salmon were significantly below average in 2018 in UCI.

UCI salmon escapements in 2018 were mixed. In UCI there are seven sockeye salmon, fourteen Chinook salmon, four coho salmon, and one chum salmon system with escapement goals that were monitored in 2018. For the 2018 season, sockeye salmon escapement goals were exceeded in two systems (Kasilof River, Big Lake at Fish Creek), and met in four systems (Kenai River, Larson, Chelatna, Judd lakes); the final escapement for Packers Lake achieved the bottom end of the escapement goal of 15,000 sockeye salmon but the total count was incomplete due to video monitoring failure. Overall, run timing of sockeye salmon inlet wide was estimated at 4 days late. In 2018 the lower end of the Kenai River early run Chinook salmon Optimal Escapement Goal (OEG) was not achieved, but the late run Kenai River Chinook salmon run ended within its Sustainable Escapement Goal (SEG). The lower ends of the Deshka River and Little Susitna River Chinook salmon SEGs were not achieved in 2018. Coho salmon assessments on all UCI systems were either above (Jim Creek and Fish Creek) or within (Little Susitna River and Deshka River) their escapement

Lower Cook inlet

The 2018 Lower Cook Inlet Area commercial salmon harvest was 2.0 million . The harvest was composed of 381 Chinook, 370,460 sockeye, 15,387 coho, 1.6 million pink, and 48,729 chum salmon, of which 758,117 (37.9%) were CCPF harvest and 1.2 million (62.1%) were hatchery cost recovery.

The preliminary estimate of the 2018 Lower Cook Inlet Area commercial salmon harvest is 2.0 million salmon. The harvest was composed of 381 Chinook salmon, 370,460 sockeye salmon, 14,544 coho salmon, 1.5 pink salmon, and 48,729 chum salmon. The harvest was comprised of 758,117 (37.9%) commercial common property fishery (CCPF) harvested fish, and 1.2 million (62.1%) hatchery cost recovery fish. The preliminary estimated exvessel value of the 2018 common property harvest of approximately $2.6 million was above the previous 10-year average annual exvessel value of $2.5 million. The majority of the commercial common property sockeye salmon and pink salmon harvests were from hatchery subdistricts. Otoliths sampled from the commercial harvest from both species in those areas will be read this winter and are anticipated to show significant hatchery contributions. SEGs for sockeye salmon were achieved in seven of the eight systems with goals. Preliminary estimates for pink salmon escapement show that of the 13 of the 18 systems with SEGs were above the minimum SEG.

Bristol Bay

The 2018 inshore Bristol Bay sockeye salmon run of 62.3 million fish is the largest on record dating back to 1893 and was 69% above the 36.9 million average run for the latest 20-year time period. The preliminary exvessel value of $281.0 million is the largest on record. It was the fourth consecutive year that inshore sockeye salmon runs exceeded 50 million fish. The 2018 Bristol Bay sockeye salmon run was 21% above the preseason inshore forecast of 51.3 million fish. Runs to all districts, except Egegik, were larger than the preseason forecast. The commercial harvest of 41.3 million sockeye salmon was 10% above the 37.6 million preseason forecast and is the second largest harvest on record. All sockeye salmon escapement goals were met or exceeded, with a total bay- wide escapement of 21.0 million fish. The preliminary harvests for other species are 41,696 Chinook salmon; 1,868,308 chum salmon; 138,466 coho salmon; and 218,998 pink salmon.

Kotzebue

The 2018 commercial harvest of 695,153 chum salmon was a record high, exceeding the previous record of 677,239 chum salmon caught in 1981. The 2018 harvest represented the fourth time in the last five years that the harvest exceeded 400,000 chum salmon but was only the eighth time in history for harvest that high. A total of 5,642,859 pounds of chum salmon (average weight 8.1 lb) was sold at an average of $0.40/lb. This year's average price was 17% lower than last year's price of $0.48/lb. The total exvessel value was $2.3 million and was 24% more than last year. 2018 was only the fourth time since 1988 that the exvessel value was over one million dollars. The historical average exvessel value of the fishery was $0.7 million without adjusting for inflation. There were 95 permit holders that sold fish in 2018, making this year the third highest permit holder participation in over 20 years. The highest daily fishing effort occurred on July 31 when 62 permit holders fished.

Norton Sound

As in 2017, the 2018 harvest ranged from well above average to record-size for chum salmon, pink salmon, sockeye salmon and coho salmon. The 2018 commercial coho salmon harvest was the highest on record. The commercial chum salmon harvest was the second highest on record and the largest since 1983. Although it only contributed a small amount to the overall salmon harvest, the sockeye salmon commercial harvest was the second highest in history with over 3,600 fish. The coho salmon catch of 260,471 fish contributed to roughly half of the Norton Sound salmon harvest in 2018. This was 36% above the catch in 2017, and 110% and 165%, respectively, above the recent 5-year and 10-year averages. The chum salmon catch of 238,030 fish was the highest recorded since 1983 and ranked second highest in history. The combined commercial harvest of all salmon species was 543,479 fish, including fish retained for personal use. 2018 is ranked with the highest harvest since 1998 in Norton Sound.

The pink salmon run was one of the greatest even-year runs on record with high escapement values reported at many counting project locations. However, there was minimal interest from the only buyer in purchasing pink salmon. No commercial fishing targeting Chinook salmon was allowed; however, the Chinook salmon run met escapement goals for the first time since 2015 .

There were 149 commercial permits fished in 2018, which was ten more permits fished than last year. The number of commercial permits fished was the second highest since 1993. The 2018 fishery value of $4.0 million was a new high record and was the eighth time in the last nine years that the season value exceeded one million dollars. Before 2010, the last time the value of the fishery exceeded one million dollars was in the 1980s. The average price paid for Chinook salmon was $2.99/lb, $1.40/lb for sockeye salmon, $1.40/lb for coho salmon, $0.25/lb for pink salmon, and $.80/lb for chum salmon.

Kuskokwim River

2018 was the third consecutive fishing season that there were no large-scale commercial salmon buyer/processors in the Kuskokwim Area. This resulted in very little opportunity for fishermen in District 1 and no opportunity for fishermen in District 4 (Quinhagak) and District 5 (Goodnews Bay). Due to confidentiality requirements the small amount of harvest that did occur cannot be reported.

Kuskokwim River Chinook salmon returns have continued to improve over recent years. The preliminary Kuskokwim River total run estimate is approximately 140,891 Chinook salmon (95% Confidence Interval: 113,093–175,521). The drainage-wide escapement goal was likely achieved but will not be fully assessed until after all the data are analyzed this winter. The preliminary subsistence Chinook salmon harvest estimate is approximately 30,000 fish, which is well below the historical average of 80,000 fish.

Kuskokwim River sockeye salmon escapements were above the historical average. Chum salmon escapement estimates were average at most monitoring projects and the single escapement goal at Kogrukluk River was achieved. The Kuskokwim River coho salmon run came in below average at all assessment projects. The Kwethluk and Kogrukluk Rivers respective escapements goals were not achieved.

Yukon River

Recent returns of Chinook salmon have been below average, therefore inseason management began with a conservative approach with commercial and sport fisheries for Chinook salmon closed. Most Yukon River districts were put on a reduced regulatory schedule in which each period was about half the usual fishing time. Inseason uncertainty about run strength and timing of the Chinook salmon run triggered subsistence fishing closures in the form of “cancelled periods” and restrictions limiting fishing time or gear in most districts that effectively protected each part of the run and spread the harvest across all pulses of the run and spread the harvest across all pulses.

Preliminary subsistence harvest is projected to be about 30,000–40,000 Chinook salmon. Chinook salmon subsistence harvest data are still being collected and analyzed. Escapement goals were met on most tributaries, including the East Fork Andreafsky, Chena River, Salcha River, and the Canadian interim management escapement goal. The preliminary Chinook salmon passage at the sonar project near Eagle was 57,959 fish. This is not considered a true escapement estimate as it does not account for harvest between Eagle and the border in Alaska, nor Canadian harvests.

Yukon River chum salmon are comprised of summer-run and fall-run fish. The 2018 summer chum salmon run was below the preseason projected run size of 2.5 million fish and was approximately 2.1 million fish. This preliminary run size estimate is based on Pilot Station sonar counts and commercial harvests, escapement estimates, and average subsistence harvests located below the Pilot Station sonar. The drainage-wide escapement goal of 500,000 to 1,200,000 fish was exceeded; however, goals on the East Fork Andreafsky and Anvik rivers were not

met. This is not entirely unexpected based on the recent trend of lower river stocks not performing as well as upriver stocks. The total 2018 commercial harvest for the entire Yukon Area was 576,700 summer chum salmon, which is the highest since 1996. Of this total, 446,381 fish were harvested from the Lower Yukon and 130,319 fish were harvested from the Upper Yukon. In the Upper Yukon, there were buyers in District 4 and District 6. The preliminary exvessel value of the Yukon summer chum salmon commercial fishery was approximately $1.9 million.

The 2018 fall-run chum salmon run of approximately 1.3 million fish was below the preseason forecast range of 1.6 to 1.8 million fish (highest forecast on record). Prior to the start of the fall season, the fall chum salmon projection was adjusted down to 700,000-900,000 fish based on the performance of this year's summer chum salmon run. Most escapement goals, as well as treaty objectives with Canada for the mainstem Yukon River, are anticipated to be met except for the Fishing Branch River. In recent years, the abundance of fall chum salmon in the upper Porcupine River has been low when compared to other stocks in the Yukon River drainage. To improve fall chum salmon escapement to the spawning grounds in Canada, the mainstem Porcupine River was changed from a reduced subsistence salmon schedule to a full closure.

The preliminary commercial harvest of 374,157 fall-run chum salmon and 106,225 coho salmon were the 4th largest on record for each species in the 57-year history of commercial fishing on the Yukon River. Commercial fishing is ongoing in the Upper Yukon River though early October. The fall chum salmon run came in about a week later than average while the coho salmon run was 3 days later than average. The preliminary $2.1 million value of the Yukon Area fall chum salmon commercial harvest equaled the record value, and the $0.67 million value of the Yukon Area coho salmon was the 5th largest on record.

WESTWARD REGION

Kodiak Area

The Kodiak Management Area (KMA) even year pink salmon return was below average, resulting in the harvest of approximately 6.0 million pink salmon. Pink salmon escapement totals were below average in most areas which resulted in minimal commercial salmon fishing openings. KMA sockeye salmon harvest was also below average with a harvest of approximately 1.8 million fish valued at $14.4 million. Sockeye salmon escapement was average with the four large systems with weirs contributing over 1.4 million fish. Due to the weak pink salmon run and overlapping run timing, the KMA chum salmon harvest was below average with only 464,000 fish valued at $1.9 million. KMA chum salmon escapement was above average. Coho salmon harvest was well above average with approximately 446,000 harvested.

Chignik

The 2018 Chignik River sockeye salmon run (approximately 540,000 fish) was the poorest on record since statehood. The Chignik River sockeye salmon early run did not meet the lower bound of the escapement goal. The sockeye salmon late run lagged well behind escapement objectives for most of the season; however, this run did meet the lower bound of the escapement goal. There is also an inriver run goal (IRRG) for the Chignik River late run sockeye salmon to provide for additional freshwater subsistence fishing opportunity. The IRRG requires that 25,000 sockeye salmon escape in August in addition to the minimum escapement needs and 50,000 sockeye salmon escapement in September. The August component was achieved however, the September component was well below the 50,000 fish required. Chinook salmon escapement was also well below the Chignik River escapement goal resulting in restrictions to Chinook salmon harvest in the subsistence fishery.

Additionally, pink salmon escapement was poor throughout the Chignik Management Area (CMA) and did not meet area wide escapement goals. Due to the poor run, there was no commercial fishing targeting sockeye salmon in the CMA. Subsistence fishing remained open to sockeye salmon in the Chignik River drainage; however, the Federal Subsistence Board (USFWS) prohibited subsistence fishing for sockeye salmon to non- federal users from June 22 to July 31. Two 48-hour commercial fishing periods occurred in select inner bays of the CMA; the first in July to target early opportunity on pink salmon and chum salmon and the second in September to target coho salmon. Very little effort occurred in either fishing period. A total of 6 permits made deliveries for a total harvest of 128 sockeye salmon, 1 coho salmon, 6 pink salmon, and 924 chum salmon.

Northern District of the Alaska Peninsula

Catches of sockeye salmon in the Northern Districts of the Alaska Peninsula were similar to the historical average. A total of 2.4 million sockeye salmon were harvested in 2018 which was below the 2017 harvest of 3.8 million sockeye salmon, but comparable to the previous 10-year average of 2.1 million fish. The estimated exvessel value of sockeye salmon for the Northern District was $15.9 million. The 2018 chum salmon harvest of 59,000 fish and $0.1 million was above the 2017 harvest when 25,000 chum salmon were harvested, but comparable to the previous 10-year average of 56,000 chum salmon. The 2018 Coho salmon harvest of 95,000 fish was well above the previous ten- year average of 56,000 fish. The 2018 estimated exvessel value of coho salmon was $0.2 million. The Chinook salmon harvest of 1,800 fish and $0.04 million was like the 10-year average of 2,000 fish, but below the 2017 harvest of 2,800 fish. All escapement goals in the Northern District were met or exceeded.

South Alaska Peninsula, Northwestern District and Aleutian Islands

Catches of sockeye salmon on the South Alaska Peninsula for the 2018 season were significantly lower than for the 2017 season and the previous 10-year average. During the 2018 South Alaska Peninsula season, a total of 1.3 million sockeye salmon were harvested with an estimated exvessel value of $8.0 million. The harvest of pink salmon was valued at $0.8 million and numbered 773,000 fish, which was much lower than the 2016 harvest of 2.9 million fish, and greater than the 2014 and 2012 harvest of 772,000 and 491,000 fish respectively. One million chum salmon were harvested in 2018 (estimated exvessel value of $3.2 million), which is greater than the most recent 10-year average of 800,000 fish. Coho salmon harvest was also high in 2018, with an estimated exvessel value of $0.8 million and approximately 271,000 harvested, greater than the most recent 10-year average of roughly 223,000 coho salmon. Chinook salmon catch was slightly above average at 17,000 fish and an estimated exvessel value of $0.1 million. A total of 3.4 million salmon of all species were harvested in 2018 on the South Alaska Peninsula, which is much lower than the recent 10-year verage of 11.1 million fish.South Alaska Peninsula fisheries were reduced in June outside of normal fishing schedules due to the conservation concerns of Chignik River early run sockeye salmon. Set gillnet gear was reduced by 72 hours and seine and drift gillnet gear were reduced by 96 hours in June. In addition to the reduced fishing periods in the June fishery, commercial salmon fishing was closed in the West Pavlof Bay Section south of Black Point and the Volcano Bay Section on July 14 to conserve Chignik Lake sockeye salmon escapement. On July 17, the Board of Fisheries met to hear emergency petitions regarding the Chignik River sockeye salmon escapement. The Board determined that the Southeastern District, Mainland District, and the “Dolgoi Island Area” would remain closed until the Chignik Lake sockeye reached its Minimum Escapement Goal (MEG). The Northwestern District harvested roughly 7,000 sockeye salmon and 94,000 chum salmon in 2018, which was entirely harvested in the Izembek-Moffet Bay Section. No commercial salmon fishing occurred in the Aleutian Islands Area in the 2018 season.

Table 3. Actual and forecasted harvests for the Alaska salmon commercial fishery by Region, area and species (in thousands of fish), 2018.

Region/Area	Chinook	Sockeye	Coho	Pink	Chum	TOTAL
Southeast/Yakutat - Region 1						
Actual Harvest	158	602	1,555	7,762	11,165	21,242
Forecasted Harvest		1,296	3,010	23,000	9,984	37,290
Central - Region 2						
Prince William Sound						
Actual Harvest	8	1,302	509	23,937	3,438	29,113
Forecasted Harvest	14	1825	408	32752	4001	38999
Cook Inlet						
Actual Harvest	4	1,185	235	1,691	178	3,293
Forecasted Harvest	8	2354	207	2057	278	4904
Bristol Bay						
Actual Harvest	42	41,253	138	219	1,868	43,521
Forecasted Harvest	32	37598	158	917	993	39,698
Central Region Grand Total						
Actual Harvest	654	227,523	6,979	97,535	40,458	373,148
Forecasted Harvest	54	41,777	773	35,726	5,271	83,601
Arctic-Yukon-Kuskokwim (AYK) - Region 3						
Actual Harvest	3	19	2,546	223	13,648	16,439
Forecasted Harvest	4	4	320	50	3,475	3,853
Westward Region – 4						
Actual Harvest	199	28,326	6,084	25,472	11,863	71,944
Forecasted Harvest	42	8,512	846	10,907	2,247	22,554
Statewide Grand Total						
Actual Harvest	235	49,885	3,615	40,662	20,094	114,490
Forecasted Harvest	99	51,589	4,949	69,682	20,977	147,297

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 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 (Munro, 2018). Fourteen stocks were identified as a Management Concern and 4 were identified as Yield Concern (Table 4).

Table 4 Stocks of concern thru 2011-2018 Board of Fish cycle

Region	System	Species	Year Listed	Type of Concern	BoF Cycle Last Reviewed
Southeast	Chilkat R.	Chinook	2017	Management	2017-18
	King Salmon R.	Chinook	2017	Management	2017-18
	Unuk R.	Chinook	2017	Management	2017-18
	McDonald Lk.	Sockeye	2017	Management	2017-18
Central	McNeil R.	Chum	2016	Management	2016-17
	Yenta R.	Sockeye	2007	Yield	2016-17
	Chuitna R.	Chinook	2010	Management	2016-17
	Theodore R.	Chinook	2010	Management	2016-17
	Lewis R.	Chinook	2010	Management	2016-17
	Alexander Cr.	Chinook	2010	Management	2016-17
	Goose Cr.	Chinook	2010	Management	2016-17
	Sheep Cr.	Chinook	2013	Management	2016-17
Westward	Karluk R.	Chinook	2010	Management	2016-17
	Swanson Lagoon	Sockeye	2010	Management	2016-17
AYK	Yukon R.	Chinook	2000	Yield	2015-16
	Norton Sound Subdistricts 5&6	Chinook	2003	Yield	2015-16
	Norton Sound Subdistricts 2&3	Chum	2000	Yield	2015-16

4.2. Enforcement update

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

2018 Commercial Salmon Fishing (Information from AWT received from Dave Gaudet AFDF)

During 2018, Alaska Wildlife Troopers boarded approximately 3200 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.
Regarding your request for information related to violation rate and overall level of compliance, I am unable to determine this specific to commercial salmon fishing on a statewide basis. However, we have another reporting method which Troopers use to report daily activity. The system allows reporting resource use types, such as commercial fisheries patrol, sport fish patrol, etc. I chose commercial fishing patrol and selected the date range of June 1, 2018 through August 1, 2018. In most areas of Alaska, during this date range, commercial fishing enforcement activity is primarily focused on salmon fisheries. This data revealed 5,024 contacts with commercial fisheries participants, 207 warnings given during these contacts, and 330 persons charged with offenses. Calculating a violation rate from these statistics indicates violations discovered during commercial fishing contacts occurred at a rate of 6.57 % in 2018.

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

A joint MSC/AKRFM audit was done during the 4th surveillance audit of the AKRFM AK Commercial Salmon fishery on December 2019.

Table 5. Summary of meetings held by AKRFM team

Date	Organization and Location	Representative	Main Topics of Discussion
Date: 12/9/2019 Time:8:30 AM	**Organization:** **ADF&G Anchorage Genetic Lab** **Location:** 717 K Street Anchorage, Alaska	**ADFG Anchorage** Bill Templin, Kyle Shedd,Chris Habicht **Client: AFDF** Dave Gaudet **MRAG** Amanda Stern Ray Beamesderfer **MSC** Kate Dewar **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson, Assessor	Results of HWI and Response to Pedigree Fitness Studies
Date: 12/9/2019 Time:11:45 AM	**Organization:** **ADF&G Anchorage** **Location:** **APICDA** 717 K Street Anchorage, Alaska	**ADFG Anchorage** Sam Rambung **Client: AFDF** Dave Gaudet **MRAG** Amanda Stern Ray Beamesderfer **MSC** Kate Dewar **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson, Assessor	Budget and changes in ADF&G
Date: 12/9/2019 Time:1:30 PM	**Organization:** **ADFG Anchorage** **Location:** **APICDA** 717 K Street Anchorage, Alaska	**NMFS AFSC Staff** Elizabeth Siddon **Client: AFDF** Dave Gaudet **MRAG** Amanda Stern Ray Beamesderfer **MSC** Kate Dewar	Ocean Productivity and relevance to AK Pacific Salmon Populations

Date	Organization and Location	Representative	Main Topics of Discussion
		Assessment Team Members: Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson , Assessor	
12/9/2019 Time:3:00 PM	**Organization:** **PNP Operators** **Location:** **APICDA** 717 K Street Anchorage, Alaska	**PNP Operators** **KRAA** Tina Fairbanks **PWSA** Tommy Sheridan **DIPAC** Eric Priestegaard Katie Harms **VFDA** **Mike Wells** **CIAA** Dean Day **Client: AFDF** Dave Gaudet **MRAG** Amanda Stern Ray Beamesderfer **MSC** Kate Dewar **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson , Assessor	All PNP Operators:Status of Operations KRAA: 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.
Date: 12/10/2019 Time:8:30 AM	**Organization:** **ADFG Anchorage** **Location:** **APICDA** 717 K Street Anchorage, Alaska	**ADFG Anchorage** Andrew Munro **Client: AFDF** Dave Gaudet **MRAG** Amanda Stern Ray Beamesderfer **MSC** Kate Dewar **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor	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 Updates on Salmon stocks status, harvest, escapments

Date	Organization and Location	Representative	Main Topics of Discussion
		Scott Marshall, Assessor Marc Johnson , Assessor	
Date: 12/10/2019 10:30AM	**Organization:** **ADFG Anchorage** **Chinook Salmon** **Research Initiative** **Location:** **APICDA** 717 K Street Anchorage, Alaska	**ADFG Southeast** Phil Richards **Client: AFDF** Dave Gaudet **MRAG** Amanda Stern Ray Beamesderfer **MSC** Kate Dewar **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson, Assessor	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.
12/11/2019	**Location** Hilton Hotel Downtown AnchorageA	**Birdlife/Workshop**	Team attended as observers in a workshop on impacts of salmon gillnet fisheries on ETP seabird species
Date: 12/12/2019 8:30 AM	**ADFG Anchorage** **Location:** **APICDA** 717 K Street Anchorage, Alaska	**ADFG Westward** Westward Region Personnel **Client: AFDF** Dave Gaudet **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson , Assessor	Westward Region status of fisheries, assessment programs and biological data
Date: 12/12/2019 2:00 PM	**Location:** **ADFG Anchorage** 333 Raspberry Rd, Anchorage	**ADFG AYK** AYK Region Personnel John Lindeman **Client: AFDF** Dave Gaudet **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson , Assessor	AYK Region status of fisheries, assessment programs and biological data
Date:	**Location:**	**Client: AFDF**	Update on meeting the milestones on the Corrective Action

Date	Organization and Location	Representative	Main Topics of Discussion
12/12/2019	Captain Cooke Hotel Time:4:30 PM	Dave Gaudet Julie Decker **ASMI** Jeff Regnart **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson , Assessor	Plan in 2018/2019 and prospects for 2020 2nd Reassessment audit findings
Date: 12/19/2019	**Location:** **CONFERENCE CALL**	**ADFG Central** Central Region Staff **Client: AFDF** Dave Gaudet **Assessment Team Members:** Ivan Mateo, Lead Assessor Brian Allee, Assessor Scott Marshall, Assessor Marc Johnson , Assessor	Central Region status of fisheries, assessment programs and biological data

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 BoF 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
Alaska's commercial salmon fisheries are managed by the State of Alaska, with federal oversight and in accordance with international treaties. Alaska's Constitution sets forth that natural resources, such as those that support its commercial salmon fisheries, be managed on the principal of sustained yield. This mandate is reflected in the Title 16 Fish and Game Alaska Statutes, that provide a clear framework for the regulation and responsible management of commercial salmon fisheries in Alaska, including laws governing the establishment and operation of hatcheries, management of the fishing fleet and authorization to Alaska Department of Fish and Game (ADFG) for developing, administrating and enforcing fisheries regulations. While ADFG employees are deputized law enforcement agents, Alaska Wildlife Troopers (AWT) are primarily responsible for enforcing fisheries regulations. Alaska and other U.S. states are members of the North Pacific Anadromous Fisheries Council, 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., including Alaska, also abide by the Food and Agricultural Organization'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.

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. Alaska's state troopers coordinate with and are 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), based in part on a strictly enforced and state-tracked violations demerit system, codified in state statute. 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. ADFG conducts regular surveys to estimate adult escapement of major salmon stocks in Alaska, publishes these findings and manages populations accordingly, providing additional protections to stocks of concern.

Fundamental Clause 13: Fisheries enhancement activities (where applicable)
Evidence adequacy rating: High

Commercial salmon fisheries harvest wild- and hatchery-produced salmon in Alaska. Hatchery salmon are produced by private non-profit corporations 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 Policy, hatcheries are typically sited away from major natural production areas, use locally-sourced fish to found and, in some cases, supplement hatchery broodstocks, and limit stock transfers. 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.

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 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. Alaska's Constitution and Policy for the Management of Sustainable Salmon Fisheries provide clear protections for traditional and common property salmon fisheries in Alaska, thereby safeguarding the livelihoods of local communities that depend upon this resource. Before a hatchery permit can be issued, public hearings are held at least 30 days in advance. ADFG must also review potential ecological, fisheries, habitat and social impacts before issuing a permit. ADFG also 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 salmon produced by the Kodiak Regional Aquaculture Association (KRAA) were not marked until recently. In accordance with a Corrective Action Plan, KRAA has developed novel techniques to mass mark the hatchery salmon that it produces and releases, with all production from Kitoi Bay Hatchery being marked in 2019. This action represents significant progress toward resolution of the single minor non-conformace issued during the 2016 US Alaska Commercial Salmon RFM Reassessment.

7. Conformity Statement

The assessment team recommends the continued certification of the applicant fisheries, the United States Alaska commercial salmon [Chinook *Oncorhynchus tschawytscha*, 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 Report[2], 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 website[3].

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 year[4]. 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.

[2] http://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-ReportMarch-2017.pdf

[3] http://www.adfg.alaska.gov/index.cfm?adfg=process.main

[4] 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 issues[5][6][7]

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 (PST[8]) 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 agreements[9][10][11].

[5] http://www.npafc.org/new/index.html
[6] http://www.psc.org
[7] http://www.psmfc.org
[8] https://www.nwcouncil.org/history/Trilateral
[9] http://www.npafc.org/new/publications/HandBook/Handbook%203rd%20E%20English.pdf
[10] http://www.psc.org/pubs/About/OrientationGeneralJune2015.pdf
[11] http://www.psmfc.org/psmfc-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 Fisheries[12] manages commercial harvests and, in conjunction with the Division of Subsistence[13], removals by subsistence fishermen.

The Division of Sport Fisheries[14] 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 39.222[15] 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 website[16].
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.

[12] http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main
[13] http://www.adfg.alaska.gov/index.cfm?adfg=fishingSubsistence.main
[14] http://www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main
[15] http://www.housemajority.org/coms/jcis/pdfs/Sustainable_Salmon_Fisheries_Policy.pdf
[16] 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)[17]. 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.

[17] 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' 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.

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 individuals[18].

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 process[19], 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.

[18] http://www.adfg.alaska.gov/index.cfm?adfg=uselicense.main
[19] https://alaskafisheries.noaa.gov/fisheries/nepa-guidance

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 Report[20] 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 website[21]. One of the functions of the NPAFC is to provide a venue for coordinating the collection, exchange, and analysis of scientific data regarding anadromous fishes, primarily Pacific salmon, and other ecologically-related species[22]. 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.

[20] http://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-Report-2017.pdf
[21] http://www.adfg.alaska.gov/index.cfm?adfg=librarypublications.publications_reports#fisheries
[22] 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 Fisheries[23] 39.222 Policy for the Management of Sustainable Salmon Fisheries[24] 39.223 Policy for State-wide Salmon Escapement Goals[25].

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 1973[26]. The Alaska Commercial Fisheries Entry Commission (CFEC) regulates the number of participating fishers, thereby conserving the resource and safeguarding the economic viability of the fishery[27]. 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.

[23] http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/findings/ff93145x.
[24] http://www.housemajority.org/coms/jcis/pdfs/Sustainable_Salmon_Fisheries_Policy.pdf
[25] http://www.touchngo.com/lglcntr/akstats/aac/title05/chapter039/section223.htm
[26] https://www.cfec.state.ak.us/pregs/Homan30YrsLimitedEntrySummary.pdf
[27] 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 resources[28]). 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 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. (see for example Wilburn and Renick 2018 and Salomone et al. 2019). 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/).

4.2. An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established.

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. However, observers are generally not needed to monitor compliance with regulations, or to collect data needed for management in Alaska's salmon fisheries. Alaska's commercial 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 of the harvests are typically sampled 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.

When special needs arise, the ADFG has placed observers aboard salmon fishing vessels. For example, during

[28] http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmonmaps

implementation of the Pacific Salmon Treaty there was a need to verify estimates of immature Chinook Salmon caught and released in Southeast troll fishery (Seibel et al. 1989) and to verify estimates of Chinook Salmon caught in the Southeast purse seine fishery (Rowse and Marshall 1988). Another example was implementation of the Alaska Marine Mammal Observe Program that provides encounter and mortality estimates for both marine mammals and sea birds in several gillnet fisheries throughout the state (Wynne et al. 1991).

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

There are processes in place to share catch data (and accompany data such as code microwire tag recoveries) with both Canada and the states of Oregon, Washington and Idaho where some stocks harvested in Alaska spawn. There is also a process for sharing catch and enhancement data with selected Pacific rim countries through the North Pacific Anadromous Fish Commission (NPAFC).

Examples of sharing catch, effort and stock composition data with Canada for transboundary rivers in Southeast Alaska is PSC-TCTR (2019 and for coastwide Chinook Salmon stock status is PSC-JTCC (2019). An example of sharing catch data through the NPAFC is NPAFC (2018a).

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). ASMI 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. The state of Alaska also operates the Kodiak Seafood and Marine Science Center (KSMSC). Among other 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. 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. In fiscal year 2018, the Kodiak Marine Science Center reported conducting ten research projects in the areas of seafood science, product development, fisheries, climate change, harmful algal blooms and safe subsistence harvest of shellfish (KMSC 2018). Examples of research reports from these activities are Faber et al. (2010) and Nettleton (2009).

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 for 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) The Commercial Fisheries Division maintains data on the ex-vessel value of commercial landings and on wholesale value.

The Sport Fish Division periodically estimates the value of recreational fishing. The Division of Subsistence publishes studies on the history and current use of salmon for subsistence. The University of Alaska maintains Institute of Social and Economic Research that periodically conducts research on the salmon fisheries of Alaska.

The social and economic data obtained are routinely used by the Board of Fish when establishing fishing regulations as required by statute. The Alaska Seafood Marketing Institute (ASMI) uses these data in developing marketing campaigns. The Alaska legislature is made aware of the social cultural and economic value of salmon when crafting statutes.

The Division of Subsistence publishes numerous papers on the history and current use of salmon for subsistence (see for example Fall et al. 2019, Sill et al. 2019 and Trainor et al. 2019). The Commercial Fisheries Entry Commission publishes research on the optimum number of permits that should be issued for a fishery (see for example Schelle et. al. 2004). The University of Alaska Institute of Social and Economic Research conducts research on the salmon fisheries of Alaska (see for example Knapp 2011). The Sport Fish Division has published reports on the value of recreational fishing (see for example Southwick *et al.* 2008). The Commercial Fisheries Division maintains data on the ex-vessel value of commercial landings[29] and on wholesale value[30] .
Various institutions have also contracted to have economic studies done and made public. For instance the public non-profit hatcheries contracted to evaluate the economic impact of hatchery production (McDowell Group 2018) and the Salmon Alliance contracted to determine the value of the seafood industry in South Central Alaska (McDowell 2015)
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 resources[31].
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 subsistence regional advisory committee, and the Alaska Department of Fish and Game. Agency members

[29] http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisherySalmon.exvesselquery
[30] http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch_wholesale.
[31] http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg

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.
In addition, the the state has conducted research to document traditional knowledge for several commercially fished salmon stocks (Bronwyn and Kukkonen 2017;Trainor et al. 2019; Ream and Merriam, 2017; Joshua and Merriam, 2017).

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.
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. All cooperative research on the Transboundary Rivers is reported annually[32].

4.8. States shall promote the adoption of uniform guidelines governing fisheries research conducted on the high seas.
There is no high seas salmon fishing on stocks originating in Alaska. There are circumstances where salmon stocks that spawn in Canada are harvested in the territorial waters of Alaska. Research and management of those stocks is subject to terms of the Pacific Salmon Treaty and discussed elsewhere. There is however, coordination of salmon research on the high seas. This is accomplished through the North Pacific Anadromous Fish Commission (NPAFC). 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. As such, 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 NPAFC is active in coordinating scientific research under the Commission's Science Plan (NPAFC 2010) and has developed a consensus long-term research and monitoring plan for Pacific salmon in the North Pacific (Beamish *et. al.* 2009). Under the research and monitoring plans, member countries are cooperating 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 (see for example Farley *et al.* Eds. (2009). The members also exchange 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. Comprehensive accounting of NPAFC activities are outlined in their annual report NPAFC (2018b).

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.

[32] https://www.psc.org/publications/technical-reports/technical-committee-reports/transboundary/

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	**7**
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.

<Insert evidence>

The conduct of diverse research concerning salmon is a collaborative effort of numerous state and federal agencies. ADFG supports a wide breath of research, including:

- The Commercial Fisheries Division maintains programs that research effects of enhancement, ecology, stock assessment, genetics, pathology, and maintains several critical databases including; the value of salmon harvested, genetic profiles, otolith anatomy, coded wire tags and disease incidence that are used in collaboration with a number of agencies.

- The Division of Subsistence researches the history and current use of salmon for subsistence.

- The Sport Fish Division studies biology, ecology, and economics of recreational fishing. It also conducts stock assessments and makes recommendations on escapement goals.

The State of Alaska, supports diverse biological, social and economic research in institutions other than ADFG, including:

- The University of Alaska has an extensive undergraduate and graduate program on a broad array of topics including quantitative stock assessment, biology, enhancement, genetics, behavioral ecology. The University also offers associate degrees and certificates in fisheries technology at facilities are located in Juneau, Seward, Kodiak and Fairbanks. The University of Alaska Institute of Social and Economic Research conducts research on the economics of Alaska's fisheries.

- The Kodiak Marine Science and Seafood Center researches the biochemistry and nutritional value of seafood.

- The Alaska Seafood Marketing Institute contracts studies to determine the value of Alaska's Seafood Industry.

- The Commercial Fishery Entry Commission publishes research on the optimum number of permits that

should be issued for a fishery.

Federal Agencies and the University of Washington's Alaska Salmon Program support varied research, including:

- The University of Washington maintains three field stations in Alaska to study a broad array of topics relating to management of salmon and to train graduate students.

- The USFWS augments state stock assessment by conducing research on salmon production and habit on federal lands. 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 lands.

Examples of the Commercial Fisheries Division research on technology is Burwen et al. (2010), on genetics is Habicht (2019), on pathology in support of enhancement is Purcell et al. (2018) on ecology is Loewen and Baechler (2014) on population dynamics is Matter and Tyers (2019). The Sport Fish Division has published reports on the value of recreational fishing Southwick et al. (2008). Examples of The Division of Subsistence research on the history, social-economic values and current use of salmon for subsistence Sill et al. (2019).

An example of The Alaska Seafood Marketing Institute supported research on economics is McDowell (2017). An example of the University of Alaska Institute of Social and Economic Research on economics is Knapp (2011). An example of the Commercial Fishery Entry Commission research on the optimum number of permits that should be issued for a fishery is Schelle *et al.* (2004).

An example of the University of Alaska research in ecology is Adkison (2010). An example of research conducted at the University of Washington on biology is Clark *et al.* (2015).

An example of the National Marine Fisheries Service Auke Bay Laboratory research in early marine life history of salmon is Murphy *et al.* (2017), on genetics and stock identification Kondezla et al. (2016) and on environmental science and pollution is Farrow *et al.* (2016).

An example of the research conducted by the USFWS on production and habit in Alaska is Tanner and Suresh (2014).

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.

<Insert evidence>

The ADFG Divisions of Commercial and Sport Fisheries take the primary lead on determining the status of salmon stocks. 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. 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. The Habitat Division performs research to monitor or evaluate the potential effects of development projects . The Sport Fish Division strategic plan prioritizes habitat research. The Sport Divisions also operates the Kachemak 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, rapid loss of coastal glaciers and coastal uplift. When evaluating stock status, ADFG research staff have access to a wealth of data collected and analysed by a number of other state, federal and non-profit sources as described below.

The primary goal of the North Pacific Anadromous Fish Commission's Science Plan is to understand variations in Pacific salmon productivity in a changing climate. Research objectives include: (1) improve knowledge of their distribution, growth and survival in the ocean (current status); (2) increase understanding of the causes of variations in Pacific salmon and steelhead trout production (mechanisms); and (3) anticipate future changes in the production of Pacific salmon and steelhead trout and the marine ecosystems producing them (e.g., modelling).

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, transportation and energy projects. The HCD focuses on activities in habitats 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. NOAA also administers the Pacific Coastal Salmon Recovery Fund 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.

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. The University of Alaska's Climate Research Center conducts basic climate research useful for understanding potential impacts on aquatic systems.

The North Pacific Research Board (NPRB) 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 Program, 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 Project 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

Examples of ADFG's research on salmon stock status is shown in Clause 4. Examples of research in environmental science is discussed in Clause 5 the extensive reporting on to estimate escapements and to set goals is explained in Clause 6.

An example The Habitat Division's research to evaluate the potential effects of development projects is Brewster (2016). The Sport Fish Division strategic plan that prioritizes habitat research is ADFG- SF (2015).
An example of the HCD focuses on activities in habitats is NOAA (2013).

An example of the U.S. Fish and Wildlife Service work on climate change is Prucha et al. (2013). An example of Alaska's Climate Research Canter's work to understanding potential impacts on aquatic systems is Wendler et al. (2015).

Examples of the research carried out by the NPAFC include a synopsis of research on production of salmon in a changing climate (NPAFC 2016)

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 two international organizations that support and encourage research on salmon in and around Alaska to ensure optimum utilization.

The North Pacific Anadromous Fish Commission (NPAFC) promotes conservation and sustainability of anadromous stocks and 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 and a Northern Fund to help support research and enhancement.. The Commission and Panels meet two times a year. The treaty process provides for policy guidance by sanctioning Panels to address harvest management issues of shared stocks in each covered fishing area and for Joint Technical Committees to provide annual stock assessments. The Yukon River Panel was established as Attachment B, Annex IV, Chapter 8, Pacific Salmon Treaty to develop and implement agreed research and management programs for shared salmon resources of the Yukon River. The Yukon Panel acts independently from other annexes under the Pacific Salmon Treaty.

There is an extensive library of documents available explaining the processes followed for both the NPAFC and PSC available on their web sites at https://npafc.org/ and https://www.psc.org/. An example of the annual reports of the NPAFC is NPAFC (2018b). An example of the annual reports of the PSC is PSC (2018). Likewise, there is an extensive library of technical documents, an example of PSC documents is PSC-JCTC (2019) and an example from the NPAFC is Akenhead et al. (2019).

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

As described in Clause 5.3 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.

There is an extensive and up-to-date library of technical reports written by the technical committees of the PSC and NPAFC available on their web sites noted in Clause 5.3. An example of PSC documents is PSC-JCTC (2019) and an example from the NPAFC is Akenhead et al. (2019).

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

Alaska Statute 16.05.815 (Confidential Nature of Certain Reports and Records) requires strict confidentiality of an individual fisher's sales data. A fisher's data is protected and may not be released to the public. As a working rule, ADFG's policy is that if three or fewer fishers report sales within a fine scale time, area strata, the data will be redacted from public reports.

There are processes 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. The PSC has established A Data Sharing Technical Committees to compile and evaluate stock assessment data also with representative of all participating agencies.

That confidentiality requirements are maintained is evident in the reports of the PSC and online data available through the PSMFC. These reports and databases only have aggregated catch data in large blocks of time and space such as an entire district's catch for a week. There are no individual records of sales in their data sets.

Evidence of maintaining strict confidentially is often observed at Board of Fish meetings when a proposal seeks to place some kind of regulation on a small geographic location and the ADFG cannot release catch data because three or fewer fishermen have reported catches in that area, see for example Weiland et al. (2003). Evidence of the PSMFC efforts can be seen at http://www.psmfc.org/program/regional-mark-processing-center-coded-wire-tag-rmpc?pid=17). The report of the PSC's Joint Committee on Data Sharing (PSC-JTCDS 1989) explains the process used and an example of the work completed as a result of data sharing is a report of the Chinook Technical Committee PSC-JCTC (2019).

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 Statewide 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.

The Policy for the Management of Sustainable Salmon Fisheries (AAC 39.222) sets out (among other things) that salmon fisheries shall be managed to allow escapements within ranges necessary to conserve and sustain potential salmon production and maintain normal ecosystem functioning.

The Alaska Board of Fisheries has the authority under 5 AAC 39.200 to establish management plans that provide ADFG guidelines to be followed when making in-season management decisions regarding the state's subsistence, commercial, sport and personal use fisheries. The primary goal of these management plans is to protect the sustained yield of the state's fishery resources while at the same time providing an equitable distribution of the available harvest between various users.

The Policy for Statewide 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. 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 Board of Fisheries may determine it is appropriate to establish a optimum escapement goal (OEG). If the board establishes an OEG, it must provide an explanation of the reasons, and with the assistance of the ADFG an estimate of expected differences in production relative to maximum sustained yield.

5. The Board of Fisheries may also establish an in-river escapement goal to provide for harvest in addition to escapement.

A variety of methods are used to develop escapement goals (Munro 2018). 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 Clark et al. 2014).

3. Risk Analysis: Risks 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 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 (see for example 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 Board of Fisheries 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 sustained escapement threshold (SET).

Among other things, the Sustainable Salmon Policy (5AAC 39.222) requires fisheries be managed in a precautionary manner to allow 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. There are approximately 295 active salmon stock escapement goals in the state.

The ADFG publishes a summary of statewide salmon escapement goals, the method used to establish those goals and the actual escapements in relation to those goals for the last ten years (Munro 2018). Escapement goals may be established for individual stocks when stock-specific catch and escapement data are available. Bristol Bay Sockeye Salmon 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 are 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.* 2019).

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). 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.

As stated in 6.1 ADFG has established a comprehensive program to estimate escapement goals. That process is based on methods for estimating the catch by all user groups (see clause 4) and escapement. Importantly, catch, catch per unit of effort and escapements are collected in real time and for comparison with historic fishery performance in relation to run timing.

The methods used to estimate escapement vary greatly depending upon local circumstances. For instance, counting towers are typically used for Sockeye Salmon in Bristol Bay, weirs are common for Sockeye Salmon in Kodiak, Chignik and Southeast. Mark recapture programs are common for Chinook Salmon in Southeast. Foot surveys are commonly used for Coho Salmon in Southeast. Aerial surveys are the normal practice for Pink and Chum salmon throughout the state. Sonar is used in large occluded rivers such as the Yukon, Copper and Kenai. A complete listing of the method used for each escapement goal is found in Munro (2018). For systems that have developed BEG's such as Sockeye Salmon stocks in Bristol Bay and Westward Region and several Chinook Salmon stocks in the Yukon and Southeast Region there is a comprehensive program for estimating the age composition of both the catch and escapement.

There is a mix of programs to estimate the stock specific catch in mixed stock fisheries. Coded microwire tags are used extensively in Southeast and Yakutat for Chinook and Coho salmon. Thermal marks on otoliths are used for Pink Salmon in Prince William Sound and for Chum Salmon in Southeast. Genetic stock Identification has/is used for Chinook Salmon in Cook Inlet and Southeast and for Sockeye Salmon in Cook Inlet, Bristol Bay and Southeast.

Environmental data such as river discharge and water quality are key observations for helping to interpret escapement data based on aerial and foot surveys.

The data needed for in-season management of the fisheries is obtained, synthesized and interpreted in real time by area research and management staff. Emergency Orders are issued to describe the area, time and gear allowed for fishing if surplus production is identified.

The Statewide summary of escapements for the last 10 years in relation to goals (Munro 2018) shows that through 2017 (the most recent years summary available) that for 17% of the stocks the minimum goal was not achieved; this is within the range (11- 31%) of what has been observed in recent years. Also, in 2017, 50% of the stocks assessed had escapements that were within the goal range (or above the lower bound if a lower-bound SEG); this too is typically of recent years. Last, 33% of established goals were exceed in 2017.

Annual Management Reports filed after each fishing season detail the management strategy going into the season, detailed explanations of the rational used for issuing emergency orders and details of the catch and escapements (e.g. Salomone et al. 2019; Wilburn and Renick 2018). Annual management reports may be supplemented with annual research papers that explain how specific estimates of escapement, age or stock compositions were estimated (e.g. Barclay 2017; Eskelin and Barclay 2018; Kerkvliet and Booz 2018). Every three years these data are synthesized to re-evaluate escapement goals so that productivity changes can be detected and goals revised, if appropriate, for example Scaberg et al (2019).

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 statewide 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 ADFG will, as needed, exercise its statutory responsibility to manage the time and area where fishing is allowed so as to achieve those escapement goals. 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 stock of concern.

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 Board of Fisheries 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 Board of Fish allocation decisions. When this occurs, the Board develops specific management plans through its open public regulatory process. There are over 100 BoF salmon management plans that detail the specific management actions that are to be taken to ensure that management targets are met[33]. The public Board of Fish process that permits individuals to submit regulatory proposals, to testify, present data and management options ensures that diverse points of view can be considered when crafting management plans. The authority, process and annual schedule for the BoF can be found at: http://www.adfg.alaska.gov/index. And schedule used cfm?adfg=fisheriesboard.main.

A detailed example of a BoF management plan is the Situk-Ahrnklin Inlet and Lost River King Salmon Management Plan (5AAC 30.365). This plan 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 plans call for a stepwise procedure for closing/opening the fisheries depending upon the projected run size of Chinook Salmon as follows:

- 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, 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

[33] http://www.adfg.alaska.gov/index.cfm?adfg=fishregulations.commercial for ADFG commercial fish regulations by area/

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; and
- 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.

In 2019 the BoF addressed management of the salmon fisheries in the Artic-Yukon-Kuskokwim Region (AYK) and for the Chignik, Alaska Peninsula and Aleutian Islands areas. For the AYK meeting, A DFG developed 14 written reports and 7 oral reports. Examples of reports presented at these meetings include the annual management report for the Yukon (Estensen *et al.* 2018) a report on the stock status and action plan for Chinook Salmon in Norton Sound (Leon 2018), recommendations for escapement goals in the region (Liller and Savereide 2018). In the Chignik, Ak Peninsula and Aleutian Is areas ADFG developed 10 written and 7 oral reports. Examples include: the annual management report for the North Peninsula (Johnson and Murphy 2019), a review of escapement goals in the Chignik area (Schaberg et al. 2019) and a review of the stock composition of Sockeye Salmon caught in western Alaska fisheries (Dann *et al.* 2012). This level of reporting on stock status, goal setting and annual management actions is typical at BoF meeting.

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.

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 first issue, Chinook (king) salmon have been returning in fewer numbers to many rivers across Alaska since 2007, requiring painful restrictions on fisheries that harvest these stocks. Chinook salmon has a life span of 3 to 8 years, with 5 and 6 year old fish being especially important to the reproductive health of a Chinook salmon population having nearly all of the female fish.
In October of 2012, the Alaska Department of Fish and Game hosted a research symposium to "identify key knowledge gaps and assemble a list of research priorities" to better understand the factors affecting Chinook salmon abundance in Alaska. Following this symposium, a team of department scientists and biologists, in collaboration with federal agencies and academic partners, developed a research plan whitch recommended studies to address the questions identified in the gap analysis. The first phase in the implementation of this plan was funded by the Alaska Legislature in 2013. The core of the plan is stock specific, life history-based research focused on 12 indicator stocks from across Alaska. For more information see Chinook salmon Stock Assessment and Research Plan at https://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative.main.

Research efforts under this plan fall into four general categories.

- Stock assessment programs targeting specific knowledge gaps on individual, indicator stocks.
- Compilation of local and traditional knowledge regarding Chinook salmon trends in abundance, distribution, and physical appearance.
- Research on juvenile Chinook salmon in the near shore marine environment, which is thought to be a critical life history stage, and one little studied.
- Life history process studies intended to examine a range of environmental factors affecting Chinook salmon growth and productivity.

The original plan was to allocate $30 million covering research over a five-year period. In response to this plan, the legislature appropriated $15 million to this effort in two separate appropriations and money was mostly allocated to adult and juvenile stock assessment studies, various subsistence studies, marine stock composition and harvest studies, the University of Alaska Fairbanks for ecological process studies, genetic stock composition and harvest studies, and programmatic support, in that order. In total the initiative funded over three dozen specific research projects through this effort. The department recognizes the public has a keen interest in the results of this work and final publications are available on the above listed website and are continuing to be updated as they become available.

Fishery closures and restrictions have been necessary in many areas in the effort to pass as much of the Chinook run to the spawning grounds as possible. This unfortunately results in great burdens on Alaskans who rely on Chinook salmon for food, income and recreation. The State of Alaska recognizes the hardships that management restrictions have caused subsistence, personal use, commercial, and sport fishermen, as well as guides, local fish processors, and other local and regional businesses.

With few exceptions, since 2007, Chinook salmon runs across the state have been well below the long term average. As a result, strict fishery management actions have been necessary to try and meet escapement objectives, and many fisheries have been curtailed to protect Chinook salmon. Even so, in some cases Chinook runs have been so poor that even with complete closures and no harvest at all not enough fish returned to make escapement objectives.

In 2018, runs improved for several stocks across the state and in general the forecasts for 2019 are for continued increases; however, some systems are still experiencing below average production with continued poor forecasts for 2019. The returns of precocial "jacks" has recently taken an upturn, some evidence that the brood (parent) years represented by these fish are experiencing improved production

Numerous physical and biological factors can influence production and survival of Chinook salmon in the freshwater and marine phases of their lifecycle. Research through this initiative suggests that most of the Chinook salmon mortality is occurring in the first few months of life at sea and freshwater survival has been average or even above average. Additional research is needed to gain a better understanding of the primary factors that are affecting Chinook productivity and abundance especially in the marine environment. Fluctuations in the survival of Chinook salmon smolt can significantly alter run strengths at local, regional, and statewide scales. For instance, the long-term marine survival for four Southeast stocks has been about four percent, meaning for every 100 smolt that emigrate to sea, four fish will return as adults over the next one to five years. Research has shown that during the recent period of poor production, marine survival has dipped below one percent. This decrease in marine survival, even in the face of some very good freshwater production in several systems, has been driving the downturn in overall adult production. The exact mechanisms behind the increased mortality rates are unknown, but environmental conditions such as precipitation, air and ocean temperatures and water currents, to name a few, are believed to affect juvenile salmon survival.

In addition to the Chinook Salmon Research Initiative funds, in 2012 the State of Alaska requested fishery federal disaster determinations from the U.S. Secretary of Commerce for Chinook salmon fisheries on the Yukon and Kuskokwim Rivers, and Cook Inlet. In September 2012, the Secretary of Commerce, after reviewing information from the state, determined that a commercial fishery failure due to a fishery resource disaster exists for three regions of the Alaska Chinook salmon fishery. As a result, in 2014 Congress appropriated $20.8 million for fishery disaster relief under the Magnuson-Stevens Fisheries Management and Conservation Act.

In 2014, $7.8 million of the appropriated funds went to Cook Inlet, Yukon, and Kuskokwim commercial salmon harvesters. In 2015, the National Oceanic and Atmospheric Administration distributed the remaining $13 million to a variety of sport and commercial users. Broken down further, $4.5 million went to the recreational fishing sector and related businesses for loss of income, $6.4 million for salmon research in the Yukon/Kuskokwim region, $1.1 million for salmon research in Cook Inlet, and $700,000 to salmon buyers in the Cook Inlet region.

In the Southeast region, each year around $5 million is provided by the U.S. federal government, the Pacific Salmon Commission Northern Endowment Fund and the State of Alaska for implementation of the Pacific Salmon Treaty and Chinook salmon research and management specifically.

With regard to the concern over hatchery pink salmon and chum salmon in PWS and hatchery Chum salmon in Southeast Alaska, in 2011 the Alaska Department of Fish and Game (ADF&G) organized a science panel composed of current and retired scientists from ADF&G, University of Alaska, aquaculture associations, and National Marine Fisheries Service to discuss ways to systematically evaluate the interaction between wild and hatchery-produced salmon in Alaska. The science panel designed a long-term research project to address three top priority research questions:
1. What is the genetic stock structure of pink salmon in Prince William Sound (PWS) and chum salmon in Southeast Alaska (SEAK)?
2. What is the extent and annual variability in straying of hatchery pink salmon in PWS and chum salmon in PWS and SEAK?
3. What is the impact on fitness (productivity) of wild pink and chum salmon stocks due to straying of hatchery pink and chum salmon?

The following is a short description of progress made to through 2019 to provide answers to these questions.

Population Structure – Laboratory analysis of the genetic stock structure for both the odd-year and even-year runs of pink salmon populations in PWS using DNA microsatellites has been completed. A report of the current population structure of odd-year lineage (2013, 2015) is available online and the results on the even-year population structure (2014) were presented in May 2018 at the American Fisheries Society meeting in Anchorage; the report is under review. As observed elsewhere in their range, variation among odd-year populations was larger than among even-year populations. In preliminary comparisons of historic (mid-1990's) and contemporary samples, populations are genetically similar across time (10+ generations), but not identical. Among odd-year collections, early and late spawners within some creeks showed genetic differences. Population structure in PWS is comparable to structure found in wild pink salmon elsewhere in its geographic range. A similar analysis of even-year pink salmon collections is currently in progress and should provide more historic perspective on population structure in the presence of hatchery production.

Straying Studies – In a systematic manner, following a robust design, the project sampled otoliths from spawned-out fish in representative chum salmon streams in SEAK, and pink and chum salmon streams in PWS, to estimate the hatchery fraction in natural spawning populations on a district scale. Previous studies have documented strays in SEAK and PWS streams, but this is the first study designed to provide an unbiased estimate for an entire region. Three years of field work focused on the variability and extent of hatchery pink and chum salmon straying in PWS, and chum salmon straying in SEAK were completed in 2015. The sample results are available online and two separate manuscripts have been completed in 2019 to publish results (Table 1 and Figure 1) in peer-reviewed journals.

Things that we can infer from work to date:
1. Hatchery proportions of pink salmon in streams across PWS ranged from 4 to 10% in the two odd years and was 14% in the even year and was highly variable among streams and districts. The distribution of hatchery fish across districts was consistent across years, with higher proportions near hatcheries similar to previous observations.
2. Hatchery proportions of chum salmon in streams across PWS ranged from 3 to 9% across the three years and was highly variable among streams and districts. The distribution of these hatchery fish across districts was fairly consistent across years, with higher proportions in the districts where fish are remotely released and/or few wild fish spawn.
3. Hatchery proportions of chum salmon in streams across SEAK ranged from 3 to 6% across the three years. The stream with the highest hatchery proportion (87% in one year) was proximate to a hatchery, while more distant streams had hatchery proportions below 2%.

Estimating Production in PWS – Ocean sampling in the entrances to PWS has provided an un-biased estimate of the hatchery fraction in the total return of pink and chum salmon. This information, when combined with estimates from the streams and known removals through harvest and hatchery take provided a means to estimate:
1) the number of natural-origin salmon spawning in streams,
2) the number of hatchery salmon spawning naturally (Hatchery strays),
3) total production of hatchery salmon (including strays; Hatchery run), and
4) total production of natural salmon (excluding hatchery strays; Natural run).

With knowledge of the total number of fish spawning in streams and the total return of natural fish, it is possible to estimate the return per spawner, an important measure of productivity and fitness (**Error! Reference source not found.**). It is also possible to estimate the proportion of the hatchery return that spawned naturally. These results were included in the manuscript submitted to a peer-reviewed journal in 2019.
The following table can be found in the ADFG report,
http://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/research/ak_hatchery_research_project_synopsis_2019.pdf

Table 6. Estimated production of pink and chum salmon in Prince William Sound

	Estimated Run sizes		Estimated Harvest Rates	
Species Year	Hatchery	Natural	Hatchery	Natural
Pink salmon				
2013	69,890	33,100	0.99	0.53
2014	42,760	6,960	0.98	0.26
2015	77,340	63,530	0.95	0.40
Chum salmon				
2013	3,010	1,140	0.98	0.22
2014	1,230	1,180	0.96	0.21
2015	2,480	1,130	0.95	0.21

1. Between 1% and 5% of the pink salmon hatchery returns, and 2% and 5% of the hatchery chum salmon returns in PWS during the three study years spawned naturally. Preparations are underway to publish run reconstruction and straying results.

2. These results indicate that natural populations in PWS continue to be productive in the presence of over 18 generations of pink salmon of straying from large scale hatchery production.
3. The natural production of PWS pink salmon has been particularly robust in the three brood years represented in the work so far: 17 million spawners in 2013 produced an estimated natural run of just under 64 million return, a 4 to 1 return-to-spawner ratio.
Comparison of harvest rates indicates that ADF&G achieved its policy of preferential harvest of hatchery produced fish (>90%) and sustainable harvest of naturally produced fish (<60%) in 2013-2015 even in the face of large hatchery production.

Fitness Studies – This ground-breaking work is based on first identifying the origin (hatchery/natural using otolith marks) and genotype of potential parents spawning in study streams and subsequently identifying parental origin (hatchery/natural) of returning fish using genetic pedigree reconstruction. This information will allow estimation of the relative reproductive success (fitness) of hatchery and naturally produced fish spawning in streams. Evaluation at this scale is important because it will provide insight into the ecological and genetic consequences of hatchery strays on fitness of natural spawners at the watershed (ie. Stockdale and Hogan creeks) scale. The field crews have completed 7 years of intensive sampling directed toward studies of the relative fitness of hatchery and natural fish in 5 pink salmon study streams in PWS and 4 chum salmon study streams in SEAK. Collectively 237,145 salmon have been sampled for this research through 2019. The laboratory analysis using single nucleotide polymorphism (SNP) genetic markers to determine pedigrees for pink salmon in PWS began in 2018. The first step in this analysis was refining methods to use cost effective sequencing technology to screen samples taken from carcasses. Pedigree data for two full generations (2 brood years for both odd and even-year runs) in 2 streams completed in spring of 2019. Generally, hatchery fish produced fewer progeny than natural fish during this first generation, but variation was observed by sex, stream, and year. Modeling has been employed to better understand how differences in where and when hatchery- and natural-origin fish spawn affect fitness. Results were reported in the summer of 2019 to the funding entities that supported this portion of the project. This program encompasses additional years from these streams, additional streams, and an additional generation (grandparents), all of which will provide a better understanding of what is driving the observed variation and how to assess the impact on fitness of hatchery fish in the wild.

Funding – In 2015, a finance committee was formed comprised of hatchery operators, a processor representative, and the ADF&G commissioner's office and aquaculture section. This team has focused attention on maintaining the funding to meet the targeted research costs of $16.7 million necessary to complete the work intended to answer the fundamental questions about spawner fitness. The current State of Alaska budget precludes additional state funds, however 7 of Alaska's largest hatchery corporations (SSRAA, NSRAA, DIPAC, PWSAC, VFDA, KRAA, and CIAA) have combined to provide $353,500 for the coming year's work. Those funds in concert with existing funds, and the processor's requested contribution of $500,000 will provide for this year's field work. ADF&G will continue to provide considerable in-kind support. In 2016, ADF&G successfully secured funding from NOAA's Saltonstall Kennedy Grant Program ($250,000) and North Pacific Research Board ($289,000) to genetically analyze adult and offspring pink salmon from 2 streams in PWS over 2 brood years as part of the fitness study. In addition, NSRAA has received $275,000 in grants from the Pacific Salmon Commission to support sampling of chum salmon in the fitness streams in SEAK. To date, funding received in support of the project totals $10.263 million. Of this, the Seafood Processors Association has provided $2.994 million, PNP operators combined have provided $3.003 million, the State of Alaska appropriated $3.5 million, and $0.447 million is from grants. In 2019, $2.5 million from the 2016 Pink Salmon Disaster funds have been awarded to this project and this funding is earmarked to replace contributions, rather than adding to the total available.

Future –Field work for Questions 1 and 2 has been completed and portions have been submitted for publication in peer-reviewed scientific journals. While, the scope of work for the research project to address the fitness question (Question 3) was narrowed, there are still significant costs. The science panel considers the fitness studies to be the most important to long term understanding of hatchery-wild fish interactions. Some funding has been secured from federal grants (NPRB, SK, Northern Fund of the Pacific Salmon Commission, and the 2016 Disaster Relief) but continued funding for the remaining portion of this component of the project is currently being provided by fishermen through the hatcheries via additional cost recovery, as well as the processor community through a consensus agreement. It is particularly important that hatchery operators and processors continue their support of the project, both for financial reasons as well as showing a commitment to maintaining this ground-breaking research that is designed to directly address questions about the Alaska salmon hatchery program. Processors had initially committed to 5 years; we hope they will continue their same level of support for the remainder of the project. This project is expected to end in 2023 with the conclusion of the fitness analysis of chum salmon in SEAK. Additional information on this project is available at: http://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/research/ak_hatchery_research_project_synopsis_2019.pdf

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 conservations 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 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 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 requirements for gear (i.e. gillnet and purse seine 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 regulations[34].

[34] http://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 and beach seines 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 specifications[35].

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.

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.

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

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	2
Supporting clauses not applicable	4
Overall level of conformity	Full Conformance
Non Conformances	0

Summarized evidence:

10.1. Enforcement agencies and framework:

The Alaska commercial salmon fishery is managed primarily by ADFG, which regularly conducts in-season monitoring and surveillance of the fishing fleet at the area level[36] to ensure compliance with fisheries regulations[37]. Enforcement of fisheries-related statutes and regulations is conducted by Alaska Wildlife Troopers (AWT), a Division of the Alaska Department of Public Safety[38], that maintains and operates a large fleet of water- and aircraft to perform its mission[39]. ADFG Area Management Biologists also monitor the commercial salmon fishery in their area through aerial surveys and on-the-ground observations. They and their regional staff biologists are deputized law enforcement officers, trained to assist AWT with law enforcement activities[40]. Citizens can also report fish and wildlife violations in Alaska through AWT's Safeguard organization.[41] This enforcement approach is highly effective, as evidenced through daily dispatch reports issued by the AWT, which provide a remarkably transparent record of law enforcement that supports responsible execution of the Alaska commercial salmon fishery. These records are published online and readily accessible to anyone, through the Department of Public Safety's Daily Dispatch webpage[42].

10.2./10.3/10.4. Fishing permit requirements:

In 1973, Alaska Statute AS 16.43.140 established that, "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 Alaska's limited entry system, only legally permitted vessels can operate in commercial salmon fisheries[43]. Commercial fishing permits are issued and managed by the Commercial Fisheries Entry Commission (CFEC), whose mission is to promote conservation of Alaska's fishery resources and economic health of Alaska's commercial fisheries by controlling entry into commercial fisheries[44]. CFEC issues permits and vessel licenses to qualified individuals in both limited and unlimited fisheries, and provides due process hearings and

[36] https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmonareas
[37] https://www.adfg.alaska.gov/index.cfm?adfg=fishregulations.commercial
[38] https://dps.alaska.gov/AWT/Home
[39] https://dps.alaska.gov/AWT/Mission
[40] http://www.dps.state.ak.us/AWT/mission.aspx
[41] https://dps.alaska.gov/awt/safeguard
[42] https://dps.alaska.gov/dailydispatch/Home/
[43] http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.main
[44] https://www.adfg.alaska.gov/index.cfm?adfg=divisions.cfecmission

appeals for those individuals denied permits. A permit holder database and portal for permit application is accessible through CFEC's website.[45] Individuals must also apply for and maintain a state-issued Crewmember License to participate in Alaska commercial salmon fisheries.[46] In accordance with Alaska Statute 16.43.140, only state-permitted vessels can participate in Alaska commercial salmon fisheries. The CFEC maintains an online database of vessels permitted to participate in Alaska commercial salmon fisheries, organized by region and gear type.[47] The CFEC also maintains and publishes vessel census data, describing the number and types of vessels participating in Alaska commercial fisheries by census region.[48] These databases are publicly accessible and up-to-date. Supporting Clauses 10.3 and 10.4 are not applicable, because Alaska commercial salmon fisheries occur entirely within the State's jurisdiction and EEZ.

[45] https://www.cfec.state.ak.us/
[46] http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.main
[47] https://www.cfec.state.ak.us/pstatus/mnusalm.htm
[48] https://www.cfec.state.ak.us/fishery_statistics/vessels.htm

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 Conformance
Non Conformances	0

Summarized evidence:

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

Alaska's Fish and Game Code, codified through Alaska Statute 16.5, provides the legal framework for establishment and enforcement of regulations governing the state's commercial salmon fisheries[49]. Violations of fishing regulations result in strict penalties that can include fines, suspension of permit[50], imprisonment and seizure of catch, gear and/or vessel[51]. Commercial fishing regulations are enforced by ADFG and AWT, with support from the United States Coast Guard (USCG) and the National Marine Fisheries Service's Office of Law Enforcement[52]. Alaska Statute 16.5.150 formally authorizes ADFG employees, State police and others deputized individuals to enforce Alaska's Fish and Game Code[53]. When violations occur, penalties often serve to prevent additional violations directly through permit suspension, gear and/or vessel seizure. Alaska has established a demerit system associated with violations of fisheries regulations. This demerit system is described and codified by Alaska Statute 16.43.850[54], and associated penalties, up to and including permit suspension, are described and codified through Alaska Statute 16.43.860[55]. These penalties and fines are of adequate severity to reasonably discourage violation of commercial salmon fishery regulations in Alaska. Commercial catch of salmon in Alaska must be reported to ADFG through Fish Tickets or eLandings documentation, within 7 days of landing or first purchase of the resource[56]. As such, all legal commercial salmon catch in Alaska is reported to and tracked by the State. Sanctions for illegal commercial harvest of salmon in Alaska are severe, established through Alaska's Fish and Game Code (Alaska Statute 16.5), with detail provided in Statutes 16.43.850–16.43.880[57].

[49] http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05.htm
[50] http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05/Section710.htm
[51] http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05/Section723.htm
[52] https://www.fisheries.noaa.gov/about/office-law-enforcement
[53] http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter05/Section150.htm
[54] http://touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter43/Section850.htm
[55] http://touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter43/Section860.htm
[56] http://www.adfg.alaska.gov/index.cfm%3Fadfg%3Dfishlicense.fishtickets
[57] http://www.legis.state.ak.us/basis/Bill/Text/20?Hsid=HB0285D#

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

ADFG and NOAA Fisheries regularly monitor and model oceanographic and biological conditions that influence salmon populations. They share and incorporate data into salmon survival and abundance forecasts that are used by state fisheries managers to set goals and regulations. This process is consistent with Alaska's Policy for the Management of Sustainable Salmon Fisheries[58], which recognizes the influence of variable environmental conditions on Alaska's salmon stocks; stating, "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 Policy further states that, "in formulating fishery management plans designed to achieve maximum or optimum salmon production, the board and department must consider factors including environmental change, habitat loss or degradation, data uncertainty, limited funding for research and management programs, existing harvest patterns, and new fisheries or expanding fisheries". Salmon harvest forecasts that incorporate biological, oceanographic and other environmental data are regularly posted online and updated by NOAA[59] and ADFG[60].

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, and research designed to evaluate fisheries impacts on the environment, 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

This policy is codified by Alaska Statutes 16.05.841-16.05.871, and implemented through regulations enforced by ADF&W that protect the freshwater habitats of anadromous fishes, and research that evaluates potential environmental impacts.

[58] http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2016-2017/jointcommittee/5aac39.pdf
[59] https://www.fisheries.noaa.gov/alaska/sustainable-fisheries/forecasting-pink-salmon-harvest-southeast-alaska
[60] https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmonforecast

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

According to the NPFMC's Alaska salmon Fisheries Management Plan, bycatch of non-target species in Alaska salmon fisheries is negligible. This regulatory document states that "Chinook salmon fisheries in Alaska have some bycatch associated with them. Generally, the numbers of other species taken during directed Chinook fishing is small and not considered a conservation issue. The most important bycatch issue in the commercial and recreational hook-and-line fisheries is the capture of undersized Chinook salmon that must be released." Indeed, bycatch in Alaska's commercial salmon fisheries primarily involves catch of non-target salmon stocks, which are reported to the State through the Fish Tickets or eLandings reporting systems.

12.7. Role of the "stock under consideration" in the ecosystem

Alaska's Policy for the Management of Sustainable Salmon Fisheries directs that, "the role of salmon in ecosystem functioning should be evaluated and considered in harvest management decisions and setting of salmon escapement goals"[61]. In accordance with this policy, ADFG establishes escapement goals for major salmon populations throughout their spawning distribution, and monitors actual escapement through aerial surveys, sonar-based counts and other methodologies[62].

Alaska's commercial salmon fisheries are enhanced through the production of hatchery fish[63]. Hatchery Permits are required for the construction and/or operation of a private nonprofit (PNP) salmon hatchery in Alaska. Hatchery permits specify the species and number of salmon than can be incubated at the hatchery, as well as the number released, release sites, broodstock sources, and other conditions of operation. ADFG considers requests for increased hatchery production by asking if an increase can be managed with consideration of potential risks to wild stocks, and ADFG administrates and conducts research to address such uncertainties[64].

At the federal level, NOAA Fisheries conducts research to aid state and federal fishery managers in making informed science-based decisions to help sustain fish populations, fisheries, and fishing communities in accordance with the NOAA's Alaska Fisheries Science Center's Science Plan and the NOAA Annual Guidance Memo. NOAA marine ecosystem monitoring is conducted in several regions, including the Eastern Bering Sea, the Gulf of Alaska, the Arctic and Aleutian Islands. Their research findings contribute to the Alaska Marine Ecosystem Status report[65], which summarizes and synthesizes historical and possible future effects of climate and fishing on large marine ecosystems.

Ecosystem reports, which include considerations of the condition and abundance of salmon in marine environments, and effects from commercial fisheries, are regularly published by NOAA Fisheries for the Eastern Bering Sea[66], Aleutian Islands[67], Gulf of Alaska[68] and Arctic[69] regions. ADFG also regularly publishes information regarding the role of salmon, salmon enhancement and effects of commercial fisheries on natural ecosystems[70].

[61] http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2016-2017/jointcommittee/5aac39.pdf
[62] http://www.adfg.alaska.gov/FedAidPDFs/FMS18-04.pdf
[63] https://www.adfg.alaska.gov/static-f/fishing/PDFs/hatcheries/2013_ak_hatcheries.pdf
[64] https://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.main
[65] https://www.fisheries.noaa.gov/resource/data/alaska-marine-ecosystem-status-reports-archive
[66] https://access.afsc.noaa.gov/REFM/REEM/ecoweb/pdf/2019EBSecosys.pdf
[67] https://access.afsc.noaa.gov/REFM/REEM/ecoweb/pdf/2018ecosysAI-508.pdf
[68] https://access.afsc.noaa.gov/REFM/REEM/ecoweb/pdf/2019GOAecosys.pdf
[69] https://archive.fisheries.noaa.gov/afsc/REFM/Docs/2015/ecosystem.pdf#nameddest=Arctic
[70] https://www.adfg.alaska.gov/index.cfm?adfg=afrb.salmon

12.8. Pollution – MARPOL.

MARPOL 73/78 (the "International Convention for the Prevention of Pollution from Ships") is one of the most important treaties regulating pollution from ships. Six Annexes of the Convention cover the various sources of pollution from ships and provide an overarching framework for international objectives. In the U.S., including Alaska, the Convention is implemented through the Act to Prevent Pollution from Ships (APPS). Under the provisions of the Convention, the United States can take direct enforcement action under U.S. laws against foreign-flagged ships when pollution discharge incidents occur within U.S. jurisdiction. When incidents occur outside U.S. jurisdiction or jurisdiction cannot be determined, the United States refers cases to flag states, in accordance with MARPOL. These procedures require substantial coordination between the Coast Guard, the State Department, and other flag states. Different regulations apply to vessels, depending on the individual state.

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

Essential fish habitats (EFHs) for salmon in Alaska's marine and intertidal waters have been designated and are identified in the Fishery Management Plan (FMP) for Salmon Fisheries in the EEZ off Alaska[71]. ADFG maintains a Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes[72], that includes freshwater habitats that are essential to the persistence of various salmon species targeted by the commercial fisheries. According to the FMP, there is "no evidence suggests salmon troll, drift gillnet, or purse seine gear impacts habitat. The activity targets only adult salmon in the water column, successfully avoiding any significant disturbance of the benthos, substrate, or intertidal habitat." And while commercial salmon fisheries are generally excluded from freshwater habitats, in many cases, hatcheries that enhance harvest by these fisheries do occur along freshwater habitats. Appropriately, construction and continued operation of salmon hatcheries in Alaska involves a strict approval and permitting process[73], administrated by ADFG, that explicitly considers and aims to limit hatchery impacts to surrounding habitats. Approved gear used in Alaska commercial salmon fisheries has little-to-no impact on essential habitats, and hatcheries that enhance these fisheries are subject to a strict permitting process administrated by ADFG that considers and mitigates potential habitat impacts. These approaches appear to be appropriate and effective at limiting significant habitat impacts from Alaska's commercial salmon fisheries.

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.

Research focused on social aspects of commercial salmon fisheries in Alaska has been supported with funds from a variety of sources. Recently, the (U.S.) federally administrated Saltonstall-Kennedy Program funded the Alaska Fisheries Development Foundation (AFDF) to conduct research and publish a report[74] describing social responsibility compliance aboard small commercial fishing vessels in Alaska, which included data from surveys of the commercial salmon fleet. Their findings suggested a high degree of safety compliance and social responsibility aboard small commercial fishing vessels in the state, but also found that some international standards were not particularly applicable to small craft fisheries in Alaska. Based on their findings, AFDF developed a list of priority criteria to evaluate social responsibility aboard commercial fishing vessels that included: no slave labor, no child labor (except for nearshore fishing families, no discrimination, reasonable working/rest hours, required documentation and compliance with immigration and human rights policies.

[71] https://www.fisheries.noaa.gov/management-plan/alaska-salmon-fisheries-management-plan
[72] https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.home
[73] https://www.adfg.alaska.gov/index.cfm?adfg=hatcheries.hatchery
[74] https://www.afdf.org/wp-content/uploads/Social-Responsibility-on-Vessels-in-Alaska-High-Res-FINAL-2019-03-08-WEB.pdf

Despite high compliance with safety precautions, commercial salmon fishing can be a dangerous occupation. The U.S. Center for Disease Control attributed the highest fatality rate among commercial fisheries in Alaska to salmon gillnet fisheries during years 2010-2014[75], though no fatalities were reported in any sector of Alaska commercial salmon fisheries in the following year[76]. Non-fatal social impacts from salmon fisheries have also been researched. A recent study by Eckert et al. (2018)[77] evaluated health risks experienced by commercial salmon fishermen participating in Bristol Bay gillnet fisheries, and found that they experienced higher prevalence of hearing loss and sleep apnea. On the other hand, Knapp et al. (2013) demonstrated that sport and commercial salmon fishing in Bristol Bay provide considerable benefits to local communities, by supporting a $1.5 billion industry that ultimately employs nearly 14,000 people[78].

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

Non-target salmonid species tend to be the stocks most often incidentally affected by commercial salmon fisheries in Alaska. Management plans for Alaska's commercial salmon fisheries set goals and measures to minimize incidental take of such non-target species.

For example, the 2019 Southeast Alaska Drift Gillnet Fishery Management Plan states,

- "The [Pacific Salmon Treaty] PST requires the harvest of natural stocks of chum salmon returning to Portland Canal streams be minimized to ensure adequate escapement of these stocks. As a result, no fishing should be expected in Section 1-A for Portland Canal chum salmon."
- "Management goals for the District 6 and District 8 drift gillnet fisheries for the 2019 season are as follows:

1. Achieve Chinook salmon escapement goals;
2. Achieve the Stikine River sockeye salmon escapement goals while harvesting the Alaska share of Stikine River sockeye salmon;
3. Achieve sustainable spawning escapements of sockeye salmon in local Alaska systems;
4. Achieve pink salmon spawning escapement objectives in Districts 6 and 8;
5. Manage the District 6 and District 8 drift gillnet fisheries consistent with the provisions of the PST;
6. Manage the directed Stikine River Chinook salmon drift gillnet fishery in accordance to the District 8 King Salmon Management Plan(5 AAC 33.368) and associated closed water regulations (5 AAC 33.350 (i)(3-9))."

Commercial salmon management plans for other regions and gear types include similar escapement and conservation goals associated with incidental catch of non-target species. Escapement goals and estimates are regularly reported by ADFG . Where ADFG recognizes a stock of concern, in response to chronically low escapement, new protective regulations are established. For example, ADFG implemented new regulations in 2019 to reduce incidental catch of several Chinook salmon stocks, closing multiple areas to commercial troll, purse seine and gillnet fisheries.

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

NOAA Fisheries set limits for allowable incidental take of marine mammals, and requires that all Category I and II

[75] https://www.cdc.gov/niosh/docs/2017-171/pdf/2017-171.pdf
[76] https://www.adfg.alaska.gov/index.cfm?adfg=wildlifenews.view_article&articles_id=757
[77] Eckert et al. (2018) https://www.tandfonline.com/doi/abs/10.1080/1059924X.2018.1425172?journalCode=wagr20
[78] https://iseralaska.org/static/legacy_publication_links/2013_04-TheEconomicImportanceOfTheBristolBaySalmonIndustry.pdf

fisheries (see Supporting Clause 12.2.4) report serious interactions with marine mammals. In general, the MMPA prohibits killing or injuring marine mammals except under certain circumstances. For example, it provides an annual exemption for accidentally killing or injuring marine mammals—referred to as incidental take—during commercial fishing operations. However, this exemption does not include marine mammal stocks listed as endangered or threatened under the ESA. To address incidental take of ETP and other marine mammal species, NOAA Fisheries has developed Take Reduction Plans and Teams to develop goals and means to reduce impacts from fisheries[79].

With respect to ETP bird species in Alaskan waters, the Steller's eider is found only in Southwest Alaska (Yukon, Kuskokwim, Alaska Peninsula and Bristol Bay areas); spectacled eiders are found in the central Bering Sea, south of St. Lawrence Island, where they remain until March or April, then migrate to Norton Sound during molting period; and short-tailed albatross are found throughout offshore areas of the Bering Sea and Gulf of Alaska and occasionally in waters of the Alaska Peninsula, and Kodiak Island. Assessments based on available data do not indicate frequent encounters with or associated mortality from Alaska's commercial salmon fisheries. Accordingly, the USFWS does not require any Alaska salmon fishery to maintain incidental take permits for these species, nor do the recovery plans require or recommend any mitigating actions by salmon fisheries where these seabirds occur.

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.

NOAA Fisheries has clearly defined Essential Fish Habitat for salmon in Alaska's marine and estuarine environments[80], and ADFG maintains a catalog of freshwater habitats used by anadromous fishes[81]. These resources are used by state and federal managers to limit and prevent serious impacts to essential salmon habitat in Alaska, in accordance with mandates specified through Alaska's Policy for the Management of Sustainable Salmon Fisheries. It is worth noting that gear used in Alaska commercial salmon fisheries has little-to-no impact on essential habitats, and hatcheries that enhance these fisheries are subject to a strict permitting process administrated by ADFG that considers and mitigates potential habitat impacts. These approaches appear to be appropriate and effective at limiting significant habitat impacts from Alaska's commercial salmon fisheries.

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

Salmon are widely recognized as important species in the natural foodwebs of Alaska's marine, aquatic and terrestrial ecosystems. Significant management actions have been implemented to limit direct and incidental take of Chinook salmon by Alaska's commercial salmon and groundfish trawl fisheries. These actions have undoubtedly offset harvest impacts to Chinook salmon, which is a preferred prey species of resident killer whales in Alaska. That said, expanding populations of (protected) marine mammals may, at some point, threaten the viability of some Chinook salmon populations that have already been granted protection from fisheries. Such scenarios could generate serious management challenges and difficult decisions in future years.

Beyond the marine environment, salmon are sometimes recognized as keystone species in freshwater and riparian habitats, providing food resources to bear, mink, otters, eagles and other species. Their ecological role in these habitats is protected by ADFG through establishment of adult escapement goals, designed to ensure sustainable wild salmon production, which in turn protects the integrity of natural foodwebs.

[79] https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-take-reduction-plans-and-teams
[80] https://www.fisheries.noaa.gov/alaska/habitat-conservation/essential-fish-habitat-efh-alaska
[81] https://www.adfg.alaska.gov/sf/SARR/AWC/

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..

Regular ecosystem status reports, developed by NOAA Fisheries, include baseline metrics of ecosystem health in Alaska's marine environments. These reports are published and readily available online[82].

ADFG considers the role of salmon in natural ecosystems, including aquatic environments, and measures trends of abundance through annual estimates of spawner escapement, as directed through Alaska's Policy for the Management of Sustainable Salmon Fisheries.

Through its hatchery research programs[83] and hatchery permitting process[84], ADFG evaluates and conducts management to limit the effects that fisheries enhancement activities (i.e. hatchery production) has on natural ecosystems. Recent research of hatchery effects on natural ecosystems has investigated rates of straying and genetic introgression from hatchery salmon[85]. Alaska's Finfish Genetics Policy[86] establishes that:

- "Gene flow from hatchery fish straying and intermingling with wild stocks may have significant detrimental effects on wild stocks. First priority will be given to protection of wild stocks from possible harmful interactions with introduced stocks. Stocks cannot be introduced where the introduced stock may have significant interactions or impact on significant or unique wild stocks."

The combined effort by ADFG and NOAA Fisheries to 1) monitor the status of marine ecosystems 2) estimate annual spawner escapement 3) regulate hatchery construction and operation through an annual permitting process and 4) evaluate the potential genetic and ecological impact from stray hatchery fish on natural systems provides substantial evidence that managers have established clear outcome indicators for their management objectives that seek to minimize adverse impacts from commercial salmon fisheries (and associated enhancement) to marine and aquatic ecosystems.

[82] https://www.fisheries.noaa.gov/resource/data/alaska-marine-ecosystem-status-reports-archive
[83] https://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.main
[84] https://www.adfg.alaska.gov/index.cfm?adfg=hatcheries.hatchery
[85] https://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.current_research
[86] http://www.adfg.alaska.gov/static-f/fishing/PDFs/research/genetics_finfish_policy.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	Minor non-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.

Alaska's commercial salmon fisheries harvest both wild- and hatchery-produced fish. Salmon hatcheries in Alaska are run by private non-profit corporations that must obtain a state-issued permit to operate. In accordance with Alaska Statute 16.10.400, ADFG administrates the state's salmon hatchery permitting process[87], and is guided by the following policies:

- The Alaska Finfish Genetics Policy[88]
- Alaska Fish Health and Disease Control Policies[89]
- The Policy for the Management of Sustainable Salmon Fisheries[90]

These policies explicitly promote responsible development and management of salmon hatcheries in Alaska.

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.

In order to alter conditions of a hatchery permit, hatchery operators must submit a Permit Alteration Request (PAR) to ADFG for review. PARs are reviewed by regional planning teams, which make recommendations for their approval or denial, and the Commissioner then considers these recommendations and other information to make a decision upon the request. This process is codified through Alaska Administrative Code 5 § 40.850, and promotes responsible operation and oversight of salmon hatcheries in Alaska. ADFG recently prepared and published a review of hatchery related plans, permits and policies designed to protect wild salmon stocks in Alaska[91], and generally found evidence of high compliance.

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.

[87] https://www.adfg.alaska.gov/index.cfm?adfg=hatcheries.hatchery
[88] https://www.adfg.alaska.gov/static-f/fishing/PDFs/research/genetics_finfish_policy.pdf
[89] http://www.sf.adfg.state.ak.us/FedAidPDFs/RIR.5J.2010.01.pdf
[90] http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2016-2017/jointcommittee/5aac39.pdf
[91] http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/ws/SP18-12.pdf

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 ecological, fisheries and other 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 16.10.420[92] 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.

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

The vast majority of salmon produced by hatcheries in Alaska are marked via thermal- or other shock-induced otolith band alteration technique, generally following the methods described by Volk et al. (1999)[93]. This mass-marking procedure allows fisheries managers opportunity to analyze otoliths from commercially harvested salmon and determine the separate contributions from wild and hatchery production to catch[94]. Otoliths are read by ADFG staff at the Department's Mark, Tag and Age Lab[95], which curates an online database of mark and tag information[96]

Unmarked pink salmon released from Kitoi Bay Hatchery on Kodiak Island once represented a noteworthy exception to this standard practice. In their 2011 evaluation of this hatchery, ADFG noted that, "A better understanding of the stock composition of salmon caught in fisheries targeting KBH stocks, the degree and effects of straying, and the effectiveness of wild stock protection measures would improve the scientific defensibility of KBH programs. The most obvious tool to achieve that would be the use of marking and tagging".

This exception to standard practice resulted in a Minor Non-conformance during a previous RFM-based Assessment, as it precluded accounting of contribution from this facility to harvest. A Corrective Action Plan was developed in response, and progress on this plan has been evaluated each year through annual Surveillances. Notably, the Kodiak Regional Aquaculture Association (KRAA), which operates Kitoi Hatchery, has made significant progress toward completion of their Corrective Action Plan, and in 2019, KRAA Executive Director Tina Fairbanks reported that all salmon released from Kitoi Hatchery had been otolith marked.

However, subsequent conversations with ADFG Kodiak Regional Biologists indicated that ADFG does not currently sample otoliths from commercial salmon fisheries operating in the region, nor does ADFG have plans to do so in future years. Accordingly, information about hatchery and wild contributions to the pink salmon commercial harvest in the Kodiak Region is likely of poor quality and therefore does not fully satisfy this Supporting Clause. Accordingly, and until the existing Corrective Action Plan for marking Kitoi Bay hatchery salmon has been approved as complete, a minor non-conformance will remain in effect for Supporting Clause 13.4.

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

The permitting process for salmon hatcheries in Alaska involves a thorough review process by ADFG and others that considers how hatchery siting and construction might impact the surrounding habitat and neighboring

[92] http://www.touchngo.com/lglcntr/akstats/Statutes/Title16/Chapter10/Section420.htm
[93] Volk et al. (1999) https://www.sciencedirect.com/science/article/abs/pii/S0165783699000739
[94] https://www.adfg.alaska.gov/FedAidPDFs/RIR.5J.2019.01.pdf
[95] https://mtalab.adfg.alaska.gov/Default.aspx
[96] https://mtalab.adfg.alaska.gov/CWT/Default.aspx

ecosystems. Moreover, Alaska Statute 16.10.400 states that "a permit may not be issued for construction or operation of a hatchery on an anadromous fish stream unless the stream has been classified as suitable for enhancement purposes by the commissioner".

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

The Pacific Salmon Treaty, ratified in 1985 and renewed in 2019, provides guidance for salmon fisheries enhancement activities on U.S.- Canada transboundary rivers, as stated in Article VII:

1. This Article applies to salmon originating in transboundary rivers.
2. Notwithstanding Article IV, paragraph 3(c), whenever salmon originate in the Canadian portion of a transboundary river, the appropriate Panel shall provide its views to the Commission on the spawning escapement to be provided for all the salmon stocks of the river if either section of the Panel so requests.
3. On the basis of the views provided by the Panel pursuant to paragraph 2, the Commission shall recommend spawning escapements to the Parties.
4. Whenever salmon originate in the Canadian portions of transboundary rivers, or would originate there as a result of enhancement projects, salmon enhancement projects on the transboundary river shall be undertaken co-operatively, provided, however, that either Party, with the consent of the Commission, may separately undertaken salmon enhancement projects on the transboundary rivers.

Noteworthy, here, is that the choice of species, stock, hatchery siting and management of fisheries activities in Alaska are regulated through Alaska Statutes 16.10.375 – 16.10.560, and guided by Alaska's Policy for the Management of Sustainable Salmon Fisheries and Finfish Genetics Policy, the latter of which prohibits the introduction of non-indigenous species through the following stock transfer guidelines:

A. Interstate: Live salmonids, including gametes, will not be imported from sources outside the state. Exceptions may be allowed for trans-boundary rivers.
B. Inter-regional: Stocks will not be transported between major geographical areas: Southeast, Kodiak Island, Prince William Sound, Cook Island, Bristol Bay, AYK and Interior.
C. Regional: Acceptability of transport within regions will be judged on the following criteria:
    1. Phenotypic characteristics of the donor sock must be shown to be appropriate for the proposed fish culture regions and the goals set in the management plan
    2. No distance is set or specified for transport within a region. It is recognized that transplants occurring over greater distances may result in increased straying and reduce the likelihood of a successful transplant. Although the risk of failure affects the agency transporting the fish, transplants with high probability of failure will be denied. Proposals for long distance transport should be accompanied by adequate justification for non-local stock.

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.

To promote effective and responsible management of salmon fisheries in Alaska and beyond, ADFG and NOAA Fisheries have either established or contributed to databases that archive, share and disseminate information

related to salmon tags[97], genetics[98], otoliths[99], catch[100], and pathology[101]. By in large, these databases are freely accessible online, allowing researchers, managers and the general public access to valuable fisheries management information across much of the species' distribution, including Alaska. In some cases, such as for coded-wire tags, databases directly inform fisheries management and are used to satisfy international treaty obligations (i.e. PST).

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.

Turner (1988)[102] developed internationally recognized codes of practice for introductions and transfers of marine and freshwater organisms, which includes specific guidelines for salmonids (in Appendix). In Alaska, introductions and transfers of salmon are further guided by the State's Finfish Genetics Policy[103], which states:

a. Interstate: Live salmonids, including gametes, will not be imported from sources outside the state. Exceptions may be allowed for trans-boundary rivers.
b. Inter-regional: Stocks will not be transported between major geographical areas: Southeast, Kodiak Island, Prince William Sound, Cook Island, Bristol Bay, AYK and Interior.
c. Regional: Acceptability of transport within regions will be judged on the following criteria:
    1. Phenotypic characteristics of the donor sock must be shown to be appropriate for the proposed fish culture regions and the goals set in the management plan
    2. No distance is set or specified for transport within a region. It is recognized that transplants occurring over greater distances may result in increased straying and reduce the likelihood of a successful transplant. Although the risk of failure affects the agency transporting the fish, transplants with high probability of failure will be denied. Proposals for long distance transport should be accompanied by adequate justification for non-local stock.

Furthermore, Alaska Statute 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".

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.

Hatchery permitting processes, administrated in Alaska by ADFG, ensure that salmon stock transfers and introductions abide by the State Finfish Genetics Policy. Consistent with and in support of the State's Finfish Genetics Policy, are the State's conditions for issuance of a Hatchery Permit that ensure appropriate choice of broodstocks and use of salmon eggs for propagation:

(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

[97] http://www.psmfc.org/rmpc/index.html
[98] https://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.main
[99] https://mtalab.adfg.alaska.gov/OTO/reports/VoucherSummary.aspx
[100] https://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.statisticsanddata
[101] https://www.adfg.alaska.gov/index.cfm?adfg=fishingpathologylab.main
[102] http://www.fao.org/3/ae989e/ae989e00.htm
[103] https://www.adfg.alaska.gov/static-f/fishing/PDFs/research/genetics_finfish_policy.pdf

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;
(6) adult salmon be harvested by hatchery operators only at specific locations as designated by the department;
(7) surplus eggs from salmon returning to the hatchery be made available for sale first to the department and then, after inspection and approval by the department, to operators of other hatcheries authorized by permit to operate under AS 16.10.400 - 16.10.470;
(8) if surplus salmon eggs are sold by a permit holder to another permit holder, a copy of the sales transaction be provided to the department;
(9) [Repealed, Sec. 5 ch 110 SLA 1980].
(10) a hatchery be located in an area where a reasonable segregation from natural stocks occurs, but, when feasible, in an area where returning hatchery fish will pass through traditional salmon fisheries.

Recently, Evenson et al. (2018)[104] reviewed Alaska's salmon hatcheries for compliance with this and other policies, confirming appropriate source and use of broodstock by Alaska's private non-profit salmon hatcheries.

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" mandate the conservation of diversity, disease control and protection of the environment, as related to salmon fisheries enhancement activities in Alaska.

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.

Salmon produced by hatcheries in Alaska 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. Alaska Statute 16.10.445 is pertinent to salmon production by hatcheries in Alaska and 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"[105]. 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".

With respect to naturally spawning components of stocks harvested in Alaska's commercial salmon fisheries, the state's Policy for the Management of Sustainable Salmon Fisheries accounts for potential impacts from harvest

[104] https://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/ws/SP18-12.pdf
[105] https://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/hatchery_statutes.pdf

and hatcheries on wild escapement, making the following key statements to direct appropriate monitoring and management (excerpted from Alaska Administrative Code 5 AAC 39.222):

- "effects and interactions of introduced or enhanced salmon stocks on wild salmon stocks should be assessed; wild salmon stocks and fisheries on those stocks should be protected from adverse impacts from artificial propagation and enhancement efforts";
- "depleted salmon stocks should be allowed to recover or, where appropriate, should be actively restored; diversity should be maintained to the maximum extent possible, at the genetic, population, species, and ecosystem levels";
- "salmon fisheries shall be managed to allow escapements within ranges necessary to conserve and sustain potential salmon production and maintain normal ecosystem functioning as follows";
- "impacts of fishing, including incidental mortality and other human-induced mortality, should be assessed and considered in harvest management decisions";
- "salmon abundance trends should be monitored and considered in harvest management decisions";

Regular estimates of salmon escapement are published by ADFG and compared to escapement goals for each population to 1) identify stocks of concern and 2) adjust harvest regulations as necessary to protect such stocks, all in accordance with overarching policy to manage potential negative effects from harvest and enhancement.

Finally, Alaska Statute 16.40.210 strictly prohibits full-lifecycle rearing of salmon (and other finfish) for commercial purposes, stating, "A person may not grow or cultivate finfish in captivity or under positive control for commercial purposes", with exceptions provided by Department [ADFG] administrated rehabilitation projects, salmon hatcheries that mandatorily release fish into open waters ("sea ranching"). Accordingly, supplemental feeding of salmon, once released to sea, does not occur in Alaska.

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.

Salmon fisheries in Alaska are managed to protect wild stocks and meet adult escapement goals, in accordance with Alaska's Policy for the Management of Sustainable Salmon Populations. Catch contributions to annual commercial harvest by hatchery and wild salmon are regularly estimated and published by ADFG[106]. Annually-produced escapement estimates[107] provide the best measure of wild stock abundance in the face of harvest. Where stocks have chronically failed to meet escapement goals, they have been recognized as stocks of concern[108] and awarded additional protections from harvest. In most cases, currently recognized stocks of concern are wild Chinook salmon populations that are now significantly protected from harvest through major reductions on harvest, as with, for example, Chilkat and King River stocks[109].

[106] http://www.adfg.alaska.gov/FedAidPDFs/RIR.5J.2019.01.pdf
[107] http://www.adfg.alaska.gov/FedAidPDFs/FMS18-04.pdf
[108] https://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.akfishstocks
[109] http://www.adfg.alaska.gov/FedAidPDFs/RIR.1J.2018.05.pdf

ADFG has engaged in several research projects to evaluate the stray rates and abundance of hatchery-origin salmon on natural spawning grounds. These studies take advantage of the mass otolith marking practices used by most hatcheries in Alaska to discriminate between hatchery and wild fish on spawning grounds. A common finding among these studies has been that the proportion of hatchery fish on spawning grounds tends to decrease with distance from the nearest hatchery. Results have not demonstrated widespread displacement of wild stocks by hatchery fish in Alaska. For example, in a recent study of pink salmon published by Otis et al. (2018)[110], the authors noted that,

> "The proportion of LCI hatchery fish identified in stream samples decreased with distance from release sites. Of the 17 streams sampled during 2014–2017, only Tutka Lagoon Creek (86.1–94.8%%), Tutka Head End Creek (35.0–77.1%), Port Graham River (1.1–45.8%) and Lou's Creek in Little Tutka Bay (13.7%) averaged double-digit percentages of LCI hatchery pink salmon in their respective samples. These were also the 4 streams closest in proximity to the Tutka Bay Lagoon and Port Graham hatcheries (approximately 0–6 miles from release sites). In the 13 streams occurring outside of SHAs, the average percentage of LCI-hatchery marked pink salmon in our samples ranged from 0.0% (Fritz Creek, Port Chatham) to 7.1% (Seldovia River) and the overall average was 2.6% during 2014–2017. This pattern of decreasing proportion of hatchery fish with increasing distance from release sites is similar to observations in PWS where Brenner et al. (2012) found higher proportions of hatchery fish on streams closest to the hatcheries".

[110] https://www.adfg.state.ak.us/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/ws/SP18-11.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 report[111], 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 fourth 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) and the 2nd cycle of reassessment 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 4th 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

Not applicable, next assessment will be a full re-assessment.

[111] https://www.alaskaseafood.org/wp-content/uploads/2017/03/ALASKA-RFM-SALMON-REASSESSMENT-Final-Report-March-2017.pdf

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

13. Recommendation and Determination

Following this 4th Surveillance Assessment,the assessment team recommends the continued certification under the Alaska Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fisheries, the United States Alaska commercial salmon [Chinook *Oncorhynchus tschawytscha*, 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).

14. References

Reference	Hyperlink
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15. Appendices

15.1. Appendix 1 – Assessment Team Details

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.

