DRAFT ENVIRONMENTAL IMPACT STATEMENT

Issuance of an Incidental Take Statement under the Endangered Species Act for Salmon Fisheries in Southeast Alaska Subject to the Pacific Salmon Treaty and Funding to the State of Alaska to Implement the 2019 Pacific Salmon Treaty Agreement

January 2024

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

***Photo Credit**:*

Tyler Emerson - Pelican, AK

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, AK 99802-1668

January 24, 2024

Dear Reviewer:

In accordance with provisions of the National Environmental Policy Act (NEPA), we request your review of the National Oceanic and Atmospheric Administration (NOAA) *Draft Environmental Impact Statement (DEIS) for the Issuance of an Incidental Take Statement under the Endangered Species Act (ESA) for Salmon Fisheries in Southeast Alaska Subject to the Pacific Salmon Treaty and Funding to the State of Alaska to Implement the 2019 Pacific Salmon Treaty Agreement.*

This DEIS is prepared pursuant to NEPA to assess the environmental impacts associated with NOAA Fisheries issuing an incidental take statement under Section 7 of the ESA that would exempt take of threatened or endangered ESA-listed species by participants in Southeast Alaska salmon fisheries subject to the 2019 Pacific Salmon Treaty Agreement and funding to the State of Alaska to implement the 2019 Pacific Salmon Treaty Agreement.

This document is expected to be published on January 26, 2024 and will be available on the NOAA Fisheries Alaska Region website at: https://www.fisheries.noaa.gov/resource/document/environmental-impact-statement-issuance-incidental-take-statement-salmon.

NOAA Fisheries will be accepting public comments on this DEIS for 45 days beginning on the date of publication. We anticipate the comment period will close on March 11, 2024. Please check the Alaska Region website noted above for updates on the comment period dates. Written comments on the DEIS should be directed to the responsible official identified below by the end of the comment period. Written comments may also be submitted electronically through the www.regulations.gov portal by entering "NOAA-NMFS-2023-0152" in the search box.

Responsible Official: Jonathan M. Kurland
Regional Administrator
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Sincerely,

Gretchen Harrington
Assistant Regional Administrator
for Sustainable Fisheries

DRAFT
Environmental Impact Statement for the Issuance of an Incidental Take Statement under the Endangered Species Act for Salmon Fisheries in Southeast Alaska Subject to the Pacific Salmon Treaty and Funding to the State of Alaska to Implement the Pacific Salmon Treaty

January 2024

Lead Agency:	National Oceanic and Atmospheric Administration National Marine Fisheries Service, Alaska Region
Responsible Official:	Jonathan M. Kurland, Regional Administrator
For further information contact:	Gretchen Harrington Assistant Regional Administrator, Sustainable Fisheries National Marine Fisheries Service, Alaska Region P. O. Box 21668, Juneau, AK 99802-1668 (907) 586-7221
Cooperating Agencies:	State of Alaska Department of Fish and Game Central Council of Tlingit and Haida Indian Tribes of Alaska

Abstract: This Environmental Impact Statement (EIS) provides decision-makers and the public with an assessment of the environmental, economic, and social impacts of alternative approaches to the issuance of an Incidental Take Statement (ITS) under Section 7 of the Endangered Species Act (ESA) that would exempt take of threatened or endangered ESA-listed species by participants in Southeast Alaska salmon fisheries that are subject to the 2019 Pacific Salmon Treaty Agreement, as well as the continuation of funding to the State of Alaska to implement the 2019 Pacific Salmon Treaty Agreement. NMFS would issue an ITS, consistent with requirements of the ESA, in conjunction with a biological opinion that evaluates the effects of two agency actions related to the Southeast Alaska salmon fisheries on listed species and critical habitat, concluding consultation on those agency actions. This EIS directly responds to a court order and analyzes the effects of the proposed issuance of an ITS for those two agency actions.

Comments on this Draft EIS must be received by March 11, 2024.

List of Acronyms and Abbreviations

Acronym or Abbreviation	Meaning
AAC	Alaska Administrative Code
AABM	abundance-based management
AC	Allowable Catch
ACL	Annual catch limit
ADF&G	Alaska Department of Fish and Game
AFSC	Alaska Fisheries Science Center
AI	abundance index
AKFIN	Alaska Fisheries Information Network
AKR	Alaska Region
AMMOP	Alaska Marine Mammal Observing Program
ASRS	Alaska Species Ranking System
BC	British Columbia
BIAs	Biologically Important Areas
BiOp	Biological Opinion
CEQ	Council on Environmental Quality
CFEC	Commercial Fisheries Entry Commission
CFR	Code of Federal Regulations
Council	North Pacific Fishery Management Council
CPBD	catch per boat day
CPUE	catch per unit effort
CTC	Chinook Technical Committee
CWA	Clean Water Act
CWT	coded wire tag
CV	Coefficient of Variation
DPS	distinct population segment
DSR	Demersal Shelf Rockfish
EO	Executive Order
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ER	exploitation rates
ESU	evolutionarily significant unit
FMP	fishery management plan
FPD	fishery performance data
FPEIS	final programmatic environmental impact statement
FONSI	Finding of No Significant Impact
FR	*Federal Register*
ft.	foot or feet
GDP	Gross Domestic Product
GHL	guideline harvest level
IFQ	individual fishing quota
ISBM	individual stock-based management
ITS	incidental take statement
LCR	Lower Columbia River
LKTK	Local Knowledge and Traditional Knowledge
m	meter or meters
METF	mid-eye to tail fork (measurement)
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
M/SI	mortalities per serious injury (ratio)
MPG	major population groups
MSY	maximum sustainable yield
t	tonne, or metric ton
NBC	Northern British Columbia
NEPA	National Environmental Policy Act
NMFS	National Marine Fishery Service
NOAA	National Oceanic and Atmospheric Administration
NOF	North of Falcon
NPFMC	North Pacific Fishery Management Council
NRKW	Northern resident killer whales
NWFSC	Northwest Fisheries Science Center
PBR	potential biological removal
PCBs	polychlorinated biphenyls
PFMC	Pacific Fishery Management Council
PMH	North Pacific Marine Heatwave
PSC	Pacific Salmon Commission
PST	Pacific Salmon Treaty
PSTRT	Puget Sound Technical Recovery Team
QCI	Queen Charlotte Islands
RFA	Regulatory Flexibility Act
RPA	reasonable and prudent alternative
SAR	stock assessment report
SEAK	Southeast Alaska
Secretary	Secretary of Commerce
SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpbacks
SRFC	Snake River Fall-Run Chinook Salmon
SRKW	Southern Resident killer whales
SW	Statistical Week
SWWCVI	Southwest/West Coast Vancouver Island
TBR	Transboundary River
TEK	Traditional Ecological Knowledge
Tlingit and Haida	Central Council of Tlingit and Haida Indian Tribes of Alaska
THA	Terminal Harvest Area
TRT	Technical Recovery Team
UWR	Upper Willamette River
U.S.	United States
U.S.C	United States Code
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VIDA	Vessel Incidental Discharge Act
WCVI	West Coast Vancouver Island
WDPS	Western Distinct Population Segment
WFC	Wild Fish Conservancy

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Executive Summary

This executive summary summarizes the *Environmental Impact Assessment (EIS) for the Issuance of an Incidental Take Statement under the Endangered Species Act for Salmon Fisheries in Southeast Alaska Subject to the Pacific Salmon Treaty and Funding to the State of Alaska to Implement the Pacific Salmon Treaty*. This EIS directly responds to court orders to provide decision-makers and the public with an assessment of the environmental, economic, and social impacts of alternative approaches to the issuance of an Incidental Take Statement (ITS) under Section 7 of the Endangered Species Act (ESA) that would exempt take of threatened or endangered ESA-listed species by participants in Southeast Alaska (SEAK) salmon fisheries that are subject to the 2019 Pacific Salmon Treaty (PST) Agreement. NMFS is preparing a Biological Opinion (BiOp) on the effects on ESA-listed species and their critical habitat from two federal actions: the Fishery Management Plan for the Salmon Fisheries in the exclusive economic zone (EEZ) Off Alaska's (Salmon FMP) delegation of management to the State of Alaska of the salmon fisheries in the EEZ in SEAK and federal grant actions to the State of Alaska. Section 1 of this EIS provides a more detailed discussion of the history of this action.

NEPA requires that an EIS analyze a reasonable range of alternatives consistent with the purpose and need for the proposed action. The alternatives were designed to accomplish the stated purpose and need for the action and to consider the effects of an issuance or non-issuance of an ITS for each ESA-listed species determined to have the potential for incidental take in the SEAK salmon fisheries subject to the 2019 PST Agreement. The alternatives also consider effects of NMFS's continuing or discontinuing the funding through grants to the State of Alaska to manage and monitor the SEAK salmon fisheries and salmon stocks subject to the 2019 PST Agreement.

Purpose and Need

Section 2 of this EIS provides a detailed discussion of the purpose and need for the proposed action and the range of alternatives analyzed in this EIS.

In summary, the primary proposed action is the proposed issuance of the ITS under the ESA. Per the court orders in *Wild Fish Conservancy v. Quan* stating that NMFS must comply with NEPA for the issuance of the ITS. The purpose of issuing the proposed ITS in a new BiOp (the "2024 BiOp") is to exempt incidental take of ESA-listed species associated with the SEAK salmon fisheries subject to provisions of the 2019 PST Agreement. The ITS would be based on the analysis in the 2024 BiOp, and would only be issued if NMFS concluded that the amount or extent of incidental take, coupled with other effects of the proposed actions, is not likely to jeopardize the continued existence of the listed species. In the case of jeopardy, NMFS may issue an ITS if the BiOp offers reasonable and prudent alternatives to avoid jeopardy or destruction or adverse modification. The ITS would specify, among other requirements: the impact (the amount or extent) of such incidental taking on the listed species; reasonable and prudent measures considered necessary or appropriate to minimize the impact of such take; terms and conditions (including reporting requirements) that implement the specified measures; and for marine mammals, measures necessary to comply with the issuance of incidental take authorization under section 1371(a)(5) of the Marine Mammal Protection Act (MMPA). If issued, the ITS would exempt any incidental take and provide fishery participants with protection from liability for any incidental takes, should they occur in compliance with the terms and conditions of the ITS.

In light of the nexus between the court's orders on the ESA and NEPA deficiencies and in light of NMFS's ongoing disbursement of funds to the State, this EIS also evaluates the effects of the following actions under consultation:

- NMFS's delegation of management authority over salmon fisheries in the EEZ in SEAK to the State of Alaska under the Salmon FMP; and
- Federal funding through grants to the State of Alaska for the State's management of commercial and sport salmon fisheries and transboundary river enhancement necessary to implementation of the 2019 PST Agreement. This is also a second proposed action considered as a component of the Alternatives.

Alternatives

Alternative 1: Status Quo, no action.

Alternative 1 is the status quo; NMFS assumes that no litigation occurred and therefore the status quo ITS remains valid and funding through grants to the State of Alaska continues. The status quo ITS is from the 2019 BiOp. With this ITS, the EIS assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would continue to be prosecuted under the 2019 PST Agreement and existing fishery management measures. This alternative would not respond to the court's orders, because the court identified flaws with the 2019 BiOp.

Under this alternative, the Council's and NMFS's decision to delegate management of the authorized salmon fisheries in the SEAK EEZ to the State of Alaska would remain unchanged, and NMFS would continue to fund grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters to meet the obligations of the PST through 2028.

Alternative 2: Issuance of a New ITS with a New 2024 BiOp.

Under Alternative 2, NMFS would issue a new 2024 BiOp to respond to the court's finding that the 2019 BiOp did not comply with the ESA. This EIS assumes the new BiOp would contain an ITS, consistent with the requirements of 16 U.S.C. 1536, that specifies the level of take that NMFS determines is reasonably certain to occur for each ESA-listed species considered in the BiOp and that will not result in jeopardy to the species. This EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would continue to be prosecuted under the 2019 PST Agreement consistent with any reasonable and prudent measures and terms and conditions included in the new proposed ITS.

Under this Alternative, this EIS also evaluates the actions considered in the 2024 BiOp. NMFS analyzes in this EIS as a second proposed action and component of this Alternative the effects from NMFS's proposed future funding to the State of Alaska for initiatives that will remain in place for the duration of the 2019 PST Agreement. NMFS also analyzed the effects from delegation of management of the authorized salmon fisheries in the EEZ to the State, primarily continued commercial troll and sport fishing in federal waters consistent with the 2019 PST Agreement. This aspect of the effects analysis is presented for analytical purposes only as there is no present action to maintain, amend, or rescind delegation of management of the federal fisheries to the State consistent with the Magnuson-Stevens Act (16 U.S.C. § 1856(a)(3)(B)).

Alternative 3: NMFS would not issue an ITS.

Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries under the 2019 PST Agreement would not be prosecuted. NMFS also would not fund grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters and NMFS and the State could fail to meet the obligations of the PST through 2028. Because the grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued. Additionally, NMFS analyzed the effects from delegation of management of the authorized salmon fisheries in the EEZ to the State, primarily effects from continued commercial troll and sport fishing in federal waters consistent with the 2019 PST Agreement. If NMFS discontinued delegation of management to the State, NMFS assumes that similar effects would result if NMFS solely managed the fisheries in federal waters. This aspect of the effects analysis on delegation is presented for analytical purposes only as there is no present action to maintain, amend, or rescind delegation of management of the federal fisheries to the State consistent with the Magnuson-Stevens Act (16 U.S.C. § 1856(a)(3)(B)).

Alternative 3 is not NMFS's preferred alternative because it does not fulfill NMFS's role under the ESA as the consulting agency, and it does not respond to the district court's order and remand that NMFS address the ESA and NEPA deficiencies identified by the court.

Comparison of Alternatives for Decision-making

Alternative	ITS Coverage for SEAK Salmon Fisheries	Comparative Features	Impacts
Alternative 1	Yes, in the absence of the court orders	ESA takes exempted for all SEAK salmon fisheries subject to the 2019 PST Agreement up to the limit of the ITS in the 2019 BiOp. Fishery participants would not be subject to enforcement action for ESA incidental takes up to the ITS limit and in compliance with the terms and conditions of the ITS. ADF&G would be expected to open the salmon fisheries per agency standards and processes. NMFS's decision to delegate management of the SEAK EEZ salmon fisheries would remain in place and NMFS would continue to fund grants to the State of Alaska to monitor and manage salmon fisheries to meet the obligations of the PST through 2028.	• Incidental take of listed Chinook, SRKW (through prey reductions), humpback whales and Steller sea lions could occur in SEAK salmon fisheries up to limit specified in 2019 ITS. • Interactions with non-ESA listed species (i.e. marine mammals, marine birds, and other fish species) could occur, but not at levels that would have impacts at the population level. • Minimal climate, greenhouse gas or habitat impacts from SEAK salmon fisheries. • Economic opportunities would be preserved, SEAK communities would continue to thrive in tandem with SEAK salmon fisheries, and 10,000 years of Alaska Native salmon stewardship, culture, and connection to salmon (including for subsistence and food security) would be maintained.
Alternative 2 (Preferred)	Yes	ESA takes exempted for all SEAK salmon fisheries subject to the 2019 PST Agreement up to the limit of the proposed ITS in the 2024 BiOp. Fishery participants would not be subject to enforcement action for ESA incidental takes up to the ITS limit and in compliance with the terms and conditions of the ITS. ADF&G would be expected to open the salmon fisheries per agency standards and processes.	• Incidental take of listed Chinook, SRKW (through prey reductions), humpback whales and Steller sea lions could occur in SEAK salmon fisheries up to limit specified in the proposed 2024 ITS. • Interactions with non-ESA listed species (i.e. marine mammals, marine birds, and other fish species) could occur, but not at

		NMFS's decision to delegate management of the SEAK EEZ salmon fisheries would remain in place and NMFS would continue to fund grants to the State of Alaska to monitor and manage salmon fisheries to meet the obligations of the PST through 2028. For analytical purposes to evaluate effects from delegation, NMFS assumes similar effects would occur if NMFS solely managed fisheries in federal waters.	levels that would have impacts at the population level. • Minimal climate, greenhouse gas or habitat impacts from SEAK salmon fisheries. • Economic opportunities would be preserved, SEAK communities would continue to thrive in tandem with SEAK salmon fisheries, and 10,000 years of Alaska Native salmon stewardship, culture, and connection to salmon (including for subsistence and food security) would be maintained.
Alternative 3	No	No ESA takes exempted in SEAK salmon fisheries. Fishery participants in salmon fisheries would be liable for ESA takes. For this analysis, we assume ADF&G would not open the SEAK salmon fisheries due to that liability. NMFS would not fund grants to the State of Alaska to monitor and manage salmon fisheries and NMFS and the State would fail to meet the obligations of the PST through 2028. For analytical purposes to evaluate effects from delegation, no fishing would occur in federal waters.	• No take of listed Chinook, SRKW, humpback whales and Steller sea lions would occur from SEAK salmon fisheries • Interactions with non-ESA listed species (i.e. marine mammals, marine birds, and other fish species) would not occur, but reduction in interactions are not likely to have any population effects. • No climate, greenhouse gas or habitat impacts from SEAK salmon fisheries, but reduction impacts likely nominal. • Catastrophic effects would be felt economically, culturally and by communities and tribes with a closure of the SEAK salmon fisheries. *Loss of $119 million in harvest revenue from all salmon fisheries * Loss of $602.8 million in procession revenue *Removal of economic pillar for many rural SEAK communities, where there are often no other economic opportunities to pivot to. * Cessation of 10,000 years of tribal fishing and cultural practices surrounding fishing, leading to loss of economic opportunities for tribal members, increased food insecurity, and severing of stewardship, culture, and connection to salmon.

Southeast Alaska Salmon Fisheries

Sections 3 and 4 provide a description of the SEAK salmon fisheries managed under the 2019 PST Agreement. The PST provides a framework for the management of salmon fisheries in the U.S. and Canada that fall within the PST's geographical scope. The 2019 PST Agreement established fishing regimes that set upper limits on intercepting fisheries, defined as fisheries in one country that harvest salmon originating in another country, and sometimes include provisions that apply to the management of the Parties' non-intercepting fisheries as well. The overall purpose of the regimes is to accomplish the conservation, production, and harvest allocation objectives set forth in the PST.

Each Party to the PST must implement the fisheries management framework domestically. In the North Pacific, the U.S. does this through implementation of provisions of the Magnuson-Stevens Act via the North Pacific Fishery Management Council for fisheries occurring in the exclusive economic zone (EEZ; 3 nautical miles to 200 nautical miles offshore) off the coast of SEAK. The State of Alaska Department of Fish and Game (ADF&G) manages salmon troll, net, personal use and sport fisheries subject to the PST in state waters (from shore to three nautical miles offshore) of SEAK. The SEAK commercial salmon fisheries include troll, purse seine, drift gillnet, and set gillnet fisheries. The State's management of commercial and sport salmon fisheries, including harvest monitoring, stock assessment, and transboundary river enhancement necessary to implement the 2019 PST Agreement, is partially funded through Federal grants dispersed by NOAA. Annette Islands Reserve fisheries are managed by the Metlakatla Indian Community and are not under the purview of the State of Alaska. Federal subsistence fisheries, including the Stikine River subsistence fishery for sockeye, coho, and Chinook salmon are managed by the U.S. Departments of the Interior and Agriculture as part of the Federal Subsistence Management Program.

Summary of the Environmental Impacts

The potentially affected environment and the degree of the impacts of the alternatives on the various resource components, together with relevant past, present, and reasonably foreseeable actions, were analyzed in Section 5 of this document. Since the primary Federal action here—the issuance of the ITS—would only exempt incidental take of ESA-listed species that occur in compliance with the ITS, this EIS focuses on effects to those species (both ESA-listed salmon and ESA-listed marine mammals). In addition, this EIS also analyzes the impacts of the SEAK salmon fisheries on non-ESA-listed salmon and marine mammals, habitat, seabirds, greenhouse gas emissions and climate change.

Environmental impacts of Alternatives 1 and 2 are expected to remain similar to existing impacts from the operation of the SEAK salmon fisheries. This would include some incidental take of ESA-listed species (Chinook and marine mammals), as well as impacts to non-listed marine mammals, fish and marine birds. However, these impacts are not expected to result in negative population level impacts to any species that interacts with the SEAK salmon fisheries. Specific to ESA-listed species, no direct take would occur for SRKWs and status quo take of Steller sea lions and humpback whales with the operation of the SEAK fisheries is well below PBR for Steller sea lions (1 take every year, relative to a PBR of 318) and although PBR is unknown for the Mexico DPS of humpback whales, the M/SI rate of one take every 3 years is unlikely to have population level effects. Take of ESA-listed Chinook salmon would occur with the operation of the SEAK fisheries, which would have direct impacts to ESA-listed ESUs of Chinook and indirect prey effects for SRKWs. However, the incidental take of ESA-listed Chinook salmon in SEAK fisheries would be limited on an annual basis by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that defines the limits of catch and total mortality or exploitation rate for each fishery. NMFS assumes that fisheries in SEAK will be managed up to the limits of allowable catch specified in Chapter 3 the 2019 PST Agreement. The SEAK fishery has, historically, had a lower exploitation rate of ESA-listed Chinook salmon ESUs (0.1–10.5%) relative to other fisheries subject to the PST. For example, the highest exploitation rate occurring for a Chinook salmon ESU in SEAK (10.5% for Lower Columbia River Bright) is lower than the exploitation rates of 22.6% for Canadian fisheries and 16.5% for areas south of Puget Sound (regulated by the PFMC). Similarly, in considering all PST Chinook salmon landed (not just ESA-listed stocks) in the PST area from 2017–2021, on average, only 15.5% were harvested in Alaska compared with 40.9% in Canada, and 43.5% for other U.S. states (CTC 2022b, Table A23). This catch of Chinook salmon in SEAK commercial fisheries is expected on average, under the 2019 PST Agreement, to reduce SRKW prey abundance annually by—

- 3.5% or an annual average of 22,500 fish in Southwest/West Coast Vancouver Island (SWWCVI),
- 1.3% or an annual average of 13,000 fish in the Salish Sea, and
- 4% or an annual average of 37,500 fish in North of Falcon (NOF).

The estimated impact of SEAK salmon fishing gear on habitat identified in the analysis area is minimal. Under Alternatives 1 and 2, no changes to fishing location, effort, or gear types are expected. The impacts to habitat would therefore maintain minimal disturbances to benthic marine habitats, continue some disturbances to freshwater habitat through stream access, and maintain the risk of gear loss that is inherent in fishing operations.

With respect to the prosecution of SEAK salmon fisheries under these Alternatives, no evidence suggests that SEAK salmon fisheries impact the ecosystem in a significant manner. These fisheries target only adult salmon in the water column, successfully avoiding any significant disturbance to benthos, substrate, or intertidal habitat, all of which are components of the larger ecosystem. Alternatives 1 and 2 would not increase the amount of harvest above the limits from the PST, the intensity of harvest, or the location of harvest; therefore, those alternatives are presumed to not increase the impacts of the fishery to various prey items eaten by Pacific salmon (forage fish, zooplankton, squid, etc.). In addition, under Alternatives 1 and 2 and as stated previously, the State's spawning escapement goals for salmon are generally expected to be achieved. These scientifically-derived escapement goals are designed to result in the highest potential for future yields without jeopardizing the conservation of the stock from too few spawners, or the productivity of the stocks due to too many spawners.

The effects of Alternative 1 and 2 on the climate would be minimal. For example, there is no evidence to suggest that these Alternatives would result in substantial changes to the amount of greenhouse gasses in the atmosphere as emissions from the SEAK salmon fisheries and associated transportation and processing are extremely small relative to global emissions. There is also no evidence to suggest that these Alternatives would exacerbate any associated effects of climate change.

In comparison to Alternatives 1 and 2 the main benefits to resource components discussed in Section 5 under Alternative 3 are to ESA-listed species and non-listed marine mammals and seabirds, as well as minor benefits to habitat and some aspects of the ecosystem. Non-issuance of an ITS, discontinued funding to the State, and assumed closure of the SEAK salmon fisheries would prevent any impacts to ESA-listed species, as well as non-listed marine mammals, fish and seabirds. As there are minimal effects to habitat from the operation of the SEAK salmon fisheries, the closure of the fisheries would have minor benefits for habitat by reducing the little bottom contact that occurs, preventing freshwater impacts and eliminating derelict gear that originates from SEAK salmon fisheries.

Under Alternative 3, the cessation of salmon fisheries would likely result in both an immediate and substantial increase in the number of salmon entering freshwater systems with effects to SEAK salmon stocks that would continue into the future. For at least the length of the generation time (in years) for each species, but potentially longer, Alternative 3 would likely result in declines in the productivity (return per spawner) of many SEAK salmon stocks due to a variety of density-dependent effects in freshwater and possibly also the nearshore marine environments. Coastal stocks of pink and chum salmon, which tend to spawn in streams that originate in steep basins and have limited spawning area, could experience severe crowding (more fish than can reasonably spawn in a given area) and the superimposition of spawning redds that could kill fertilized eggs. High abundances of pink and chum salmon would also likely result in very low levels of dissolved oxygen in many streams (hypoxia), which has been shown to be lethal to salmon. Depending upon watershed characteristics and the abundance of spawners, hypoxia may also be a factor that results in the death of coho, sockeye, and Chinook salmon. Unanticipated large returns can also change water quality through the spread of disease: the Klamath River had a large return of Chinook salmon in 2002 that was a likely contributing factor in a fish kill of approximately 34,000 Chinook and coho salmon due to infections from the parasite *Ichthyopthirius multifilis* (ich) and the bacterial pathogen *Flavobacter columnare* (columnaris).

A minor benefit from Alternative 3 on the ecosystem would be the elimination of greenhouse gases, however minor that contribution is, from the salmon harvest industry.

Human Dimensions

Under Alternatives 1 and 2, fishermen in communities would continue to participate in salmon fisheries and local communities would continue to benefit from the SEAK salmon fisheries. For example, SEAK salmon fishermen would continue to operate, which requires purchasing goods and services in SEAK communities and for some vessels employing crew, and to sell their catches, which provides income to permit holders, 85% of which are local to SEAK. In addition, processors would continue to receive deliveries and provide jobs within communities that would not otherwise have economic opportunities, and salmon fisheries would continue to pay taxes that benefit the State and local communities. Costs of living in remote areas with more limited economic diversification would continue to be supported by fisheries suppliers. In addition, tribal communities of SEAK would continue more than 10,000 years of salmon stewardship and cultural connections to salmon. Community resilience would be maintained as economic opportunities for rural communities would be preserved. In addition, subsistence harvest, a crucial activity in reducing the high cost of living in Alaska, would be maintained. Intergenerational relationships and teaching would continue in Alaska Native communities, and the health and well-being of tribal youth in SEAK rural communities would continue to be bolstered by access to cultural salmon opportunities.

Impacts of the closure of the SEAK salmon fisheries under Alternative 3 would be keenly felt throughout SEAK communities and would have serious economic, community and culture repercussions, especially for SEAK's smallest communities. The resultant effect of a closure to the SEAK salmon fisheries would be detrimental to fishermen and have a cascading effect on processors, sport fishermen, tribes, and communities throughout SEAK. Current participants in salmon fisheries in rural communities in SEAK do not have the ability to easily pivot to other economic opportunities to mitigate any impacts from a decline in fishery stocks or closures of existing salmon fisheries. Most vessels are smaller and specialized, and may not be easily convertible to other fisheries that generally require larger boats or different gear types such as large pot gear. In addition, the required limited entry permit held by every participant would lose its value. Limited entry permits can have significant market value as long as there is a salmon fishery the buyer can enter. The cascading effect would directly impact the processing sector, since processing plants rely heavily on the salmon fisheries and many would not remain open without the influx of salmon each year. This would reduce fishery taxes and contributions to SEAK communities.

Revenue losses would be felt throughout SEAK. The ex-vessel value of all SEAK salmon fisheries (all gear types, all salmon species) was approximately $119 million in 2022 (Conrad and Thynes 2023). The $119 million for all commercial salmon fisheries would likely be reduced to zero, since it is unclear the extent to which the SEAK commercial fisheries could continue to operate in the absence of an ITS for listed salmon (and other listed species) if those commercial fisheries target or incidentally catch listed salmon. On the processing side, commercial salmon comprises approximately 70 percent of the SEAK region's seafood value, the cessation of salmon fishing would be a huge loss for the processing sector. The first wholesale value of salmon in 2022 was $602.8 million. For sport fishing, recent reports indicate that annual salmon angling expenditures ranged between $105 million and $132 million annually for both the guided and unguided SEAK sport salmon fisheries.

Overall, salmon accounted for approximately 70 percent of SEAK's seafood production value. Using data from the most recent comprehensive economic study produced by ASMI in 2020, the SEAK salmon fishery produced $303 million in output, $165 million in labor income for SEAK, and 7,910 in jobs for the region. Breaking it down, commercial fishing contributed to 4,410 jobs, followed by processing that contributed to 2,730 jobs, and lastly, management contributed to 770 jobs for salmon-related fisheries. At this time, this is the closest analysts can get to an estimate for 2022 and all salmon-related activity is included in this estimate, not just salmon managed under the PST Agreement.

Alternative 3 would halt more than 10,000 years of Alaska Native salmon stewardship and cultural identity associated with salmon harvest. Cessation of access to SEAK commercial salmon fisheries would result in the loss of cultural ties to an industry that is often multi-generational, family run, and a pillar of the economy for many SEAK communities where there often are not many other economic opportunities. In addition to direct loss of revenue from SEAK commercial salmon fisheries, downstream dollars from revenue earned by commercial fisheries (ex. fuel and grocery purchases, mechanical repairs, restaurant and pub visits) would cease to flow into rural communities. Aside from economic impacts, cultural and health well-being would decrease as cultural, family, and recreational outlets would no longer exist, and access to a critical protein source—salmon—would be undermined, which could exacerbate food insecurity across rural and remote SEAK. This could, in turn, fray the cultural, health, well-being, and connectedness of Alaska Native peoples who have been stewards of Southeast Alaska for at least 10,000 years.

Management Considerations

Under Alternative 1 and 2, NMFS may disburse grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters related to the obligations of the PST through 2028. Some of this information is required for domestic fishery management as well. NMFS has already approved and disbursed funds in consecutive multi-year awards to the State of Alaska under the 2019 PST Agreement through the State's current fiscal year. NMFS expects that the proposed funding initiatives necessary for the State to implement the 2019 PST Agreement will remain for the duration of the Agreement or will be similar to the funding initiatives currently implemented. Consistent with Federal law and regulations, NMFS reviews actions taken by the State of Alaska consistent with the proposed grants.

In addition under Alternatives 1 and 2, NMFS would also monitor the percent reduction of Chinook salmon prey attributed to the SEAK salmon fisheries as a surrogate for incidental take of SRKW. This "prey reduction" value would include only the amount of Chinook salmon catch expected to overlap in time and space with SRKW (i.e., available prey after natural and fisheries mortality). NMFS can quantify and monitor this value, and it directly relates to the extent of effects on prey availability. The extent of take NMFS expects for SRKW in future years is expected to vary, but be within the range of prey reductions analyzed that would have occurred during the most recent decade (2009 to 2018) had the 2019 PST Agreement been in effect.

Regarding the Mexico DPS of humpback whales and the Western DPS of Steller sea lions, NMFS would be able to describe an amount of take that is expected to occur, based on stranding data, self-reports, and observer data that contributes to monitoring of ESA listed humpback and Steller sea lion interactions in the SEAK salmon fisheries; however, NMFS acknowledges that these data are limited. Fishery observers are not required for most of these fisheries, and much of the existing data regarding interactions is opportunistic. Further, ESA listed and non-listed humpbacks and Steller sea lions co-occur in the analysis area and are not readily distinguishable;

NMFS is generally not able to identify their DPS of origin. In the absence of precise DPS identification for each take, NMFS employs the best available science to allocate those takes relative to the proportion of occurrence of listed versus non-listed humpback whales and Steller sea lions in SEAK. Furthermore, NMFS notes that the recovery of these DPSs continues despite past rates of take that are essentially identical to what we expect to occur in the future.

Under Alternative 3, no ITS coverage for Treaty salmon fisheries and no Federal funding will be provided to the State of Alaska to implement the PST and actively participate in the various Pacific Salmon Commission panels and technical committees. The PST commits the U.S. and Canada to prevent overfishing; provide for optimum production; and provide for each party to receive benefits equivalent to the production of salmon originating in its waters. Treaty principles also state that in fulfilling their obligations pursuant to the above principle, the Parties shall cooperate in management, research, and enhancement. Treaty principles also recognize the desirability, in most cases, of avoiding undue disruption of existing fisheries.

Alternative 3 directly conflicts with the underlying Treaty principles. First and foremost, Alternative 3 violates the principle of "fair sharing" or "equity principle." Alaska will not reap the benefits equivalent to the production of salmon originating in its waters. Without access to equitable sharing, there is little incentive for Alaska to participate in the Treaty. For example, while Alaska is prevented from prosecuting Treaty salmon fisheries under Alternative 3, Canada may keep harvesting Alaska salmon stocks. Secondly, under Alternative 3, no Treaty salmon fisheries would occur, which directly violates the Treaty principle of "avoiding undue disruption of fisheries." Thirdly, Alternative 3 severely hinders the ability of the State of Alaska from cooperating in management, research, and salmon enhancement activities, which undermines Treaty conservation commitments. Salmon in the Treaty area are a shared resource, a lack of coordination and cooperation among the Parties undermines the Treaty itself and impacts conservation of salmon stocks coast-wide. Prior to the Treaty, management of salmon fisheries of the two countries was not coordinated and was often competitive, leading to overfishing and the loss of production to both Parties. Fourth, Alternative 3 runs counter to congressional intent under the Pacific Salmon Treaty Act and congressional intent in funding annual Department of Commerce Treaty appropriations. Fifth, this alternative would likely increase the uncertainty in overall stock assessment and fisheries management, necessitating more conservative management actions and accompanying economic losses to fishery participants. Finally, disruptions to agreements reached under the Treaty may increase the possibility of litigation.

Lastly, under Alternative 3, if NMFS did not issue a BiOp and ITS for the incidental take of listed species, and if the SEAK salmon fisheries did not open, NMFS would not need to develop reasonable and prudent measures and terms and conditions for the ITS. NMFS would not develop additional measures to monitor the harvest of Chinook salmon in the SEAK fisheries.

1. Introduction

This Environmental Impact Statement (EIS) provides decision-makers and the public with an assessment of the environmental, economic, and social impacts of alternative approaches to the issuance of an Incidental Take Statement (ITS) under Section 7 of the ESA that would exempt take of threatened or endangered ESA-listed species by participants in Southeast Alaska (SEAK) salmon fisheries that are subject to the 2019 Pacific Salmon Treaty (PST) Agreement. NMFS would issue an ITS, consistent with requirements of the ESA, in conjunction with a biological opinion (BiOp) that evaluates the effects of two agency actions on listed species and critical habitat, concluding consultation on those agency actions. This EIS directly responds to a court order that NMFS comply with NEPA for the issuance of this ITS. The EIS therefore examines three alternatives related to two actions: proposed issuance of an ITS and proposed funding to the State of Alaska to implement the 2019 PST Agreement. These alternatives are described in detail in Section 2. The effects of the agency actions to be analyzed in the 2024 BiOp are included as well.

This EIS addresses the statutory requirements of the National Environmental Policy Act (NEPA) related to NMFS's respective authorities under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act, 16 United States Code (U.S.C.) 1801, *et seq.*) and the Endangered Species Act (ESA), 16 U.S.C. 1531, *et seq.* This EIS is being prepared using the 2020 Council on Environmental Quality NEPA Regulations as modified by the 2022 Phase 1 final rule.[1]

1.1. History of ESA Consultations and Litigation

This section provides background information on NMFS's roles under the ESA and NEPA, the litigation that required this EIS, and how NMFS is responding to the litigation.

1.1.1. NMFS's Role as the Consulting Agency and Action Agency under the ESA and NEPA

Under Section 7 of the ESA, NMFS (as the consulting agency) consults with Federal agencies (also called action agencies) to ensure that any action authorized, funded, or carried out by that action agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species (16 U.S.C. § 1536(a)(2)). At the conclusion of a consultation, NMFS issues a Biological Opinion, or "BiOp," which is a written statement setting forth NMFS's opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects listed species and designated critical habitat (16 U.S.C. § 1536(b)(3)(A)).[2]

If a BiOp concludes that the proposed action is not likely to jeopardize the continued existence of any threatened or endangered species nor destroy or adversely modify their critical habitat, or if

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[1] The page limits of this EIS are consistent with NEPA, as amended by the Fiscal Responsibility Act of 2023, 42 U.S.C. § 4336a(e).

[2] As stipulated in 50 C.F.R. § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the incidental take statement (ITS) is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

the BiOp offers reasonable and prudent alternatives to avoid jeopardy or destruction or adverse modification, the BiOp would include an ITS exempting the take of ESA-listed species that is reasonably certain to occur incidental to that action. The ITS specifies the amount and extent of incidental take (16 U.S.C. § 1536(b)(4); 50 C.F.R. § 402.14). The term "take" under the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. § 1532(19)). The term "incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 C.F.R. § 402.02). Section 7(b)(4) and section 7(o)(2) of the ESA provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of the ITS. In short, the consulting agency is therefore required under the ESA to (1) consult with the action agency; and (2) prepare a BiOp detailing how the agency action affects listed species and their designated critical habitat (16 U.S.C. § 1536(b)(3)) and issue an ITS for take that is reasonably certain to occur incidental to the action (16 U.S.C. § 1536(b)(4)) if the consulting agency concludes, among other things, that the agency action and any incidental take is not likely to jeopardize the continued existence of any listed species (16 U.S.C. § 1536(b)(4); 50 CFR 402.14(g)(7)).

Action agencies are required in certain circumstances to comply with the ESA and NEPA. For the ESA, as explained above, the action agency is required to consult with the consulting agency (NMFS or Fish and Wildlife Service) (16 U.S.C. § 1536(a)(2)).

Generally, when NMFS issues a BiOp and ITS in its role as the consulting agency, the ITS is not a permit or authorization or otherwise a major Federal action that triggers the requirement to comply with NEPA. As set forth in section 7(o) of the ESA, an ITS provides an exemption from the ESA's take prohibition and is prepared as part of the ESA section 7 consultation process on Federal actions. The requirement to comply with NEPA falls on the action agency: as part of the agency's decision-making process for an action, the action agency should include appropriate consideration of environmental effects of proposed actions and their alternatives, as well as encourage and facilitate public involvement in decisions which affect the quality of the human environment, consistent with NEPA and implementing regulations.

There are instances in which NMFS is both the consulting agency and the action agency under the ESA section 7 consultation process: in those instances, NMFS as the action agency should comply with NEPA for the underlying major Federal actions. This requirement is based in NEPA and is not tied to the issuance of the BiOp and ITS. There is a limited circumstance, however, in which a court has found that the issuance of the ITS is the functional equivalent of a permit and therefore NMFS must comply with NEPA for the issuance of that ITS. In *Ramsey v. Kantor*, the U.S. Court of Appeals for the Ninth Circuit held that, with respect to the Columbia River basin fisheries, the issuance of an ITS is a major Federal action requiring NEPA compliance.[3] Courts in the Ninth Circuit have construed *Ramsey* narrowly in the years since the decision.[4] Since *Ramsey*, the Ninth Circuit has confirmed that NMFS's production of a BiOp and ITS is not a "major Federal action" that triggers the requirement to complete an EA or EIS when the action agency will comply with NEPA for the federal actions covered in the BiOp and ITS.[5] Therefore, under NEPA, the consulting agency is not required to comply with NEPA for the issuance of the BiOp

[3] *See Ramsey v. Kantor*, 96 F.3d 434, 444 (9th Cir. 1996).
[4] *See Grand Canyon Tr. v. U.S. Bureau of Reclamation*, No. CV-07-8164-PHX-DGC, 2011 WL 1211602, at *11 (D. Ariz. Mar. 30, 2011) ("*Ramsey*'s holding has been construed narrowly."); *City of Santa Clarita v. U.S. Dep't of Interior*, No. CV-02-00697 DT (FMOx), 2006 WL 4743970, at *19 (C.D. Cal. Jan. 30, 2006), *aff'd*, 249 F. App'x 502 (9th Cir. 2007).
[5] *See San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581, 644–45 (9th Cir. 2014).

and ITS, except in the narrow circumstance described in *Ramsey*, while the action agency is required to comply with NEPA for the agency actions subject to the consultation.

1.1.2. 2019 Biological Opinion and Magnuson-Stevens Act Essential Fish Habitat Response, and NEPA for the Federal Actions Related to the SEAK Salmon Fisheries

In response to the 2019 PST Agreement, NMFS consulted under section 7 of the ESA on three actions (note that NMFS was both the action agency and the consulting agency for these actions)—

- delegation of management authority over salmon fisheries in the SEAK EEZ to the State of Alaska on the basis of new information regarding the effects of the action and the condition of ESA-listed species,
- Federal funding through grants to the State of Alaska for the State's management of commercial and sport salmon fisheries and transboundary river enhancement necessary to implement the 2019 PST Agreement, and
- Federal funding of a conservation program to support critical Puget Sound Chinook stocks and Southern Resident Killer Whales (SRKW) related to the 2019 PST Agreement.

NMFS concluded in the 2019 Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response (NMFS 2019) that the actions were not likely to jeopardize the continued existence of any of the ESA-listed species and that the actions were not likely to destroy or adversely modify designated critical habitat for any of the listed species.

The Federal funding of a conservation program to support critical Puget Sound Chinook stocks and SRKW was a separate action from the two Federal actions related to the SEAK salmon fisheries. The conservation program included three components, one of which is a prey increase program to fund hatchery production to supplement prey for SRKW. The funding for the conservation program was meant to increase prey availability and mitigate the impacts from fisheries conducted under the 2019 PST Agreement, including the SEAK salmon fisheries; the ocean fisheries in federal waters off the coast of Washington, Oregon, and California managed by the Pacific Fishery Management Council and NMFS; and salmon fisheries in Puget Sound.

Separately, NMFS has prepared BiOps for the other salmon fisheries managed under the PST. This includes a 2021 BiOp on the management under the Magnuson-Stevens Act of the ocean salmon fisheries off the coast of Washington, Oregon, and California that harvest ESA-listed Chinook salmon and take SRKW, as well as the annual BiOps on federal actions related to the Puget Sound salmon fisheries. Those BiOps all concluded that those salmon fisheries do not cause jeopardy for ESA-listed salmon or SRKW.

Finally, NMFS as the action agency complied with NEPA for the federal actions related to the SEAK salmon fisheries (delegation and funding to the State). The decision to delegate to the State management of the authorized fisheries in the SEAK EEZ was made in 1990 and reaffirmed and evaluated under NEPA in several actions, mostly recently in 2012 (Amendment 12 to the Salmon FMP and supporting environmental assessment). For the funding actions, NMFS determined that those actions fell within a categorical exclusion that precluded further NEPA review. These NEPA documents are discussed in more detail in Section 5.

1.1.3. Litigation

In 2020, the Wild Fish Conservancy (WFC), a 501(c)3 nonprofit organization, filed a lawsuit in the U.S. District Court for the Western District of Washington challenging the 2019 BiOp.[6] WFC alleged NMFS violated the ESA and NEPA. On August 8, 2022, the district court found that NMFS violated both the ESA and NEPA.[7] With respect to the ESA, the district court determined the prey increase program lacked specificity and deadlines or otherwise enforceable obligations and was not subject to agency control or reasonably certain to occur. The court therefore found NMFS erred by relying on the program to offset the effects of the fisheries on ESA-listed salmon and SRKW. The district court also concluded that NMFS failed to evaluate the effects of the prey increase program on ESA-listed Chinook salmon. For these reasons, the court found that NMFS's jeopardy determinations for SRKWs and ESA-listed Chinook salmon were flawed.

With respect to NEPA, the district court concluded NMFS failed to conduct NEPA analyses for the issuance of the ITS exempting take of ESA-listed species associated with the SEAK salmon fisheries considered in the 2019 BiOp. The district court also concluded NMFS violated NEPA by funding the prey increase program without preparing a NEPA analysis.

On May 2, 2023, the U.S. District Court for the Western District of Washington vacated the portions of the 2019 SEAK BiOp ITS that authorize "take" of the SRKW and Chinook salmon resulting from commercial harvests of Chinook salmon during the troll fishery's winter and summer seasons (excluding the spring season); take coverage under the ITS for humpback whales and Steller sea lions was not vacated for the commercial troll fishery in the summer and winter.[8] The district court remanded to the agency to address the ESA and NEPA deficiencies identified by the court. The district court's order partially vacating the ITS was stayed by the Ninth Circuit on June 21, 2023.[9]

To address the district court's orders, NMFS is consulting and preparing a BiOp for the effects of the delegation and grant actions on ESA-listed species and their critical habitat as well as an ITS. NMFS is preparing this EIS to respond specifically to the court orders that NMFS must complete a NEPA analysis for the issuance of the ITS. Separately, NMFS is also preparing an EIS to respond to the district court's orders that NMFS must complete a NEPA analysis for funding the prey increase program; that EIS will analyze alternative uses of funding to increase prey availability for SRKWs, including one alternative for the use of funding for hatchery production of prey. NMFS is consulting on and preparing a separate BiOp for the federal funding of the prey increase program.

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[6] *Wild Fish Conservancy v. Quan*, No. 20-CV-417-RAJ-MLP (W.D. Wash.).

[7] *Wild Fish Conservancy v. Thom*, No. 20-CV-417-RAJ-MLP, 2021 WL 8445587 (W.D. Wash. Sept. 27, 2021), *report and recommendation adopted*, No. 20-CV-417-RAJ, 2022 WL 3155784 (W.D. Wash. Aug. 8, 2022).

[8] *Wild Fish Conservancy v. Rumsey*, No. 20-CV-417-RAJ-MLP, 2022 WL 18877886 (W.D. Wash. Dec. 13, 2022), *report and recommendation adopted*, No. 20-CV-417-RAJ, 2023 WL 3204697 (W.D. Wash. May 2, 2023).

[9] *Wild Fish Conservancy v. Alaska Trollers Association*, Nos. 23-35322, 23-35323, 23-35354 (Docket entry filed June 21, 2023).

1.1.4. New Biological Opinion and Incidental Take Statement to respond to the court's orders

For SEAK salmon fisheries, NMFS is preparing a BiOp on the effects of two actions on ESA-listed species to address deficiencies identified by the district court in the 2019 BiOp that evaluated those same actions.

The first action that will be considered in the BiOp is NMFS's delegation of management authority over commercial troll and sport salmon fisheries in the EEZ in SEAK to the State of Alaska under the Salmon FMP (described in Section 3.3).

The second action that will be considered in the BiOp is Federal funding through grants to the State of Alaska for the State's management of commercial and sport salmon fisheries and transboundary river enhancement related to implementation of the 2019 PST Agreement (described in Section 3.5). NMFS may in its discretion disburse grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters to meet the obligations of the PST through 2028. Generally, NMFS approves the scope of work for three to five years and then disburses funds annually for that award period. Consistent with Federal law and regulations, NMFS reviews actions taken by the State of Alaska consistent with the proposed grants.

In response to the court's orders finding the 2019 BiOp deficient and remanding to the agency to address those deficiencies, NMFS is consulting and plans to issue the 2024 BiOp to consider the effects of these actions on ESA-listed species, likely to include ESA-listed Chinook salmon (Puget Sound, Lower Columbia River, Upper Willamette River, and Snake River fall-run Evolutionary Significant Units (ESUs, all threatened)); Steller sea lions, western Distinct Population Segments (DPS) (endangered); humpback whale, Mexico DPS (threatened); killer whale, southern resident DPS (SRKW) (endangered) and their critical habitats. Salmon fisheries in SEAK are likely to have direct effects on ESA-listed salmon species. These fisheries may also affect listed and non-listed salmon that are prey resources for SRKW and therefore may affect SRKW. Fishing gear interactions occur in these SEAK salmon fisheries that may affect the Mexico DPS of humpback whales and the western DPS of Steller sea lions.

If the 2024 BiOp concludes that the proposed actions are not likely to jeopardize the continued existence of any threatened or endangered species nor destroy or adversely modify their critical habitat, or if the BiOp offers reasonable and prudent alternatives to avoid jeopardy or destruction or adverse modification, the BiOp would include an ITS exempting take of the ESA-listed species. The issuance of the ITS would exempt any incidental take and provide fishery participants with protection from liability for any incidental takes, should they occur in compliance with the terms and conditions of the ITS. The issuance of the ITS is predicated on the understanding that such incidental takes are reasonably certain to occur in the SEAK salmon fisheries.

1.1.5. New EIS to respond to the court's orders

NMFS is preparing this EIS to respond specifically to the court orders with respect to the stated NEPA deficiency for the issuance of the ITS for the SEAK salmon fisheries. This EIS analyzes the effects of a reasonable range of alternatives for the issuance of an ITS to exempt take of ESA-listed species in the SEAK salmon fisheries under the PST, as well as the effects from the agency actions to be analyzed in the BiOp.

As explained above, the Ninth Circuit has confirmed that NMFS's production of a BiOp and ITS as the consulting agency is not a "major Federal action" that triggers the requirement to complete an EA or EIS when the action agency (here, NMFS) complies with NEPA for the federal actions covered in the BiOp and ITS.[10] While the district court in the *Wild Fish Conservancy v. Quan* case concluded *Ramsey* applies here, NMFS does not believe the narrow circumstance identified in *Ramsey* is present here.[11] As the action agency, NMFS complied with NEPA for each amendment to the Salmon FMP addressing delegation of management of the federal fisheries to the State of Alaska; this includes the most recent amendment to the Salmon FMP (Amendment 12) that maintained delegation of management to the State of the authorized fisheries in the SEAK EEZ. NMFS also has ensured NEPA coverage for the issuance of funding to the State of Alaska to implement the PST. In these circumstances, when NMFS also serves as the consulting agency, NMFS does not separately have to comply with NEPA for the issuance of the BiOp and the ITS since that action does not constitute a "major Federal action[12]." Because the district court in *Wild Fish Conservancy v. Quan* issued an opinion indicating that NMFS must comply with NEPA in issuing this ITS, we have prepared this EIS to comply with the court's decision.

In evaluating the scope to be analyzed in this EIS, NMFS has decided to incorporate NMFS's funding through grants to the State of Alaska for the State's management of commercial and sport salmon fisheries and transboundary river enhancement related to implementation of the 2019 PST Agreement. Generally, NMFS approves the scope of work for three to five years and then disburses funds annually for that award period. Therefore, NMFS analyzes in this EIS the effects from NMFS's proposed future funding to the State of Alaska, and NMFS expects that the proposed funding initiatives or similar funding initiatives will remain in place for the duration of the 2019 PST Agreement. This EIS provides the updated NEPA analysis for the proposed funding through grants to the State.

NMFS is also incorporating and analyzing the delegation of management of authorized salmon fisheries in the SEAK EEZ to the State of Alaska. There is no proposed action related to delegation; this decision was made in 1990 and reaffirmed and evaluated under NEPA in several actions, mostly recently in 2012 (Amendment 12 to the Salmon FMP).[13] The environmental assessment/regulatory impact review for Amendment 12 evaluated the impacts of the delegation and the continued operation of the commercial troll and sport fisheries in the SEAK EEZ on Alaska salmon stocks, ESA-listed salmon, marine mammals, seabirds, and essential fish habitat, as well as cumulative effects and economic effects. This EIS updates that analysis and evaluates the effects of continued commercial troll and sport fishing in federal waters consistent with the 2019 PST Agreement (under either State or federal management).

1.1.6. West Coast Region's Prey Increase Program ESA consultation and EIS

NMFS is separately responding to the court orders by preparing the Programmatic Draft Environmental Impact Statement for Funding of the Prey Increase Program for Southern Resident Killer Whales (NMFS 2024). The proposed action is to fund the production of juvenile hatchery salmon for release into the wild as prey (food) for SRKWs. The availability of prey (food) for SRKWs is a limiting factor currently inhibiting the recovery of this species. Congress has

[10] *See San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581, 644–45 (9th Cir. 2014).

[11] To NMFS's knowledge the *Ramsey* decision and the *Wild Fish Conservancy v. Quan* decision are the only two cases holding that NMFS as the consulting agency must comply with NEPA for the issuance of a BiOp and ITS.

[12] *See San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581, 644–45 (9th Cir. 2014).

[13] Any change in delegation would require the Council to develop and recommend a new FMP amendment. NMFS reviews Council recommendations for consistency with the Magnuson-Stevens Act and other applicable law, including NEPA. NMFS's implementation of a Council recommendation is subject to NEPA, and therefore any future FMP amendment that maintained or altered delegation would be subject to NEPA.

appropriated Federal funds to NMFS for PST implementation, a portion of which NMFS has used to fund a program to produce additional hatchery salmon as prey for SRKWs (NMFS 2024).

The Programmatic EIS evaluates different alternatives for the use of funding to increase prey availability for SRKWs; these include using the funding for 1) a hatchery program to increase prey availability, 2) Chinook habitat restoration, and 3) reduced fishing effort across U.S. fisheries managed under the PST (and therefore harvest).

NMFS is also conducting an ESA section 7 consultation and plans to issue a BiOp on the prey increase program that evaluates effects on listed species and designated critical habitat.

1.1.7. Past ESA consultations for the SEAK salmon fisheries under the Pacific Salmon Treaty

Prior to the 2019 BiOp, NMFS had consulted a number of times since 1993 on the impacts of the SEAK salmon fisheries on ESA listed species. This section summarizes these consultations.

1993 to 1998 - NMFS determined, through the section 7 consultation process, that the SEAK salmon troll fishery does not jeopardize the continued existence of the Snake River fall Chinook or result in the destruction or adverse modification of critical habitat. NMFS issued six BiOps; including no-jeopardy determinations and incidental take statements for listed Pacific salmon. Each BiOp contained one-year expiration dates, except the 1998 opinion lasted while the Letter of Agreement between ADF&G and the U.S. Section of the Pacific Salmon Commission was in effect (Attachment 1 to NMFS 1997). Conservation measures contained in these past opinions varied somewhat, but generally were recommendations related to limiting Chinook harvest in the all-gear fishery consistent with United States/Canada treaty negotiations.

1999 - NMFS conducted a consultation under section 7 of the ESA on the effects of implementing the proposed 1999 PST Agreement to ESA-listed species. The BiOp concluded that the PST and the decision by the North Pacific Fishery Management Council (Council) to continue to delegate its management authority to the State is not likely to jeopardize any of the sixteen threatened or endangered ESUs of Pacific salmon, steelhead, or cutthroat trout or destroy or adversely modify any of the critical habitat that has been designated for these species (NMFS 1999). The BiOp contains an ITS and prescribes reasonable and prudent measures that must be undertaken. These measures are necessary to minimize and reduce the anticipated level of incidental take of listed species. The BiOp also details terms and conditions and conservation recommendations for NMFS and the State.

2008 - NMFS conducted a consultation under section 7 of the ESA on the effects of implementing the proposed 2009 PST Agreement to ESA-listed species and the continued delegation under the FMP. NMFS concluded in a 2008 BiOp that the proposed actions were not likely to jeopardize the continued existence of any of the listed species and that the actions were not likely to destroy or adversely modify designated critical habitat for any of the listed species. The 2008 BiOp included an ITS that covers the PST, and the deferral of management to the State for the duration of this management program, subject to the conditions that require re-initiation of consultation (NMFS 2008a).

2012 - Salmon FMP Amendment 12 - NMFS conducted informal consultations under section 7 of the ESA on the effects to ESA-listed salmon and marine mammals from the implementation of Amendment 12 to the Salmon FMP, which, among other things, reaffirmed that management of the commercial troll and sport salmon fisheries Southeast Alaska is delegated to the State and updated provisions to bring the Salmon FMP into compliance with requirements for annual catch limits and fishery impact statements. NMFS West Coast Region concurred that the action would have no direct or indirect effects on ESA-listed salmon species, relative to the status quo. NMFS

Alaska Region concurred that Amendment 12 and the salmon fisheries conducted in Federal waters pursuant to Amendment 12 were not likely to adversely affect ESA-listed marine mammal species or designated critical habitat.

1.2. Analysis Area

The analysis area considered in this EIS is defined by the three actions considered in this analysis: (1) NMFS's proposed issuance of an ITS, (2) the delegation to the State of Alaska of management of the SEAK salmon commercial troll and sport fisheries in the EEZ, and (3) proposed Federal funding for the State of Alaska's SEAK salmon management as it pertains to requirements under the PST.

Incidental take of ESA-listed Chinook salmon ESUs, humpback whale Mexico DPS, and Steller sea lion Western DPS are known to or may occur in the SEAK commercial and sport troll fisheries, as well as the SEAK salmon purse seine, drift, and set gillnet fisheries that are subject to the 2019 PST Agreement. Therefore, State waters of SEAK and waters in the EEZ off Alaska in which these fisheries occur, east of longitude of Cape Suckling (143°53' 36'' West) south to the international boundary in Dixon Entrance, are included in the analysis area (Figure 1-1). Figure 1-2 illustrates the geographic range of the 2019 PST Agreement.

This EIS analyzes the effects of the proposed issuance of the ITS for take of the four Chinook salmon ESUs, the humpback whale Mexico DPS, the Steller sea lion western DPS (WDPS), and the SRKW DPS under consideration in the 2024 BiOp. Therefore, the analysis area for this EIS is consistent with the likely action area for the BiOp: it includes all marine fishing areas in State waters of SEAK and waters off Alaska in the EEZ east of longitude of Cape Suckling (143°53' 36'' West) south to the international boundary in Dixon Entrance as well as the overlap of the SRKW range and the range of Chinook salmon ESUs that are affected by the SEAK salmon fisheries.

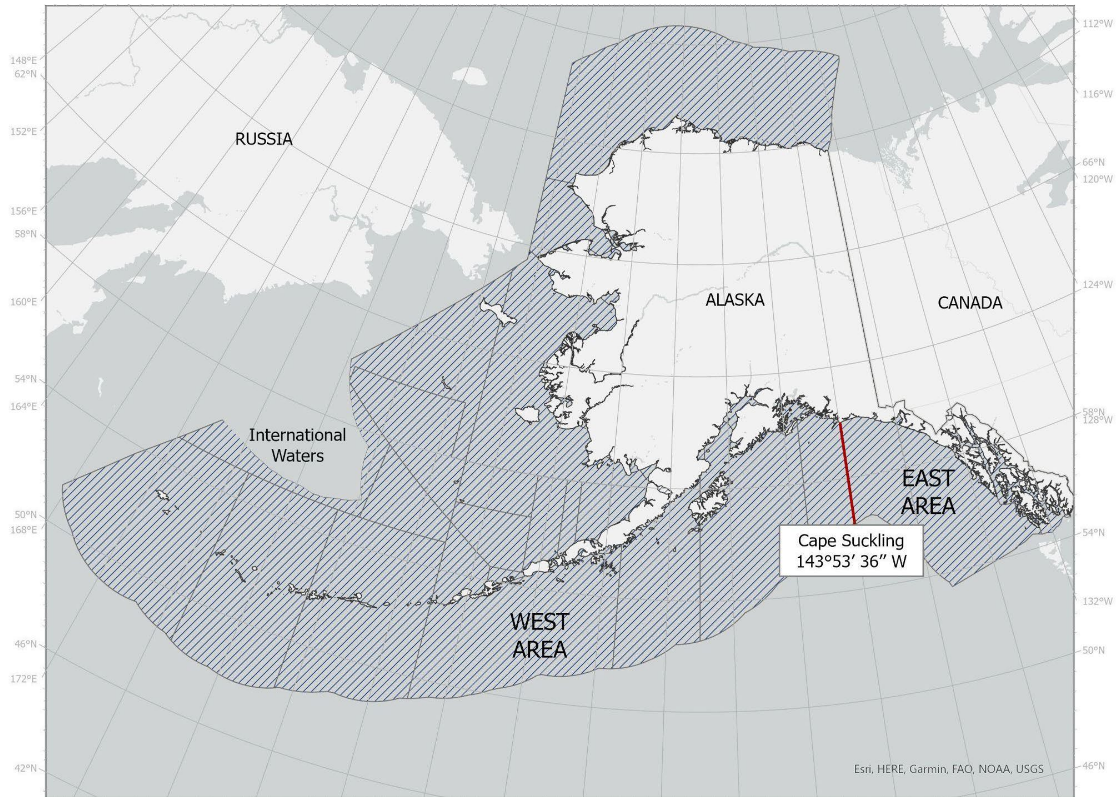

Figure 1-1 The Geographic Scope of the North Pacific Fishery Management Council's Salmon FMP, showing the East and West Areas. The area east of Cape Suckling is where the SEAK salmon fisheries occur.

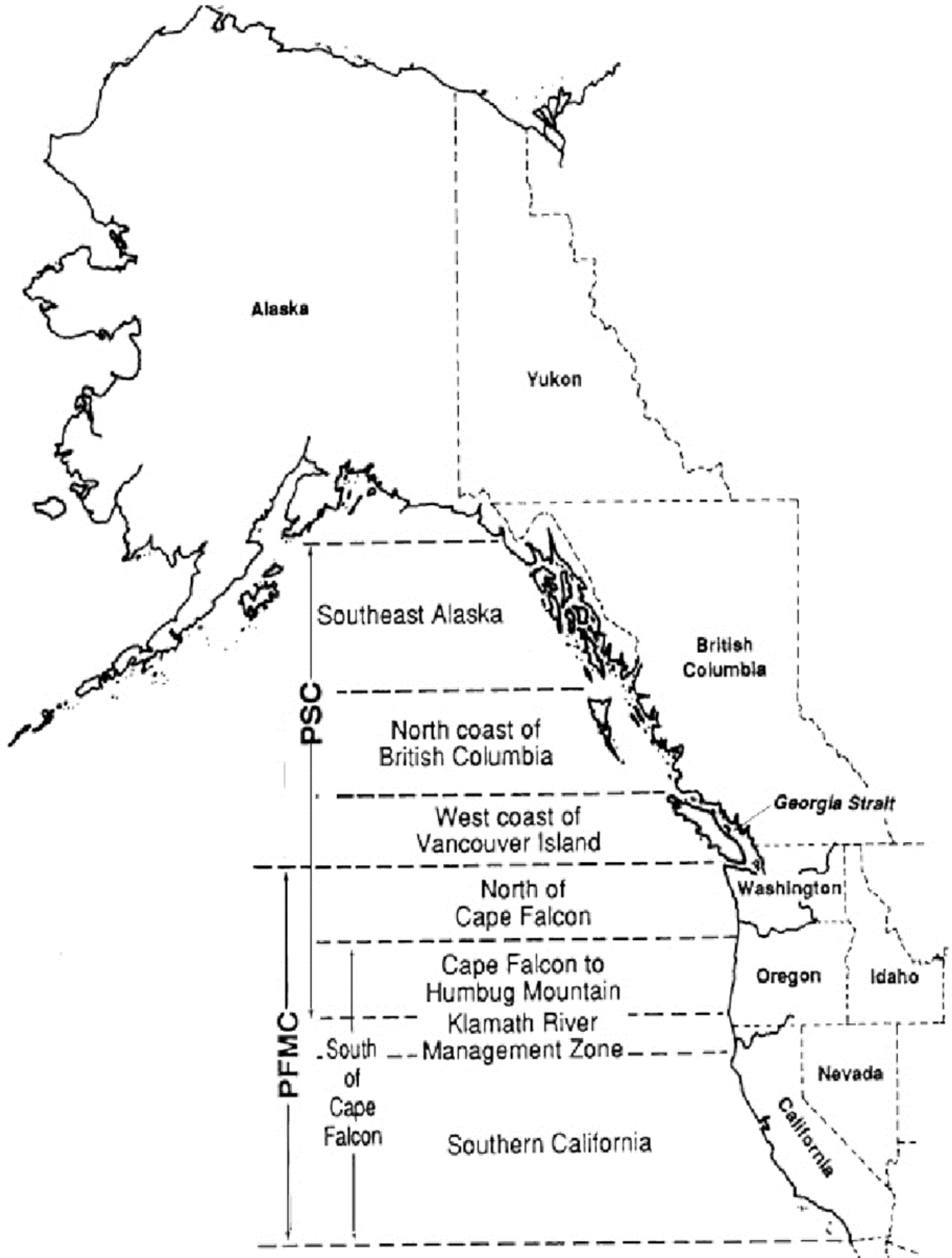

Figure 1-2 Areas managed subject to the jurisdiction of the PSC and the Pacific Fishery Management Council (PFMC) and various geographic subdivisions of each. Figure 1-1 shows NPFMC geographic jurisdiction which includes Southeast Alaska.

1.3. Public Scoping Process

The EIS process provides opportunities for public participation. Scoping, the term used for involving the public in the NEPA process at its initial stages, is designed to provide an opportunity for the public, agencies, and other interest groups to provide input on potential issues associated with the proposed action. Scoping is used to identify the environmental issues related to the proposed action and identify alternatives to be considered in the EIS. Scoping is accomplished through written communications and consultations with agency officials, interested members of the public and organizations, Alaska Native representatives, and State and local governments.

The formal scoping period began with the publication of a Notice of Intent in the *Federal Register* on October 4, 2023 (88 FR 68572). Public comments were due to NMFS by November 20, 2023. In the Notice of Intent, NMFS requested written comments from the public on the range of alternatives to be analyzed and on the environmental, social, and economic issues to be considered in the analysis. This Draft EIS addresses the relevant issues identified during the scoping processes and provides another opportunity for public comments and participation.

1.3.1. Summary of scoping comments

NMFS received 5 written comments from the public and interested parties. The scoping comments are available on *Regulations.gov* at https://www.regulations.gov/document/NOAA-NMFS-2023-0115-0001/comment.

This section summarizes the issues raised during the scoping process. To the extent practicable and appropriate, this Draft EIS addresses the following issues raised during scoping.

Section 2 describes the alternatives NMFS determined best accomplish the proposed action's purpose and need. Section 2 also describes the alternatives raised during scoping that were considered but not carried forward, and discusses the reasons for their elimination from further detailed study.

Generally, the comments received suggested that NMFS consider:

(1) Broadening the scope of the proposed action to include the increased Chinook (and other salmon species) hatchery production ("prey increase") in Washington State;

(2) A cost-benefit analysis of fisheries restrictions and mitigation programs, such as the prey increase program;

(3) Specific analytical approaches to assessing impacts of the alternatives on ESA-listed species, especially Chinook salmon and SRKW, such as a population viability analysis; additionally consider impacts to species under consideration for ESA-listing;

(4) Potential economic impacts of the alternatives on salmon-dependent SEAK communities;

(5) Conducting Tribal Consultation under E.O. 13175 to understand and address Tribal issues related to potential cultural impacts; also consider the use of local knowledge and traditional knowledge (LKTK) in assessing potential impacts of the alternatives;

(6) Potential impacts of the alternatives on subsistence practices and resources and identify mechanisms to avoid and/or mitigate impacts to subsistence communities and subsistence resources;

(7) assessing the implications on environmental justice through the use of methodologies from "Environmental Justice Interagency Working Group Promising Practices for EJ Methodologies in NEPA Reviews" report and the Council on Environmental Quality's Environmental Justice guidance; and

(8) Effects of climate change on the ESA-listed species impacted by the proposed action.

Additional information provided by commenters included peer reviewed papers and general information on: Chinook salmon productivity; Indigenous management systems of Pacific salmon and other fisheries; impacts of climate change and marine heatwaves on marine biological productivity, fish stocks in the North Pacific including Chinook and other salmon species, and zooplankton energetics pathways; impacts of foraging strategies, and prey/energetics requirements and availability for SRKW; impacts to SRKW from contaminants in Chinook salmon prey; developing recovery criteria for ESA-listed species; and alternate salmon fishing gear technology. Additional information was also submitted on the economic and cultural importance of the SEAK salmon fisheries to coastal communities, Tribes, and fishery participants.

1.3.2. Tribal Governments and Alaska Native Claims Settlement Act Regional and Village Corporations

Pursuant to Executive Order 13175 and subsequent Presidential memoranda, NOAA must have an accountable process to ensure meaningful and timely input from Tribal officials in the development of Federal policies with Tribal implications. Consistent with NOAA's Tribal consultation handbook, NMFS consults with Tribal officials from Alaska Native tribes on a government-to-government basis. In addition, because Congress required federal agencies to consult with Alaska Native corporations on the same basis as federally recognized Tribes, NMFS engages in government-to-corporation consultation with Alaska Native Claims Settlement Act (ANCSA) corporations.[14]

To start the consultation process, NMFS emailed letters to Alaska tribal governments, Alaska Native corporations, and related organizations on October 16, 2023, when NMFS started the EIS scoping process. Separate hard copies were mailed to Alaska tribal governments, Alaska Native corporations, and related organizations on October 18, 2023. The letter provided information about the EIS process, the Notice of Intent, and solicited consultation and coordination with Alaska Native representatives. NMFS received no letters providing scoping comments from tribal government or Alaska Native corporation representatives.

NMFS received one request from tribal representatives for tribal Consultation. NMFS conducted formal tribal Consultation on October 30, 2024 with the Central Council of Tlingit and Haida Indian Tribes of Alaska (Tlingit and Haida). At this tribal Consultation, it was mutually agreed upon that Tlingit and Haida would assist NMFS in drafting sections of the EIS as a cooperating agency. As a cooperating agency, Tlingit and Haida has helped NMFS identify, include, and integrate Traditional Ecological Knowledge (TEK) into this EIS to the extent practicable and consistent with CEQ's November 30, 2022, published Guidance for Federal Departments and Agencies on Indigenous Knowledge.[15]

Once this Draft EIS was released, NMFS sent a letter to Alaska Native representatives to announce the release of the document and solicit comments concerning the scope and content of the Draft EIS. The letter provided information on how they can access the electronic Draft EIS.

1.3.3. Cooperating Agencies

The Council for Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA emphasizes agency cooperation early in the NEPA process (40 C.F.R. §§ 1501.8 & 1508.1(e)). NMFS is the lead agency for this EIS.

ADF&G is a cooperating agency. ADF&G participated in the development of this EIS and provided data, staff, and review for this analysis. ADF&G had an integral role in the development of this EIS because it manages the commercial, sport, personal use, and subsistence salmon fisheries, and collects and analyzes salmon biological information.

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[14] Public Law (P.L.) 108-199, 118 Stat. 452, as amended by P.L.108-447, 118 Stat. 3267. NOAA interprets the term "Alaska Native corporations" to mean "Native corporation[s]" as that term is defined under the Alaska Native Claims Settlement Act (ANCSA) of 1971 (43 U.S.C. § 1602).
[15] https://www.whitehouse.gov/wp-content/uploads/2022/12/OSTP-CEQ-IK-Guidance.pdf

Central Council of Tlingit and Haida Indian Tribes of Alaska is also a cooperating agency. The Central Council participated in the development of this EIS and provided data, staff, and review for this analysis. The Central Council had an integral role in the development of this EIS because it has special expertise with respect to the impacts of the salmon fisheries on tribes, culture, and communities in SEAK.

2. Purpose and Need and Alternatives

In light of the court orders, NMFS must prepare an EIS to analyze the impacts of the proposed issuance of an ITS on the human environment. Here, under the ESA, NMFS is both the action agency (the Federal agency that implements the Federal actions under consultation) and the consulting agency (the Federal agency consulting on the effects of the Federal actions at issue). As the action agency, NMFS complied with NEPA for each amendment to the Salmon FMP addressing delegation of management of the federal fisheries to the State of Alaska, and has ensured NEPA coverage for the issuance of funding to the State of Alaska to implement the PST. In these circumstances, when NMFS also serves as the consulting agency, NMFS does not separately have to comply with NEPA for the issuance of the BiOp and the ITS since that action does not constitute a "major Federal action." However, because the district court in *Wild Fish Conservancy v. Quan* issued an opinion indicating that NMFS must comply with NEPA in issuing this ITS, we have prepared this EIS to comply with the court's decision.

NEPA requires that an EIS analyze a reasonable range of alternatives consistent with the purpose and need for the proposed action. The alternatives in this Section were designed to accomplish the stated purpose and need for the action. All of the alternatives were designed to consider the effects of an issuance or non-issuance of an ITS for each ESA-listed species determined to have the potential for "take" in any SEAK salmon fisheries, as well as the effects of the underlying agency actions analyzed in the BiOp and ITS.

2.1. Purpose and Need

The primary proposed action for review under NEPA is the proposed issuance of the ITS under the ESA, per the court orders in *Wild Fish Conservancy v. Quan* stating that NMFS must comply with NEPA for the issuance of the ITS. The purpose of issuing the proposed ITS in conjunction with a new BiOp is to exempt incidental take of ESA-listed species associated with the SEAK salmon fisheries subject to provisions of the 2019 PST Agreement. NMFS issues an ITS in cases where NMFS concludes an action and the resultant incidental take of listed species will not violate ESA section 7. The ITS would be based on the analysis in the 2024 BiOp, and would only be issued if NMFS concluded that the amount or extent of anticipated take, coupled with other effects of the proposed actions, is not likely to jeopardize the continued existence of the listed species. In the case of jeopardy, NMFS may issue an ITS if the BiOp offers reasonable and prudent alternatives to avoid jeopardy or destruction or adverse modification.

The ITS would specify, among other requirements: the impact (the amount or extent) of such incidental taking on the listed species; reasonable and prudent measures considered necessary or appropriate to minimize the impact of such take; terms and conditions (including reporting requirements) that implement the specified measures; and for marine mammals, measures necessary to comply with the issuance of incidental take authorization under section 1371(a)(5) of the MMPA. If issued, the ITS would exempt any incidental take and provide fishery participants with protection from liability for any incidental takes, should they occur in compliance with the terms and conditions of the ITS. The issuance of the ITS is predicated on the understanding that such incidental takes are reasonably certain to occur in the SEAK salmon fisheries.

The proposed issuance of a new BiOp and ITS also are required, per the court's finding that the BiOp was deficient and remand to NMFS to address those deficiencies. In light of the nexus between the court's orders on the ESA and NEPA deficiencies and in light of NMFS's ongoing disbursement of funds to the State, this EIS evaluates the effects of the actions under consultation and evaluated in the BiOp. As a result, as an aspect of each alternative, NMFS is also evaluating the effects of the following:

- NMFS's delegation of management authority over salmon fisheries in the EEZ in SEAK to the State of Alaska under the Salmon FMP; and
- Federal funding through grants to the State of Alaska for the State's management of commercial and sport salmon fisheries and transboundary river enhancement necessary to implementation of the 2019 PST Agreement. This is also a second proposed action considered in the Alternatives.

For the first agency action evaluated in the BiOp, however, there is no proposed action to maintain, amend, or rescind delegation of management of the federal fisheries to the State consistent with the Magnuson-Stevens Act (16 U.S.C. § 1856(a)(3)(B)). The decision to delegate to the State management of the authorized fisheries in the SEAK EEZ was made in 1990 and reaffirmed and evaluated under NEPA in several actions, mostly recently in 2012 (Amendment 12 to the Salmon FMP). The environmental assessment/regulatory impact review for Amendment 12 evaluated the impacts of the delegation and the operation of the commercial troll and sport fisheries in the SEAK EEZ on Alaska salmon stocks, ESA-listed salmon, marine mammals, seabirds, and essential fish habitat, as well as cumulative effects and economic effects. This EIS updates that analysis and evaluates the effects of commercial troll and sport fishing in federal waters consistent with the 2019 PST Agreement (under either State or federal management). Because there is no proposed action related to delegation, this aspect of the effects analysis is presented for analytical purposes only. If NMFS were to rescind delegation and solely manage the fisheries, NMFS expects that effects similar to delegated management would occur (and would be similar whether NMFS managed the fishery solely, or managed the fishery through closure).

The second proposed action is Federal funding through grants to the State of Alaska for the State's management of commercial and sport salmon fisheries and transboundary river enhancement related to implementation of the 2019 PST Agreement. NMFS may in its discretion disburse grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters related to meeting the obligations of the PST through 2028. NMFS expects that the proposed funding initiatives or similar funding initiatives will remain in place for the duration of the 2019 PST Agreement.

2.2. Description of the Alternatives

Alternative 1: Status Quo, no action.

Alternative 1 is the status quo; NMFS assumes that no litigation occurred and therefore the ITS remains valid and funding through grants to the State of Alaska continues. The status quo is the ITS from the 2019 BiOp. With this ITS, the EIS would assume that the SEAK salmon fisheries subject to the 2019 PST Agreement would continue to be prosecuted under the 2019 PST Agreement and existing fishery management measures. Under this alternative, the Council's and NMFS's decision to delegate management of the authorized salmon fisheries in the SEAK EEZ to the State of Alaska would remain unchanged, and NMFS would continue to fund grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters to meet the obligations of the PST through 2028.

This alternative would not respond to the court's orders, because the court identified flaws with the 2019 BiOp. As noted in Section 1.1, the district court determined the prey increase program lacked specificity and deadlines or otherwise enforceable obligations and was not subject to agency control or reasonably certain to occur. The court therefore found NMFS erred by relying on the program to offset the effects of the fisheries. The district court also concluded that NMFS failed to evaluate the effects of the prey increase program on ESA-listed Chinook salmon. Ultimately, the court found that NMFS's jeopardy determinations for SRKWs and ESA-listed

Chinook salmon were flawed. Because NMFS issues an ITS if NMFS concludes, among other things, that the agency action and any incidental take is not likely to jeopardize the continued existence of any listed species (16 U.S.C. § 1536(b)(4); 50 CFR 402.14(g)(7)), NMFS cannot continue to rely on the 2019 BiOp and ITS with respect to SRKWs and ESA-listed Chinook salmon.

Alternative 2: Issuance of a New ITS with a New 2024 BiOp.

Under Alternative 2, NMFS would develop a new 2024 BiOp to respond to the court's finding that the 2019 BiOp did not comply with the ESA. This EIS assumes the new BiOp would contain an ITS, consistent with the requirements of 16 U.S.C. 1536, that includes the level of take that NMFS determines is reasonably certain to occur for each ESA-listed species considered in the BiOp and that will not result in jeopardy to the species. This EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would continue to be prosecuted under the 2019 PST Agreement and fishery management measures consistent with any reasonable and prudent measures and terms and conditions included in the new ITS. Under this alternative, the Council's and NMFS's decision to delegate management of the authorized salmon fisheries in the SEAK EEZ to the State of Alaska would remain unchanged, and NMFS would continue to fund grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters to meet the obligations of the PST through 2028.

The ITS for the 2024 BiOp is not yet completed, thus for purposes of this EIS NMFS relies on preliminary components of the ITS. This EIS assumes the proposed ITS would exempt levels of take for all ESA-listed species as follows:

- ESA-listed Chinook salmon; Puget Sound, Lower Columbia River, Upper Willamette River, and Snake River fall-run ESUs (all threatened). The incidental take of listed Chinook salmon from the various ESUs in the SEAK fisheries would vary from year to year depending on the stock abundances, annual variation in migratory patterns, and fishery management measures used to set and implement fishing levels consistent with the 2019 PST Agreement. The incidental take of ESA-listed Chinook salmon in SEAK fisheries would be limited on an annual basis by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that define the limits of catch and total mortality or exploitation rate for each fishery (see Table 2, Table 3, and Table 4). Post season measures of Chinook salmon catch, total mortality, and exploitation rate would be used as surrogates for the incidental take of ESA-listed Chinook salmon. Exceedance of take limits would result in reinitiation.
- Steller sea lions, WDPS (endangered). NMFS has preliminarily determined that the incidental take of WDPS Steller sea lions is reasonably certain to occur as a result of interaction with SEAK salmon fisheries. ESA-listed species interactions with SEAK salmon fisheries potentially considered as take in the BiOp could include entanglement with gear such as buoy extender lines or other types of salmon fishing lines that could result in or contribute to an entanglement. Interactions that include hooking injuries from troll gear, with or without entanglement of the fishing line, also occur. These hooking and entanglement interactions would be considered take in the BiOp, even though they may not lead to mortality and serious injury in all cases. NMFS would calculate the expected number of interactions with SEAK salmon fishery gear of Steller sea lions (listed and non-listed) and the portion of those takes expected to be ESA-listed Steller sea lions. NMFS would consider the extent of take exempted under its ITS to be exceeded if the number of interactions attributed to SEAK salmon fisheries summarized in the annual NOAA Tech Memo on Human-caused Mortality and Injury of NMFS-managed Marine Mammal stocks or summarized in the annual Marine Mammal Stock Assessment Reports (SARs) exceed the interaction take numbers specified in the ITS. Take would be

calculated based on interactions and not allocated differently based on severity (e.g. non-serious vs serious vs mortality). NMFS has preliminarily determined that the amount of take reasonably certain to occur in the SEAK fisheries and proposed to be exempted in the ITS is 1 Western DPS Steller sea lion interaction on average each year that is expected to result in 1 mortality and serious injury on average each year.

- Humpback whale, Mexico DPS (threatened). NMFS has preliminarily determined that the incidental take of Mexico DPS humpback whales is reasonably certain to occur as a result of interaction with SEAK salmon fisheries. ESA-listed species interactions with SEAK salmon fisheries considered as take in the BiOp could include entanglement and blow-throughs in a net or other components of gear such as buoy extender lines or other types of salmon fishing lines that could result in or contribute to an entanglement. These entanglement interactions would be considered take in the BiOp, even though they may not lead to mortality and serious injury in all cases. NMFS would calculate the expected number of interactions with SEAK salmon fishery gear of humpback whales (listed and non-listed) and the portion of takes expected to be ESA-listed that have been reported to NMFS annually. NMFS would consider the extent of take exempted under its ITS to be exceeded if the number of interactions attributed to SEAK salmon fisheries summarized in the annual NOAA Tech Memo on Human-caused Mortality and Injury of NMFS-managed Marine Mammal stocks or summarized in the annual Marine Mammal Stock Assessment Reports (SARs) exceed the interaction take numbers specified in the ITS. Take would be calculated based on interactions and not allocated differently based on severity (e.g. non-serious vs serious vs mortality). NMFS has preliminarily determined that the amount of take reasonably certain to occur in the SEAK fisheries and proposed to be exempted in the ITS is up to 4 Mexico DPS humpback whale interactions on average each year, of which 0.27 interactions per year are expected to cause mortality and serious injury (M/SI) (which results in an exemption of 1 M/SI every 3 years).

- Killer whale, southern resident DPS (endangered). NMFS likely would use two measures of the incidental take of SRKW. The first surrogate NMFS proposes to use is the expected level of Chinook salmon catch in SEAK fisheries, which we can quantify and monitor and is described by the provisions of Chapter 3, Annex IV of the PST Agreement that define annual catch or total mortality limits on Chinook salmon (including ESA-listed and non ESA-listed Chinook salmon). Second, NMFS would monitor the percent reduction of Chinook salmon prey attributed to the SEAK salmon fisheries as a surrogate for incidental take of SRKWs. This "prey reduction" value includes only the amount of Chinook salmon catch expected to overlap in time and space with SRKW (i.e., available prey after natural and fisheries mortality). We can quantify and monitor this value, and it directly relates to the extent of effects on prey availability. The extent of take NMFS would expect for SRKWs in future years is expected to vary but be within the range of prey reductions analyzed that would have occurred during the most recent decade (2009 to 2018) had the 2019 PST Agreement been in effect. Preliminarily, NMFS estimates the SEAK fisheries are expected to reduce SRKW prey abundance annually by—
    - 3.5% or an annual average of 22,500 fish in Southwest/West Coast Vancouver Island (SWWCVI),
    - 1.3% or an annual average of 13,000 fish in the Salish Sea, and
    - 4% or an annual average of 37,500 fish in North of Falcon (NOF).
    - Annual average prey reductions in Oregon and California are expected to be much lower (0.8% and 0.03%, respectively).

- If the percent reduction in abundance in any one year exceeds the maximum of the range of percent reduction in abundance estimated for that region from 2009 to 2018, this will constitute an exceedance of take.

Under this Alternative, the 2024 BiOp would evaluate the proposed issuance of funding to the State, and NMFS would continue to disburse funds to the State of Alaska. Therefore, NMFS analyzes in this EIS the effects from NMFS's proposed future funding to the State of Alaska, and NMFS expects that the proposed funding initiatives or similar funding initiatives will remain in place for the duration of the 2019 PST Agreement.

As a component of this Alternative, NMFS also analyzed the effects from delegation of management of the authorized salmon fisheries in the EEZ to the State, primarily continued commercial troll and sport fishing in federal waters consistent with the 2019 PST Agreement. However, even if NMFS discontinued delegation of management to the State, NMFS assumes that similar effects would result if NMFS solely managed the fisheries in federal waters. This aspect of the effects analysis is presented for analytical purposes only as there is no present action to maintain, amend, or rescind delegation of management of the federal fisheries to the State consistent with the Magnuson-Stevens Act (16 U.S.C. § 1856(a)(3)(B)).

Alternative 3: NMFS would not issue an ITS.

Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. The EIS therefore assumes that the SEAK salmon fisheries under the 2019 PST Agreement would not be prosecuted. Under this Alternative, NMFS also would not fund grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters and NMFS and the State could fail to meet the obligations of the PST through 2028. Because the grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued. Additionally, NMFS has analyzed the effects if no fishing occurred in federal waters, such as if NMFS would supersede delegation of the troll and sport fisheries in the EEZ to the State and close those fisheries under the Salmon FMP. This aspect of the effects analysis on delegation is presented for analytical purposes only as there is no present action to maintain, amend, or rescind delegation of management of the federal fisheries to the State consistent with the Magnuson-Stevens Act (16 U.S.C. § 1856(a)(3)(B)).

This Alternative, where NMFS would not issue a revised BiOp and ITS, is not NMFS's preferred alternative because it does not fulfill NMFS's role under the ESA as the consulting agency, and it does not respond to the district court's order and remand that NMFS address the ESA and NEPA deficiencies identified by the court. Under the ESA, NMFS as the consulting agency is obligated at the conclusion of any consultation to (1) prepare a BiOp detailing how the agency action affects listed species and their designated critical habitat (16 U.S.C. § 1536(b)(3)); and (2) issue an ITS for take that is reasonably certain to occur incidental to the action (16 U.S.C. § 1536(b)(4)) if NMFS concludes, among other things, that the agency action and any incidental take is not likely to jeopardize the continued existence of any listed species (16 U.S.C. § 1536(b)(4); 50 CFR 402.14(g)(7)).

2.3. Comparison of Alternatives

Alternative 1. (Status Quo) This alternative is the no action alternative and is also status quo. This alternative includes an ITS issued under the 2019 BiOp, which concludes that the actions would not jeopardize the continued existence of the ESA-listed species covered by the 2019

BiOp. However, as the court identified flaws with the 2019 BiOp, this alternative is not considered a viable alternative. As noted in Section 1.1, the district court determined the prey increase program lacked specificity and deadlines or otherwise enforceable obligations and was not subject to agency control or reasonably certain to occur. The court therefore found NMFS erred by relying on the program to offset the effects of the fisheries. The district court also concluded that NMFS failed to evaluate the effects of the prey increase program on ESA-listed Chinook salmon. Ultimately, the court found that NMFS's jeopardy determinations for SRKWs and ESA-listed Chinook salmon were flawed. Because NMFS issues an ITS if NMFS concludes, among other things, that the agency action and any incidental take is not likely to jeopardize the continued existence of any listed species (16 U.S.C. § 1536(b)(4); 50 CFR 402.14(g)(7)), NMFS cannot continue to rely on the 2019 BiOp and ITS with respect to SRKWs and ESA-listed Chinook salmon. NMFS must therefore prepare a new BiOp and ITS that respond to the court's orders.

For purposes of analytical illustration, this alternative proceeds as if there were no litigation or court decision. Therefore, this EIS assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would continue to be prosecuted under the 2019 PST Agreement and existing fishery management measures. The ITS in the 2019 BiOp covers ESA-listed species that occur within the action area: Chinook salmon (Puget Sound, Lower Columbia River, Upper Willamette River, and Snake River fall-run ESUs); Steller sea lions, WDPS; humpback whale, Mexico DPS; and SRKW DPS. The issuance of the ITS in the 2019 BiOp provides an exemption for SEAK salmon fishery participants against liability for any covered incidental take of the ESA-listed species, DPSs, or ESUs included in the ITS, if that take occurs in compliance with the terms and conditions of the ITS. Therefore, this analysis assumes that under Alternative 1 the State would open all SEAK salmon fisheries and the fisheries would continue to be prosecuted. Under this alternative, the Council's and NMFS's decision to delegate management of the salmon fisheries in the SEAK EEZ to the State of Alaska would remain unchanged, and NMFS would continue to fund grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters to meet the obligations of the PST through 2028.

Alternative 2. (Preferred Alternative) This alternative includes an ITS that NMFS would issue under a new BiOp prepared in response to the court orders in *Wild Fish Conservancy v. Quan.* If the BiOp concludes that the actions would not jeopardize the continued existence of the ESA-listed species covered by the BiOp or result in the destruction or adverse modification of designated critical habitat, the BiOp would include an ITS. The ITS in the 2024 BiOp would cover ESA-listed species that occur within the action area, mostly likely to include: Chinook salmon (Puget Sound, Lower Columbia River, Upper Willamette River, and Snake River fall-run ESUs); Steller sea lions, WDPS; humpback whale, Mexico DPS; and SRKW DPS. The issuance of the ITS in the 2024 BiOp would provide an exemption for SEAK salmon fishery participants against liability for any covered incidental take of the ESA-listed species, DPSs, or ESUs included in the ITS, if that take occurs in compliance with the terms and conditions of the ITS. Therefore, this analysis assumes that under Alternative 2 NMFS would issue an ITS with the new BiOp and the State would open all SEAK salmon fisheries to proceed and the fisheries would continue to be prosecuted. The assumed ITS limits under this Alternative are similar to those in the 2019 BiOp for ESA-listed salmon ESUs and the SRKW DPS, with more clarity on the use of surrogates for monitoring and defining the level of take in the ITS, but would be revised for the Western DPS of Steller sea lions and the Mexico DPS of humpback whales based on new information, such as new resolution on the distribution of listed species.

Under this Alternative, NMFS would continue to disburse funds to the State of Alaska. Therefore, NMFS analyzes in this EIS the effects from NMFS's proposed future funding to the State of

Alaska, and NMFS expects that the proposed funding initiatives or similar funding initiatives will remain in place for the duration of the 2019 PST Agreement.

As a component of this Alternative, NMFS also analyzes the effects from delegation of management of the authorized salmon fisheries in the EEZ to the State, primarily continued commercial troll and sport fishing in federal waters consistent with the 2019 PST Agreement. For purposes of the analysis, NMFS assumes that similar effects would result if delegation were rescinded and NMFS solely managed the fisheries in federal waters. This aspect of the effects analysis is presented for analytical purposes only as there is no present action to maintain, amend, or rescind delegation of management of the federal fisheries to the State consistent with the Magnuson-Stevens Act (16 U.S.C. § 1856(a)(3)(B)).

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. Under this Alternative, SEAK salmon fishing would not be prohibited pursuant to the ESA, but fishery participants would be liable under the ESA for take of ESA-listed species that occur within the action area. Due to that liability, this analysis assumes that the State would not open the SEAK salmon fisheries under the 2019 PST Agreement and those fisheries would not be prosecuted. On May 3, 2023, the State of Alaska issued a press release[16] explaining this rationale in regards to the troll fishery (which at that time was subject to vacatur of the ITS for the summer and fall seasons), yet the logic holds for the SEAK salmon fisheries subject to the proposed BiOp and ITS:

> "While technically ADF&G could still open a fishery in State waters, doing so would have great risk to both the State and individual fishermen. Fishermen would be liable for any incidental take. Unlawful "take" of a listed species is a federal felony violation with severe penalties. In short, without incidental take authorization, the troll fishery simply cannot occur."

The EIS would therefore assume that the SEAK salmon fisheries would not be prosecuted.

Under this Alternative, NMFS would not fund grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters and NMFS and the State could fail to meet the obligations of the PST through 2028. Additionally, NMFS analyzes the effects if no fishing occurred in federal waters, such as if NMFS would supersede delegation of the troll and sport fisheries in the EEZ to the State and close those fisheries under the Salmon FMP. This aspect of the effects analysis is presented for analytical purposes only as there is no present action to maintain, amend, or rescind delegation of management of the federal fisheries to the State consistent with the Magnuson-Stevens Act (16 U.S.C. § 1856(a)(3)(B)).

This Alternative (where NMFS would not develop and issue a BiOp and ITS) is presented for analytical purposes consistent with the requirements of NEPA and implementing regulations that NMFS analyze a range of alternatives. It is not NMFS's preferred alternative because it is not consistent with NMFS's role as the consulting agency, nor does it respond to the district court's order and remand that NMFS address the ESA and NEPA deficiencies identified by the court. Under the ESA, NMFS as the consulting agency is obligated at the conclusion of any consultation to (1) prepare a BiOp detailing how the agency action affects listed species and their designated critical habitat (16 U.S.C. § 1536(b)(3)); and (2) issue an ITS for take that is reasonably certain to occur incidental to the action (16 U.S.C. § 1536(b)(4)) if NMFS concludes, among other things,

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[16] Press release available at https://www.adfg.alaska.gov/static/home/news/pressreleases/pdfs/state_appeal_ruling_southeast_alaska_chinook_fisheries_05_03_2023.pdf

that the agency action and any incidental take is not likely to jeopardize the continued existence of any listed species (16 U.S.C. § 1536(b)(4); 50 CFR 402.14(g)(7)).

2.4. Alternatives Considered but not Analyzed Further

In the development of the alternatives, NMFS considered whether to analyze the following suite of alternatives in addition to the status quo alternative: (1) NMFS would not issue a new BiOp and ITS, and NMFS would not continue to fund grants to the State (Alternative 3); (2) NMFS would not issue a new BiOp and ITS, and NMFS would continue to fund grants to the State; (3) NMFS would issue a new BiOp and ITS, and NMFS would not continue to fund grants to the State; and (4) NMFS would issue a new BiOp and ITS, and NMFS would continue to fund grants to the State (Alternative 2). NMFS did not analyze these other permutations as separate alternatives. Under the second permutation where NMFS would not issue a new BiOp and ITS but would continue to fund grants to the State, NMFS assumes that ADF&G would not open the SEAK salmon fisheries in the absence of a new BiOp and ITS since fishery participants in the salmon fisheries would be liable for ESA incidental takes; the effects from this permutation are therefore encompassed and analyzed under Alternative 3. Under the third permutation NMFS would issue a new BiOp and ITS but would not continue to fund grants to the State of Alaska. While fishery participants would have an exemption for incidental take and therefore ADF&G may open the SEAK salmon fisheries, it is not certain that ADF&G can manage and monitor the fisheries consistent with the obligations under the 2019 PST Agreement in the absence of federal funding. The SEAK salmon fisheries may remain closed; if ADF&G did not open the SEAK salmon fisheries, effects would be commensurate with those analyzed under Alternative 3. If ADF&G did open the SEAK salmon fisheries, NMFS assumes similar effects from the operation of the fisheries as analyzed under Alternatives 1 and 2, although likely reduced since the lack of funding would increase uncertain in stock assessment and fishery management that would lead to more conservative management and reduced fishing opportunities for SEAK salmon fishing.

Scoping comments also recommended additional alternatives that NMFS considered but did not analyze further because they are outside the scope for this action.

(1) *Analyze the Prey Increase Program.*

NMFS West Coast Region is already analyzing the prey increase program in a separate Programmatic EIS (NMFS 2024) that evaluates alternative uses of funding to address impacts to, and increase prey availability for, SRKW. Any decision to fund and carry out the prey increase program is a separate action from analyzing the ITS for the SEAK salmon fisheries in this EIS, as well as from analyzing the effects from the agency actions analyzed in the BiOp on the SEAK salmon fisheries. The prey program is intended to offset adverse impacts from fisheries managed under the 2019 PST Agreement generally including—SEAK fisheries, Puget Sound fisheries, and ocean fisheries off the West Coast. As analyzed in Section 5.4, the SEAK fisheries are a small portion of total fishery mortality of Chinook that are prey for SRKW. While these documents are being prepared separately because the actions are separate, the impacts of each action are considered comprehensively in the NEPA and ESA documents NMFS is preparing for the separate actions.

(2) *Analyze measures that restrict the SEAK salmon fisheries below the 2019 PST Agreement Chinook catch limits and evaluate the ways to minimize or mitigate economic harms from fisheries closure, such as a fishery disaster.*

The catch limits under the 2019 PST Agreement are subject to international negotiation and implemented under the PST. Therefore, this EIS assumes that fishing would occur up to the catch limits negotiated under the 2019 PST Agreement, subject to the analysis in the BiOp and ITS whether fishing at those catch limits is likely to jeopardize the continued existence of listed species.

The proposed federal actions analyzed in this EIS—issuance of the ITS and funding—do not authorize the federal and State fisheries, and NMFS does not have authority over the State fisheries. For the issuance of the ITS, if the 2024 BiOp concludes that the proposed actions are not likely to jeopardize the continued existence of any threatened or endangered species, the BiOp would include an ITS exempting take of ESA-listed species, and the reasonable and prudent measures and the terms and conditions in the ITS could be no more than a minor change to the action (50 C.F.R. 402.14(i)(2))). If NMFS were to reach a jeopardy conclusion, NMFS would offer a reasonable and prudent alternative or alternatives that can be implemented consistent with the scope of NMFS's legal authority and jurisdiction and are economically and technologically feasible (50 C.F.R. § 402.02). The measures suggested by the commenter to restrict the SEAK salmon fisheries would have to be consistent with this framework under the ESA.

The alternatives included in this EIS examine the impacts if NMFS did not issue an ITS or continue funding to the State, which NMFS assumes would mean the SEAK salmon fisheries would not open. The EIS therefore includes impacts from essentially a complete restriction of the SEAK salmon fisheries.

In addition, NMFS's separate Programmatic EIS to evaluate alternatives for the use of federal funding for the prey increase program analyzes as an alternative a reduction in harvests under the PST (NMFS 2024). The Programmatic EIS alternative focuses on fishery modifications in U.S. fisheries managed under the 2019 PST Agreement that would be expected to result in increases to Chinook salmon abundances in the most meaningful times and areas for SRKWs. These areas are the regions North of Falcon (NOF), Southwest Vancouver Island (SWWCVI), and Puget Sound (PS) in the winter (October-April) and the Salish Sea in the summer (July – September) (Dygert et al. 2018). Given that all of the PST-managed U.S. fisheries contribute to the total fishery mortality of Chinook salmon that are prey for SRKW, it is more appropriate to analyze reduced harvests in fisheries throughout the PST-managed U.S. fisheries relative to those times and areas that are most important for SRKWs.

The Secretary of Commerce determines a fishery resource disaster under section 312(a) of the Magnuson-Stevens Act and that is started within 12 months of the conclusion of the fishing season where the disaster was experienced. The cause for the fishery resource disaster must be an allowable cause under the Magnuson-Stevens Act. Allowable Cause means a natural cause, discrete anthropogenic cause (such as an oil spill), or undetermined cause, including a cause that occurred not more than five years prior to the date of a request for a fishery resource disaster determination that affected such applicable fishery. The Secretary of Commerce has the ability to determine fishery resource disaster when one occurs.

(3) *Engage with Canada's Department of Fisheries and Oceans and renegotiate the PST to significantly reduce harvest levels of Chinook in the SEAK PST AABM fisheries, Pacific Fishery Management Council's (PFMC) North of Falcon fisheries, British Columbia's AABM Chinook fisheries (North-Central, NBC; and West Coast Vancouver Island, WCVI), as well as near-terminal sport fisheries.*

The proposed actions analyzed here are NMFS's issuance of an ITS and NMFS's grants to the State of Alaska, and NMFS also evaluates the effects from delegated management of the EEZ fisheries to the State of Alaska. The PST is a bilateral agreement between the United States and Canada, with the current agreement effective 2019 to 2028. Renegotiating the 2019 PST Agreement between the United States and Canada, and significantly reducing harvest of Chinook salmon in all PST fisheries, is therefore outside the scope of this EIS. The next PST Agreement will be renegotiated to be effective for 2029.

(4) *Transition all Alaska PST fisheries that encounter Chinook salmon to a limiting stock framework, consistent with how PFMC fisheries are managed, to bring consistency to, and better coordination with, fisheries occurring in marine waters off the coast of Washington, Oregon, and California.*

NMFS does not have the ability to change how the SEAK Chinook salmon fisheries are designated under the 2019 PST Agreement from abundance-based management (AABM) to individual stock-based management (ISBM) as suggested in this comment. Instead, SEAK fisheries are managed to not exceed a preseason limit, to meet escapement goals for SEAK and Transboundary river stocks, and to stay below an incidental mortality limit, which is more restrictive than the way ISBM fisheries are managed. During the negotiations for the 2019 PST Agreement, the State of Alaska advocated for SEAK Chinook fisheries to also be designated IBSM; however, that change was not adopted in the 2019 PST Agreement. The parties to the PST may make that change in the next PST Agreement that will be renegotiated to be effective for 2029.

(5) *Evaluate requiring highly selective fishing gears in terminal/near-terminal fisheries such as reef nets, pound nets, and weirs (fish traps) that are capable of releasing non-target Chinook and other taxa with negligible or no harm.*

This measure is outside the scope of this EIS because (1) NMFS does not have jurisdiction to manage the SEAK fisheries in State waters under the Magnuson-Stevens Act, and (2) NMFS does not have the ability to designate the use of specific gears under the PST. Use of such gear would constitute a significant management change that would require consensus among the Parties to the PST. Per Chapter 3, Paragraph 3(a), the SEAK AABM fishery is defined as sport, net, and troll, where net catch is specific to seine, drift gillnet and set gillnet. Fish traps, reef nets, and pound nets are not part of Alaska's standardized fishing regime under the PST.

Per Alaska State Statute, operation of fish traps, including but not limited to floating, pile-driven, or hand-driven fish traps is not legal in the state on or over state land, tideland, submerged land, or water. Reef nets, pound nets, and weirs are all effectively versions of fish traps. Again, NMFS does not have the authority to designate the use of traps in state fisheries.

Further, the assessment of the proposed gear types have not been adequately tested in remote, glacially dominant rivers without road access. The remoteness of the majority of SEAK rivers prevents net tending over a prolonged time period, which impacts the utility of these gear types to minimize incidental mortality and may increase marine mammal interactions.

The gear types proposed are not as harmless as assumed in the comment. Chinook salmon return to the rivers concurrently with other salmon species and those species arrive in greater numbers and density. Trapping is designed to aggregate salmon into tight spaces for handling and these can be overwhelmed in some situations. This can cause harm to fish intended to be released as well as those to be harvested.

Additionally, limiting harvest of Chinook salmon to terminal areas will reduce the State's ability to collect information on stock abundance and timing over the course of the season and thereby limit the ability to effectively manage the fishery. When harvest occurs over a wide area and during an extended period of time there is greater ability to adjust fishing in response to observations made early in the season. In addition, this dispersal of effort over space and time reduces the effect of the fishery on any one location or congregation of fish and stocks.

3. Pacific Salmon Treaty and SEAK Salmon Fishery Management

This section provides an overview of the PST, 2019 PST Agreement, and the Federal and State of Alaska management of the SEAK salmon fisheries under the PST.

3.1. Pacific Salmon Treaty

The United States (U.S.) and Canada (collectively the Parties) ratified the PST in 1985. The PST provides a framework for the management of salmon fisheries in those waters of the U.S. and Canada that fall within the Treaty's geographical scope. In addition to institutional and procedural provisions, the Treaty established fishing regimes that set upper limits on intercepting fisheries, defined as fisheries in one country that harvest salmon originating in another country, and sometimes includes provisions that apply to the management of the Parties' non-intercepting fisheries as well. The Treaty also established procedural mechanisms for revising the regimes when necessary. The overall purpose of the regimes is to accomplish the conservation, production, and harvest allocation objectives set forth in the Treaty. It is important to note that these fishing regimes are not self-executing; they must be implemented by the Parties with conforming regulations issued under the authority of their respective management agencies. The fishing regimes contained in Annex IV of the Treaty are expected to be amended periodically upon recommendation of the Pacific Salmon Commission (PSC) as new information becomes available to better accomplish the Treaty's conservation, production, and allocation objectives (Turner and Reid 2018). Chapters in Annex IV of the PST were amended in 1999, 2009, and again in 2019, including Chapter 3 regarding Chinook.

The PST covers fisheries on many stocks of salmon harvested in the area between Cape Suckling, Alaska and Cape Falcon on the northern Oregon coast and in the Yukon River[17]. The PST establishes general principles and guidelines for the conservation and allocation of salmon stocks in the treaty area and establishes the PSC to negotiate fishery provisions supported by advisory panels and technical committees.[18] The PST is essential for the conservation and management of salmon because Pacific salmon are highly migratory, spending years at sea, traveling thousands of miles before returning to their native rivers to spawn and, in doing so, cross international boundaries and multiple management jurisdictions. The U.S. and Canada cooperate to prevent overfishing, provide optimum production, and ensure that each country receives benefits that are equivalent to the production of salmon in its waters. Such fishing regimes are expected to be amended periodically upon recommendation from the PSC as new information becomes available to better accomplish the PST's conservation and allocation objectives.

The original regimes established in 1985 expired by the end of 1992. Between 1993 and 1998, salmon fisheries subject to the PSC were managed pursuant to short-term agreements that governed only some of the fisheries. Where short-term agreements could not be reached, the fisheries were managed independently by the respective domestic management agencies in approximate conformity with the most recently applicable bilateral agreement.

[17] The Yukon River is included in the PST, but is not managed under the auspices of the Pacific Salmon Commission, it operates under its own set of bylaws by the Yukon Panel.

[18] The PSC is made up of four Commissioners and four alternates from both the U.S. and Canada. The U.S. Commissioners must be knowledgeable or experienced concerning Pacific salmon and must include an official of the United States government, one resident of the State of Alaska, one resident of the States of Oregon or Washington, and one individual nominated by the treaty Indian tribes of Idaho, Oregon, or Washington (16 U.S.C. 3632). The U.S. is represented on the Northern Panel by six members, including one official of the United States government, one official of the State of Alaska, and four individuals knowledgeable and experienced in the salmon fisheries for which the Panel is responsible.

In 1999, new fishery agreements under the PST were adopted by the U.S. and Canada, including an agreement for Chinook salmon. The new abundance-based Chinook salmon agreement replaced the previous fixed ceiling-based regime. A major component of the 1999 Agreement is the management regime set forth for Chinook salmon, which established a basic AABM approach for three major ocean Chinook salmon fisheries in SEAK and Canada coupled with an individual stock-based management (ISBM) approach for all other treaty-area fisheries in Canada and the Pacific Northwest. The three AABM Chinook salmon fisheries are managed to stay within harvest limits; the 1999 Agreement specifies a harvest limit based on a relationship between a preseason Abundance Index (AI) generated by the PSC's Chinook Technical Committee (CTC) and a target harvest rate specified in the agreement. The harvest ceiling is abundance-based, with increased catch limits when abundance is high and decreased catch limits when abundance is low. In addition to the catch limits of treaty fish, provisions of the PST provide for an additional harvest of Chinook salmon that have been produced in Alaskan hatcheries (add-on). The all-gear add-on is equal to the total number of Alaskan hatchery Chinook harvested, minus the pre-treaty production of Chinook salmon of around 5,000 fish, and a risk adjustment factor of around 1,000 fish that accounts for uncertainty of estimates. The hatchery add-on is calculated in season using data from port sampling programs with final estimates produced post season.

The fishing regimes established under the 1999 Agreement applied for ten years, expiring at the end of 2008. In May 2008, the PSC negotiated a new bilateral agreement that was approved by the U.S. and Canadian governments in December 2008. As with the 1999 Agreement, the 2009 Agreement contained fishing regimes that were in force for a ten-year period (2009-2018). The revised agreement contained a similar Chinook management framework as the 1999 Agreement but called for a 30% reduction in the harvest of the Canadian Chinook salmon AABM fishery on the West Coast of Vancouver Island and a parallel reduction of 15% in the SEAK Chinook salmon fishery. The fishing regimes contained in the Transboundary River (TBR), Northern Boundary, and Coho chapters did not change substantively under this new Agreement.

Anticipating the expiration of the fishing regimes established in the 2009 Agreement and the time required to negotiate new regimes, the PSC began negotiations for new regimes in January of 2017. After more than 18 months of negotiations, the PSC reached agreement in July of 2018 on amended versions of each of the five expiring Chapters of Annex IV. The 2019 PST Agreement carried forward the basic structure of the two prior agreements relative to TBR, Northern Boundary, Coho, and Chinook salmon. Provisions of the 2019 PST Agreement resulted in additional reductions in catch in the SEAK Chinook fisheries relative to those allowed under the 2009 Agreement, but the magnitude of the reduction changes depending on the abundance. Generally, the required reductions are less in years of high abundance. In the SEAK fishery, in most cases, catch is reduced by 7.5 percent relative to what was allowed in the 2009 PST Agreement, but at higher abundance levels catch reductions are either 3.25 or 1.5 percent.

3.2. Description of Annex IV Chapter 1, 2, 3 and 5 of the Pacific Salmon Treaty

Fishing regimes are set forth in six chapters of Annex IV of the PST: Chapter 1: Transboundary Rivers (TBR); Chapter 2: Northern British Columbia and Southeastern Alaska; Chapter 3: Chinook Salmon; Chapter 4: Fraser River Sockeye and Pink Salmon; Chapter 5: Coho Salmon; Chapter 6: Southern British Columbia and Washington State Chum Salmon. General obligations are set forth in Chapter 7. Chapter 8 contains the Yukon River Salmon Agreement, which is managed separately under its own set of bylaws. Of these, Chapters 1, 2, 3, and 5 are relevant to SEAK salmon fisheries management along with Attachment B of Chapter 7 which contains additional obligations relative to coho. Of note, some provisions of Chapter 1 specify management of Chinook must be consistent with provisions of Chapter 3.

Chapter 1 of Annex IV, the TBR Chapter of the PST, is specific to salmon originating in the Canadian portions of the transboundary Alsek, Taku, and Stikine Rivers. Implementation of this chapter is overseen by the Transboundary Rivers Panel with scientific input from the Transboundary Technical Committee. Chapter 1 defines harvest sharing arrangements between the Parties, a coordinated stock assessment program, escapement goals, and a sockeye enhancement program. Chapter 1 defines fisheries under consideration to Canadian and U.S. in-river fisheries and U.S. marine fisheries in Alaska Districts 106, 108, 111, and subdistrict 182-30 (Dry Bay) of SEAK. It calls for improved cooperative management on TBR stocks, specifically to implement and refine abundance-based management of Chinook in the Taku and Stikine Rivers, sockeye in the Taku and Stikine Rivers, and coho in the Taku River, and to fully develop and implement abundance-based management regimes for coho in the Stikine River and both sockeye and Chinook in the Alsek River.

Chapter 2 of Annex IV, Northern British Columbia and Southeast Alaska, is primarily focused on large sockeye salmon stocks in northern BC (Nass and Skeena rivers), and to a lesser extent pink salmon. Implementation of this chapter is overseen by the Northern Panel with scientific input from the Northern Boundary Technical Committee. Chapter 2 outlines management goals, harvest sharing arrangements, and data sharing commitments between the U.S. and Canada. It obligates the U.S. to manage the Alaska District 104 purse seine fishery prior to statistical week 31 to achieve an annual catch share of Nass and Skeena Sockeye of 2.45% of the Annual Allowable Harvest (AAH) and manage the Alaska District 101 drift gillnet fishery to achieve an annual catch share of Nass Sockeye of 13.8% of the AAH. The Chapter also contains pink salmon catch share arrangements for the Canadian Area 1 troll and Area 3 net fisheries, but these generate little interest due to continued large underages in Canadian fisheries.

Chapter 3 of Annex IV of the PST describes a comprehensive and coordinated Chinook fishery management program that uses an abundance-based framework to manage all Chinook fisheries that are subject to Chapter 3. Harvest regimes are based on annual indices of abundance that are responsive to changes in production, that take into account all fishery induced mortalities, and that are designed to meet maximum sustainable yield (MSY) or other agreed biologically-based numeric escapement or exploitation rate objectives. The harvest regime in this management program includes an AABM, which is an abundance-based regime that constrains catch or total mortality to a numerical limit computed from either a pre-season forecast or an in-season estimate of abundance, from which a harvest rate index can be calculated.

Chapter 5 of Annex IV, Coho Salmon, is primarily focused on southern coho stocks. However, it obligates the Northern Panel and Northern Boundary Technical Committee to share and evaluate coho stock status information and review management actions in the northern boundary area. Attachment B of the 1999 PST Agreement, Management of Northern Boundary Coho, lays out circumstances where the troll fishery may be closed or restricted in either country for conservation purposes. It requires the Parties to exchange on a weekly basis information on coho regarding stock status, catches, and fishery management information including open areas and times for each fishery.

3.3. Federal Salmon Fishery Management Plan

Each Party to the PST must implement the fisheries management framework domestically, and in the North Pacific the U.S. does this through implementation of provisions of the Magnuson-Stevens Act via the Council for fisheries occurring in the EEZ (3 nautical miles to 200 nautical miles offshore) off the coast of SEAK.

Under the Magnuson-Stevens Act, the United States has exclusive fishery management authority over all marine fishery resources found within the EEZ. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the regional fishery management councils. In the Alaska Region, the Council has the responsibility for preparing fishery management plans (FMPs) and FMP amendments for the marine fisheries that require conservation and management, and for submitting its recommendations to the Secretary. Upon approval by the Secretary, NMFS is charged with carrying out the Federal mandates of the Department of Commerce with regard to marine and anadromous fish.

Pursuant to the Magnuson-Stevens Act, the Council and NMFS manage the salmon fisheries in the EEZ off Alaska under the "*Fishery Management Plan for the Salmon Fisheries in the EEZ off Alaska*" (Salmon FMP). The Salmon FMP was approved in 1979. The Salmon FMP conserves and manages the Pacific salmon commercial and sport fisheries that occur in the United States EEZ off Alaska. NMFS does not manage the salmon fisheries that occur in state waters. The FMP establishes two management areas, the East Area and the West Area, with a border at Cape Suckling (Figure 1-1) and addresses commercial salmon fisheries differently in each area. In the East Area, the FMP delegates management of the commercial troll and sport salmon fisheries that occur in the EEZ to the State of Alaska and prohibits commercial salmon fishing with net gear in the EEZ.

The Salmon FMP has been amended several times since 1979 for various reasons, including to (1) update the FMP to contain the best available scientific information, (2) correct minor errors, (3) increase management flexibility, and (4) make the plan consistent with the 1985 PST. In December 2011, the Council unanimously recommended Amendment 12 to revise the Salmon FMP to more clearly reflect the Council's policy to facilitate State of Alaska salmon management and comply with recent Magnuson-Stevens Act requirements. NMFS published a notice of availability for Amendment 12 on April 2, 2012 (77 FR 19605), and a proposed rule on April 11, 2012 (77 FR 21716). NMFS approved Amendment 12 on June 29, 2012 and published the final rule on December 21, 2012 (77 FR 75570).

Amendment 12 maintained the geographic scope of the management area in the East Area, continued Federal management of the commercial and sport fisheries, and reaffirmed that management of the commercial and sport salmon fisheries in the East Area is delegated to the State to manage consistent with State and Federal laws, including the U.S.-Canada PST. The FMP relies on a combination of State management and management consistent with the PST to ensure that salmon stocks, including trans-boundary stocks, are managed as a unit throughout their ranges and interrelated stocks are managed in close coordination. Maintaining the geographic scope and fisheries managed under the FMP in the East Area facilitated State management of salmon fisheries in the East Area by allowing the FMP to continue to serve as the nexus for the application of the PST and applicable Federal law and leaving existing management structures in place. The primary new FMP provision under Amendment 12 was a mechanism to establish annual catch limits (ACLs) and accountability measures for the salmon stocks caught in the East Area commercial troll fishery. The FMP separates these salmon stocks into three tiers for the purposes of status determination criteria. Tier 1 stocks are Chinook salmon stocks covered by the PST.

Under this delegation, the State applies management regulations, limited entry licensing programs, reporting requirements, and other management-related actions, to the salmon troll fishery and the sport salmon fishery in the EEZ, unless NMFS determines that a State management measure is inconsistent with the Salmon FMP, the Magnuson-Stevens Act, or other applicable law. If the State does not correct an inconsistency identified by NMFS, NMFS issues a notice announcing the extent to which the authority delegated to the State to implement fishery management measures has been withdrawn and whether NMFS intends to issue federal regulations that would govern salmon fishing in Southeast Alaska.

Because State regulations governing salmon management of the commercial troll and sport fisheries in SEAK do not differentiate between EEZ and State waters, the Salmon FMP's delegation means that the State manages the Southeast salmon troll and sport fisheries within State waters in a manner that is consistent with its management of fisheries in the EEZ.

While the FMP delegates management of any sport fishing in the EEZ to the State, the FMP does not contain any measures specific to the sport salmon fishery. As with the commercial salmon troll fishery, the FMP governs sport fishing for salmon in Southeast without differentiating between the EEZ and State waters. However, the sport fishery for salmon takes place almost entirely within State waters (the FMP indicates there is little reason for sport fishermen to fish for salmon seaward of State waters). In the Southeast, the sport harvest of salmon from the EEZ is estimated to be a few thousand salmon, less than one percent of the combined State and Federal marine waters sport harvest. Chinook and coho salmon are taken primarily in the charter boat fishery. Additional information on the management of the SEAK salmon fisheries is in Section 4.

3.4. State of Alaska Implementation of the PST

The State of Alaska manages salmon troll, net, and sport fisheries subject to the PST in state waters (from shore to three nautical miles offshore) of SEAK. The commercial fisheries include troll, purse seine, drift gillnet, and set gillnet fisheries. The State's management of commercial and sport salmon fisheries, including harvest monitoring, stock assessment, and transboundary river enhancement necessary to implement the 2019 PST Agreement, is partially funded through Federal grants dispersed by NOAA. Additional information on the management of the SEAK salmon fisheries is in Section 4.

3.5. Federal Grants to the State of Alaska under the PST

Congress passed the Pacific Salmon Treaty Act of 1985, Public Law 99-5 (16 USC 3631 et seq), to give effect to the bilateral Treaty Between the Government of the United States of America and the Government of Canada Concerning Pacific Salmon. The Act, among other things, authorizes Congress to make appropriations to support research, enhancement and other activities as necessary to carry out the purposes of the Treaty and the Act (16 U.S.C. 3641(c)). Congress annually appropriates funds to the Department of Commerce, as well as the Department of State and Department of the Interior, for implementation of the PST. For the funds distributed to the Department of Commerce, NMFS collaborates with the State and Tribal representatives to the PSC to develop an annual spend plan, which in some years also includes the funds appropriated to the Fish and Wildlife Service. The annual spend plan allocates funding for conservation activities to benefit listed species (such as hatcheries and habitat restoration) and for implementation of the PST including the 2019 PST Agreement. Funds are provided to the States to support their ongoing implementation of the PST. For 2022, $12.7 million was provided to the States of Alaska, Washington, Oregon, and Idaho for PST implementation activities, including state fishery sampling and monitoring, spawner estimates, and fishery exploitation rate assessments (which is an increase from fiscal year (FY) 2019 and FY 2020 of $9.9 million and FY 21 of $11.5 million). The annual spend plan is reviewed and approved by congressional committee.

U.S. obligations under the PST are fundamentally a federal commitment, and the State has the responsibility for the preponderance of the U.S. fishery and stock assessments in Alaska. Federal funding is essential to conduct the fishery and stock assessments required to implement and evaluate the international obligations of the PST, and to provide for the participation of ADF&G in the committee, panel, and commission implementation meetings. ADF&G is engaged in implementation of 3 chapters of the PST, which requires participation in 2 bilateral panels and 8 bilateral technical committees, as well as fisheries management and research to implement these chapters.

Chapter 1: Transboundary Rivers requires abundance-based management of fisheries in Alaska and Canada that harvest Chinook, coho, and sockeye salmon returning to the Taku, Stikine, and Alsek rivers. Obligations include management based upon specified stock assessments, conservation measures, and harvest sharing agreements.

Chapter 2: Northern Boundary defines obligations that limit interceptions of: (1) Canadian Nass and Skeena origin sockeye salmon in Southeast Alaska fisheries and (2) Southeast Alaska-origin pink salmon stocks in Canadian fisheries. The obligations include providing forecasts, fishery monitoring, catch sampling for age and origin, and extensive bilateral coordination.

Chapter 3: Chinook Salmon is complex– it lists individual stocks or stock groups from the Oregon coast to Southeast Alaska with specific management and monitoring measures and lists extensive assignments to the Chinook Technical Committee. Obligations include annual estimation of catch for all PST fisheries, exploitation rates, escapements, and forecasts.

In 2017 ADF&G completed a detailed assessment of the costs to the agency to fulfill the international obligations. This was accomplished through a position-by-position accounting of salaries, benefits, and goods and services for activities that are necessary to fulfill PST obligations (Fair et al. 2017). The total cost of these activities at that time exceeded $9.0 million and, after consideration of inflation, costs now exceed $10.3 million annually.

NMFS may in its discretion disburse grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters related to the obligations of the PST through 2028. NMFS has already approved and disbursed funds to the State of Alaska under the 2019 PST through the State's current fiscal year. NMFS expects that the four proposed funding initiatives for the State to implement the 2019 PST Agreement will remain for the duration of the agreement or will be similar to the funding initiatives currently implemented. The four funding initiatives are described below.

In disbursing funds related to implementation of the 2019 PST Agreement, NMFS considers whether to approve grants to the State. Once NMFS approves the grants to the State, and NMFS awards the funds each fiscal year (July to July each year). For example, one grant is approved for up to five years and is disbursed through annual awards. Consistent with Federal law and regulations, NMFS reviews actions taken by the State of Alaska consistent with the proposed grants.

NMFS has already approved and disbursed funds to the State of Alaska to implement provisions of the 2019 PST Agreement through the State's fiscal year which ended on June 30, 2023. NMFS proposes to continue to disburse funds to the State consistent with the PST and federal law. The State will submit a new agreement by the end of April, 2024 for the next fiscal year. NMFS expects that the proposed funding initiatives or similar funding initiatives for the State related to implementation of the 2019 PST Agreement will remain in place for the duration of the 2019 PST Agreement (through 2028).

1) The *PST Transboundary River (TBR) Enhancement Initiative*, is a five-year, multi-disciplinary initiative grant to the ADF&G that ranges from $415K to $460K per year. Starting in FY24 the funding will be combined with the PST Implementation Program Support Award. Although this initiative began under the 2009 PST Agreement, it continues under the new 2019 PST Agreement. This initiative is targeted at supplementing the number of sockeye available to fishermen by increasing fry production from several Transboundary Lakes through hatchery incubation in the U.S. The goal of the enhancement efforts has been to produce 100,000

additional sockeye, worth approximately $900,000, to each of the Taku and Stikine River drainages. The U.S. and Canada agreed to joint enhancement projects on the Stikine and Taku Rivers according to the Understanding signed in 2009.[19] At that time it was determined that Parties would share the cost of joint enhancement. The TBR Salmon Enhancement Program provides funding to cover the costs that will be incurred by the U.S. in the course of meeting obligations specified in the Understandings. These obligations include: 1) operation of the Port Snettisham Sockeye Central Incubation Facility (CIF) for the incubation and rearing of sockeye eggs received from Canadian Lakes on the Stikine and Taku River drainage; 2) pathology screening of eggs and fry and otolith marking of fry reared at the CIF; 3) transport of fry back to enhancement sites; and 4) sampling and analysis of returning enhanced adult fish taken by U.S. fisheries and in the transboundary rivers.

The sampling and analysis component entails the use of otolith mass marks to identify enhanced fish and the establishment of a monitoring program to recover marks in mixed stock fisheries targeting on the adults returning to the transboundary rivers. Information from the monitoring program is used in development of management models to ensure optimal harvest and adequate escapement during the season. The estimates of enhanced contribution provide the means for determining if U.S. and Canada meet their allocation goals as specified in the Transboundary Rivers Chapter of the PST.

2) The *PST Sport Harvest Monitoring and Wild Chinook Stock Assessment* is funded by a three year grant at approximately $1.5 million per year, which covers permanent staff responsible for analytical, supervisory, and coordination duties associated with long-term wild Chinook salmon stock assessment and marine sport harvest monitoring projects in SEAK. Chinook salmon spawning abundance and age and length compositions will be estimated for nine indicator stocks in SEAK. Spawning abundance will be estimated using a combination of weirs, aerial and foot surveys, and mark-recapture experiments. For the Chilkat, Taku, Stikine and Unuk Rivers wild stocks of Chinook salmon, juvenile coded wire tag (CWT) projects will allow smolt abundance, marine harvest, exploitation, and marine survival estimates. This project will also support key activities of the sport harvest monitoring program strategically focusing on Chinook salmon. This includes necessary coordination to estimate harvest of Chinook salmon by port in SEAK and to increase sampling rates for CWTs in marine sport fisheries in SEAK to maintain or surpass an inspection rate of 20% of all Chinook salmon caught. The results will be used in support of multiple PSC Chinook Technical Committee salmon analyses and in abundance-based management of these stocks, as directed by the 2019 PST agreement. Goals and objectives for this element include:

A. Estimate the escapements of large (≥660 mm MEF (mideye to fork of tail length)) Chinook salmon in the Chilkat, Taku, King Salmon, Stikine, Unuk, Chickamin, Blossom and Keta Rivers and Andrew Creek, such that estimates are within 25% of the true value 90% of the time (Coefficient of variation (CV) ≤ 15%).
B. Estimate the age and sex composition of large Chinook salmon spawning in the Chilkat, Taku, King Salmon, Stikine, Unuk, Chickamin, Blossom and Keta Rivers and Andrew Creek, such that all estimated proportions are within 10% of the true values 90% of the time.
C. Estimate the marine harvest of wild Chinook salmon from the Chilkat, Taku, Stikine and Unuk Rivers such that the estimate is within 35% of the true value 90% of the time, a target CV of 21%.

[19] See Appendix to Annex IV, Chapter 1: Understanding on the Joint Enhancement of Transboundary River Sockeye Stocks.

D. Estimate the number of wild Chinook salmon smolt emigrating from the Chilkat, Taku, Stikine, and Unuk Rivers in spring such that the estimate is within 35% of the true value 90% of the time, a target CV of 21%.
E. Estimate the preliminary yearly values of the following characteristics of the Chinook salmon harvest such that the relative precision is within 20 percentage points of the true value 90% of the time for each port.
F. Estimate the early season (late April to mid-July) harvest of Chinook salmon in District 108 (Petersburg/Wrangell) and District 111 (Juneau).
G. Maintain or increase CWT sampling rates of 20% or more for Chinook salmon caught in marine sport fisheries in SEAK.

Other tasks/objectives associated with the stock assessment component of this project include: 1) estimating mean length-at-age of Chinook salmon; 2) estimating the escapement and age-sex composition of small (<400 mm MEF) and medium (≥400 mm and <660 mm MEF) Chinook salmon with precision of estimates dependent on the number of small and medium fish sampled and present in the drainage; 3) sampling all Chinook salmon captured for adipose fin clips; 4) counting all large fish observed during age-sex-length sampling trips; and 5) estimating the exploitation rate (expected CV = 20% or less), total adult production, and the marine survival rate (smolt to adult). Other tasks/objectives associated with the marine sport harvest monitoring component of this project include to: 1) increase CWT recovery efficiency by using handheld tag detection wands by identification of "No Tags" (Chinook salmon with adipose fin clips but not having a CWT); 2) sub-sample adipose-intact Chinook salmon from the marine sport fisheries at a rate of 1 in 10 for double index tags; 3) collect matched scales and tissues; and 4) estimate the proportion of the catch of Chinook salmon (both <28 inches: small and ≥28 inches: large) that were released.

3) The *PST Implementation Program Support* is funded by a three-year award at approximately $4.2 million per year to fund several programs including administrative, management, research, and information technology services related to implementation of the 2019 PST Agreement in SEAK as well as State of Alaska participation in the various PST panels and technical committees. Along with domestic obligations, numerous abundance-based PST provisions directly influence the harvest of salmon from Yakutat to Ketchikan in five gillnet, one purse seine, and three seasonal troll fisheries. PST obligations include management and research programs that provide accurate and timely forecasting, catch, effort, escapement, stock identification, and run timing data. Because current harvest sharing agreements are based on annual abundance, total return (catch in all significant fisheries plus escapement) of treaty stocks must be reconstructed on an annual basis.

Programs that operate under this grant are organized under five Project Titles: 1) Program Support; 2) Regional Treaty Support, 3) Transboundary Annex; 4) Northern Boundary Annex; and 5) Chinook Annex. Program Support provides clerical and administrative support, travel, training, supplies and contractual items for administrative personnel and PST related projects operating out of the ADF&G PSC Regional Office in Douglas, Region I Headquarters in Juneau, and field offices in Ketchikan, Craig, Petersburg, Sitka, and Yakutat. Regional Treaty Support covers personnel involved in the design, development, maintenance, and analytical capabilities of the regional catch and effort database. Programs under the Transboundary Annex (Alsek, Taku, and Stikine Rivers) support: 1) management, research, sampling, and stock identification of treaty stocks in directed Transboundary fisheries; 2) in-river stock assessment efforts and; 3) enhancement of shared Transboundary stocks. Adherence with abundance-based harvest sharing agreements for U.S. and Canadian fisheries requires inseason management and stock assessment efforts in Alaska fisheries near the mouths of rivers to pass sufficient fish to meet bilaterally agreed-to spawning objectives and for Canadian in-river fisheries. Implementation of the

Transboundary Rivers Chapter of the PST requires extensive bilateral cooperation and coordination. Successful enhancement programs currently return large numbers of sockeye salmon to both the Taku and Stikine rivers. Inseason programs that identify the enhanced component of the run are needed to facilitate appropriate harvest levels on commingled enhanced and wild stocks. Programs grouped under Northern Boundary Area Annex will support the 2019 revision of the PST, which places specific, abundance-based harvest constraints on Canadian-origin sockeye salmon in U.S. fisheries and on U.S.-origin pink salmon in Canadian fisheries in the Northern Boundary Area. These programs support basic stock assessment and management, sockeye salmon tissue sampling for genetic analysis, and inseason catch and effort monitoring programs required by the PST, as well as support bilateral cooperation and coordination to reconstruct total returns, evaluate compliance with agreed harvest shares, and develop run forecasts. Programs grouped under the Chinook Annex fund personnel, supplies, travel and contractual items used in Chinook management, stock assessment, run forecasting, and inseason catch and effort monitoring programs required by the Chinook Chapter of the PST, as well as participation in the PSC's Chinook Technical Committee.

4) The *PST Genetics Program Support* is also funded by a three-year award at approximately $747K to $585K per year. The PST Genetics grant funds genetic mixed stock analysis required to implement the PST in SEAK. Numerous abundance-based PST agreements directly influence the harvest levels of salmon in SEAK fisheries. Domestic and PST obligations rely on the collection and analysis of catch, escapement, recruitment information, and stock composition to forecast indices of abundance in PST fisheries. Stock contribution estimates are critical to assess compliance with the harvest sharing agreements, reconstruct runs of wild stocks, estimate the return of enhanced fish, forecast upcoming returns, and support sustainable management. This program provides information necessary to the successful implementation of the intentions of the PST as it relates to the transboundary rivers, the Northern Boundary Area, and SEAK Chinook salmon harvest.

4. Description of the SEAK Salmon Fisheries Subject to the 2019 PST Agreement

The SEAK salmon fisheries occur in the area south and east of Cape Suckling, Alaska and north of the U.S./Canada border. These fisheries are conducted under preseason management plans that are consistent with Annex IV of the 2019 PST Agreement; including obligations defined within Chapter 3 for Chinook salmon. For the SEAK AABM fishery, the approval of the PST Agreement establishes upper limits on allowable catch that may be authorized by U.S. domestic management authorities, but does not itself authorize the conduct of any fishery.

All SEAK Chinook salmon fisheries are subject to the PST. These primarily include commercial troll, drift gillnet, Yakutat set gillnet, purse seine, sport, and Metlakatla Indian Community Annette Islands Reserve fisheries, but also include personal use and subsistence fisheries. Other salmon species are also subject to the PST but are fishery and area specific. These fisheries include commercial troll and sport coho salmon fisheries; sockeye and chum salmon in the District 101 (Tree Point) drift gillnet fishery; sockeye and coho in the Districts 106 (Prince of Wales), 108 (Stikine), and 111 (Taku) drift gillnet fisheries; sockeye salmon in the District 104 purse seine fishery; sockeye in the Alsek River set gillnet fishery; and sockeye, coho, and Chinook salmon in the Stikine River subsistence fishery and sockeye salmon in the Taku River personal use fishery. Annette Islands Reserve fisheries within the Metlakatla Indian Reserve are managed by the Metlakatla Indian Community and are not under the purview of the State of Alaska. Similarly, the federal subsistence fisheries are managed by the Departments of the Interior and Agriculture as part of the Federal Subsistence Management Program (which the Federal Subsistence Board administers); this currently includes the Stikine River subsistence fishery for sockeye, coho, and Chinook salmon, as well as federal subsistence fishing on federal public lands (36 C.F.R. 242.27(e)(13)(xiii), 242.3).

Chinook salmon originating from Alaska, British Columbia, and the Pacific Northwest are harvested in the SEAK Chinook salmon fisheries. Stock composition information is based on CWT recoveries, genetic mixed-stock identification analysis, and age, sex, and length data. Management of Chinook salmon stocks and fisheries in SEAK is coordinated through the PSC (Hagerman et al. In prep).

The information in Section 4 was largely provided by ADF&G because they manage these fisheries, with a few exceptions, and collect all the data from these fisheries.

Table 4-1 SEAK salmon fisheries and whether they are subject to the PST Agreement and would be covered under an ESA ITS under Alternatives 1 and 2.[20]

SEAK Fishery	PST Allocation	ESA ITS Issued under Alternatives 1 and 2?
Commercial Troll	Yes	Yes
Commercial Drift Gillnet	Yes	Yes
Commercial Seine	Yes	Yes
Commercial Set Gillnet	Yes	Yes
Federal Subsistence Fisheries[21]	Yes	Yes
Subsistence Fisheries[22]	Yes	Yes
Metlakatla Annette Islands Reserve Fisheries[23]	Yes	Yes
Sport Fisheries	Yes	Yes
Personal Use Fisheries	Yes	Yes

4.1. PST Chinook Salmon Catch Limits

Chinook salmon's extended migrations, vulnerability to fisheries at multiple age classes, and the extreme mixed stock nature of many Chinook salmon fisheries greatly complicate the management of fisheries impacting this species. U.S. stocks are caught in Canadian fisheries and Canadian stocks are caught in U.S. fisheries. The coast-wide Chinook management regime evolved over time to address the need for a coordinated management framework and concerns for conservation and sharing of available harvest. In doing so, the Parties have agreed, among other things that:

> *fishery management measures that are implemented under th[e] Treaty are intended to be appropriate for recovering, sustaining, and protecting Chinook salmon stocks in Canada and the United States and are responsive to changes in productivity of Chinook salmon stocks associated with environmental conditions (Paragraph 1(b) of Chapter 3 of the 2019 Agreement).*

[20] Some fishery components of all State managed fisheries are not subject to the Treaty depending on target species, location, and timing.

[21] State subsistence and personal use fisheries subject to the PST occur in terminal areas as described in Chapter 1 of the PST. Federal subsistence fishing is authorized on federal public lands and federal subsistence fisheries are generally in-river fisheries.

[22] Ibid.

[23] Metlakatla Annette Islands Reserve Chinook salmon catches are subtracted from the SEAK all-gear catch limit by gear type.

Under the Chinook regime, fisheries are classified into two categories – aggregate abundance-based management (AABM) and individual stock-based management (ISBM) fisheries. AABM fisheries are managed using a graduated harvest rate approach based on a relationship between the aggregate abundance of all stocks available to the fishery and a harvest rate index (referred to as Appendix C of the 2019 PST Agreement). Estimates of abundance are translated through the harvest rate index to an associated annual catch limit. Abundance levels are expressed as a proportion of the abundance observed during the 1979–1982 base period. An abundance of 1.0, for example, means that the available abundance is the same as the average observed during the base period. An abundance of 1.2 means that the abundance is 20 percent greater than the 1979–1982 base period. AABM fisheries are managed by setting limits on the landed catch, but the 2019 PST Agreement also limits incidental mortality so that the total mortality associated with each AABM fishery is constrained.

Three fishery complexes are designated for management as AABM fisheries:

1. The SEAK sport, net, and troll fisheries;
2. The Northern British Columbia (NBC) troll fishery (Canada's Pacific Fishery Management Areas 1-2, 101-105 and 142) and the Queen Charlotte Islands sport fishery (QCI, Canada's Pacific Fishery Management Areas 1-2, 101, 102 and 142) and
3. The West Coast Vancouver Island (WCVI) troll fishery and outside sport fishery (Canada's Pacific Fishery Management Areas 21, 23-27, 121, 123-127 but with additional time and area specifications that distinguish WCVI outside sport from inside sport).

Abundance levels for the AABM fisheries are determined each year as described below and in more detail in the PST and associated reports. Abundance indices for the NBC and WCVI are calculated by the PSC's Chinook Technical Committee (CTC) using the PSC Chinook salmon model.

The CTC reports directly to the PSC annually on catches, harvest rate indices, estimates of incidental mortality, and exploitation rates for all Chinook fisheries and stocks harvested within the treaty area; and on the escapement of naturally spawning Chinook stocks in relation to agreed escapement objectives (CTC 2022b & c, CTC 2023).

Catch levels for the SEAK fishery are established using measures of catch per unit effort (CPUE) from the winter power troll fishery in District 113 during statistical weeks 41–48 in combination with output from the PSC Chinook model. This multivariate method for estimating abundance in the SEAK fishery is new, includes additional information, and was approved for use by the PSC on February 16, 2023. A comparison of the new multivariate method and existing methods that rely solely on the PSC Chinook model or CPUE estimates demonstrated that the multivariate method was more accurate and precise than the PSC Chinook model or the CPUE method alone.

Nonetheless, the 2019 PST Agreement includes specific provisions that will require close monitoring and review of the method during the term of the Agreement. Based on recent reviews, the method for setting the SEAK catch limit is subject to change in 2024, and may revert back to use of the PSC Chinook model. Catch limits associated with the year-specific estimates of abundance for the NBC, WCVI, and SEAK fisheries are shown in Table 4-2 and Table 4-3 (referred to as Tables 1 and 2 in the 2019 PST Agreement). For 2023, catch limits for the SEAK fisheries were determined using a tiered approach. There are seventeen tiers that are defined by a range of abundance index values. A catch ceiling is associated with each tier (Table 4-3). For example, tier 6 is associated with abundance indices from 1.105-1.175 and the catch ceiling for the SEAK fishery for tier 6 is 142,101 Chinook salmon. Although the SEAK fishery used this tiered approach in 2023, the abundance levels and associated catch ceilings are nonetheless tied directly to the values in Table 4-3. The tiered approach is subject to change for 2024 and beyond and may revert back to the continuous linear relationship between abundance indices (AI) and catch limits specified in Table 1 of the 2019 PST Agreement (Table 4-2).

Table 4-2 Catches specified for AABM fisheries at levels of the Chinook abundance index - (Referred to as Table 1 in the 2019 PST Agreement). Catch limits in each column are numbers of fish.

Abundance Index	SEAK	NBC	WCVI
0.25	42,100	42,300	29,200
0.30	47,000	47,700	33,700
0.35	51,900	53,200	38,300
0.40	56,800	58,700	42,800
0.45	61,600	64,100	47,300
0.50	66,500	69,600	51,900
0.55	71,400	75,100	65,800
0.60	76,300	80,500	71,100
0.65	81,200	86,000	76,400
0.70	86,000	91,500	81,700
0.75	90,900	96,900	87,000
0.80	95,800	102,400	92,300
0.85	100,700	107,900	97,500
0.90	105,500	113,300	102,800
0.95	110,400	118,800	108,100
1.00	115,300	124,200	113,400
1.05	122,900	129,700	118,700
1.10	133,500	135,200	134,900
1.15	144,200	140,600	140,700
1.20	154,900	146,100	167,300
1.25	185,900	151,600	173,900
1.30	192,600	157,200	180,500
1.35	199,300	163,300	191,800
1.40	206,000	169,500	198,500
1.45	212,700	175,700	205,300

1.50	219,400	181,800	212,000
1.55	226,100	188,000	218,800
1.60	250,900	194,200	225,500
1.65	258,200	200,300	232,300
1.70	265,400	225,300	239,000
1.75	272,700	231,400	245,800
1.80	279,900	237,600	252,500
1.85	287,200	243,700	259,300
1.90	308,000	249,800	266,000
1.95	315,600	256,000	272,700
2.00	323,100	262,100	279,500
2.05	330,700	268,200	286,200
2.10	338,300	274,400	293,000
2.15	345,900	280,500	299,700
2.20	353,500	286,600	306,500
2.25	361,100	292,700	313,200

1. Values for catch at levels of abundance between those stated may be linearly interpolated between adjacent values.
2. The PSC adopted a new Chinook model October 17, 2019; revisions to Chapter 3 Table 1, Table 2 and Appendix C were required to maintain relationships between AIs and catch limits.

Table 4-3 Abundance tiers and associated catch limits used to set the 2023 annual catch limit for the SEAK AABM fishery (CTC 2023). Catch limits are numbers of fish. [24]

Tier	Abundance Index Range	AI Midpoint	Catch Limit
1	Less than 0.895	NA	Commission Determination
2	Between 0.895 and 0.945	0.920	107,498
3	Between 0.945 and 0.985	0.965	111,888
4	Between 0.985 and 1.035	1.010	116,278
5	Between 1.035 and 1.105	1.070	127,130
6	Between 1.105 and 1.175	1.140	142,101
7	Between 1.175 and 1.245	1.210	157,072
8	Between 1.245 and 1.345	1.295	191,963
9	Between 1.345 and 1.455	1.400	206,027
10	Between 1.455 and 1.555	1.505	220,091
11	Between 1.555 and 1.665	1.610	252,358
12	Between 1.665 and 1.765	1.715	267,594
13	Between 1.765 and 1.875	1.820	282,830
14	Between 1.875 and 2.015	1.945	314,799
15	Between 2.015 and 2.145	2.080	335,288
16	Between 2.145 and 2.285	2.215	355,778
17	Greater than 2.285	2.285	373,801

1. The PSC adopted a new method and tier structure for setting the 2023 SEAK catch limit on February 16, 2023; revisions to Chapter 3, Table 2 are under consideration.

The 2019 PST Agreement allows for the use of alternative approaches for estimating the abundances including, for example, the use of inseason data for the NBC or WCVI fisheries, or reliance on the PSC Chinook model for the SEAK fisheries.

Provisions of the 2019 PST Agreement result in reductions in catch in the SEAK and WCVI AABM fisheries relative to those allowed under the 2009 PST Agreement, but the magnitude of the reduction changes depending on the abundance. Generally, the required reductions are less in years of high abundance. In the SEAK fishery, in most cases, catch is reduced by 7.5 percent relative to what was allowed in the 2009 PST Agreement, but at higher abundance levels catch reductions are either 3.25 or 1.5 percent. In the WCVI fishery, in most cases, catch is reduced by

24 The PSC adopted a new method for setting SEAK catch limits and a new tier structure on February 16, 2023; revisions to Chapter 3 Table 2 were required to maintain relationships between AIs and catch limits.

12.5 percent relative to what was allowed in the 2009 Agreement, but catch reductions are either 4.8 or 2.4 percent during years of high abundance (see PST, Chapter 3, Table 2). The abundance break points were set with the expectation that the SEAK and WCVI reductions would be at 7.5 and 12.5 percent in three out of four years, and at 3.25 and 4.8 percent, respectively in most remaining years. The reductions would be 1.5 and 2.4 percent in the SEAK and WCVI fisheries only if abundance levels exceed those observed over the same time period. All Chinook salmon fisheries subject to the PST that are not AABM fisheries are classified as ISBM fisheries. ISBM fisheries include, but are not limited to: northern British Columbia marine net and coastal sport (excluding Haida Gwaii), and freshwater sport and net; central British Columbia marine net, sport and troll and freshwater sport and net; southern British Columbia marine net, troll and sport and freshwater sport and net; WCVI inside marine sport and net and freshwater sport and net; south Puget Sound marine net and sport and freshwater sport and net; north Puget Sound marine net and sport and freshwater sport and net; Juan de Fuca marine net, troll and sport and freshwater sport and net; Washington Coastal marine net, troll and sport and freshwater sport and net; Washington Ocean marine troll and sport; Columbia River net and sport; Oregon marine net, sport and troll, and freshwater sport; Idaho (Snake River Basin) freshwater sport and net.

For the SEAK fisheries, the annual catch limit established under the PST is allocated among gear types in accordance with regulations established by the Alaska Board of Fisheries to provide 4.3% of the Chinook catch limit to the purse seine fleet, 2.9% to the drift gillnet fleet, and 1,000 fish to the set gillnet fleet. The total net gear allocation is then subtracted from the all-gear catch limit, and the remainder of the allocation is divided between the troll and sport fisheries in an 80/20 split (5 AAC 29.060(b)) (Hagerman et al. in prep).

The PST provides an exemption for most Alaska hatchery-produced Chinook salmon and for catch in specific terminal areas, which do not count towards the Treaty annual catch limit; the remaining non-Alaska hatchery-produced Chinook salmon are referred to as treaty Chinook salmon. The all-gear SEAK treaty catch and catch limits are provided in Table 4-4.

Table 4-4 Southeast Alaska all-gear treaty Chinook salmon harvest, hatchery add-on, total harvest, treaty harvest limit, terminal exclusion harvest, and the number of fish over or under the harvest limit, 2013-2022.

All-Gear						
Year	Treaty Harvest	Hatchery add–on	Terminal Exclusion	Total Harvest	Pre-season Treaty Harvest Limit	Over/Under Pre-season Harvest Limit
2013	191,388	65,598	266	257,252	176,000	15,388
2014	435,195	56,592	736	492,522	439,400	-4,205
2015	335,026	68,097	216	403,339	237,000	98,026
2016	350,939	35,673	664	387,042	355,600	-4,661
2017	175,414	31,638	0	207,052	209,700	-34,286
2018	127,776	36,966	0	164,742	144,500	-16,724
2019	140,307	34,578	211	175,096	140,323	-16
2020	204,624	30,164	0	234,788	205,165	-541
2021	202,082	34,092	0	236,175	205,165	-3,083
2022	238,633	37,157	0	275,790	266,585	-27,952

Overages in harvest are addressed in Chapter 3, paragraph 6 and 7 of the PST. Paragraph 6(h) of the PST contains provisions for overages of harvests for the AABM fisheries, including (but not limited to): “(i) if the actual catch exceeds the pre-season catch limit (overage) then the overage shall be paid back in the fishing year after the overage occurs, (ii) if the actual catch is lower than the pre-season catch limit (underage) then the underage shall not be accumulated;...”

Provisions in paragraph 7(a) of Chapter 3, Annex IV of the PST directs the CTC to provide the PSC with: “(i) the AABM fisheries pre-season limits, actual catches, and identify the extent of any exceedance (overage) of those limits for the prior fishing season (management error), (ii) the AABM fisheries post-season limits for fisheries that occurred two years prior and any exceedance (overage) between the annual pre- and post-season limits from two years prior (model error),…”

Additional provisions in paragraph 2(b) of the PST further defines the responsibilities of the CTC to provide the PSC with a post-season abundance index, review the performance of the fisheries to meet management objectives and harvest provisions, and compute and report AABM post-season fishery limits defined by using the first post-season Commission Chinook model estimate.

4.2. Alaska Chinook Salmon Management under the PST

Since 1999, an all-gear total allowable catch for the SEAK Chinook salmon AABM fishery has been determined in early spring, prior to the spring and summer commercial and sport fisheries. This total allowable treaty catch is allocated among troll, net, and sport fisheries through state regulations established by the Alaska Board of Fisheries. After net catches are removed from the total allowable treaty catch, the remaining allowable catch is allocated to troll fisheries and to sport fisheries. The PST provides an exemption for most Alaska hatchery-produced Chinook salmon and for catch in specific terminal areas, which do not count towards the treaty annual catch limit. All fisheries are sampled for coded-wire tags, which are processed and used to determine the proportion of catch comprised of Alaska hatchery-produced fish.

ADF&G manages the sport and commercial fisheries for Chinook consistent with the terms and conditions of the PST, which requires that ADF&G stay within the annual catch limit established by the PSC, manage to achieve escapement goals for six SEAK and TBR wild stocks, and to not exceed a 59,400 fish limit on incidental mortality. With respect to incidental mortality, this includes estimated: (1) drop-off mortality of legal-sized fish in retention fisheries, (2) mortality of legal-size fish in Chinook non-retention fisheries, and (3) mortality of sublegal-size fish in both retention and Chinook non-retention fisheries (CTC 2023). Supporting information for estimates of incidental mortality are provided in appendix E of CTC 2022a.

Annual accounting of catch in troll fisheries occurs on a cycle that begins October 1 and ends September 30 each year. The troll fishery consists of three periods: (1) a winter fishery that occurs from October through April, (2) a spring fishery that occurs in May and June, and (3) a summer fishery that occurs from July through September. Fishery openings for net fisheries vary by year but they typically occur from mid to late June through early fall. Except for directed harvest of Chinook salmon in terminal areas of Districts 108 and 111 as described in the TBR chapter of the 2019 PST Agreement, all other net harvest of Chinook salmon is incidental to the harvest of other species. Sport fisheries generally occur throughout the year; however, bag limits may vary annually depending on the level of allowable catch.

4.3. Commercial Troll Fishery

Commercial troll fisheries in the EEZ in SEAK occur pursuant to the Council’s and NMFS’s delegation to the State of Alaska and regulations issued by ADF&G conforming with the 2019 PST Agreement. State management of the commercial troll fisheries in the EEZ must be consistent with the Salmon FMP and the Magnuson-Stevens Act. In practice, ADF&G manages the commercial troll fisheries in state waters and the EEZ as a single unit in conformity with the PST, and consistent with State statutes and Alaska Board of Fisheries (BOF) regulations and management plans with assistance from Federal grants to implement the PST.

The commercial troll fishery harvests the largest proportion of Chinook salmon in SEAK salmon fisheries and is managed consistent with the provisions of the PST. Commercial troll coho salmon fisheries are also subject to the provisions of the PST contained within general obligations under Attachment B of the 1999 PST Agreement. The commercial troll fishery is the only authorized commercial salmon fishery in the SEAK EEZ. The Salmon FMP provides the delegation of management authority to the State of Alaska for management of the troll fishery in the EEZ. Because State regulations governing salmon management of the troll fishery in SEAK do not differentiate between EEZ and State waters, the State manages the SEAK salmon troll fishery within State waters and in the EEZ as a single unit.

Nichols (2021) provides a concise summary description of the commercial troll fishery:

“Trolling is a low-impact gear type noted for its high quality of catch as each fish is individually hooked, handled and bled. As a slow and selective harvesting method, trollers use fishing lures imitating salmon prey to appeal to specific salmon species. Trollers often fish offshore for multiple days seeking areas where salmon are schooled to feed. Troll caught salmon are widely recognized as some of the highest quality and markets pay a premium price for these fish. Trollers drag lines (typically 2-6) with multiple fishing lures or bait behind them. Each line is held in place with a heavy weight referred to as a ‘cannon ball’ as the boat moves slowly forward to draw the lures or bait through the water. Trollers have a small crew (often family members) and some captain's even fish alone."

The State manages the SEAK Chinook commercial troll fishery to not exceed the preseason annual all-gear PSC annual catch limit, and to meet escapement goals for six SEAK and TBR wild stocks. The commercial troll fishery in SEAK occurs in State of Alaska waters and in the Federal EEZ east of the longitude of Cape Suckling and north of Dixon entrance. All other waters of Alaska and the EEZ are closed to commercial trolling. The commercial troll fishery harvests primarily Chinook, coho, and chum. Historically, the troll fishery harvested about 85% to 90% of the Chinook salmon taken in SEAK. Since 1980, the percentage of the Chinook harvest taken by the troll fishery has declined, with a recent 10-year average (2013-2022) of 67%. The troll fleet has harvested an average of 65% of the commercial coho salmon harvested in SEAK since 1989, with a range of 53% to 78%. Most other species are harvested incidentally, but in recent years, hatchery-produced chum salmon have been the target of substantial troll effort. The troll fleet incidentally harvests Pacific halibut under Federal Individual Fishing Quota regulations and lingcod and rockfish under state regulations (refer to section below for a discussion on incidental harvest and bycatch management in the directed salmon fisheries (Hagerman et al. in prep)).

Within the East Area, the commercial troll fishery is the only commercial salmon fishery allowed in the EEZ. From Alaska statehood in 1959 until 1979, this fishery was conducted and managed with little recognition of the boundary separating Federal and State waters, although at one time the State of Alaska banned hand trolling seaward of the "surf line" (see Figure 4-1). Upon implementation of the Federal Salmon FMP in 1979, accounting of salmon harvests became delineated between Federal and State waters; however, the commercial troll fishery continues to be managed and prosecuted as a single unit.

4.3.1. Gear and fishing methods

Trolling is defined as artificial lures or baits towed behind a vessel at varying speeds and depths corresponding to the nature, habitat, and size of the species being sought.[25] The commercial troll fleet in SEAK is composed of power and hand troll gear types. Power trollers are limited to 4 lines operated by hydraulic, electrical, or mechanical powered gurdies, except within the EEZ north of the latitude of the southernmost tip of Cape Spencer, where 6 lines may be used. Vessels using hand troll gear are limited to 2 lines on 2 hand-operated gurdies or 4 fishing rods, except that following the closure of the initial summer Chinook salmon retention period and prior to the winter troll fishery, 4 hand troll gurdies or 4 fishing rods may be onboard and operated within the EEZ north of the latitude of the southernmost tip of Cape Spencer. During the winter troll season only, 2 hand troll gurdies or hand-powered downriggers can be used in conjunction with 2 fishing rods. Specific exceptions to these gear limits may be found in state regulations at 5 AAC 29.120. Although the majority of the troll fleet sells their harvest to shorebased processing plants or tenders, the fleet does include some catcher–processors, or "freezer boats," which harvest and freeze their fish at sea.

4.3.2. Chinook Salmon Troll Fishery

Chinook salmon caught in troll fisheries must be equal to or greater than 28 inches in total length, undersized Chinook salmon must be returned to the water unharmed, and the heads of all adipose-fin clipped salmon must remain attached until the fish is sold to facilitate recoveries of CWTs (5

[25] For a more detailed description of troll gear, see ADF&G's report "What king of fishing boat is that," available at https://www.adfg.alaska.gov/static/fishing/PDFs/commercial/whatkindofboat_cf.pdf

AAC 29.140). Additional detail on the Chinook salmon troll fishery is provided in the sections that follow.

4.3.3. Coho Salmon Troll Fishery

Coho salmon management is based on aggregate abundance. Coho salmon fisheries in southern SEAK are also managed in cooperation with Canada under guidelines of the PST. There are no harvest ceilings for SEAK coho salmon fisheries under the PST; however, areas near the U.S./Canada border will close to trolling if the harvest by Alaska trollers fishing in the border area falls below specified thresholds. The primary objectives for management of the coho salmon fishery are as follows:

- Provide adequate escapement of coho salmon, by area, to ensure sustainable populations.
- Provide maximum opportunities for harvest consistent with conservation objectives.
- Manage the coho salmon fisheries to achieve allocations consistent with State of Alaska BOF regulations.
- Manage coho salmon on the U.S./Canada border to comply with provisions of the PST.

The regulatory period for coho salmon retention in the troll fishery is June 1 through September 20. However, in years when wild coho salmon abundance is projected by ADF&G to meet escapement needs after considering harvest and effort ADF&G may extend, by emergency order, the coho salmon fishery in any portions of Districts 101–116 for up to 10 days after September 20. Troll harvests of coho salmon generally peak between mid-July and early September. The troll fishery may also be closed, by emergency order, for conservation of coho salmon stocks as follows:

- For up to seven days beginning on or after July 25 if the total projected commercial harvest of wild coho salmon is less than 1.1 million fish; or
- For up to ten days, if ADF&G makes an assessment and determines that:
    - the number of coho salmon reaching inside waters might be inadequate to provide for spawning requirements under normal or restricted inside fisheries for coho salmon and other species; the primary abundance indicators for the assessment consist of relative harvest levels by all fisheries and, in particular, catch per unit effort in inside drift gillnet and sport fisheries as compared to average 1971 through 1980 levels and escapement projections for streams where escapement goals have been established; or
    - the proportional share of coho salmon harvest by the troll fishery is larger than that of inside gillnet and sport fishing fisheries when compared to average (1971 through 1980) levels; the primary inside fisheries indicators for the assessment are overall coho salmon harvests and catch per unit effort in the District 101, 106, 111, and 115 drift gillnet fisheries and by anglers sport fishing from boats in the salt water sport fishery that return to any port connected to the Juneau road system.

Following any closure, waters for coho salmon trolling may be reopened by emergency order; however, if ADF&G determines that the strength of the coho salmon run in the inshore and terminal salmon fishing waters is less than required to provide a spawning escapement that will maintain the runs on a sustained-yield basis, ADF&G may take additional actions on coho salmon fishing seasons, periods, and areas.

Similar to Chinook salmon, ADF&G's primary tool for inseason assessment of coho salmon harvest rates is a program of dockside interviews with vessel skippers. Catches by the net fisheries are obtained from fish tickets and run strength assessments using troll catch per unit effort data occurs in mid to late July, early to mid-August, and in mid-September.

4.3.4. Chum Salmon Troll Fishery

Historically, chum salmon were harvested incidentally in the general summer troll fishery. Effort directed at targeting chum salmon from Alaska hatcheries has increased significantly over the most recent 10-years. This increase in participation in directed chum salmon fisheries has resulted in a shift of effort away from traditional fisheries that target both Chinook and coho. Target effort for chum salmon is primarily found in terminal or near terminal waters close to hatchery facilities or release sites. Chum troll fisheries in terminal areas may be conducted during periods of closures for Chinook or coho salmon. In such fisheries, a person may not have Chinook salmon or coho salmon (respectively) on board a salmon troll vessel while fishing for chum salmon.

4.3.5. Seasons and Areas

The commercial troll Chinook salmon fishery is divided into three seasons: a winter season, a spring season, and a summer season. Accounting of PST Chinook salmon harvested by the commercial troll fleet begins with the start of the winter fishery and ends with the close of the summer fishery.

The winter troll season is defined as October 11–April 30, and is managed not to exceed a guideline harvest level (GHL) of 45,000 treaty Chinook salmon (with a guideline range of 43,000 to 47,000 fish). However, as adopted under the Unuk and Chickamin (Meredith et al., 2022), Northern SEAK (Hagerman et al., 2022c), and Stikine and Andrew Creek (Salomone et al., 2021) Chinook Salmon Stock Status and Action Plans (SEAK action plans) during the March 2022 Alaska BOF meeting, notwithstanding any remaining portion of the 45,000 non-Alaska hatchery-produced Chinook salmon GHL, the commercial winter troll fishery is closed by emergency order on March 15 in all inside waters of SEAK. Under provisions of these newly adopted action plans to conserve SEAK and TBRs wild Chinook salmon stocks, ADF&G was given direction to take necessary management actions under emergency order authority that provide for conservation of these wild Chinook salmon stocks while continuing to identify harvest opportunities that maintain conservation of these stocks. The winter fishery is restricted to waters of Yakutat Bay and most waters east of the winter boundary line defined by established point to point landmarks between Cape Spencer and the International Boundary at Dixon Entrance (5 AAC 29.020(b)) (Figure 4-1). All coastal waters to the west of the winter boundary line, including the EEZ, are closed during the winter fishery. Fish tickets provide inseason harvest and effort information throughout the fishery. In 2023, some areas of the fishery with historically low catches of SEAK wild stocks were open through April 15. When those stocks rebound, the winter fishery will return to an April 30 end date. Chinook salmon caught in the winter troll fishery count towards the annual SEAK troll fishery allocation (under provisions established by the BOF) and the SEAK all-gear PST catch limits (under provisions of the PST). Any treaty Chinook salmon not harvested during the winter fishery will be available for harvest during the spring and summer fisheries. More information on the winter troll fishery can be found in ADF&G Fishery Management Plans (see Hagerman and Vaughn in prep). Because the winter troll fishery does not occur in the EEZ, the fishery is outside the scope of the Salmon FMP.

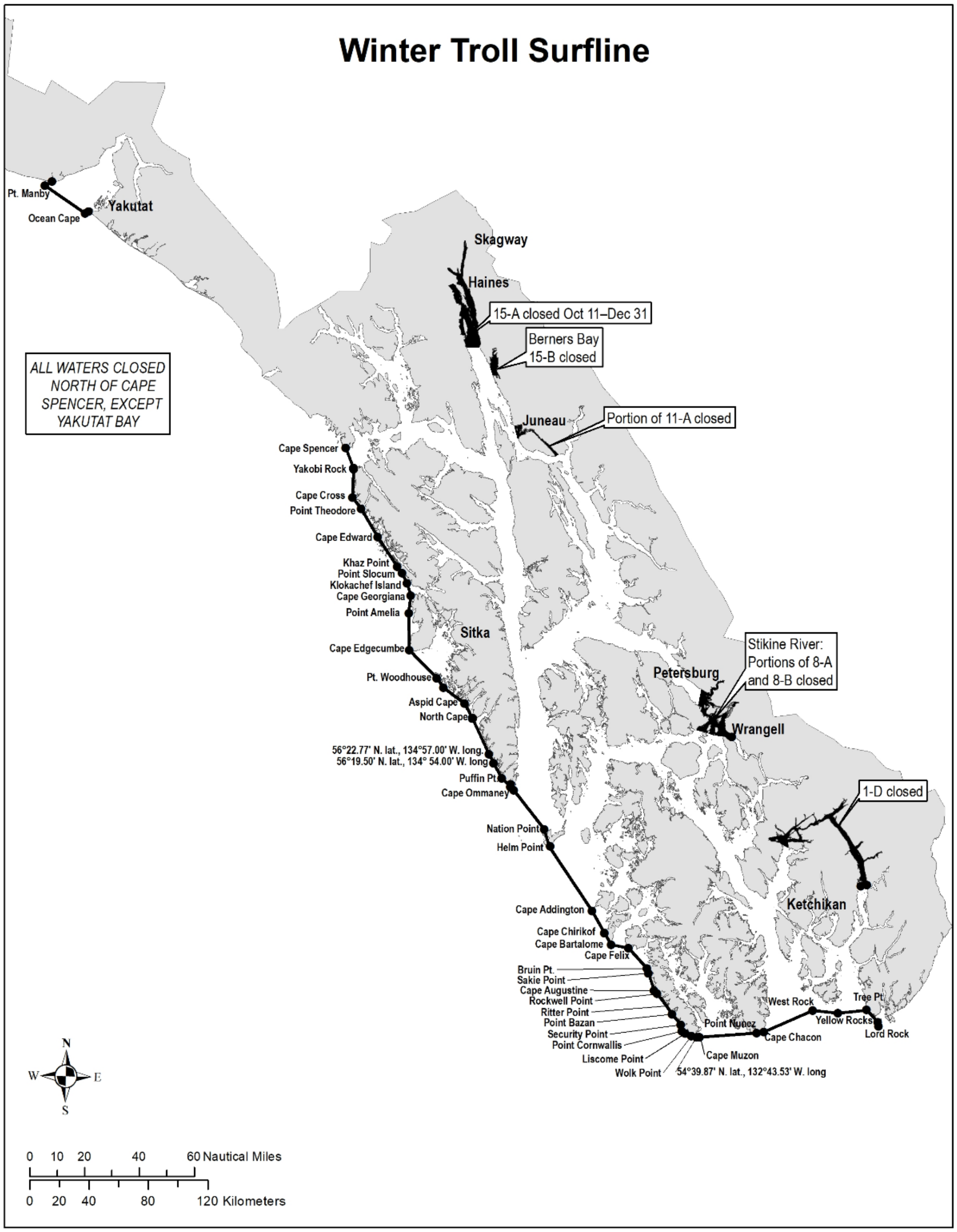

Figure 4-1 Southeast Alaska/Yakutat winter troll fishery area. (Hagerman and Vaughn in prep).

The spring troll fishery begins after the winter fishery closes, and under provisions of SEAK wild Chinook salmon stock of concern management plans, may start on or after May 1, even if there is an early winter fishery closure from reaching the winter season harvest cap of 45,000 Chinook salmon. The spring troll and terminal area troll fisheries are designed to target Alaska hatchery-produced Chinook salmon (though Chinook salmon from across the treaty area are also harvested). Provisions of SEAK action plans adopted by the Alaska BOF in 2022 to reduce encounters of SEAK wild salmon stocks during spring troll fisheries included limiting opportunities in May and June to terminal harvest areas (THA), waters in close proximity to hatchery release sites, and waters in a few defined spring troll fishery areas located on the outer coast (Figure 4-2). Although some THAs open on June 1 and remain open for extended periods of time, others open in accordance with the fishing schedules provided in THA management plans. Fish tickets and biological sampling data provide information on harvest, effort, and stock composition for the spring fisheries. CWT data are used in season to estimate the Alaska hatchery contribution to the harvest in each area. This information is used in combination with historical harvest timing data to determine fishing time for the following week. Treaty Chinook salmon harvest caps for each spring fishery vary based on a Tier system established to increase the allowable treaty Chinook salmon harvest as the Alaska hatchery proportion of the harvest increases. Treaty fish are counted towards the annual PST harvest limit of Chinook salmon, whereas most Alaska hatchery fish are not. Each spring troll fishing area is managed individually and closes when the treaty limit is reached. Depending on run forecasts, directed commercial fisheries may also occur in Districts 108 and 111 targeting Chinook salmon returning to the Taku and Stikine Rivers under provisions of Chapter 1 of the PST.

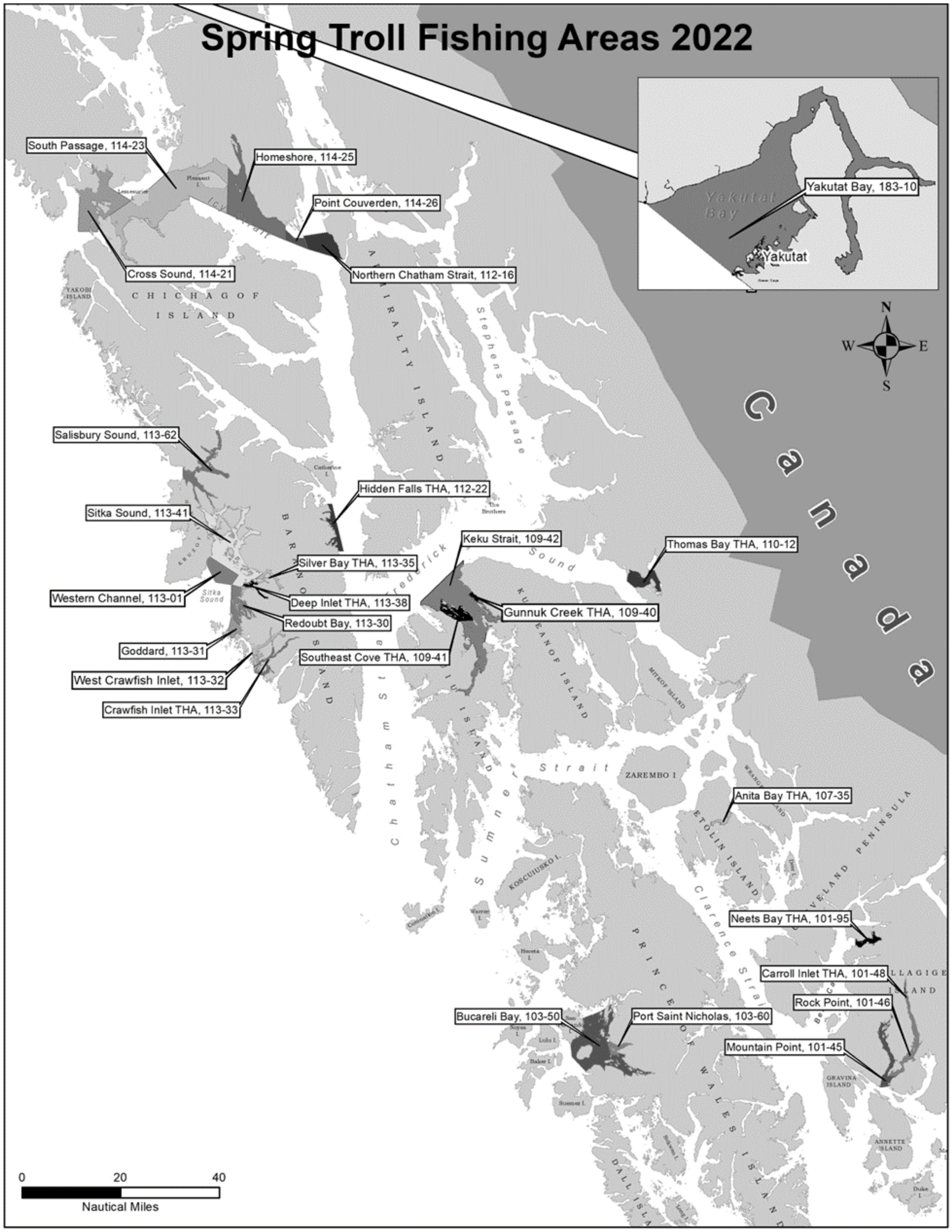

Figure 4-2 Southeast Alaska/Yakutat spring troll fishery area. (Hagerman and Vaughn 2022a).

The general summer troll fishery opens July 1 and targets the remaining allocation following the winter and spring seasons, which is the majority of the annual treaty Chinook salmon annual catch limit, in two open periods during the July 1–September 30 timeframe. During the summer season, most waters of the SEAK/Yakutat area are open to commercial trolling, including outer coastal waters in the EEZ, except for those waters described in 5 AAC 29.150 and state waters closed by emergency order (Figure 4-3). Those closed waters in effect during the summer season are exempted during the winter and spring fisheries; however, State waters within 3,000 feet of the Annette Island Reserve are closed. The Annette Island Reserve is open year-round for a tribal troll fishery. The primary objectives for management of the summer Chinook salmon fishery are:

- Management of Chinook salmon harvest under the conservation and harvest sharing provisions of the PST.
- Maximize the harvest of Alaska hatchery-produced Chinook salmon.
- Achieve harvest allocations among user groups as mandated by the BOF.
- Minimize the incidental mortality of Chinook salmon to the extent practicable.

A harvest control limit is set for management of Chinook salmon during the general summer fishery. ADF&G manages the summer fishery to target 70 percent of the annual summer Chinook salmon allocation in an initial opening beginning July 1. ADF&G manages the first retention period inseason and closes that period by emergency order when the total harvest target for that period will be reached. The remainder of the Chinook salmon annual allocation is harvested in a second summer retention period in August, and in some years September. Due to the time lag between when fish are harvested and when the harvest information is received through receipt of fish landing tickets, ADF&G conducts a fisheries performance data (FPD) program to estimate the catch per boat day (CPBD) inseason during the summer fishery. Confidential interviews are conducted with trollers to obtain detailed CPBD data. Aerial vessel surveys are conducted to obtain an immediate estimate of fishing effort. Total harvest to date is estimated by multiplying vessel counts observed during weekly overflights with the CPBD data obtained from the interviews. Daily tallies from processors are also an important tool in tracking harvest.

Following the first Chinook salmon opening, the waters of high Chinook salmon abundance will be closed unless ADF&G determines that less than 30 percent of the Chinook salmon harvest goal for the initial opening was taken in that opening. In addition, during the second Chinook salmon opening, if ADF&G determines after 10 days that the annual troll Chinook salmon harvest ceiling might not be reached by September 20 with those waters closed, ADF&G shall reopen the waters of high Chinook salmon abundance by emergency order. Following the closure of the initial summer Chinook salmon period, all Chinook salmon must be offloaded prior to trolling for other species. Further information on the spring and summer troll fisheries can be found in ADF&G Fishery Management Plans (Hagerman and Vaughn 2022a and 2022b).

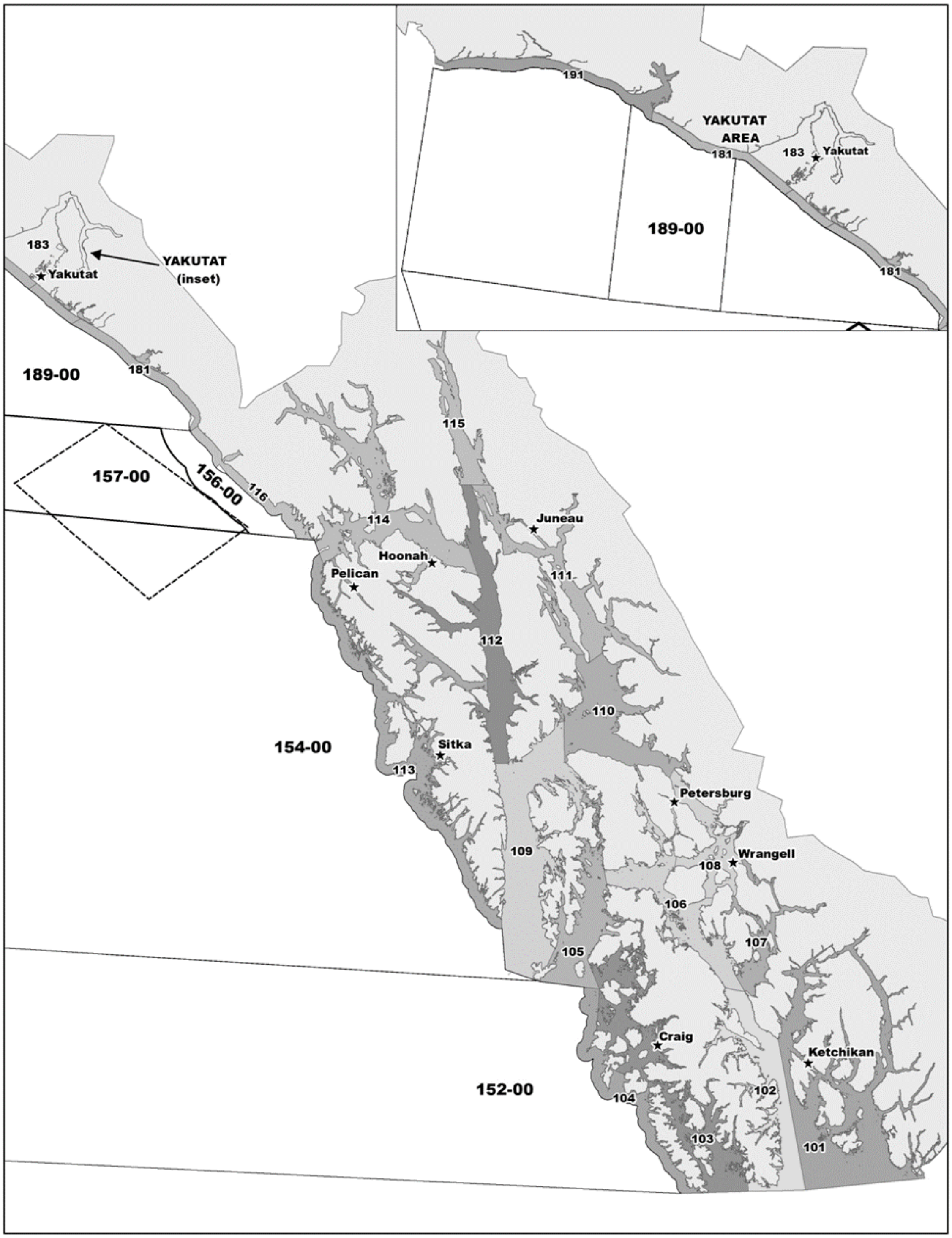

Figure 4-3 Summer troll fishing districts for Southeast Alaska/Yakutat. (Hagerman and Vaughn 2022b).

4.3.6. Commercial Troll Chinook Salmon Harvest

Since 2014, Chinook salmon harvests have continuously declined, with five out of the six lowest harvest years since Alaska statehood in 1959 falling between 2017 and 2022. The all-gear harvest of treaty Chinook salmon exceeded the pre-season harvest allocation 2 times over the 10-year period from 2013 through 2022, with the troll fishery exceeding its allocation 6 times during this period (Table 4-5). However, excess fish taken above the preseason troll allocation in several years, most recently in 2020 and 2021, were a result of an end of the year re-allocation of unharvested Chinook salmon from the commercial net and sport fisheries allocations. Estimates of total harvest and treaty harvest include Metlakatla Indian Community Annette Islands Reserve commercial troll catches that are not under the purview of the State of Alaska.[26]

Table 4-5 Commercial troll Treaty Chinook salmon harvest, total harvest, treaty harvest allocation, and the number of fish over or under the harvest allocation, 1999–2022. Negative numbers are the number of fish harvested under the pre-season harvest allocation.

Year	Treaty Harvest	Total Harvest	Pre-season Treaty Allocation	Over/Under Pre-season Allocation
2013	134,580	149,541	129,862	4,718
2014	340,015	355,570	325,411	14,604
2015	251,086	269,862	175,149	75,937
2016	266,172	276,432	263,197	2,975
2017	123,691	129,649	154,881	-31,190
2018	101,469	107,565	106,477	-5,008
2019	103,067	109,364	103,376	-309
2020	165,406	169,916	151,514	13,892
2021	155,590	163,210	151,514	4,076
2022	187,625	196,795	197,113	-9,488

The harvest of treaty Chinook salmon by the commercial salmon troll fleet is limited to a specific number of fish, which varies annually (see Table 4-5). The troll accounting year for treaty Chinook salmon begins in fall with the start of the winter fishery, continues through the spring fishery, and ends with the summer fishery.

During the 2022 season, the troll harvest of Chinook salmon was managed to comply with the Chapter 3 obligations of the 2019 PST, continue all-gear conservation measures for wild SEAK and TBR Chinook salmon, provide maximum harvest of Alaska hatchery-produced Chinook salmon, minimize incidental mortality during Chinook salmon nonretention periods by closing areas of high Chinook salmon abundance, and comply with terms of the incidental take statement issued by NMFS in the 2019 BiOp (ADF&G 2022).

[26] The Metlakatla Indian Community Annette Islands Reserve commercial troll catches are quite small. In 2022, for example, this fishery caught 125 Chinook salmon total, 75 of which were the Treaty harvest, which was a decrease from 2021 of 313 total harvest and 308 Treaty harvest.

4.4. Commercial Net Fisheries

Three salmon commercial net fisheries occur in SEAK exclusively within State waters: the purse seine, drift gillnet, and Yakutat area set gillnet fisheries. These net fisheries are managed by the State of Alaska (outside the scope of the Salmon FMP), with allocation and harvest of Chinook in all net fisheries, and sockeye and coho salmon in select net fisheries falling under provisions of the PST. Except for the Yakutat Chinook salmon set gillnet fishery and the directed drift gillnet harvest for Chinook salmon in some terminal areas as described in Chapter 1 of the 2019 PST Agreement, all other net harvest of Chinook salmon managed by the State of Alaska is incidental to the harvest of other species.

Other net fisheries subject to the PST include sockeye and chum salmon in the District 101 (Tree Point) drift gillnet fishery; sockeye and coho salmon in the Districts 106 (Prince of Wales), 108 (Stikine), and 111 (Taku) drift gillnet fisheries; sockeye salmon in the District 104 purse seine fishery; sockeye salmon in the Alsek River set gillnet fishery; and sockeye, coho, and Chinook salmon in the Stikine River subsistence and sockeye salmon in Taku River personal use set gillnet fisheries.

These net fisheries are managed in accordance with the PST (where applicable), state regulations, and Alaska BOF adopted stock of concern action plans (with the exception of a Stikine River subsistence fishery, which is managed under the Federal Subsistence Management Program and overseen by the Federal Subsistence Board). The net fisheries are managed separately through weekly fishing periods. While some initial opening dates and the start of weekly fishing periods are established in regulation, decisions on open areas and the duration of openings each week are generally based on inseason run size estimates, fishery performance data, stock composition data, and estimates of spawning escapement. More information on specific annual management regimes for these fisheries can be found in ADF&G fishery management plans and annual management reports: (http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareasoutheast.salmon#management)

4.4.1. Net Fisheries Chinook Salmon Harvest

Combined net fishery catches of Chinook salmon have ranged from 25,097 to 53,718 total catch over the last decade from 2013–2022 (Table 4-6). Because of where these fisheries operate in or near terminal areas, the vast majority of the catch is comprised of Alaska hatchery-produced Chinook salmon and net fisheries have only occasionally been over their allocation of Treaty fish. Treaty catches have ranged from 5,063 to 25,265 since 2013 with some of the lowest treaty catches on record occurring over the past five years. Estimates of total harvest and treaty harvest include Metlakatla Indian Community Annette Islands Reserve commercial purse seine and drift gillnet catches that are not under the purview of the State.[27]

[27] In 2022, the Metlakatla Indian Community Annette Islands Reserve catches included 555 total Chinook salmon in drift gillnet and 394 in purse seine (of which 299 drift gillnet and 394 purse seine were Treaty harvest). In 2021, the Metlakatla Indian Community Annette Islands Reserve catches included 520 total Chinook salmon in drift gillnet and 478 in purse seine (of which 228 drift gillnet and 478 purse seine were Treaty harvest).

Table 4-6 Net fishery treaty Chinook salmon harvest, total harvest, treaty harvest allocation, and the number of fish over or under the harvest allocation, 2013-2022. Negative numbers are the number of fish harvested under the pre-season harvest allocation.

Year	Treaty Harvest	Total Harvest	Preseason Treaty Harvest Allocation	Over/Under Pre-season Harvest Allocation
2013	13,504	51,319	13,672	-168
2014	21,229	50,010	32,637	-11,408
2015	18,766	53,718	18,064	702
2016	25,265	42,263	26,603	-1,339
2017	7,598	25,097	16,098	-8,501
2018	5,063	30,777	11,404	-6,341
2019	12,644	36,032	11,103	1,541
2020	8,657	29,772	15,772	-7,114
2021	9,557	30,983	15,772	-6,215
2022	16,842	37,819	20,194	-3,352

4.4.2. Purse Seine Fishery Description

The salmon purse seine fishery occurs in several areas of SEAK and primarily targets pink and chum salmon. During the years following Alaska statehood (1960–2022), the purse seine fishery has accounted for approximately 76% of the total commercial salmon harvest in numbers of fish in the SEAK. Pink salmon is the primary species targeted by the purse seine fleet; therefore, most management actions are based on inseason assessments of pink salmon abundance. Since 1962, the average percentage of all-gear harvest taken by the common property purse seine fishery, by species, has been 6% of Chinook salmon, 43% of sockeye salmon, 16% of coho, 89% of pink salmon, and 55% of chum (O. keta) harvests (Conrad and Thynes In prep). Long-term average species composition of the common property purse seine fishery harvest has been <1% Chinook, 2% sockeye, 1% coho, 87% pink, and 10% chum salmon (Thynes et al. In prep).

State of Alaska regulation (5 AAC 33.310(a)) allows traditional purse seine fishing in Districts 101 (Sections 1-C, 1-D, 1-E, and 1-F), 102, 103, 104, 105, 106 (Sections 6-C, 6-D, and 6-E), 107, 109, 110, 111 (Sections 11-A and 11-D), 112, 113, and 114 (Figure 4-4). Although these specified areas are traditionally open or available for purse seine fisheries, regulations mandate that specific open areas and fishing periods be established by emergency order. In 2022, common property purse seining occurred in 9 hatchery THAs (Thynes et al. In prep).

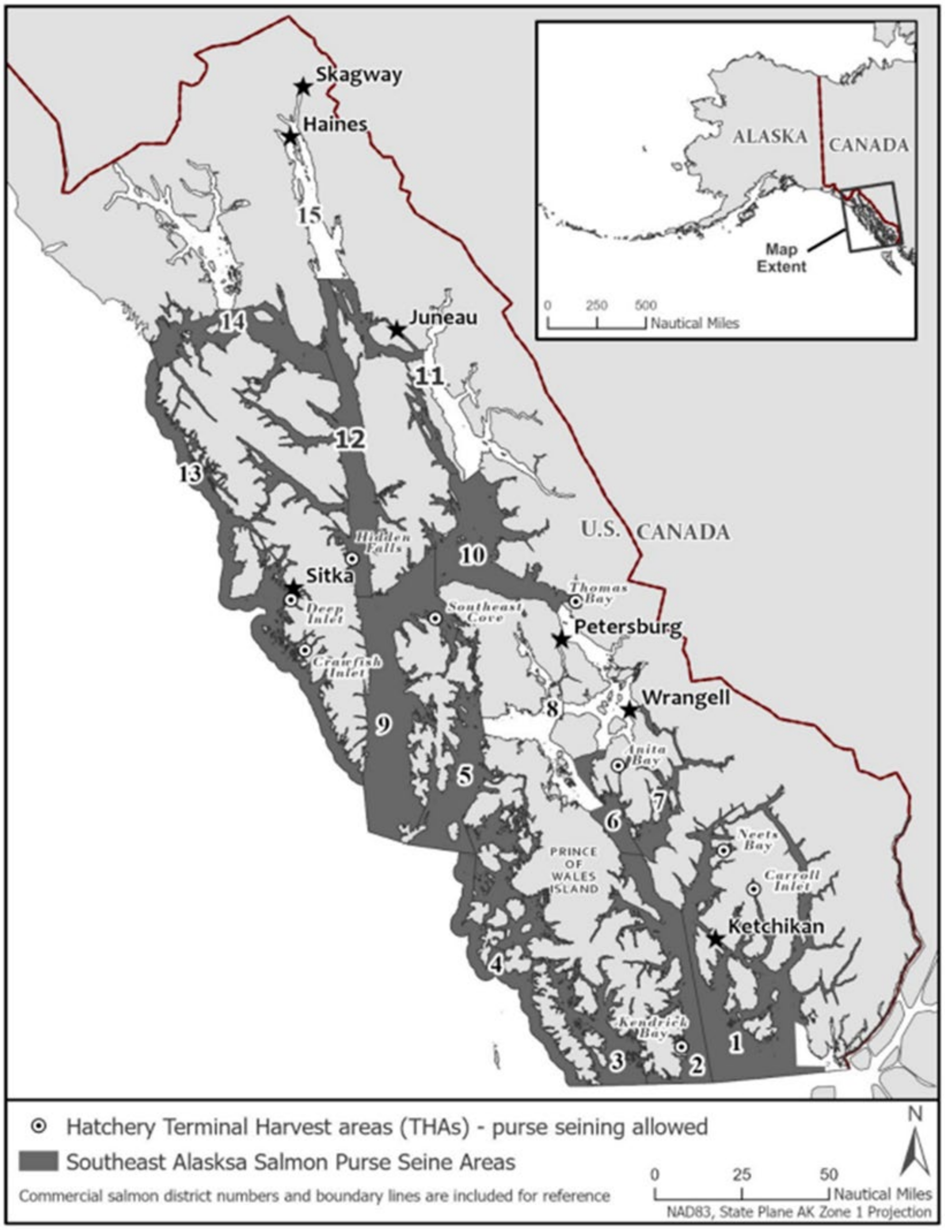

Figure 4-4 Southeast Alaska traditional purse seine fishing areas (Thynes et al, 2022a).

The 2022 total common property purse seine harvest was 19.0 million salmon. Common property fisheries included traditional wild stock fisheries and hatchery THA fisheries where fishery participants competed to harvest surplus runs. The total common property purse seine harvest included 27,000 Chinook, 629,000 sockeye, 162,000 coho, 14.8 million pink, and 3.5 million chum salmon (Table 4-7). The 2022 common property purse seine harvest was below the 2012-2021 average of 34.4 million fish and ranks as the 40th largest common property purse seine harvest in the 63-year period since 1960 (Thynes et al. In prep).

Table 4-7 Southeast Alaska traditional and terminal harvest areas purse seine salmon harvest in numbers of fish by species, 2013–2022 (Thynes et al. In prep).

Year	Chinook[a]	Jacks[a]	Sockeye	Coho	Pink	Chum	Total
2013	22,859	1,657	282,350	545,667	88,764,579	5,797,941	95,415,053
2014	27,185	1,105	900,955	388,692	33,471,883	2,384,335	37,174,155
2015	29,522	545	908,663	284,301	32,224,601	4,827,047	38,274,679
2016	27,363	195	610,532	257,065	15,388,943	3,108,581	19,392,679
2017	10,448	896	287,857	270,043	32,061,417	4,044,328	36,674,989
2018	16,139	613	230,931	154,176	6,850,978	4,985,011	12,237,848
2019	21,174	1,224	445,273	246,357	18,611,309	4,380,782	23,706,119
2020	16,611	1,748	237,220	76,706	5,958,004	2,012,622	8,302,911
2021	17,287	3,602	793,869	301,815	44,520,097	2,586,723	48,223,393
2022	26,175	1,300	629,374	162,379	14,738,246	3,460,787	19,018,261
Average 2013–2022	21,476	1,289	532,702	268,720	29,259,006	3,758,816	33,842,009

[a] Chinook salmon are 28″ or greater from tip of snout to tip of tail; jacks are less than 28″.

4.4.2.1. Purse Seine Chinook Salmon Summary

State of Alaska regulation (5 AAC 33.392(a)) states that unless otherwise specified, Chinook salmon (called "king salmon" in regulatory language) taken and retained must measure at least 28 inches from the tip of snout to tip of tail. This regulation applies to all common property purse seine fisheries. Further, 5 AAC 29.060(b)(1) establishes a purse seine harvest allocation for Chinook salmon 28 inches or larger of 4.3% of the annual harvest ceiling established by the PST. Non-Alaska hatchery Chinook salmon over 28 inches in length fall under the terms of the PST and are referred to as treaty Chinook salmon. The Alaska BOF adopted the Chinook salmon harvest guidelines as part of an overall allocation scheme among commercial and sport users resulting from implementation of the PST. State of Alaska regulation 5 AAC 33.392(b) states that a purse seine permit holder may take but may not sell Chinook salmon less than 28 inches. Chinook salmon less than 28 inches do not count against the Chinook salmon harvest catch limit. In addition, it is specified in 5 AAC 29.060(c) that Chinook salmon produced by Alaska hatcheries do not count against the seasonal harvest guideline, minus adjustments for pre-treaty hatchery production (5,000 fish base) and estimation error (risk factor). The purse seine harvest allocation in 2022 was 11,200 treaty Chinook salmon (Thynes et al. *In prep*).

The primary management tool used to limit purse seine harvests within the Chinook salmon harvest allocation is to establish fishing periods by emergency order when large (28 inches or larger for purse seine and troll) Chinook salmon cannot be retained. When nonretention periods are necessary, it is preferable to implement the related emergency orders either early or late in the season when the total salmon harvest is low. This allows for a more efficient release of large Chinook salmon and minimizes the impact of incidental mortality. Retention of Chinook salmon 28 inches or larger is permitted during the period when harvest rates for other species are high. Once the Chinook salmon purse seine allocation is harvested, nonretention is required.

In 2018, the Alaska BOF declared Chinook salmon stocks from Chilkat, King Salmon, and Unuk Rivers as stocks of concern and in 2022 in addition to these 3 stocks, also declared the Chickamin, Stikine, and Taku Rivers, and Andrew Creek as stocks of concern. These action plans called for nonretention of Chinook salmon through late July in most areas fished by the SEAK purse seine fleet.

The total 2022 common property purse seine harvest (traditional and THA) of Chinook salmon was 27,500 fish, of which 26,200 fish were reported as 28 inches or larger and 1,300 fish as less than 28 inches (Table 3-8). The estimated purse seine harvest of Alaska hatchery Chinook salmon is 12,000 fish. Of these Alaska hatchery fish, 11,800 are designated as "hatchery add-on"

Chinook that do not count against the seasonal harvest guideline. For all districts, 14,200 Chinook were caught in traditional fisheries, and 12,000 fish were caught in hatchery THA fisheries. The total large Chinook harvest of 26,200 fish, minus the add-on Chinook harvest, translates into a treaty Chinook harvest of 14,400 fish. The treaty Chinook harvest by purse seine gear in the Metlakatla Indian Community Annette Islands Reserve fishery was 394 fish for a total treaty Chinook harvest of 14,800 fish, just under 3,600 fish over the purse seine treaty allocation. However, since all other Alaska PST fisheries were determined to be well under their allocation, the purse seine fishery was allocated some of the remaining treaty fish. Despite this reallocation, Alaska was 28,000 fish under its treaty allocation.

4.4.2.2. District 104 Purse Seine Fishery

The District 104 purse seine fishery is one of two SEAK northern boundary fisheries that are managed under Chapter 2 of the PST. The District 104 purse seine fishery is a mixed stock fishery and harvests salmon bound for streams in SEAK and Canada. District 104 includes all waters north of Cape Muzon, west of District 103, and south of a line from Helm Point on Coronation Island to Cape Lynch. Prior to statistical week (SW) 31, District 104 is managed based on PST obligations and this time period is referred to as the "treaty period". For the remainder of the season, District 104 is managed based on wild SEAK pink salmon abundance.

The 2019 PST agreement calls for abundance-based management of the District 104 purse seine fishery. The agreement allows the District 104 purse seine fishery to harvest 2.45% of the annual allowable harvest (AAH) of Nass and Skeena Rivers sockeye salmon prior to SW 31. The AAH is calculated as the total run of Nass and Skeena Rivers sockeye salmon minus either the escapement requirement of 1.1 million fish (200,000 Nass and 900,000 Skeena) or the actual in river escapement, whichever is less. Canada's Department of Fisheries and Oceans (DFO) 2022 preseason sockeye salmon run forecasts were for runs of 560,000 sockeye salmon to the Nass River and 2,134,000 sockeye salmon to the Skeena River. This produced an initial AAH estimate of approximately 39,000 Nass and Skeena Rivers′ sockeye salmon for the District 104 purse seine fishery (Table 3-7; Thynes et al. 2022a).

Management actions were taken in the early season to be consistent with U.S. PST obligations during the treaty period. Inseason escapement estimates for the Skeena River in early July caused the AAH to rise dramatically and fishery restrictions in District 104 were relaxed. The District 104 purse seine fishery had one 8-hour opening, one 12-hour opening, and three 15-hour openings for a total of 65 open hours out of a potential 90 open hours during the treaty period. The total fishing time during the treaty period was above the 1985–2021 average of 59 hours. The total treaty period harvest was 49,000 sockeye salmon, the preseason AAH was approximately 39,000 sockeye salmon and the post season AAH was approximately 100,0000 sockeye salmon. In addition, 8,000 coho, 295,000 pink, and 92,000 chum salmon were harvested by 31 purse seine vessels during the treaty period. The treaty period sockeye salmon harvest was 31% of the 1985–1998 average of 158,000 fish, 76% of the 1999–2008 average of 65,000 fish, and 123% of the recent average of 40,000 fish. The purse seine effort of 65 vessels was also low compared to the 1985–1998 average of 139 vessels, above the 1999–2008 average of 47 vessels and near the recent average of 48 vessels (Thynes et al. *In prep*).

In recent years, approximately 60% of sockeye salmon harvested during the treaty period have been of Nass and Skeena Rivers origin. In January 2023, the Northern Boundary Technical Committee revisited the run reconstruction for 2021 and presented the preliminary run reconstruction for 2022 to the bilateral Northern Panel. For 2021, the preliminary run reconstruction allowed for an AAH of 27,673 fish, which is slightly above the preseason AAH of 25,300 Nass and Skeena Rivers sockeye salmon. During the treaty period, Alaska harvested

32,312 Nass and Skeena Rivers sockeye salmon. For 2022, the preliminary run reconstruction allowed for an AAH of 94,599 fish, which was well above the preseason AAH of 39,000 Nass and Skeena Rivers sockeye salmon. During the treaty period, Alaska harvested 34,658 Nass and Skeena Rivers sockeye salmon. This resulted in an overage of 4,639 sockeye salmon for 2021, an underage of 59,941 sockeye in 2022 and a cumulative underage of 191,976 treaty sockeye since 1999 (Table 4-8; Thynes et al. 2022a).

Table 4-8 District 104 purse seine fishery performance for sockeye salmon under Chapter 2 of the PST, 2013-2022 (Thynes et al. 2022a). Negative numbers are the number of fish harvested under the pre-season harvest allocation.

	Nass/Skeena Total Return	Nass/Skeena Escapement	Allowable Nass/Skeena AAH	Allowable D4 Harvest (2.45%)	Total Pre-Week 31 Sockeye Harvest	Actual Nass/Skeena Harvest	Overage/ Underage Per Year	Cumulative overage / (underage)
2013	981,476	642,461	339,015	8,306	13,102	4,228	-4,078	-122,668
2014	3,824,537	1,100,000	2,724,537	66,751	114,375	74,005	7,254	-115,414
2015	3,015,042	1,100,000	1,915,042	46,919	43,873	21,433	-25,486	-140,899
2016	2,140,259	1,100,000	1,040,259	25,486	110,346	65,039	39,553	-101,347
2017	1,422,783	1,100,000	322,783	7,909	12,036	6,916	-993	-102,340
2018	2,086,466	1,100,000	986,466	24,168	19,743	9,999	-14,169	-116,509
2019	1,200,155	862,549	337,606	8,271	9,399	4,450	-3,821	-120,331
2020	1,983,411	1,100,000	883,411	21,644	6,923	5,300	-16,344	-136,674
2021	2,229,497	1,100,000	1,129,497	27,673	49,304	32,312	4,639	-132,035
2022	4,961,172	1,100,000	3,861,172	94,599	49,025	34,658	-59,941	-191,976

4.4.3. Drift Gillnet Fishery Description

The SEAK salmon drift gillnet fishery primarily targets sockeye, pink, and chum salmon during the summer season and coho and chum salmon during the late summer and fall season. All Chinook salmon harvested in the drift gillnet fishery are accounted for under provisions of Chapter 3 of the PST. The drift gillnet fishery targets Chinook salmon during the spring season in hatchery THAs and in terminal areas of the Taku and Stikine Rivers in accordance with provisions established under Chapter 1 of the PST. Other drift gillnet fisheries subject to the PST include sockeye and chum salmon in the District 101 (Tree Point) drift gillnet fishery (Chapter 2); sockeye and coho salmon in the Districts 106 (Prince of Wales), 108 (Stikine), and 111 (Taku) drift gillnet fisheries (Chapter 1). Chinook salmon harvested in the District 115 (Lynn Canal) fishery are the only salmon subject to the PST (Chapter 3).

Traditional drift gillnet fisheries are allowed by State of Alaska regulation 5 AAC 33.310(c) in District 101 (Sections 1-A and 1-B), District 106 (Sections 6-A, 6-B, 6-C, and 6-E), District 108 (Sections 8-A and 8-B), District 111 (Sections 11-B and 11-C), and District 115 (Sections 15-A, 15-B, and 15-C) in SEAK (Figure 4-5). Regulations require that specific open areas and weekly fishing periods within these districts and sections be established by emergency order starting Sunday at noon. Drift gillnet openings may also be allowed in the Nakat Inlet, Carroll Inlet, Neets Bay, Anita Bay, Boat Harbor, Speel Arm, and Deep Inlet hatchery THAs (Figure 4-5).

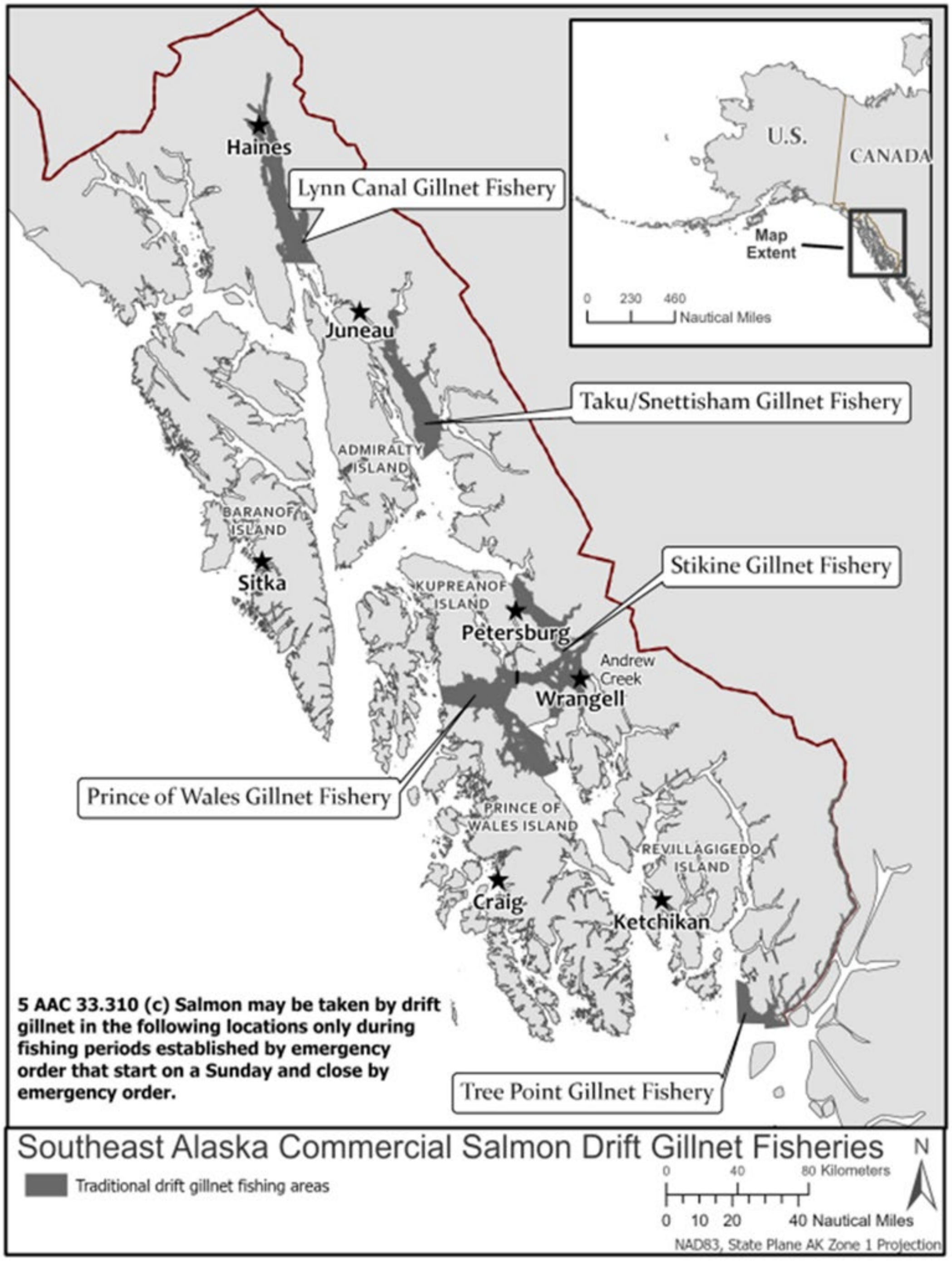

Figure 4-5 Southeast Alaska traditional drift gillnet fishing areas (Thynes et al. 2022b)

In 2022, drift gillnet openings targeting sockeye salmon began in SW 26 at noon on Sunday, June 19, in Districts 101, 106, 111, and 115. Drift gillnet fisheries targeted sockeye salmon during SWs 26–29 in District 101, SWs 26–31 in District 106, SWs 26–33 in District 111, and SWs 26–35 in District 115. The District 108 drift gillnet fishery was open in SWs 27 and 28 to target Tahltan Lake sockeye stocks. It then closed during SWs 29–31 due to concerns for mainstem Stikine River sockeye stocks. Pink salmon runs drive management decisions in SWs 29–34 in District 101, SWs 32–34 in Districts 106 and 108, and SWs 29–35 in Section 11-C. Drift gillnet fisheries target fall chum and coho beginning in or after SW 35 in Districts 101, 106, and 108, and SW 34 in Districts 111 and 115. Traditional drift gillnet fisheries occurred during 12 weeks in District 108; 15 weeks in District 101, 106, and 111; and 16 weeks in District 115. Drift gillnet fisheries in THAs took place in Carroll Inlet, Nakat Inlet, and Neets Bay in District 101; Anita Bay in District 107; Speel Arm in District 111; Deep Inlet in District 113; and Boat Harbor in District 115 (Thynes et al. *In prep*).

The 2022 drift gillnet common property fisheries (traditional and THA) harvested 3.7 million salmon (Table 4-9). The 2022 drift gillnet harvest was the 29th highest since 1960. Common property salmon harvests include 2.8 million fish in traditional fisheries and 858,000 fish in hatchery THAs. Traditional drift gillnet salmon harvests by district included 770,000 fish from District 101; 357,000 fish from District 106, 105,000 fish from District 108, 496,000 fish from District 111; and 1.1 million fish from District 115. Ranking 2022 traditional and terminal harvests among previous years since 1960, District 101 ranked 34th, District 106 ranked 48th, District 108 ranked 29th, District 111 ranked 28th, and District 115 ranked 10th (Thynes et al. *In prep*).

The 2022 drift gillnet common property harvests varied by species. Common property harvests of 16,200 Chinook accounted for 70% of the recent average (2012-2021) of 23,500 fish; sockeye harvest of 480,000 fish was 132% of the recent average of 364,000 fish; coho harvest of 133,000 was 49% of the recent average of 271,000 fish; pink salmon harvest of 633,000 fish was 62% of the recent average of 1.0 million fish; and harvest of 2.4 million chum was 56% of the recent average of 4.3 million fish. Common property drift gillnet harvest composition by species included <1% Chinook, 13% sockeye, 4% coho, 17% pink, and 65% chum salmon. The most notable trend is a continued large component of chum in drift gillnet fishery harvests since 1992 that is largely attributable to hatchery production (Thynes et al. *In prep*).

Table 4-9 Southeast Alaska traditional and terminal harvest areas drift gillnet salmon harvest in numbers of fish by species, 2013–2022 (Thynes et al. In prep).

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
2013	34,524	456,014	441,552	1,664,045	3,422,488	6,018,624
2014	27,877	497,968	554,301	1,417,432	2,381,516	4,879,094
2015	29,267	389,979	251,058	1,374,363	3,351,918	5,396,585
2016	20,701	622,390	263,968	1,152,890	2,679,235	4,739,184
2017	17,057	239,571	158,610	1,019,549	3,611,923	5,046,710
2018	21,276	226,707	258,883	556,370	2,526,020	3,589,256
2019	20,846	395,307	196,452	872,380	2,327,435	3,812,420
2020	19,493	102,330	124,806	501,173	1,061,927	1,809,729
2021	17,290	209,119	193,269	673,173	1,532,188	2,625,039
2022	16,174	479,728	132,522	632,901	2,394,186	3,655,511
Average 2013–2022	22,451	361,911	257,542	986,428	2,528,884	4,157,215

4.4.3.1. Drift Gillnet Chinook Salmon Summary

Allocation of Chinook salmon in the SEAK-Yakutat Area (5 AAC 29.060(b)(2)) was modified at the 2006 Alaska BOF meeting to assign 2.9% of the annual treaty harvest ceiling for Chinook salmon to the drift gillnet fishery. This was a change to the drift gillnet allocation from a fixed number of 7,600 Chinook to a percentage of the fluctuating annual all-gear catch limit, excluding directed fisheries in Districts 108 and 111, Alaska hatchery harvests above the pre-treaty 5,000 Chinook salmon baseline, and a risk factor apportioned between fisheries. The Alaska BOF adopted this harvest limit approach as an allocation measure to ensure that all user groups share in the Chinook salmon harvest limit specified by the PST. The Alaska BOF has specified that inseason management measures for maintaining harvest levels, if needed, may include early season area closures for protection of mature wild Chinook and nighttime fishing restrictions to minimize harvest of immature fish. The 2022 drift gillnet harvest allocation was 7,700 treaty Chinook (Thynes et al. *In prep*).

All Chinook salmon caught in the drift gillnet fishery may be retained (no size limit). Chinook salmon harvest may be limited by time (delaying start of season as Chinook run timing is earlier than other species) and area (closing areas near river mouths). Chinook harvest may also be limited by using regulatory authority (5 AAC 33.331) to implement a maximum mesh size of 6 inches.

The 2022 regional drift gillnet harvest of Chinook totaled 17,000 fish with a common property drift gillnet harvest of 16,000 fish. Chinook of all sizes can be sold in the drift gillnet fishery. Due to inaccuracies in reporting of small Chinook less than 28 inches on fish tickets and the need to report large (in drift gillnet fishery, "large" Chinook are ≥660 mm from mid eye to tail fork (METF), primarily age-1.3 fish) Chinook for PST purposes, drift gillnet fish tickets were revised in 2012 to report Chinook salmon of all sizes as one category, and data from 2005 to 2011 was revised accordingly. Accounting of Chinook for PST purposes is now done by adjusting fish ticket counts by port sampling age, sex, and length data. Preliminary accounting for PST purposes is based on a drift gillnet fishery harvest estimate of 17,300 large Chinook salmon, including harvests from the Metlakatla Indian Community Annette Islands Reserve. Total drift gillnet harvest of large Chinook included an estimated 9,600 Alaska hatchery fish. The hatchery "add-on" was calculated at 9,200 fish resulting in 1,580 Chinook salmon designated as treaty harvest in traditional (non-TBR) fisheries, 299 fish as Treaty harvest in the Metlakatla Indian Community Annette Islands Reserve drift gillnet fishery, and 30 fish as treaty harvest in the Taku and Stikine Rivers TBR fisheries, for a total treaty harvest of 1,910 fish (Thynes et al. In prep).

4.4.3.2. District 101 Drift Gillnet Fishery

The District 101 (Tree Point) commercial drift gillnet fishery can occur in the waters of Sections 1-A and 1-B. Due to wild chum salmon concerns on the Canadian side of Portland Canal and the proximity to the Nass River, Section 1-A and a portion of Section 1-B north of the latitude of Akeku Point has remained closed since the 1970s. In Section 1-B, fishing primarily occurs along the mainland shore south of Foggy Point to Cape Fox and along the western shore of Tongass and Kanagunut Islands just north of the U.S./Canada border.

The District 101 drift gillnet fishery is one of two U.S. northern boundary fisheries that are managed under Chapter 2 of the PST. The 2019 PST agreement calls for abundance-based management of the District 101 drift gillnet fishery. The agreement specifies that the U.S. shall adhere to a harvest of 13.8% of the AAH of the Nass River sockeye salmon run. The AAH is calculated as the total run of Nass River sockeye salmon minus either the escapement requirement of 200,000 fish or the actual in river escapement, whichever is less.

The District 101 drift gillnet fishery opens by regulation on the third Sunday in June. During early weeks of the fishery, management is based on run strength of Alaska wild stock chum and Nass River sockeye. In the third week of July, when pink salmon stocks begin to enter the fishery in larger numbers, management shifts by regulation to that species. The District 1 Pink Salmon Management Plan (5 AAC 33.360) sets drift gillnet fishing time in this district in relation to the District 101 purse seine fishing time when both fleets are concurrently harvesting the same pink salmon stocks. Management focus transitions to fall run wild coho when the pink salmon management plan is no longer in effect, usually in SW 35 or 36 depending on pink salmon abundance. For the remainder of the season the fishery is managed based on the strength of southern SEAK wild fall run coho.

The preseason forecast of 560,000 Nass River sockeye provided for a 2022 AAH of 58,400 fish. Early inseason estimates of Nass River sockeye salmon abundance were lower than the preseason forecast; however, effort and total sockeye salmon harvest in the fishery were also extremely low and no time and area restrictions were warranted during the sockeye salmon management period. The 2022 preliminary postseason Nass River total sockeye salmon run was estimated at 623,024 fish, which resulted in a final AAH of 58,377 sockeye salmon. The preliminary 2022 estimate of Nass River sockeye salmon harvested in the District 101 drift gillnet fishery was 18,392 fish. This resulted in an underage of 39,985 sockeye salmon for 2022 and a cumulative underage of 383,609 treaty sockeye since 1999 (Table 4-10; Thynes et al. 2022b).

Effort and total harvests of all salmon species except Chinook and chum salmon were below averages for the season. Traditional drift gillnet harvest of 26,600 sockeye salmon was 26% of the 1985–2021 average of 104,000 fish; coho harvest of 27,000 fish was 58% of the 1985–2021 average of 47,000 fish; pink harvest of 382,000 fish was 82% of the 1985–2021 average of 465,000 fish; chum harvest of 332,000 fish was 116% of the 1985–2021 average of 287,000 fish; and Chinook harvest of 1,900 fish was 125% of the 1985–2021 average of 1,500 fish (Thynes et al. *In prep*).

Table 4-10 District 101 drift gillnet fishery performance for sockeye salmon under Chapter 2 of the PST, 2013-2022 (Thynes et al. 2022b).

	Nass River Total Return	Nass River Escapement	Allowable Nass River AAH	Allowable D1 GN Harvest (13.8%)	Total Sockeye Harvest	Actual Nass River Alaska Harvest	Overage/ Underage Per Year	Cumulative overage / -underage
2013	501,428	200,000	301,428	41,597	54,589	35,471	(6,126)	(166,426)
2014	549,685	200,000	349,685	48,257	55,828	29,022	(19,235)	(185,661)
2015	868,744	200,000	668,744	92,287	28,155	14,867	(77,420)	(263,081)
2016	442,420	200,000	242,420	33,454	39,912	14,389	(19,065)	(282,146)
2017	368,653	200,000	168,653	23,275	25,073	12,445	(10,830)	(292,976)
2018	315,972	200,000	115,972	16,005	19,920	11,303	(4,702)	(297,678)
2019	377,745	200,000	177,745	24,529	15,987	11,269	(13,260)	(310,937)
2020	295,163	200,000	95,163	13,132	9,343	7,528	(5,604)	(316,542)
2021	502,536	200,000	302,536	41,750	21,577	14,668	(27,082)	(343,624)
2022	623,024	200,000	423,024	58,377	26,553	18,392	(39,985)	(383,609)

4.4.3.3. Districts 106 and 108 Drift Gillnet Fisheries

Drift gillnet fisheries occur in marine waters adjacent to Prince of Wales Island and the Stikine River in Districts 106 and 108. District 106 is in the waters of eastern Sumner Strait and northern Clarence Strait, and District 108 is in the waters adjacent to the Stikine River delta. Management of these fisheries is interrelated due to their proximity and migration patterns of stocks harvested in both areas. Salmon stocks of Stikine River origin, a major transboundary river originating in Canada, are harvested in Districts 106 and 108; because of this, management of Chinook salmon in District 108 and sockeye and coho salmon in Districts 106 and 108 must be in accordance with Chapter 1 of the PST. Chinook salmon have the earliest run timing and initial management in District 108 is based on Stikine River Chinook salmon abundance. In June, as the Chinook run begins to wane, management emphasis shifts to sockeye based on inseason abundance. In August, fishery management is based on pink salmon abundance and in September transitions to coho management for the remainder of the season based on abundance of that species.

The 2022 District 106 drift gillnet fishery total harvest of 357,000 salmon was well below the recent average of 613,000 fish, and included 800 Chinook, 45,000 sockeye, 51,000 coho, 86,000 pink, and 173,000 chum salmon. Compared to recent averages, only chum salmon harvests were above average. An estimated 260 Chinook salmon (33%) in the District 106 harvest were of Alaska hatchery origin. An estimated 8,500 Stikine River sockeye were harvested in District 106, 19% of the harvest. An estimated 23,000 coho in the District 106 harvest (45%) were of Alaska hatchery origin (Thynes et al. *In prep*).

The 2022 total salmon harvest in the District 108 drift gillnet fishery was also well below average and included 480 Chinook, 5,700 sockeye, 14,000 coho, 12,000 pink, and 73,000 chum salmon. Compared to recent averages, salmon harvests were below average for all 5 species. During the PST Chinook reporting period (through SW 29) for the terminal area of District 108, 331 large fish were harvested, of which 31 fish were determined to be of Stikine River origin based on genetic analysis. An estimated 4,500 Stikine River sockeye were harvested in District 108, which contributed 79% of the District 108 sockeye harvest. An estimated 3,300 (23%) coho harvested in District 108 were of Alaska hatchery origin (Thynes et al. *In prep*).

4.4.3.3.1. District 108 Chinook Salmon Fishery

Directed fisheries for the harvest of Stikine River Chinook were reinstituted in 2005 in accordance with harvest provisions of Chapter 1 of the PST. Directed fisheries may only occur in District 108 when forecasts are large enough to produce an allowable catch (AC). There has not been an AC since 2012 and the escapement goal has not been met since 2015 despite conservation measures implemented in all fisheries since 2016. Conservation measures in the drift gillnet fishery have included mesh size restrictions, time and area restrictions, and complete closures of District 108. Stikine River Chinook harvest is estimated in-season based on coded wire tag recoveries. Final stock compositions are determined post-season by genetic analysis. Drift gillnet harvests of Stikine River Chinook in District 108 have averaged 184 fish since 2016 (Thynes et al. *In prep*).

4.4.3.3.2. Districts 106 and 108 Sockeye Salmon Fishery

Districts 106 and 108 drift gillnet fisheries are mixed stock salmon fisheries. The proportions of Stikine River sockeye salmon harvests are estimated in-season using historical data for stock composition and proportions of thermally marked fish from hatchery-raised fry planted in Tahltan Lake in Canada. Final stock compositions are determined by genetic analysis post-season.

The 2022 U.S. total harvest of 14,100 (drift gillnet and subsistence harvest) Stikine River sockeye salmon was below the U.S. AC of 37,400 fish. The average U.S. Stikine River sockeye salmon harvest since 2013 is 20,400 fish (Thynes et al. *In prep*).

4.4.3.3.3. Districts 106 and 108 Coho Salmon Fishery

Management emphasis transitions to wild coho salmon abundance the last week of August or the first week of September through the end of the season in early October. Harvest estimates of wild coho salmon are based on coded wire tag recoveries. The harvests of Stikine River coho salmon are unknown due to lack of a stock assessment program. In 2022, 65,000 coho salmon were harvested in Districts 106 and 108, and 26,000 were of Alaska hatchery origin. Harvests of coho in Districts 106 and 108 have varied between 65,000 and 317,000 fish and have averaged 128,000 from 2013 through 2022 (Thynes et al. *In prep*).

4.4.3.4. District 111 Drift Gillnet Fishery

The District 111 (Taku/Snettisham) commercial drift gillnet fishery occurs in the waters of Section 11-B including Taku Inlet, Port Snettisham, and Stephens Passage north of the latitude of

Midway Island, and in Section 11-C in the waters of Stephens Passage south of the latitude of Midway Island and north of a line from Point League to Point Hugh. Chapter 1 of the PST directly affects management of Chinook, sockeye, and coho fisheries in District 111 because the Taku River is a major TBR extending into Canada that significantly contributes to the District 111 salmon harvest. The Section 11-B fishery targets Chinook salmon in May and early June when the Taku River Chinook salmon run strength is sufficient; sockeye and summer chum salmon from mid-June through mid-August; and coho and fall chum salmon from late August until the season is closed. The Section 11-C fishery targets pink salmon from mid-July to mid-August when southern Stephens Passage pink salmon runs are sufficient. Management of sockeye and coho salmon fisheries are based on wild sockeye salmon runs in summer and wild coho salmon runs in fall. A stock assessment program conducted at Canyon Island on the Taku River provides inseason run size estimates through a mark–recapture study for Chinook, sockeye, and coho salmon. Douglas Island Pink and Chum, Inc (DIPAC) operates a sockeye salmon escapement enumeration program at Speel Lake in Port Snettisham. Aerial and foot surveys are conducted to monitor the development of salmon escapement in other streams throughout the district. The PST mandates the District 111 sockeye salmon fishery be managed primarily for Taku River spawning escapement needs. The PST provides a sliding harvest share of the total allowable catch (TAC) for Taku River sockeye salmon based on documented enhanced sockeye salmon runs resulting from joint U.S./Canada sockeye salmon enhancement projects in the Taku River drainage.

Chapter 1 of the PST includes harvest sharing provisions for Taku River coho salmon. The management intent of both countries is to achieve the escapement objective, or MSY point goal in this case, of Canadian-origin Taku River coho and respective ACs defined in the harvest sharing agreement developed for the 2019 PST Agreement.

4.4.3.4.1. District 111 Chinook Salmon Fishery

Directed fisheries for the harvest of Taku River Chinook salmon were reinstituted in 2005. Directed fisheries may only occur in District 111 when the run forecast, and subsequent inseason run estimates, are large enough to produce an AC. The last directed Taku River Chinook drift gillnet opening occurred in 2012 and the escapement goal has not been met since 2015 despite conservation measures implemented in all fisheries since 2016. Conservation measures in the drift gillnet fishery have included area restrictions, reduced fishing time, mesh size restrictions, and night closures. Taku River large Chinook salmon harvest is estimated in-season using age-sex-length information in combination with coded wire tag data. Final catch composition is determined post-season by genetic analysis. Annual drift gillnet harvest estimates of Taku River large Chinook salmon in District 111 during the PST Chinook salmon reporting period (through SW 29) have ranged between 30 and 190 fish since conservation measures were implemented in 2016.

4.4.3.4.2. District 111 Sockeye Salmon Fishery

The proportions of Taku River sockeye salmon harvests in District 111 are estimated in-season using historical data for stock composition and proportions of thermally marked fish from hatchery-raised fry planted in Tatsamenie, Trapper, and Tahltan Lakes in Canada. Final catch compositions are determined post-season by genetic analysis and are used in conjunction with the in river run size from the mark-recapture project to estimate a terminal run size.

The PST harvest shares for the TAC of Taku River sockeye salmon in 2022 were 75% U.S. and 25% Canada based on enhanced salmon production. A postseason terminal run size estimate of 211,200 Taku River sockeye salmon produced a TAC of 153,200 fish resulting in a U.S. AC of 114,900 fish. The estimated Taku River sockeye salmon harvest in the District 111 drift gillnet fishery and the Taku River personal use set gillnet fishery is 90,200 fish or 79% of the AC. The recent 10-year average harvest of Taku River sockeye salmon in District 111 gillnet fisheries is 55,900 fish.

4.4.3.4.3. District 111 Coho Salmon Fishery

Management emphasis transitions to wild coho salmon abundance at the end of August through the end of the season in early October. Coho salmon stocks harvested in District 111 include runs to the Taku River, streams draining into Stephens Passage and Port Snettisham, and to Alaska hatcheries and release sites. Taku River coho salmon in river run size estimates are developed inseason using mark-recapture analysis and projected by average run timing combined with estimating Canadian-origin coho salmon harvested in District 111 via CWT analysis to produce a terminal run size estimate with which ACs can be calculated.

The 2022 postseason terminal run size estimate of Taku River coho salmon is 87,200 fish resulting in a U.S. AC of 8,600 fish. The estimated Taku River coho salmon harvest in the District 111 drift gillnet fishery is 12,100 fish or 141% of the AC. The recent 10-year average harvest of Taku River coho salmon in the District 111 drift gillnet fishery is 12,600 fish.

4.4.4. Yakutat Set Gillnet Fishery Description

Yakutat set gillnet fisheries are divided into 2 fishing districts: the Yakutat District, which extends from Cape Fairweather to Icy Cape, and the Yakataga District, which extends from Icy Cape to Cape Suckling. Yakutat District set gillnet fisheries primarily target sockeye and coho salmon, although all 5 species of salmon are harvested. Yakataga District fisheries only target coho salmon (Figure 4-6).

Although the bulk of the Yakutat salmon harvest is usually reported from 7 major fisheries (Situk-Ahrnklin Inlet, Yakutat Bay, Manby Shore, the Alsek, East Alsek, Kaliakh, and Tsiu/Tsivat Rivers), up to 25 different areas are open to commercial fishing each year. With few exceptions, set gillnetting is confined to the intertidal area inside the mouths of the various rivers and streams and to the ocean waters immediately adjacent to each (Figure 4-6).

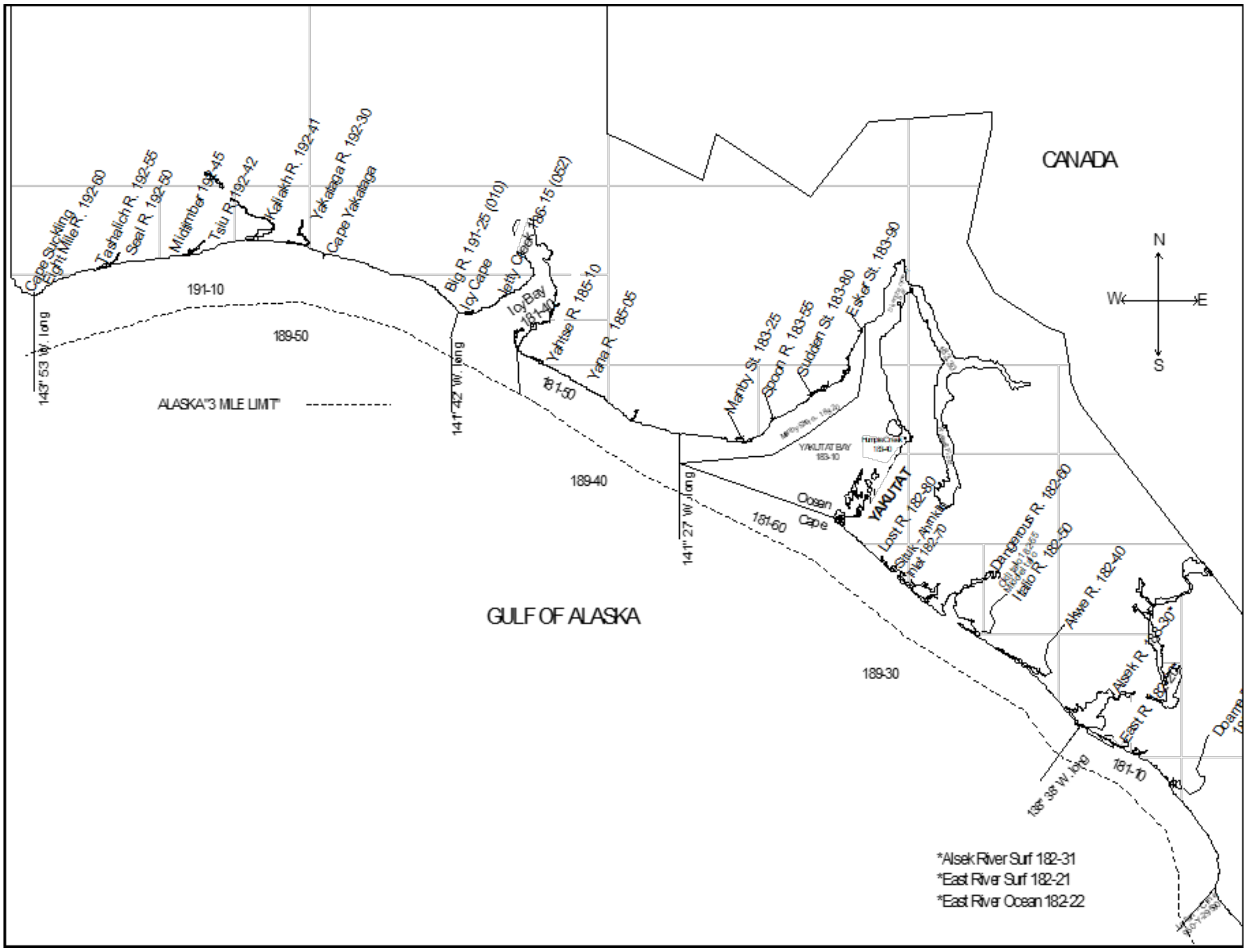

Figure 4-6 Yakutat Management Area map, showing statistical reporting areas (Hoffman and Landback In prep).

Set gillnet fisheries harvesting Chinook salmon are managed under the terms of both Chapter 1 (Alsek River Dry Bay fishery only) and Chapter 3 of the PST.

The 2022 Yakutat management area (YMA) set gillnet fishery yielded a cumulative harvest of 135,000 salmon (Table 4-11). The total harvest was down 46% from the recent 10-year (2012-2021) average of 248,000 fish. Up to 166 Yakutat set gillnet permits are renewed annually and of those, an average of 105 permits are actively fished each year. In 2022, 137 permits were renewed, and 77 permits actively fished (Hoffman and Landback *In prep*).

Table 4-11 Yakutat area set gillnet fishery effort and salmon harvest, 2013–2022 (Hoffman and Landback In prep).

Year	Permits Fished	Chinook	Sockeye	Coho	Pink	Chum	Total
2013	106	1,401	168,356	158,046	67,344	1,428	396,575
2014	117	1,403	116,435	161,977	20,733	621	301,169
2015	112	934	82,748	129,069	68,785	660	282,184
2016	109	361	93,193	144,058	21,879	554	259,759
2017	113	946	120,665	140,844	91,933	912	356,046
2018	102	295	7,213	95,954	29,072	132	131,356
2019	94	316	54,810	100,473	33,048	395	189,049
2020	91	404	26,384	81,709	14,657	122	123,276
2021	95	577	87,850	75,004	28,071	69	191,571
2022	77	423	48,374	62,888	22,798	97	134,580
2013–2022 Avg	102	706	80,603	115,002	39,832	499	236,557

4.4.4.1. Set Gillnet Chinook Salmon Harvests

There are no directed commercial set gillnet fisheries for Chinook salmon in the YMA. All Chinook salmon are harvested incidentally in sockeye salmon fisheries. The principal areas of Chinook salmon harvest include the Situk-Ahrnklin Inlet, the Alsek River, and Yakutat Bay.

Generally, all Chinook salmon caught in the set gillnet fishery may be retained (no size limit). Chinook salmon harvest may be limited by time (delaying start of season as Chinook salmon run timing is earlier than other species) and limiting area (closing areas near river mouths). Chinook salmon harvest may also be limited by using regulatory authority (5 AAC 33.331) to implement a maximum mesh size of 6 inches. The Yakutat Chinook salmon set gillnet fishery has a small fixed annual allocation of 1,000 treaty fish (5 AAC 29.060(b)(3)).

The total YMA harvest of 420 Chinook salmon was below the 2012--2021 average harvest of 760 fish. (Table 3-10). The Alsek River and Yakutat Bay accounted for 69% of all Chinook salmon harvested in the YMA. The Situk-Ahrnklin Inlet set gillnet fishery was open to the retention of Chinook salmon for only the second time since 2010. A total of 12 Chinook salmon were retained in the subsistence (0), sport (0), and commercial (12) fisheries. The Situk-Ahrnklin fisheries harvest of 12 Chinook salmon was below average, but 2022 was only the second time since 2013 that Chinook salmon could be retained and sold. The 2022 preseason projection for Alsek and Klukshu Rivers Chinook salmon stocks was for a below average run to the Klukshu River and an average run for the Alsek River. In response to the low expected run sizes, a 6 inch maximum mesh size restriction was implemented. The Alsek River Chinook salmon harvest of 110 fish was below average. Chinook salmon were also harvested in other YMA fisheries. The Yakutat Bay harvest of 180 Chinook salmon was below the average harvest of 300 fish and was the largest harvest of Chinook salmon in the YMA for 2022. The Manby Shore Outside fisheries harvest of 110 Chinook salmon was well above the average of 50 fish (Hoffman and Landback *in prep).*

The 2022 SEAK set gillnet harvest of Chinook salmon totaled 420 fish. Like the drift gillnet fisheries, all set gillnet Chinook salmon harvest is reported as one size class. Using district specific age, sex, and length data, the total set gillnet Chinook salmon harvest is then adjusted to report large size Chinook salmon (≥660 mm METF). Chinook salmon harvest for PST purposes was 180 large Chinook salmon caught in the set gillnet fishery. Of those, it was estimated that none were of Alaska hatchery origin, for a total treaty harvest of 180 Chinook salmon (Hoffman and Landback in prep).

4.4.4.2. Alsek River Set Gillnet Fishery

Alsek River stocks contribute to the U.S. commercial set gillnet fisheries located in Dry Bay, at the mouth of the Alsek River. No commercial fishery exists in the Canadian portions of the Alsek River drainage, although aboriginal and sport fisheries occur in the Tatshenshini River and some of its headwater tributaries (Figure 4-7). Harvest-sharing arrangements of Alsek River salmon stocks between Canada and the U.S. have not been specified. Chapter 1 of the PST calls for the development and implementation of cooperative abundance-based management plans and programs for Alsek River Chinook and sockeye salmon. Alsek River salmon management is conducted in cooperation with Canada DFO under the auspices of the PST (Hoffman and Landback *In prep*).

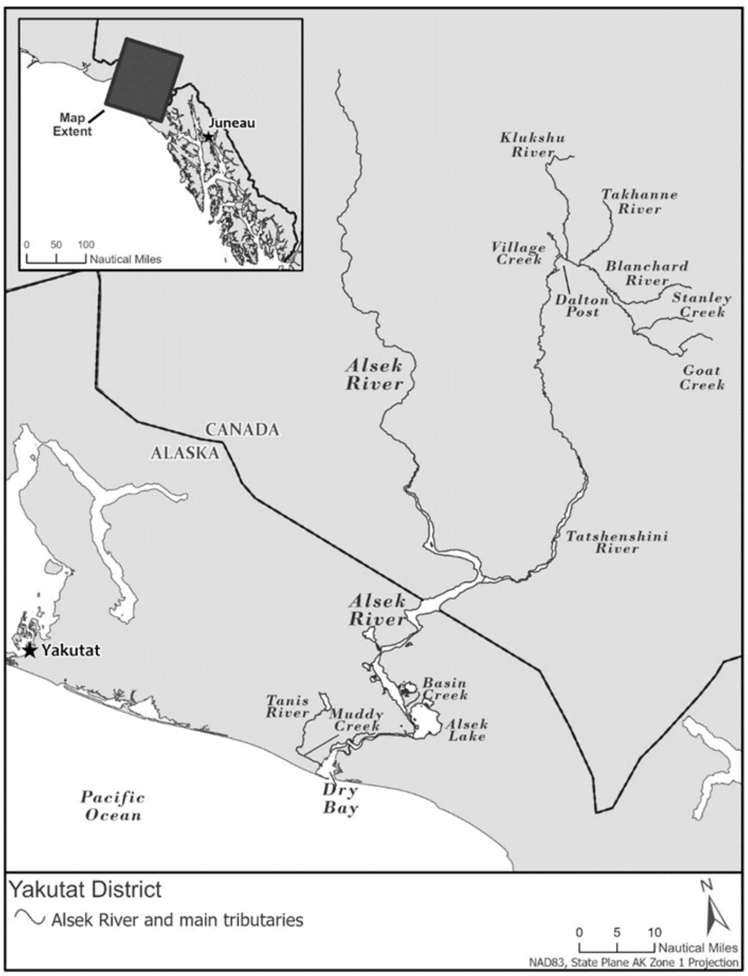

Figure 4-7 Alsek River drainage map (Hoffman and Landback in prep).

The Alsek River (Dry Bay) commercial set gillnet fishery is managed in accordance to Chapter 1 of the PST to achieve the established Chinook salmon escapement goal range, Alsek River sockeye salmon escapement goal range, and the Klukshu River sockeye salmon EG range, plus an additional 3,000 sockeye salmon. Time and area openings are adjusted by monitoring CPUE data from the Dry Bay fishery and comparing it to historical CPUE. The duration of weekly fishing periods is based on CPUE and Klukshu River weir data. Parent-year escapement information and harvest trends are also considered when determining the weekly fishing periods. Historically, set gillnets have typically been restricted to a maximum mesh size of 6 inches through July 1 to minimize Chinook salmon harvest (Hoffman and Landback *in prep*).

Preseason forecasts were for below average Chinook and sockeye salmon runs to the Klukshu and Alsek Rivers in 2022. The U.S. commercial set gillnet sockeye salmon fishery first opened June 5 in statistical week (SW) 24 with a 24-hour opening and then opened for 48 hours in SW 25 on June 12. The fishery opened for 72 hours each week in SWs 26–30, and for 96 hours in SW 31, due to the lack of air taxi service and low participation in the fishery. A 6-inch maximum mesh restriction was in effect through July 13 as a Chinook conservation measure. The total number of permits fished during the season was 6, which was below the average of 15 permits (Table 3-11). The 2022 sockeye salmon harvest of 4,700 fish was below the average harvest of 11,000 fish. Harvests of Chinook through late June were below average. The Chinook harvest of 110 fish was below the average harvest of 330 fish (Table 4-12; Hoffman and Landback *In prep*).

Coho are targeted by the third week of August when fishing effort typically declines. Since 2010, fishing effort during the coho season has been reduced due to a lack of aircraft charters for transport of fish to Yakutat for processing. By SW 33, management emphasis was focused on coho salmon and fishing time increased to 3 days per week. In 2022, there was no effort during the last 11 weeks of the season (SWs 32–42), and the Dry Bay fishery closed for the season on October 13. The 2022 commercial fishery was opened for a total of 56 days but was only actively fished for 22 days (Hoffman and Landback *In prep*).

Table 4-12 Alsek River set gillnet fishery effort and salmon harvest, 2013–2022 (Hoffman and Landback In prep).

Year	Permits Fished	Days	Chinook	Sockeye	Coho	Pink	Chum
2013	15	40.0	469	7,517	17	0	5
2014	15	47.0	1,074	33,668	3	0	12
2015	19	62.0	243	16,104	11	0	0
2016	18	65.5	140	6,729	655	0	4
2017	13	47.0	127	4,883	114	0	0
2018	10	32.5	88	1,363	2	0	0
2019	12	40.5	79	9,787	1	0	0
2020	13	38.5	182	2,518	0	0	0
2021	14	42.0	340	8,877	0	0	0
2022	6	56.0	112	4,693	0	0	0
2013–2022 Avg	14	47	285	9,614	80	0	2

4.5. Sport Fishery Description

The ADF&G Division of Sport Fish manages the sport fisheries in accordance with Alaska statutes and various management plans and regulations established by the Alaska BOF and consistent with the terms and conditions of the 2019 PST Agreement. Alaska statute defines sport fishing as the "taking of or attempting to take for personal use, and not for sale or barter, any fresh water, marine, or anadromous fish by hook and line held in the hand, or by hook and line with the line attached to a pole or rod which is held in the hand or closely attended, or by other means defined by the Board of Fisheries" (AS 16.05.940(31)). An ADF&G sport fishing license is required for all resident anglers 18 and older and nonresident anglers 16 and older to fish in Alaska. With some exceptions (e.g., youth anglers and those with permanent licenses), anglers fishing for Chinook must also have purchased a current year's Chinook salmon stamp. The ADF&G Division of Sport Fish is also responsible for overseeing the annual registration of sport fish businesses and guides and administers the saltwater charter logbook program.

The sport fishery for salmon occurs throughout SEAK but effort and harvest are concentrated around population centers. Chinook and coho are the primary targets for sport anglers although pink, chum and sockeye are also harvested. Most sport salmon fishing effort and harvest occurs in saltwater. The freshwaters south of Cape Fairweather (including nearly all of SEAK) are closed to sport fishing for Chinook, but opportunity for other salmon species is available in freshwater with some area specific exceptions.

Management provisions (including bag, possession, and annual limits) are established in regulation for the sport salmon fisheries in SEAK and in the case of Chinook salmon are guided by a specific management plan (Southeast Alaska King Salmon Management Plan; see below). Under criteria adopted by the Alaska Board of Fisheries, emergency order authority may be used to increase or decrease sport fish bag limits or modify methods of harvest for sport fish.

Information is collected from SEAK sport fisheries through the charter logbook program, the statewide harvest survey (mailed survey), and an onsite marine creel survey where sport anglers are interviewed and their catch examined at exit points of the fishery across all major ports in SEAK. Through these projects angler effort and catch, harvest, and release information is collected, as well as biological samples including the recovery of coded-wire tags, genetic stock analysis, age, and length data.

4.5.1. Sport Fishery for Chinook Salmon

The Southeast Alaska King Salmon Management Plan (5 AAC 47.055) directs the management of the SEAK sport Chinook fishery by providing specific management actions to be implemented on an annual basis corresponding to the allocation of Chinook to the sport fishery after the Alaska all-gear catch limit is determined under the PST and domestic allocation between fisheries is applied. The sport fishery is allocated 20 percent of the all-gear catch limit after subtraction of the net gear fishery allocations (5 AAC 29.060).

Under this plan, sport harvest opportunity increases or decreases in response to the annual allocation to the sport fishery. The minimum size limit to retain a Chinook salmon in the sport fishery is 28 inches, although special regulations in select times and areas where Alaska hatchery-produced Chinook are returning permit anglers to keep Chinook of any size.

The sport fishery is also managed to achieve Chinook escapement goals and comply with SEAK action plans that reduce sport opportunity by establishing periods of nonretention or closed waters in specific areas and times in order to conserve SEAK wild and TBR Chinook stocks, which are currently in a period of poor productivity (Figure 4-8). Outside of these areas and time, the regional bag, possession, and annual limits as determined by the Southeast Alaska King Salmon Management Plan continue to apply.

Alaska hatchery-produced Chinook provide an important contribution to SEAK sport fisheries by providing directed harvest opportunities in areas where Alaska hatchery-produced Chinook are returning. In accordance with various management plans, emergency order authority is used to provide increased harvest opportunity in areas where Alaska hatchery-produced Chinook are returning on an annual basis and with consideration to conserve broodstock for the next generation while protecting wild Alaska and TBR Chinook stocks (Figure 4-9).

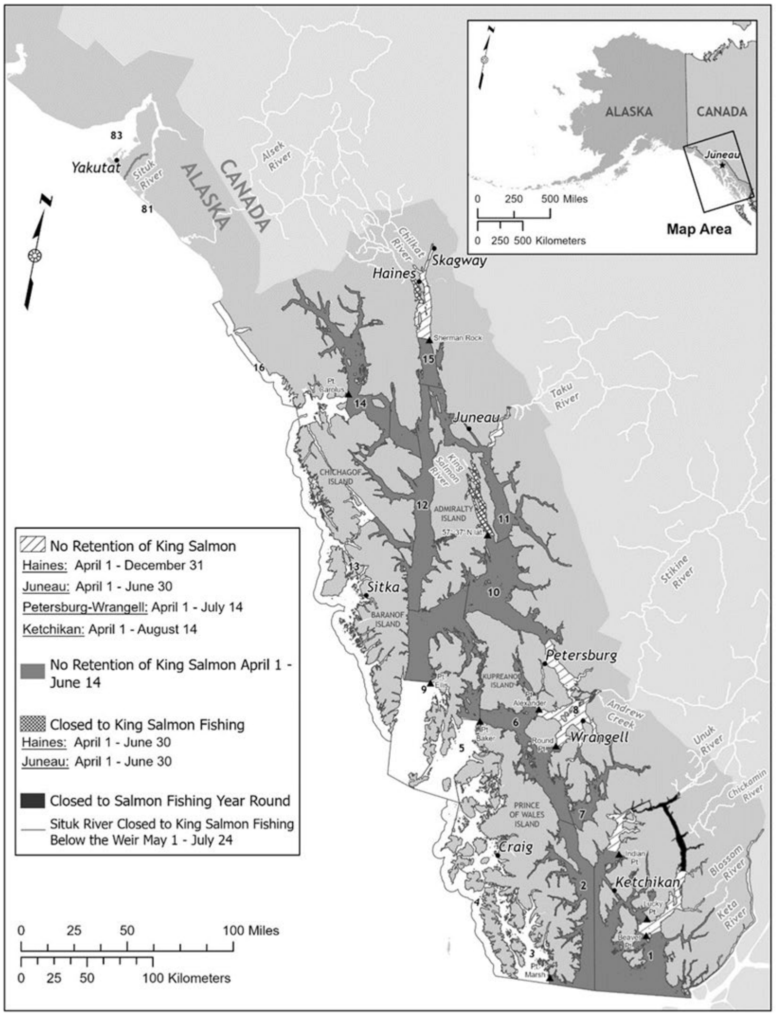

Figure 4-8 Southeast Alaska sport fishery Chinook salmon conservation actions.

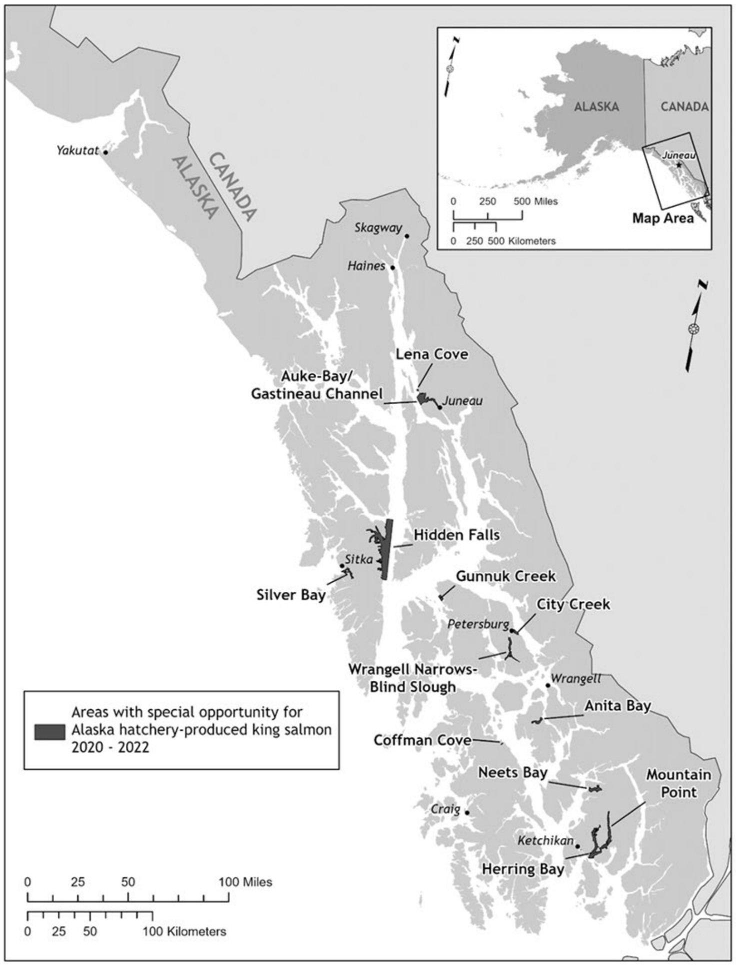

Figure 4-9 Southeast Alaska sport fishery Chinook hatchery opportunity areas.

4.5.2. Sport Fishery Chinook Salmon Harvest

Since 2013, total Chinook salmon harvests in SEAK have ranged from approximately 26,000 to 87,000 and treaty Chinook catches have ranged from just over 21,000 to nearly 74,000. The sport catch of treaty Chinook exceeded the preseason harvest limit 3 times over the 10-year period from 2013 through 2022, with most of the overages being small, and no overages occurring 2019-2022, in the most recent PST Agreement (Table 4-13). In several years, the sport fishery had large underages as the sport fishery typically does not realize its full allocation when catch limits are high.

Table 4-13 Southeast Alaska sport fishery accounting 2013–2022, including estimated treaty and total Chinook salmon harvest, preseason treaty harvest allocation, and the number of fish over or under the sport harvest allocation below the preseason Treaty allocation to the sport fishery. Negative numbers are the number of fish harvested under the pre-season harvest allocation.

Year	Treaty Harvest	Total Harvest	Pre-Season Treaty Harvest Allocation	Over/Under Pre-Season Harvest Allocation
2013	43,304	56,392	32,466	10,839
2014	73,951	86,942	81,353	-7,401
2015	65,174	79,759	43,787	21,387
2016	59,503	68,347	65,799	-6,296
2017	44,125	52,306	38,720	5,405
2018	21,243	26,400	26,619	-5,376
2019	24,596	29,700	25,844	-1,248
2020	30,561	35,100	37,879	-7,317
2021	36,935	41,982	37,879	-944
2022	34,166	41,176	49,278	-15,112

4.5.3. Sport Fishery for Coho Salmon

While coho fishing in freshwater is a popular sport fishery in SEAK, the majority of coho salmon are harvested in saltwater within state waters (approximately 87% in 2022). Southeast Alaska bag and possession limits for coho salmon are established in regulation by area and water type. In some cases, the Alaska Board of Fisheries has implemented more restrictive coho salmon regulations in select bodies of water within SEAK, often with the intent to reduce harvest pressure on road accessible locations adjacent to population centers. The estimate of coho salmon harvested in the SEAK sport fishery during 2022 was 270,078, including 34,704 in freshwater and 235,364 in saltwater. This was higher than the 10-year average harvest of 235,364 in saltwater and 29,556 in freshwater.

4.6. Subsistence and Personal Use Fisheries

Salmon are harvested in SEAK personal use and subsistence fisheries by residents of Alaska. Subsistence fisheries have priority over other fisheries: for State subsistence fisheries the BOF must provide a reasonable opportunity for subsistence uses first before providing for other consumptive uses of any harvestable surplus (AS 16.05.258), and for Federal subsistence fisheries subsistence uses of fish taken on federal public lands are accorded priority over taking for other purposes (16 U.S.C. 3114). Subsistence fisheries occur in marine waters outside of stream mouths and in freshwater. Personal use fisheries occur in non-subsistence areas and in hatchery THAs. A State issued permit is required to participate in State managed subsistence salmon and personal use salmon fisheries in SEAK. In addition, federally qualified users (rural

Alaska residents) can subsistence fish with a federally issued permit in inland waters of SEAK within or adjacent to federal public lands (including the Admiralty Island National Monument, Misty Fjords National Monument, and the Tongass National Forest).

Harvest and participation in State subsistence and personal use fisheries varies from year to year and is not necessarily dependent on salmon abundance. Seasonal weather and other outside factors (i.e. fuel prices) can influence participation. The average annual harvest in State subsistence and personal use fisheries over the last 10 years is 42,000 fish from an average participation of just under 1,600 state permits fishing (Table 4-14). The harvest is predominantly comprised of sockeye salmon followed by coho and pink salmon (Conrad and Thynes, 2023).

Table 4-14 Southeast Alaska salmon subsistence/personal use effort and harvest by species, 2013–2022 (Conrad and Thynes in prep).

	Permits[a]			Numbers of salmon harvested					
Year	Issued	Returned	Fished[a]	Chinook	Sock-eye	Coho	Pink	Chum	Total
2013	3,441	2,792	1,869	764	42,513	3,124	3,094		50,710
2014	3,320	2,703	1,763	769	38,059	2,748	2,041	818	44,435
2015	3,025	2,421	1,489	393	31,084	2,552	4,267	968	39,264
2016	3,041	2,425	1,628	368	38,365	2,828	3,026		45,906
2017	3,065	2,318	1,501	406	31,968	1,934	4,064	840	39,212
2018	3,554	656	1,690	259	41,491	3,191	1,412		47,455
2019	3,605	2,322	1,656	363	40,966	2,456	2,229	928	46,942
2020	3,555	2,705	1,425	254	27,728	2,529	2,587	526	33,624
2021	3,077	2,374	1,466	327	32,448	2,071	2,018	459	37,323
2022	3,030	2,430	1,435	150	32,073	2,046	1,330	460	36,059
Average 2013–	3,271	2,315	1,592	405	35,670	2,548	2,607	864	42,093

Note: Data presented in this table includes harvest from State managed fisheries only and does not include harvest from Federal subsistence fisheries or Metlakatla Indian Community Annette Island Reserve subsistence fisheries.
[a] Number of permits fished is estimated from permit data.

There are three Federal and State subsistence and personal use fisheries that are directly accounted for in the PST and all three are accounted for in Chapter 1. The Stikine River federal subsistence fishery is the largest fishery in terms of harvest, harvesting mostly Chinook and sockeye salmon. Annual harvests since 2013 have averaged 26 Chinook, and 1,700 sockeye and even though coho fishing is allowed there has been no reported harvest. The Stikine subsistence fishery is administered by the U.S. Forest Service. The Taku River personal use set gillnet fishery targets sockeye salmon over a one-month period with possession and annual limits of 10 fish for a household of one person and 20 fish for a household of 2 or more persons, but Chinook and coho salmon may be taken incidentally with possession limits of 2 and 6 fish respectively. Annual average reported harvests over the last 10 years (2013-2022) are 1,208 sockeye, 229 coho, and 16 Chinook salmon taken by an average of 118 permits fishing. The Taku River personal use fishery has been delayed by approximately two weeks since 2017 to reduce the amount of Chinook salmon incidentally harvested, running from mid-July to mid-August. The Dry Bay subsistence fisheries, both State and Federal, harvest Chinook, sockeye, and coho. The average annual harvest from 2013–2022 is 158 sockeye and 19 Chinook (Transboundary Technical Committee, *In prep*).

4.7. Metlakatla Indian Community Annette Islands Reserve Fisheries

The Annette Islands Reserve is the only federally-recognized Indian reservation in Alaska and has the only tribally-managed fisheries in Alaska.[28] Fisheries are managed directly by the Metlakatla Indian Community Department of Fish and Wildlife, a Fisheries Management Board and the Bureau of Indian Affairs, using a management plan.[29] Jurisdiction is limited to a 3,000-foot band of marine waters around Annette, Ham, Walker, Lewis, Spire, and Hemlock Islands (25 CFR 241.2) (Figure 4-10). Metlakatla's fishing fleet includes about 90 gillnet vessels, 15 purse seine boats, and approximately 16 boats that troll for Chinook and coho though most trollers also gillnet or seine once those fisheries open (Department of Fish and Wildlife Metlakatla Indian Community 2021 and 2022). Sport and subsistence fisheries also occur. Fisheries target all five species of salmon.

While the 2019 PST Agreement does not mention the Annette Islands Reserve specifically, there are some provisions in the Treaty that incorporate Chinook and sockeye salmon catch data from the salmon fisheries that occur there under Chapter 2 and 3 of the PST (Table 4-15). Additionally, the Metlakatla Indian Community receives an annual grant from a Department of Interior appropriation to collect and report the data necessary for Treaty implementation. Note that the Treaty also does not specifically mention all the other tribal fisheries in the Pacific Northwest.

Catch data from the Annette Island Reserve are included in Treaty calculations and published in various PSC reports annually. The Annette Island Reserve falls within District 101 and therefore the harvest is accounted for in total run estimates for Nass and Skeena sockeye which are used to determine annual allowable harvest levels. Similarly, the Treaty, Chapter 3, paragraph 2(b)(ii) directs the CTC to report annually on catches for all Chinook salmon fisheries and stocks harvested within the Treaty area. Chapter 3, paragraph 3(a)(i) defines the SEAK fishery as southeast Alaska sport, net, and troll. It does not specify state managed but rather by fishery location. It is implied that Metlakatla Indian Community catches are included in the State's Chinook salmon catch accounting. Metlakatla Indian Community catches of Chinook salmon subtract directly from the SEAK all gear catch limit by gear type. In this manner, all SEAK Chinook fisheries are treated the same.

Annette Island Reserve catches of Chinook salmon for all gear types have ranged from 693 to 2,165 total catch over the last decade from 2013–2022 (Table 4-15). Because these fisheries operate near the tribally owned and operated Tamgas Creek Hatchery, the vast majority of the catch is comprised of Alaska hatchery-produced Chinook, most of which do not count against the treaty limit. Annette Islands Reserve Chinook catches of Treaty fish are subtracted from the SEAK all-gear catch limit by gear type.

Because of the proximity of Annette Islands Reserve to the northern British Columbia border, sockeye catches are incorporated into the stock assessment framework for Nass and Skeena Rivers to determine annual allowable harvest levels as specified in Chapter 2 of the PST. Sockeye catches have ranged from 6,299 to 26,633 from 2013–2022 (Table 4-15).

[28] For a helpful summary of the history of the Metlakatla Indian Community and Annette Islands Reserve, *see Metlakatla Indian Community v. Dunleavy*, 58 F.4th 1034 (9th Cir. 2023).

[29] https://www.metlakatla.com/documents/fish_wildlife/2022_mic_fishing_management_plan.pdf

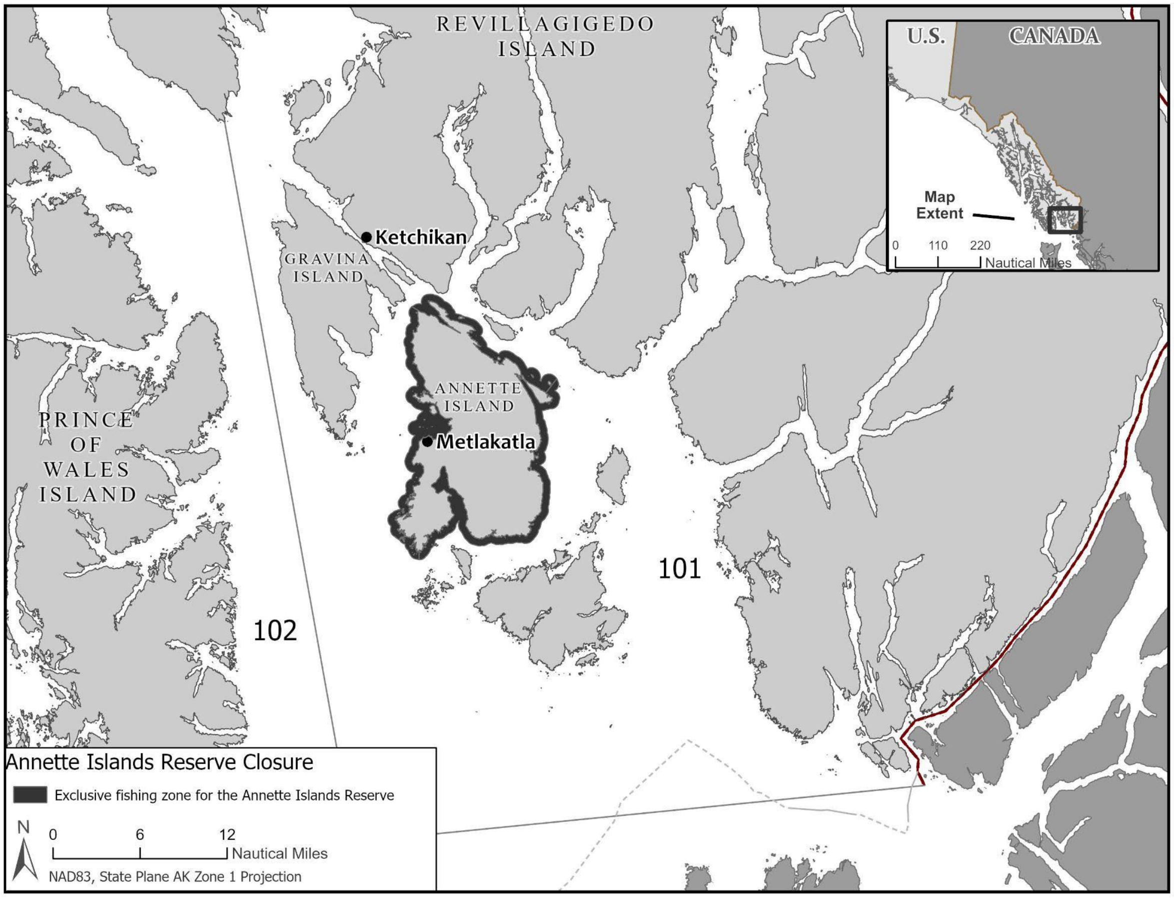

Figure 4-10 Metlakatla Indian Community Annette Island Reserve fishing boundaries

Table 4-15 Metlakatla Indian Community Annette Islands Reserve salmon harvest, 2013–2022. (These represent total harvest of salmon in numbers of fish, and not the numbers of Treaty harvest).

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
2013	1,396	10,900	48,715	2,578,016	182,481	2,821,508
2014	1,287	21,645	50,769	1,962,087	129,330	2,165,118
2015	2,165	26,633	34,100	776,981	704,131	1,544,010
2016	1,731	22,185	45,819	1,418,243	396,058	1,884,036
2017	1,549	11,275	35,862	879,193	249,088	1,176,967
2018	1,541	6,299	16,702	296,377	211,145	532,064
2019	693	10,142	17,602	1,239,661	97,769	1,365,867
2020	812	14,593	7,548	524,353	75,376	622,682
2021	1,295	13,411	23,671	2,754,124	133,965	2,926,466
2022	1,531	12,468	11,647	1,991,260	118,815	2,135,721
2013–2022 Avg	1,400	14,955	29,244	1,442,030	229,816	1,717,444

5. Environmental Impacts

This chapter evaluates the potentially affected environment and the degree of the effects of the alternatives on the various resource components, together with relevant past, present, and reasonably foreseeable actions (40 CFR 1501.3(b)). This EIS relies on the information and evaluation contained in the 2019 BiOp, as well as previous NMFS NEPA documents including the environmental assessment/regulatory impact review for Amendment 12 to the Salmon FMP, and on information provided by the Alaska Department of Fish and Game and the Central Council of Tlingit and Haida Indian Tribes of Alaska, and on the Programmatic Draft Environmental Impact Statement for Funding of the Prey Increase Program for Southern Resident Killer Whales prepared by NMFS in conjunction with the preparation of this EIS (NMFS 2024). These documents are incorporated by reference.

Recent and relevant information, necessary to understand the impacts of the alternatives on each resource component, is summarized in the sections below. For each resource component, the analysis identifies the potential impacts of each alternative, and evaluates these impacts.

The environmental impacts of the Salmon FMP were first analyzed in an Environmental Impact Statement (NPFMC 1978). The EIS analyzed the impacts of alternatives to allow an unrestricted fishery, greatly restrict the fishery, or hold the fishery at its present level. The 1978 FMP maintained the fisheries in the EEZ at their then present level (i.e., no change in fishing with the introduction of the Federal FMP). The EIS concluded –

> A primary objective of the action is to prevent overfishing and conserve the resource, the overall impact of the fishery management plan on the environment will generally be beneficial. Monitoring the plan will allow adjustments in applying the management concepts outlined in the plan. These concepts are designed to help minimize fluctuations in fish stock numbers due to catch efforts and to integrate management of ocean salmon with those of other salmon fisheries. This will exert a stabilizing influence in the ecosystem by preventing biological depletion of fish populations.

The environmental impacts of Amendment 3 to the FMP were analyzed in an EA (NPFMC 1990). The EA concluded –

> The EA shows that implementing the proposed amendment will have no significant impacts on the human environment. The proposed changes are primarily of style and structure of the fishery management plan, rather than with the way the fisheries are actually managed. The parts of the draft amendment that deal with management of the fisheries (e.g. deferring regulatory authority to the State of Alaska, for vessels registered under Alaska law) will, by themselves, have little, if any effect on the human environment.

In 1997, NMFS and the ADF&G prepared an EA for the salmon fisheries in the EEZ and State waters off Alaska that evaluated the deferral of regulation and management to the State (NMFS 1997). The EA concluded that the impacts on the target species by the current salmon fishery in SEAK, due to a fishery policy of optimal sustainable yield, are such that produce optimum production of the stocks and healthy escapement levels. Moreover, the EA concluded that management over the past several decades (since Statehood) has resulted in healthy salmon stocks for all species.

In 2003, in response to litigation and an adverse court decision, NMFS published the *Final Programmatic Environmental Impact Statement for the Pacific Salmon Fisheries Management off* *the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin* (FPEIS, NMFS 2003). The primary Federal action considered in the FPEIS for the SEAK salmon fishery was the continued deferral of management to the State, as well as NMFS's review of the salmon fishery management plans under NMFS's jurisdiction, including Salmon FMP. The FPEIS details the short-term, long-term, and cumulative effects of the Federal action on salmon fisheries and harvests, ESA-listed salmon, non-salmon fish species, ESA-listed and unlisted marine mammals, ESA-listed and unlisted seabirds. The FPEIS also evaluates effects on the human environment, including angler benefits (i.e., net willingness to pay for ocean salmon fishing), net income (profit) to businesses that are directly affected by angler activity, net income to commercial fishers, and social effects on the coastal and riverine communities of commercial and sport fisheries affected by the Federal action.

In 2012, NMFS prepared an EA that evaluated the environmental impacts of Amendment 12 to the Salmon FMP. This amendment, among other things, reaffirmed the delegation of management to the State in the East Area (NMFS 2012). NMFS determined that the impacts of the Federal salmon fishery management were not significant. The Alaska Region (AKR) Sustainable Fisheries Division conducted an informal consultation under the ESA with the AKR Protected Resources Division on the potential effects of proposed Amendment 12 on Cook Inlet Beluga whales and Steller sea lions. Based on this review, Amendment 12 was not expected to have any direct or indirect effects on ESA-listed species, but the salmon fisheries in Federal waters may affect, but are not likely to adversely affect, Steller sea lions and Cook Inlet Beluga whales or designated critical habitat. Based on a review of the subject action and the information generated during the informal consultation process with NMFS Northwest Region staff on the potential effects of proposed Amendment 12 on salmon listed under the ESA, the NMFS Alaska Region determined that Amendment 12 would have no direct or indirect effects on ESA-listed salmon or their designated critical habitat because it involves only an administrative change, namely, the removal of management of three traditional net fisheries prosecuted in the EEZ from the FMP. In the East Area, Amendment 12 retained provisions of the current FMP and reaffirmed that management of the salmon fisheries in the East Area is delegated to the State of Alaska. The East Area salmon fishery would continue to be managed by the State subject to provisions of the PST.

5.1. Resource Components Addressed in the Analysis

As explained above, NMFS has analyzed the environmental impacts of its decision to delegate management of the commercial troll fishery and sport salmon fishery in the EEZ to the State of Alaska in EISs and EAs since 1978. Although this EIS updates and addresses the environmental impacts from the fisheries in the EEZ, there is no proposed action to maintain, amend, or rescind delegation of management of the fisheries in the SEAK EEZ to the State consistent with the Magnuson-Stevens Act (16 U.S.C. § 1856(a)(3)(B)). There is therefore no alternative presented to change delegated management, but for analytical purposes the effects analysis includes effects from potential changes to delegated management (such as federal closure of the SEAK EEZ).

In addition, this proposed action would not directly change the prosecution of the SEAK salmon fisheries under the 2019 PST Agreement, except that, under Alternative 3, with no ITS, the State would likely not open the SEAK salmon fisheries to avoid having participants be liable for incidental take of ESA-listed species in the absence of a valid ITS. The analysis assumes catch up to the limits authorized under the 2019 PST Agreement because these catch limits are subject to international negotiation and implementation under the PST. The 2019 BiOp also found that catch up to the limits authorized under the 2019 PST Agreement would not cause jeopardy of ESA-listed salmon and SRKWs. This assumption could change based on the analysis presented in the anticipated 2024 BiOp and ITS.

The expected effects of the alternatives on the resource components (described below) would result from the issuance of an ITS that exempts incidental take of ESA-listed salmon and marine mammals, including incidental take of the ESA-listed SRKW related to the harvest of their preferred Chinook salmon prey in SEAK fisheries, and proposed Federal funding of grants under the 2019 PST Agreement for the State's implementation of the 2019 PST Agreement. While none of these actions directly authorize the fisheries, NMFS expects these effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. This EIS therefore looks at effects on resource components from the operation of the SEAK fisheries. In addition, these expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ pursuant to the delegation of management of those fisheries to the State. NMFS expects that similar effects would result from the operation of the commercial troll and sport fisheries in the SEAK EEZ if those fisheries were managed by the State (under delegation) or NMFS solely (no delegation, assuming there was a change in delegated management, although there is no pending proposal to amend this prior decision). For more information on the impacts analysis for resources components from state and federal fishing, see Section 5.2.

In addition economic, community and tribal impacts would occur from NMFS not issuing an ITS for the SEAK salmon fisheries, NMFS not funding grants, and the State of Alaska not opening the SEAK salmon fisheries for prosecution, for reasons noted above. This EIS is focused on effects to those resources (described below) and is intended to provide focused information on the primary issues and impacts of environmental concern resulting from the proposed decisions for which NMFS is responsible--the issuance of an ITS and the continued funding of grants under the 2019 PST Agreement. The scope of impacts from the closure of all fisheries embrace closure of the EEZ (which is discussed for analytical purposes only).

The resource components examined in this EIS are: salmon (ESA-listed and non-listed), marine mammals (ESA-listed and non-listed), marine birds, bycatch of non-salmon finfish, habitat, and ecosystem and climate change components, as well as human dimension factors including economic, community and tribal aspects. Table 5-1 shows the components of the human environment and whether the proposed action and its alternatives have the potential to impact that resource component and thus require further analysis.

Table 5-1 Resources potentially affected by the proposed action and alternatives.

	Potentially Affected Resource Components						
Resource Component	**Salmon**	**Marine Mammals**	**Marine Birds**	Bycatch of non-salmon Finfish	**Habitat**	Ecosystem & Climate Change	**Economic, Community and Tribal**
Analyzed Further in EIS	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.2. Analyzing Effects of the Alternatives

While there are three possible routes of action laid out as the three Alternatives discussed in Section 2.2, there are in reality two probable outcomes of the Alternatives that could impact the resource components above. Alternatives 1 and 2 would result in prosecution of the SEAK salmon fisheries and Alternative 3 would result in no fishing. Therefore, for efficiency in analysis, discussion of effects from Alternatives 1 and 2 will be lumped and effects from Alternative 3 will be described separately.

In addition, NMFS has considered as a component of its effects analysis impacts of the fisheries in federal waters. Currently, the authorized federal fisheries are managed by NMFS, the NPFMC, and the State under the Salmon FMP, with management of the commercial troll and sport fisheries delegated to the State for the State's day-to-day management. If the NPFMC and NMFS were to rescind delegation such that NMFS directly managed the fishery, however, NMFS expects that similar effects would result, including if, as a component of sole federal management, NMFS were to close federal waters to the commercial troll and sport fisheries. In the absence of delegation, the Council would have to recommend and NMFS would have to implement some regulatory changes to directly manage the fisheries (such as a requirement for vessel monitoring systems).

Under either permutation (sole federal management, or sole federal management with closure), NMFS does not anticipate significant differences in the impacts between state and federal management of the EEZ fisheries. First, changes in federal management would not impact the catch limits under the 2019 PST Agreement or the State's allocation of the all-gear catch limit among the sectors, including the allocation to the commercial troll fleet. Under sole federal management, NMFS would expect similar fishing effort in terms of timing, locations, and harvest. If federal management were too onerous or if federal waters were closed, the commercial troll fleet has the ability to catch all of its allocation in state waters, and so could readily shift effort to state waters. As a result, overall commercial harvest levels would most likely remain the same and up to the limits under the 2019 PST Agreement. Second, the sport fishery harvests a very small amount of salmon in federal waters, and so changes in federal management of the EEZ likely would not affect catch or harvest in that fishery. Finally, NMFS does not expect that there are differences in impacts, spatially or temporally, between state and federal waters. For these reasons, the analysis that follows on the resource components does not isolate or identify impacts specific to fishing in federal waters versus fishing in state waters. The impacts analyzed herein, primarily in Section 5, embrace the scope of impacts that will occur from salmon fishing in SEAK under the 2019 PST Agreement.

5.3. Effects of Aggregate Past, Present, and Reasonably Foreseeable Future Actions

The NEPA and the Council on Environmental Quality (CEQ) regulations, as amended in 2022 (87 FR 23453, April 20, 2022), under which this EIS is prepared, also requires an analysis of the potential cumulative effects of a proposed action and its alternatives. An EIS must consider cumulative effects when determining whether an action significantly affects environmental quality. The CEQ regulations for implementing NEPA define cumulative effects as:

> effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.1(g)(3)).

The cumulative effects analysis captures the total effects of many actions over time that would be missed if evaluating each action individually. Concurrently, the CEQ guidelines recognize that it is most practical to focus cumulative effects analysis on only those effects that are meaningful.

This EIS analyzes the effects of each alternative and the effects of past, present, and reasonably foreseeable future actions (RFFA). Based on Table 8, the proposed action and alternatives may affect salmon (ESA-listed and non-listed), marine mammals (ESA-listed and non-listed), marine birds, bycatch of other finfish, habitat, ecosystem and climate change components, and human dimension factors including economic, community and tribal aspects. Past and present actions that are related to the resources analyzed in the EIS are contained in the appropriate sub-sections of Section 5 describing the relevant and recent information necessary to understand the impacts of the alternatives on each resource component.

Each section also analyzes the RFFA that may result in aggregate effects on the resource components. A complete review of the past, present, and RFFAs are described in the prior NEPA and other documents incorporated by reference, including the most recent BiOps on the PFMC and Puget Sound fisheries. Additionally, the environmental baseline section of the 2019 BiOp describes the past, present, and RFFAs that are incorporated by reference in this Section.

Reasonably foreseeable future actions are understood to be human actions (e.g., a designation of North Pacific right whale critical habitat in the Pacific Ocean), as distinguished from natural events (e.g., an ecological regime shift). CEQ regulations require consideration of actions, whether taken by a government or by private persons, which are reasonably foreseeable. This requirement is interpreted to indicate actions that are more than merely possible or speculative. In addition to these actions, this aggregate effects analysis includes the effects of climate change.

Actions are considered reasonably foreseeable if some concrete step has been taken toward implementation, such as a Council recommendation or NMFS's publication of a proposed rule. Actions only "under consideration" have not generally been included, because they may change substantially or may not be adopted, and so cannot be reasonably described, predicted, or foreseen. In addition, any federal action that is "under consideration" would need its own NEPA analysis before it could be implemented. Identification of actions likely to impact a resource component within this action's area and time frame will allow NMFS to make a reasoned choice among alternatives. In this case, NMFS responded to the court orders and re-initiated ESA section

7 consultation on the federal actions related to the SEAK salmon fisheries, which will result in the forthcoming 2024 BiOp. NMFS is also required by the court to analyze the issuance of the ITS in the 2024 BiOp under NEPA.

5.4. ESA-Listed Chinook Salmon

Chinook salmon have a complex life cycle that generally involves a freshwater rearing period followed by 2–4 years of ocean feeding prior to their spawning migration. Chinook salmon from individual brood years can return over a 2–6 year period, although most adult Chinook salmon return to spawn as 4 and 5 year old fish. As a result, a single year class can be vulnerable to conditions in both freshwater and marine environments. Chinook salmon migrate and feed over great distances during their marine life stage; some stocks range from the Columbia River and coastal Oregon rivers to as far north as the ocean waters off SEAK to take advantage of productive waters of the Gulf of Alaska to feed and grow (Figure 5-1). Without these feeding grounds it is likely that fish would have lower marine growth rates and survival, as they would concentrate into alternative foraging areas where competition for resources would likely be higher. Other stocks migrate north, but not as far, while still others remain in local waters or range to the south of their natal streams. While there is great diversity in the range and migratory habits among different stock groups of Chinook salmon, there also is a remarkable consistency in the migratory habits within stock groups, which greatly facilitates stock-specific fishery planning.

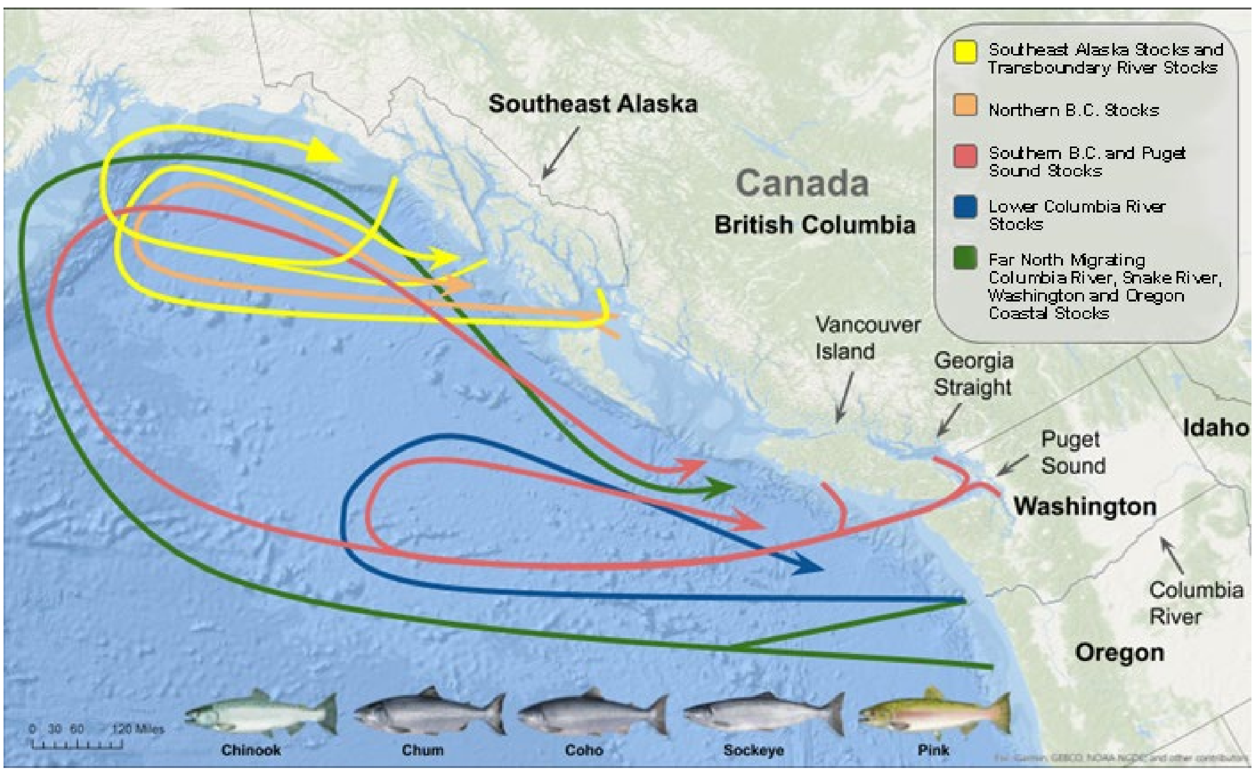

Figure 5-1 Migratory patterns of major Chinook salmon stock groups.

During their homeward migration, mature Chinook salmon are subject to harvest in a number of fisheries while simultaneously exposed to consumption by a variety of marine predators, including Northern Resident killer whales (NRKW), SRKW, salmon sharks, and a wide range of pinnipeds before they reach their natal rivers. Chasco et al. (2017) determined that the number of individual salmon consumed by marine mammals in the entire Northeast Pacific has increased 6-

fold from 5 to 31.5 million individual salmon from 1975–2015. Geographically, the SEAK fisheries are the first directed Chinook salmon fisheries that the far-north migrating stocks encounter, but for many stocks that do not have as far-north migration as those that reach SEAK, vulnerability to harvest begins in Canadian fisheries. From SEAK, the migratory pathway proceeds through salmon fisheries in British Columbia (BC) then down into Washington where they become available as prey to SRKW. Additional directed fisheries for Chinook salmon occur off the coasts of Oregon, Washington, especially near the Columbia River, and in Puget Sound. The average proportions of directed Chinook salmon harvest in Treaty fisheries from 2017–2021 by region, were 16% in Alaska, 58% in Canada, and 26% in Washington, Oregon, and California (CTC 2022b).

5.4.1. Status of ESA-listed Chinook Salmon

This document considers the effects of the alternatives on four ESA-listed species of Chinook salmon. A species of salmon designated for ESA-listing is referred to as an evolutionarily significant unit (ESU). Lower Columbia River, Upper Willamette River, and Puget Sound Chinook ESUs were first listed as threatened under the ESA in 1999. That status was reaffirmed in 2005 and again in 2014. The Snake River Fall Run Chinook ESU was first listed as threatened in 1992, and that status was reaffirmed in 2005 and again in 2016. More information follows below in each Chinook ESU section. Detailed information on the ESA status of each of the four listed Chinook Salmon ESUs is available in the 2019 BiOp in the Status of the Species section for listed Chinook and is incorporated by reference. Additional information will be available in the 2024 BiOp and can also be found in the 2021 West Coast BiOp on Amendment 21 to the Pacific salmon Fishery Management Plan[30]. Relevant information necessary to understand the impacts of the alternatives on ESA-listed Chinook salmon is summarized here.

5.4.1.1. Lower Columbia River Chinook

On March 24, 1999, NMFS listed the Lower Columbia River (LCR) Chinook Salmon ESU as a threatened species (64 FR 14308). The threatened status was reaffirmed on June 28, 2005 (70 FR 37160) and on April 14, 2014 (79 FR 20802). Critical Habitat for LCR Chinook salmon was designated on September 2, 2005 (70 FR 52630).

The LCR Chinook Salmon ESU includes natural populations in Oregon and Washington from the ocean upstream to, and including, the White Salmon River (river mile 167.5) in Washington and Hood River (river mile 169.5) in Oregon, except for salmon in the Willamette River (which enters the Columbia River at river mile 101). Within the Willamette River, Chinook salmon are listed separately as the Upper Willamette River Salmon ESU, and not as part of the LCR Chinook Salmon ESU.

Thirty-two historical populations, within six Major Population Groups (MPGs), comprise the LCR Chinook Salmon ESU. These are distributed through three ecological zones.[31] A combination of life-history types, based on run timing and ecological zones, result in six MPGs,

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[30] https://repository.library.noaa.gov/view/noaa/29545.

[31] There are a number of methods of classifying freshwater, terrestrial, and climatic regions. The Willamette-Lower Columbia Technical Recovery Team used the term ecological zone as a reference, in combination with an understanding of the ecological features relevant to salmon, to designate four ecological areas in the domain: (1) Coast Range zone, (2) Cascade zone, (3) Columbia Gorge zone, and (4) Willamette zone. This concept provides geographic structure to ESUs in the domain. Maintaining each life-history type across the ecological zones reduces the probability of shared catastrophic risks. Additionally, ecological differences among zones reduce the impact of climate events across entire ESUs (Myers et al. 2003).

some of which are considered extirpated or nearly extirpated (Table 9). The run timing distributions across the 32 historical populations are: nine spring populations, 21 early-fall populations, and two late-fall populations (Table 5-2).

Table 5-2 LCR Chinook Salmon ESU description and MPGs (NMFS 2022a).

ESU Description[1]	
Threatened	Listed under ESA in 1999; most recently updated in 2014.
6 major population groups	32 historical populations
Major Population Group	***Populations***
Cascade Spring	Upper Cowlitz (C,G), Cispus (C), Tilton, Toutle, Kalama, NF Lewis (C), Sandy (C,G)
Gorge Spring	(Big) White Salmon (C), Hood
Coast Fall	Grays/Chinook, Elochoman (C), Mill Creek, Youngs Bay, Big Creek (C), Clatskanie, Scappoose
Cascade Fall	Lower Cowlitz (C), Upper Cowlitz, Toutle (C), Coweeman (G), Kalama, EF Lewis (G), Salmon Creek, Washougal, Clackamas (C), Sandy River early
Gorge Fall	Lower Gorge, Upper Gorge (C), (Big) White Salmon (C), Hood
Cascade Late Fall	North Fork Lewis (C,G), Sandy (C,G)
Artificial production	
Hatchery programs included in ESU (18)	Big Creek Tule Fall Chinook; Astoria High School Salmon-Trout Enhancement Program (STEP) Tule Chinook Program; Warrenton High School (STEP) Tule Chinook Program; Cowlitz Tule Chinook Program; North Fork Toutle Tule Chinook Program; Kalama Tule Chinook Program; Washougal River Tule Chinook Program; Spring Creek National Fish Hatchery (NFH) Tule Chinook Program; Cowlitz Spring Chinook Program in the Upper Cowlitz River and in the Cispus River; Friends of the Cowlitz Spring Chinook Program; Kalama River Spring Chinook Program; Lewis River Spring Chinook Program; Fish First Spring Chinook Program; Sandy River Hatchery Program; Deep River Net Pens-Washougal Program; Klaskanine Hatchery Program; Bonneville Hatchery Program; and the Cathlamet Channel Net Pens Program.
Hatchery programs not included in ESU (12)	Clatsop County Fisheries (CCF) Select Area Brights Program Fall Chinook, CCF Spring Chinook salmon Program, Carson NFH Spring Chinook salmon Program, Little White Salmon NFH Tule Fall Chinook salmon Program, Bonneville Hatchery Tule Fall Chinook salmon Program, Hood River Spring Chinook salmon Program*, Deep River Net Pens Tule Fall Chinook, Klaskanine Hatchery Tule Fall Chinook, Bonneville Hatchery Fall Chinook, Little White Salmon NFH Tule Fall Chinook, Cathlamet Channel Net Pens Spring Chinook, Little White Salmon NFH Spring Chinook

The designations "(C)" and "(G)" identify Core and Genetic Legacy populations, respectively. Core populations are defined as those that, historically, represented a substantial portion of the species' abundance. Genetic legacy populations are defined as those that have had minimal influence from nonendemic fish due to artificial propagation activities, or may exhibit important life-history characteristics that are no longer found throughout the ESU (McElhany et al. 2003).

5.4.1.2. Upper Willamette River Chinook

On March 24, 1999, NMFS listed the Upper Willamette River (UWR) Chinook Salmon ESU as a threatened species (64 FR 14308). The threatened status was reaffirmed on June 28, 2005 (70 FR 37160) and again on April 14, 2014 (79 FR 20802). Critical habitat was designated on September 2, 2005 (70 FR 52630). The ESU includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River and the Willamette River and its tributaries above Willamette Falls, Oregon. Critical habitat encompasses 60 watersheds within the range of this ESU's critical habitat as well as the lower Willamette/Columbia River rearing/migration corridor, occurring in the counties of Benton, Clackamas, Clatsop, Columbia, Lane, Linn, Marion, Multnomah, Polk, and Yamhill, in the State of Oregon, and Clark, Cowlitz, Pacific, and Wahkiakum, in the State of Washington. For a detailed description of how NMFS evaluates and determines whether to include hatchery fish in an ESU or DPS see NMFS (2005). The ESU contains seven historical populations, within a single MPG, as well as several artificial propagation programs (western Cascade Range, Table 5-3).

Table 5-3 UWR Chinook Salmon ESU description and MPG (Jones Jr. 2015; NWFSC 2015).

ESU Description	
Threatened	Listed under ESA in 1999; most recently updated in 2014.
1 major population group	7 historical populations
Major Population Group	***Populations***
Western Cascade Range	Clackamas River, Molalla River, North Santiam River, South Santiam River, Calapooia River, McKenzie River, Middle Fork (MF) Willamette River
Artificial Production	
Hatchery programs included in ESU (6)	McKenzie River spring, North Santiam spring, Molalla spring, South Santiam spring, MF Willamette spring, Clackamas spring

5.4.1.3. Snake River Fall-Run Chinook

On April 22, 1992, NMFS listed the Snake River Fall-Run Chinook Salmon (SRFC) ESU as a threatened species (57 FR 14653). The threatened status was reaffirmed on June 28, 2005 (70 FR 37160) and on May 26, 2016 (81 FR 33468). Critical habitat was designated on December 28, 1993 (58 FR 68543). It includes spawning and rearing areas limited to the Snake River below Hells Canyon Dam, and within the Clearwater, Hells Canyon, Imnaha, Lower Grand Ronde, Lower North Fork Clearwater, Lower Salmon, Lower Snake, Lower Snake-Asotin, Lower Snake-Tucannon, and Palouse hydrologic units. However, this critical habitat designation includes all river reaches presently or historically accessible to this species (except reaches above impassable natural falls, and Dworshak and Hells Canyon Dams). On October 4, 2019, NMFS announced the initiation of a new 5-year status review process including review of the SRFC ESU (84 FR 53117), which it completed and published on August 16, 2022 (NMFS 2022).

The SRFC ESU includes naturally spawned fish in the lower mainstem of the Snake River and the lower reaches of several of the associated major tributaries, including the Tucannon, the Grande Ronde, Clearwater, Salmon, and Imnaha Rivers, along with 4 artificial propagation programs (NMFS 2022b). Table 5-4 lists the natural and hatchery populations included in the ESU.

Table 5-4 SRFC ESU description and MPGs (NMFS 2022b).

ESU Description	
Threatened	Listed under ESA in 1992; most recently updated in 2022
1 major population groups	2 historical populations (1 extirpated)
Major Population Group	***Population***
Snake River	Lower Mainstem Fall-Run
Artificial Production	
Hatchery programs included in ESU (4)	Lyons Ferry National Fish Hatchery (NFH) fall, Acclimation Ponds Program fall, Nez Perce Tribal Hatchery fall, Idaho Power fall.

5.4.1.4. Puget Sound Chinook

The Puget Sound Chinook ESU was listed as a threatened species in 1999 (64 FR 14308, March 24, 1999). Its threatened status was reaffirmed June 28, 2005 (70 FR 37160), and again on April 14, 2014 (79 FR 20802). Critical habitat for Puget Sound Chinook salmon was designated on September 2, 2005 (70 FR 52630). There are 61 watersheds within the range of this ESU. Habitat areas for this ESU also include 2,216 mi (3,566 km) of stream and 2,376 mi (3,824 km) of nearshore marine areas, which includes that zone from extreme high water out to a depth of 30 meters and adjacent to watersheds occupied by the ESU. The Puget Sound Chinook Salmon ESU includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Strait of Juan de Fuca from the Elwha River, westward, including rivers and streams flowing into Hood Canal, South Sound, North Sound, and the Strait of Georgia in Washington (64 FR 14308).

The Puget Sound Technical Recovery Team (PSTRT) determined that 22 of the historical populations within the Puget Sound ESU currently contain Chinook salmon and grouped them into five major geographic regions, based on consideration of historical distribution, geographic isolation, dispersal rates, genetic data, life history information, population dynamics, and environmental and ecological diversity (Table 5-5). Based on genetic and historical evidence reported in the literature, the PSTRT also determined that there were 16 additional spawning aggregations or populations in the Puget Sound Chinook Salmon ESU that are now putatively extinct (Ruckelshaus et al. 2006).

The ESU also includes Chinook salmon from certain artificial propagation programs. Artificial propagation (hatchery) programs (26) were added to the listed Puget Sound Chinook Salmon ESU in 2005, as part of the final listing determinations for 16 ESUs of West Coast Salmon and Final 4(d) Protective Regulations for Threatened Salmonid ESUs (70 FR 37160). In October of

2016, NMFS proposed revisions to the hatchery programs included as part of some Pacific salmon ESUs and steelhead DPSs listed under the ESA (81 FR 72759). NMFS issued its final rule in December of 2020 (85 FR 81822).

Table 5-5 Extant Puget Sound Chinook salmon populations in each geographic region (Ruckelshaus et al. 2006).

Geographic Region	Population (Watershed)
Strait of Georgia	**North Fork Nooksack River**
	South Fork Nooksack River
Strait of Juan de Fuca	**Elwha River**
	Dungeness River
Hood Canal	**Skokomish River**
	Mid Hood Canal River
Whidbey Basin	Skykomish River (late)
	Snoqualmie River (late)
	North Fork Stillaguamish River (early)
	South Fork Stillaguamish River (moderately early)
	Upper Skagit River (moderately early)
	Lower Skagit River (late)
	Upper Sauk River (early)
	Lower Sauk River (moderately early)
	Suiattle River (very early)
	Cascade River (moderately early)
Central/South Puget Sound Basin	Cedar River
	North Lake Washington/ Sammamish River
	Green/Duwamish River
	Puyallup River
	White River
	Nisqually River

Note: NMFS has determined that the **bolded** populations are essential to recovery of the Puget Sound

Chinook Salmon ESU.

5.4.2. Effects of Alternatives on ESA-Listed Chinook Salmon ESUs

The effects on ESA-listed Chinook ESUs from the actions considered in the 2019 BiOp—the consultation on the delegation of authority to manage salmon troll and sport fisheries in the EEZ to the State of Alaska, and funding to the State of Alaska for the implementation of the 2019 PST Agreement in SEAK—were extensively analyzed in the 2019 BiOp. The Programmatic Draft Environmental Impact Statement for Funding of the Prey Increase Program for Southern Resident Killer Whales prepared by NMFS also presents updated information on ESA-listed Chinook ESUs (NMFS 2024). These documents are incorporated by reference here.

The analysis of the effects of the actions considered in the 2019 BiOp on ESA-listed Chinook ESUs was based on the best scientific and commercial data available and supported the determination that the actions would not jeopardize the continued existence of those ESUs. The 2019 BiOp and "no jeopardy" determination supported the issuance of an ITS that exempted the incidental take of those ESA-listed Chinook ESUs in a manner consistent with the terms and conditions of the 2019 BiOp. The 2019 BiOp stipulated that the incidental take of ESA-listed Chinook salmon in SEAK fisheries would be limited on an annual basis by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that define the limits of catch and total mortality or exploitation rate for each fishery. The 2019 BiOp also stipulated that measures of Chinook salmon catch, total mortality, and exploitation rate would be used as surrogates for the incidental take of ESA-listed Chinook salmon, because they can be monitored directly and readily assessed for compliance. The ITS represented the upper limit of Chinook salmon that may be harvested in SEAK fisheries.

In response to the court orders on the 2019 BiOp, NMFS must prepare a new BiOp; the proposed 2024 BiOp will be updated based on the best scientific and commercial data available. If the BiOp reaches a "no jeopardy" determination based on the best scientific and commercial data available, this analysis assumes NMFS would issue an ITS and that the BiOp would contain similar effects analyses as the 2019 BiOp, likely with more clarity on the use of surrogates for monitoring and defining the level of take in the ITS. Incidental take of ESA-listed Chinook salmon in SEAK fisheries likely would continue to be limited on an annual basis by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that define the limits of catch and total mortality or exploitation rate for each fishery.

In addition, provisions of the 2019 PST Agreement related to the SEAK fisheries in particular, and fisheries in general, will be responsive to significant reductions in salmon abundances. For each Chinook salmon ESU affected, Exploitation Rates (ERs) reported in the 2019 BiOp and which are also expected for the 2024 BiOp, are shown to be reduced in response to a decline in overall abundance, primarily due to reductions in ERs in AABM fisheries as the Abundance Indices declines. This results in a proportional reduction in catch that is similar to but slightly greater than the corresponding reduction in abundance. This is a result of the relationship between catch and abundance for the AABM fisheries, where there are different harvest rate tiers that allow increased or decreased levels of catch as abundance increases or decreases (see Appendix C in Chapter 3 of the 2019 PST Agreement). These reduction effects are consistent across the affected salmon ESUs because the 2019 PST Agreement requires a total reduction in the AABM fisheries allowable rates of harvest from the 2009 PST Agreement, as described in the Proposed Action. These required reductions in harvest also affect salmon ESUs relative to their migration routes. For purposes of this action, those ESUs that more commonly migrate far north into the range of the SEAK salmon fisheries see larger effects from harvest rates in SEAK fisheries—such as UWR Chinook salmon, versus those that do not, such as Puget Sound Chinook salmon—but all of them experience reductions in harvest to some extent, as designed by the strategy of curtailing harvest across the 2019 PST Agreement.

Alternatives 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2), and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

For the SEAK salmon fisheries, ITSs issued under Alternatives 1 and 2 would include the level of take reasonably certain to occur for each Chinook salmon ESU determined by NMFS to have the potential for “take” in SEAK salmon fisheries subject to the PST. The incidental take of ESA-listed Chinook salmon in the SEAK salmon fisheries would vary from year to year depending on the stock abundances, annual variation in migratory patterns, and fishery management measures used to set and implement fishing levels in the PST Agreement. The incidental take of ESA-listed Chinook salmon in SEAK fisheries would be limited on an annual basis by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that defines the limits of catch and total mortality or exploitation rate for each fishery. NMFS assumes that fisheries in SEAK will be managed up to the limits of allowable catch specified in Chapter 3 the 2019 PST Agreement. Measures of Chinook salmon catch, total mortality and exploitation rate are used as surrogates for the incidental take of ESA-listed Chinook salmon because they can be monitored directly and readily assessed for compliance.

Additional perspective on the effects of Alternatives 1 and 2 is provided by comparing recent fishery exploitation rates of ESA-listed Chinook salmon in the SEAK fishery to other fisheries in the action area. The SEAK fishery has, historically, had a lower exploitation rate of ESA-listed Chinook salmon ESUs (0.1–10.5%) relative to other fisheries in the action area. For example, the highest exploitation rate occurring for a Chinook salmon ESU in SEAK (10.5% for Lower Columbia River Bright) is smaller in comparison to exploitation rates of 22.6% for Canadian fisheries and 16.5% for areas south of Puget Sound (regulated by the PFMC). Similarly, in considering all PST Chinook salmon landed (not just ESA-listed stocks) in the PST area from 2009–2021, on average, only 17% were harvested in Alaska compared with 35.6% in Canada, and 47.4% for other U.S. states (CTC 2022b, Table A23).

NMFS estimates that, on average, under the 2019 PST Agreement, SEAK fisheries are expected to reduce total Chinook abundance (listed and unlisted) annually by 3.5% in SWWCVI, 1.3% in the Salish Sea, and 4% in NOF. This translates to an annual average of 22,500, 13,000, and 37,000 fish in each area, respectively. Annual average reductions in Oregon and California are expected to be much lower (0.8% and 0.03%, respectively). These reductions in Chinook abundance are also described in the SRKW section (Section 5.6.1.1.).
The proposed actions (the issuance of an ITS and the continued funding) would facilitate salmon fishing in SEAK that would take ESA-listed salmon in commercial and sport fishery catches; however, the expected catch of Chinook salmon would be limited by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that define annual catch or total mortality limits on Chinook salmon (including ESA-listed and non ESA-listed Chinook salmon). As analyzed above, catch at this level in the SEAK fisheries does have impacts on ESA listed salmon as analyzed in this EIS, the EIS for funding for prey availability (NMFS 2024), and the 2019 BiOp. Further

analysis on the effects of the SEAK fisheries on ESA listed salmon would be available in a proposed BiOp and ITS under Alternative 2. Any issued ITS would be based on: (1) the requirements of the ESA, (2) the supporting analysis of the effects of the actions, (3) the "no jeopardy" for ESA listed species and no destruction or adverse modification of designated critical habitat determinations, (4) reasonable and prudent measures and terms and conditions for the issuance of the proposed ITS, and (5) the best scientific and commercial data available.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

Effects of this Alternative could have some beneficial effects on ESA-listed Chinook compared to Alternatives 1 and 2, since under Alternative 3, there would be no possibility of incidental takes of Chinook salmon from SEAK salmon fisheries subject to the PST, because they would not be prosecuted. The effect of not issuing an ITS for ESA-listed Chinook for the SEAK salmon fisheries is the assumed closure of the SEAK salmon fisheries, which would eliminate take of any ESA-listed Chinook. This could have the effect of allowing an increased number of Chinook to migrate south toward natal streams and rivers. However, Chinook salmon not caught in the SEAK salmon fisheries could still be subject to harvest in a sequence of fisheries and simultaneously exposed to consumption by a variety of marine predators before reaching natal streams and rivers. From SEAK, the Chinook salmon migratory pathway proceeds through fisheries in northern BC, central BC, Vancouver Island, and Southern BC. More directed Chinook salmon fisheries occur off the coasts of Oregon, Washington, especially near the Columbia River, and in Puget Sound. In considering all PST Chinook salmon landed (not just ESA-listed stocks) in the PST area from 2009–2021, on average, only 17% were harvested in Alaska compared with 35.6% in Canada, and 47.4% for other U.S. states (CTC 2022b). The impacts on listed Chinook species from the SEAK salmon fisheries are generally low (0.1% to 10.5%) and, except for the UWR Chinook ESU, represent 20 percent or less of the overall coastwide marine exploitation rate (NMFS 2019).

5.4.3. Effects of Aggregate Past, Present, and Reasonably Foreseeable Actions on Chinook salmon ESUs

The RFAs that are likely to have an impact on ESA-listed Chinook ESUs taken in SEAK salmon fisheries subject to the PST within the analysis area and timeframe are identified in the environmental baseline and cumulative effects analysis in the 2019 BiOp and are incorporated here by reference. As described in other sections of this analysis and in the 2019 BiOp, Chinook salmon ESUs have been and presently are impacted by climate change and its many associated effects, predation, loss of habitat, and other effects that are likely to continue into the reasonably foreseeable future (Crozier et al. 2021; Hilborn 2013; Mongomery 2003; NRC 1996; Sorel et al. 2020). Some examples of these effects on Chinook salmon ESUs are provided in this section, but it is not intended to provide a comprehensive list of all past, present, or RFAs. It is reasonably certain that state and private actions associated with marine pollution will continue into the future (e.g., state permits for effluent discharges and the status of currently contaminated sites) (NMFS 2011c).

Additionally, forage, water quality, and rearing and spawning habitat are expected to continue to be affected by forestry, grazing; agriculture; channel/bank modifications; road building/maintenance; urbanization; sand and gravel mining; dams; irrigation impoundments and withdrawals; river, estuary, and ocean traffic; wetland loss; forage fish/species harvest; and climate change. Lastly, habitat degradation due to hydroelectric operations and effects from hatchery production[32] (e.g., competition and reduced fitness associated with introgression and domestication) are identified as factors influencing recovery and are likely to continue (Anderson et al. 2020; Mobrand et al. 2005; NRC 1996; Williamson et al. 2010).

As mentioned previously, the SEAK fishery has, historically, had a low exploitation rate of ESA-listed Chinook salmon ESUs (0.1–10.5%) relative to other areas in the action area, and these lower relative exploitation rates are expected to occur into the reasonably foreseeable future. However, exploitation rates for all Chinook salmon ESUs are projected to decline from these rates in the future based on implementation of the revised 2019 PST Agreement.

Substantial Chinook salmon mortality occurs from marine predators along their migratory route, including by NRKW and pinnipeds (Chasco et al. 2017), and this mortality is expected to continue or increase in the future. Chasco et al. (2017) determined that the number of individual salmon consumed by marine mammals in the entire Northeast Pacific has increased 6-fold from 5 to 31.5 million individual salmon from 1975–2015. Other marine predators on Chinook salmon include sharks, a variety of other fish, and squid. Lastly, bycatch of a small number of ESA-listed Chinook salmon occurs in Gulf of Alaska groundfish fisheries (Guthrie et al. 2022). NMFS Alaska Region compiles a yearly report on Chinook bycatch in groundfish fisheries, which it sends to NMFS West Coast Region[33].

Climate change, including increased water temperature, changes in precipitation, ocean acidification, changes to freshwater and marine food webs, and many associated and interrelated effects pose an extremely serious and even existential threat to salmon populations throughout the North Pacific, including ESA-listed Chinook salmon ESUs (e.g., Crozier et al. 2021), and these effects are expected to continue in the future. Salmon are particularly vulnerable to the effects of climate change because their life history characteristics include distinct freshwater, estuarine, and marine components, all of which are and will continue to be impacted by climate change for the reasonably foreseeable future. Climate change is implicated as a potential cause of declines in Chinook salmon abundance and size throughout the entire eastern North Pacific, from California to the Bering Sea (Dorner et al. 2018; Riddell et al. 2013; Schindler et al. 2013). Chinook salmon size and age at return have also declined throughout much of their range during recent years (Ohlberger et al. 2018; Oke et al. 2020). As smaller Chinook salmon have fewer eggs, the individual and population-level reproductive potential of Chinook salmon has also declined as a result (Beacham and Murray 1993; Ohlberger et al. 2020).

Production hatcheries play a major role in supplying Pacific salmon and trout to the common property fisheries, and benefiting commercial, sport, tribal, and non-tribal fishers. In addition, conservation hatcheries play a role in slowing the decline or rebuilding natural populations in many areas, reducing demographic risks. However, there is debate that hatchery fish, released globally, may compete for resources with wild salmon and reduce fitness in wild salmon populations. Data is still emerging on the potential impacts of hatchery fish on wild stocks.

Nichols (2021) explains it is a modern reality that anthropogenic impacts will likely continue to exacerbate the conditions that have created disturbances affecting wildlife (such as salmon and

[32] https://stateofsalmon.wa.gov/regions/lower-columbia-river/hatcheries/. Accessed 06/11/2023

[33] https://www.fisheries.noaa.gov/alaska/commercial-fishing/fisheries-catch-and-landings-reports-alaska#bsai/goa-combined--%C2%A0prohibited-species

SRKW). Ongoing development may lead to impacts that cannot be mitigated and money spent on restoration and enhancement may not effectively reverse the downward trajectory of ESA-listed species without also considering the accumulation of anthropogenic impacts such as pollution or development.

Considering the direct and indirect impacts of the proposed action, which is the issuance of an ITS and continued funds through grants to the State of Alaska, when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the reasonably foreseeable actions listed above and in other sections of this analysis, the impacts of the proposed action are determined to have some minimal impact on ESA listed Chinook salmon, especially relative to impacts across the range of the listed species. With the issuance of an ITS, the SEAK salmon fisheries would be allowed to occur—as it has been under the terms agreed to in the PST—in which case ESA-listed Chinook have been harvested at a relatively low exploitation rate, with lower exploitation rates projected to continue under the implementation of the 2019 PST Agreement (where in most cases catch is reduced by 7.5 percent relative to the 2009 PST Agreement). As per the terms outlined in the 2019 PST Agreement, harvests in the SEAK salmon fisheries are adjusted based on an abundance index; thus, any large-scale declines due to these threats are factored into harvest limits for this fishery. For the reasonably foreseeable future, the main threats to these ESUs are from climate change , loss of habitat, predation, and pollution, none of which are anticipated to increase as a result of this action.

5.5. Non-ESA listed Alaska salmon

In addition to the harvest of ESA-listed Chinook salmon, the SEAK salmon fisheries analyzed in this EIS also harvest salmon that originate in Alaska, either wild salmon or those released from hatcheries, which are not ESA-listed. The State of Alaska manages these salmon fisheries to meet established escapement goals consistent with the sustained yield principle, and to focus harvest on Alaska hatchery salmon. Since the Federal action analyzed in this EIS is NMFS's issuance of an ITS, along with providing Federal funding to the State for the implementation of the 2019 PST Agreement and delegating management of the troll and sport fisheries in the EEZ, this analysis focuses on the effects of the alternatives while also providing an overview of the State's management of salmon harvested in SEAK.

5.5.1. Status of non-ESA listed Salmon Stocks Caught in SEAK Fisheries

The SEAK salmon fisheries are complex and target mixed stocks of five Pacific salmon species (Chinook, chum, coho, pink, and sockeye salmon), with many divergent users. It is difficult to achieve MSY for each salmon stock and species present in these mixed stock, mixed species fisheries because the composition, abundance, and productivity of salmon stocks and species varies substantially on an annual basis. In addition, the production of pink, chum, and coho salmon in SEAK is widely dispersed and largely driven by runs originating from over two thousand small to medium sized streams. One of the primary tools used by the State to conserve and maximize yield of Alaska salmon stocks is the escapement goal, where escapement is defined as the annual spawning stock. A description of the scientific methods and principles underlying State of Alaska escapement goal-based salmon management can be found in Munro, 2023 and in the State's *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222)[34] and the *Policy for Statewide Salmon Escapement Goals* (5 AAC 39.223)[35].

[34] https://www.akleg.gov/basis/aac.asp#5.39.222; accessed 11 November 2023.
[35] https://www.akleg.gov/basis/aac.asp#5.39.223; accessed 11 November 2023.

The most recent review and recommendations for setting spawning escapement goals for SEAK salmon stocks can be found in Heinl et al. (2021). That report includes estimates of stock-specific harvests, overall exploitations rates, and the relationship between various levels of spawning abundance and subsequent returns of adult salmon that are, collectively, the elements of salmon stock assessments. The stocks assessments described and referenced in the report inform the setting of escapement goals designed to result in sustained yields while also being abundantly precautionary with respect to conserving future generations of returns.

The need to conserve weaker stocks by reducing fishing effort sometimes results in foregone yield from more productive stocks. This can result in escapement goals being exceeded, which is sometimes referred to as overescapement or overcompensation. The potential for overescapement to reduce future yields through density dependent processes is considered by ADF&G in publications by Clark et al. 2007 and McKinley et al. 2020.

5.5.1.1. Abundance data

The State establishes salmon spawning escapement goals for specific stocks, which provide benchmarks for assessing stock health and performance (Munro 2019; Munro and Brenner 2022; Munro 2023). Annually, the State of Alaska publishes a report of all current escapement goals for salmon stocks in Alaska (e.g., Munro 2023). In 2022, the State had 264 established and monitored escapement goals and there were 43 escapement goals for SEAK.

Table 5-6 provides an overview of salmon stocks in SEAK for which escapement goals exist. This includes a numerical description of the goal, type of goal, year the goal was first implemented, and recent years' escapement data for each stock. In addition, summary statistics documenting performance in achieving goals are presented Table 5-7. Escapement data are collected by aerial and foot surveys, through weir and sonar counts, and mark-recapture studies. Depending on the method of observation, the annual escapement estimate may represent an absolute or relative index of spawning abundance. For many Chinook, sockeye, chum, and coho salmon stocks in SEAK, available information allows estimates of stock-specific spawner-recruit reference points. For SEAK pink and summer-run chum salmon, escapement estimates include three regional aggregates. Marine tagging studies have repeatedly demonstrated that Southeast Alaska pink salmon stocks are strongly segregated into southern and northern areas or subregions and the commercial fisheries in each subregion generally target pink salmon stocks that ultimately spawn in that subregion. This has allowed ADF&G to produce biological escapement goals for pink salmon based on a yield analysis for each of the three stock groups (Piston and Heinl 2020).

5.5.1.2. Stock-specific exploitation data

Stock, or even stock complex-based, exploitation rates require the ability to partition catches to the stock or stock complex to which they belong. For SEAK salmon stocks that are managed by ADF&G, Heinl et al. 2021 provides stock-specific exploitation rates for those stocks with sufficient information to estimate stock-specific exploitation rates.

Genetic analysis is one of the most prevalent methods for stock identification, and genetic stock identification (GSI) baselines exist for Chinook and sockeye salmon in SEAK. Commercial catches of Chinook and sockeye are sampled for GSI throughout the season by ADF&G for specific time and area strata, and gear types, enabling the post-season allocation of harvests and harvest impacts to specific stocks (Shedd et al. 2022). GSI data are not yet available for coho, chum, or pink salmon stocks in SEAK, preventing run or stock specific harvest allocations of these species.

For Chinook and coho, CWTs are the preferred method under the PST to apportion catch composition and estimate exploitation rates. For the most part, the CWT program focuses on hatchery fish, which are easy to tag and are used as surrogates of wild fish to estimate fishery contributions. Fisheries on the Pacific Coast are sampled at an agreed upon rate of 20% (in SEAK, Chinook are typically sampled at a rate of approximately 40% in the commercial fishery). Because the tags are readily identifiable, the sampling and tagging rates can and are used to expand the CWT recoveries to estimate harvest contributions for each stock and to estimate exploitation rates. Because of the relatively high sampling rates in fisheries, there is a high probability of detecting even minor contributions to a fishery. For decades, annual coded-wire-tagging studies in SEAK (and along the U.S. West coast) have occurred on four wild Chinook and five wild coho stocks of salmon. Through these efforts, and in addition to stock-specific spawner-recruit reference points, estimates of wild Chinook and coho salmon marine survival are available in SEAK, which is unique along the U.S. West coast.

GSI and CWT data are key sources of information for reconstruction of stock-specific annual run sizes, informing the correct apportionment of mixed-stock catches and allocation to stock of origin. While age-only reconstruction methods are available (see Bernard 1983 and Branch and Hilborn 2010), using both age and catch composition data to inform run reconstruction is preferred (Cunningham et al. 2017).

In addition to using genetics and CWT to assess the harvest and exploitation rates of specific stocks, estimates of hatchery salmon harvests in SEAK, especially chum salmon, are also made possible by marking the otoliths (ear bones) of juvenile hatchery salmon and then enumerating the number of adult salmon containing these hatchery marks (Wilson 2023).

5.5.1.3. Sustainable Escapement Goals

State management of salmon fisheries within the SEAK region by ADF&G is based on inseason adjustment of fishing effort by emergency order (EO) and time-area closures to achieve escapement goals, some of which have been bilaterally agreed to under the PST. Both the type of escapement target and method used to estimate abundance vary by species and location. Three types of escapement goals are currently implemented for SEAK stocks: biological escapement goals (BEG), sustainable escapement goals (SEG), and optimal escapement goals (OEG) (Munro 2023).

A BEG is defined in policy as the escapement level that provides the greatest potential for maximum sustained yield, and usually requires a complete stock-recruitment analysis be conducted to identify the range of escapements that are likely to produce MSY, and therefore requires stock-specific spawning abundance (escapement), catch, and age composition information. ADF&G seeks to maintain evenly distributed salmon escapements within the bounds of a BEG.

An SEG is a level of escapement, as indicated by an absolute level of spawning abundance or alternative index, that has been observed to provide sustained yield over a 5 to 10-year period and is used when data are insufficient to reliably estimate maximum sustainable yield and a BEG can therefore not be established or managed effectively. SEGs may be established by the ADF&G as either an "SEG range" or "lower bound SEG" and may be defined based on a Percentile Approach (Clark et al. 2014, Table 5-6), stock-recruitment analysis, habitat capacity, risk analysis or other methods. In the case of the Percentile Approach, the range of observed escapements to a system are ranked, and percentiles of the observed range are ascribed to each observation. SEGs are subsequently defined as a function of the distribution of observed escapements, the contrast in past escapement observations, exploitation rate, and the level of relative measurement error.

Both BEGs and SEGs are based on the best available biological information and are scientifically defensible, with escapement ranges intended to account for variation in stock productivity and data uncertainty.

OEGs are management targets established by the BOF that consider other biological or allocative factors and may differ from the SEG or BEG specified for a given stock.

The majority of management targets for SEAK salmon stocks are BEGs, evaluated annually based on mark-recapture studies, weir or sonar counts, or aerial and/or foot surveys Table 5-6). Exceptions are SEGs for all chum salmon escapement indicator stocks; Mainstem Stikine, McDonald Lake, Speel Lake, Chilkoot Lake, and East Alsek River sockeye salmon; and Klawock River, Montana Creek, Peterson Creek, Tawah Creek (Lost River), Situk River, and Tsiu/Tsivat Rivers coho salmon. There are OEGs in place for Hugh Smith Lake and Redoubt Lake sockeye.

Table 5-6 Percentile ranges recommended by Clark et al. (2014) for defining Sustainable Escapement Goals using the Percentile Approach. Contrast in the escapement data is defined as the maximum observed escapement divided by the minimum observed escapement.

Tier	Contrast	Measurement Error	Exploitation	SEG Range
1	High (>8)	High (aerial and foot surveys)	Low to moderate (<0.40)	20^{th} to 60^{th} Percentile
2	High (>8)	Low (weirs, towers)	Low to moderate (<0.40)	15^{th} to 65^{th} Percentile
3	Low (<=8)		Low to moderate (<0.40)	5^{th} to 65^{th} Percentile

The State does not have the necessary resources to monitor runs of salmon to each of the several thousand drainages in SEAK. Therefore, the State does not have the information necessary to set escapement goals for several of the salmon runs, nor is there a need for an escapement goal for each of the tributaries or >2,500 drainages for purposes of sustainable salmon management. The State directs resources to monitoring runs of indicator stocks of salmon. Even though the State does not directly monitor some stocks, aerial surveys, test fisheries, and commercial harvests provide indicators of relative abundance. In the absence of specific stock information, the State manages these stocks conservatively following the precautionary principle outlined in the policies referenced previously and based on information collected from adjacent indicator stocks (stocks that can be assessed that are assumed to represent nearby stocks) and the performance of salmon fisheries, which are regularly reported in annual management reports (e.g., Thynes et al. 2022).

The majority of escapement goals in SEAK are BEGs, including lower-bound SEGs. OEGs and SEGs collectively represent a smaller proportion of escapement goals in SEAK. SEGs and BEGs are set by ADF&G to maximize return per spawner, while OEGs are set by the BOF and may not represent a spawning escapement that maximizes return per spawner. Escapement goals are typically evaluated on a triennial basis.

Between 2013 and 2022, an average of approximately 70% of stocks in SEAK with escapement data achieved at least the lower bound of their escapement goals (See Table 5-7). Where escapements for a given stock are chronically below established goal ranges or lower bounds, a stock of concern designation may be recommended to the BOF by ADF&G at one of three levels of increasing concern: yield, management, and conservation. Stocks of concern and the conditions that may trigger their adoption by the BOF are narrowly defined in the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222). Three categories of concern exist:

- Yield concern – stocks that fail to produce expected yields or harvestable surpluses;
- Management concern – stocks that fail to meet established escapement goals; or
- Conservation concern – stocks with chronic inability to maintain escapements above a threshold level such that the ability of the stock to sustain itself is jeopardized.

Stocks may be designated as a management concern if the stock fails to meet the escapement goal over a period of four to five years despite appropriate management taken to address the concern.

When stocks of concern are identified, ADF&G works with the BOF and public to develop action plans describing potential management actions and research programs to achieve stock rebuilding goals. Action plans for management may involve time and area restrictions for commercial fisheries judged to have significant impacts on the stock of concern, as well as sport fishery restrictions including bag limit changes, prohibiting use of bait or retention of a species, or closures of the fisheries. Subsistence fishing restrictions may also be considered in action plans.

Currently, stocks of concern in SEAK are as follows:

- Chilkat River, King Salmon River, and Unuk River – Chinook stocks of management concern, designation adopted 2017;
- Taku River, Stikine River, Andrew Creek, and Chickamin River – Chinook stock of management concern, designation adopted 2021;
- McDonald Lake– sockeye stock of management concern, designation adopted 2017; and
- Klukshu River – sockeye stock of management concern, designation adopted 2021.

In addition to measures affecting commercial and sport fishery management, stock of concern action plans also identify key research objectives designed to provide information necessary to make informed decisions. For Chinook salmon stocks of concern, research objectives include maintaining standardized aerial and foot surveys and mark-recapture studies; collection of age, sex, and length data in the escapement and marine harvest; and marine sampling programs to obtain harvest and coded wire tag data. These programs help to determine the current stock status and whether action plans are helping to reduce harvest rates on these stocks. Similarly for McDonald Lake and Klukshu River sockeye salmon stocks of concern, research objectives call for maintaining or improving escapement and harvest estimates to ensure that management actions are having a positive impact on these stocks. Continued monitoring of salmon escapements relative to established goals allows ADF&G, the BOF, and the public to gauge the success of these actions and modify action plans accordingly.

Table 5-7 Summary of Upper Southeast Alaska Cook Inlet salmon escapements compared against escapement goals for the years 2013–2021.

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Stocks with Escapement Data		50	50	51	50	49	46	45	44	44	43
Below Lower Goal	Number	14	10	3	20	16	18	10	21	13	13
	Percent	28%	20%	6%	40%	33%	39%	22%	48%	30%	30%
Goal Met	Number	24	24	30	22	23	20	25	18	18	21
	Percent	48%	48%	59%	44%	47%	43%	56%	41%	41%	49%
Above Upper Goal	Number	12	16	18	8	10	8	10	5	13	9
	Percent	24%	32%	35%	16%	20%	17%	22%	11%	30%	21%

Source: Munro 2023

Table 5-8 Southeast Alaska Chinook, chum, coho, pink, and sockeye salmon escapement goals and escapements, 2013–2022. SEG is Sustainable Escapement Goal, BEG is Biological Escapement Goal, and OEG is Optimal Escapement Goal.

	2022 Goal Range			Initial	Escapement									
System	**Lower**	**Upper**	**Type**	**Year**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
CHINOOK SALMON[a]														
Keta River	550	1,300	BEG	2018	1,484	1,321	915	1,342	903	1,662	1,041	668	707	689
Blossom River	500	1,400	BEG	2018	987	840	642	522	341	1,087	557	515	170	395
Chickamin River	2,150	4,300	BEG	2018	2,223	3,097	2,760	964	722	2,052	1,610	2,280	2,404	2,522
Unuk River	1,800	3,800	BEG	2009	1,135	1,691	2,623	1,463	1,203	1,971	3,115	1,135	2,666	1,304
Stikine River	14,000	28,000	BEG	2000	16,784	24,374	21,597	10,554	7,335	8,603	13,817	9,753	8,376	9,090
Andrew Creek	650	1,500	BEG	1998	920	1,261	796	402	349	482	698	470	530	821
King Salmon River	120	240	BEG	1997	94	68	50	149	85	30	27	100	134	123
Taku River	19,000	36,000	BEG	2009	18,002	23,532	23,567	9,177	8,214	7,271	11,558	15,593	11,341	12,722
Chilkat River	1,850	3,600	inriver[b]	2003	1,730	1,534	2,456	1,386	1,173	873	2,028	3,180	2,038	1,582
	1,750	3,500	BEG	2003	1,719	1,529	2,452	1,380	1,173	873	2,028	3,180	2,038	1,582
Klukshu (Alsek) River[c]	eliminated			2018	1,227	832	1,388	646	443					
Alsek River[c]	3,500	5,300	BEG	2013	4,992	3,357	5,697	2,514	1,741	4,348	6,319	5,330	5,562	3,351
Situk River	450	1,050	BEG	2003	912	475	174	329	1,187	420	623	1,197	1,064	890
CHUM SALMON														
S. SEAK Summer	62,000		LB SEG	2015	86,000	47,000	115,000	90,000	84,000	127,000	105,000	70,000	77,000	136,000
N. SEAK Inside Summer	107,000		LB SEG	2018	278,000	93,000	166,000	66,000	277,000	109,000	123,000	52,000	67,000	116,000
N. SEAK Outside Summer	25,000		LB SEG	2015	22,800	27,600	26,300	26,000	24,800	19,400	25,500	16,100	11,600	18,000
Cholmondeley Sound Fall	30,000	48,000	SEG	2009	13,000	48,000	73,000	30,000	52,000	70,000	20,000	30,000	55,000	42,000
Port Camden Fall	2,000	7,000	SEG	2009	2,400	4,300	7,300	4,700	4,200	1,000	4,800	1,500	2,200	700
Security Bay Fall	5,000	15,000	SEG	2009	2,800	6,300	21,500	14,300	15,500	5,600	14,300	11,500	3,000	3,000
Excursion River Fall	4,000	18,000	SEG	2009	7,600	10,800	12,000	1,400	14,500	6,200	3,600	200	1,900	800
Chilkat River Fall	75,000	250,000	SEG	2015	166,000	142,000	207,000	218,000	130,000	NA	224,000	23,000	169,000	343,000
COHO SALMON														
Hugh Smith Lake	500	1,600	BEG	2009	3,048	4,110	956	948	1,266	619	1,239	634	903	892

	2022 Goal Range			Initial	Escapement									
System	**Lower**	**Upper**	**Type**	**Year**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Klawock River	4,000	9,000	SEG	2013	8,323	7,698	12,780	24,242	7,412	13,578	5,287	5,783	5,289	6,968
Taku River	50,000	90,000	BEG	2015	68,117	124,171	60,178	87,704	57,868	51,173	82,759	52,063	75,526	66,034
Auke Creek	200	500	BEG	1994	736	1,533	577	204	283	146	345	173	322	449
Montana Creek	400	1,200	SEG	2006	367	911	1,204	717	634	1,161	203	495	391	NS
Peterson Creek	100	250	SEG	2006	126	284	202	52	20	172	NC	65	15	65
Ketchikan Survey Index	4,250	8,500	BEG	2006	11,287	16,795	10,039	13,419	11,563	13,886	7,913	8,610	21,006	11,945
Sitka Survey Index	400	800	BEG	2006	1,414	2,161	2,244	2,943	1,305	1,502	1,480	630	1,486	1,363
Ford Arm Creek	eliminated			2018	1,573	3,025	3,281	NS	NS					
Berners River	3,600	8,100	BEG	2018	6,280	15,480	9,940	6,733	7,040	3,550	9,405	3,296	5,933	4,472
Chilkat River	30,000	70,000	BEG	2006	51,324	130,201	47,930	26,280	33,383	65,749	34,779	28,660	55,220	43,519
Lost River	eliminated			2015	2,593	3,555								
Tawah Creek (Lost River)	1,400	4,200	SEG	2015	2,593	3,555	2,015	746	1,455	2,211	1,866	NS	NS	NS
Situk River	3800	9600	SEG	2022	14,853	8,226	7,062	6,177	4,122	6,198	10,381	NS	NS	NS
Tsiu/Tsivat Rivers	10,000	29,000	SEG	2018	47,000	27,000	19,500	31,000	38,000	48,600	NS	56,000	NS	NS
PINK SALMON														
S. SEAK	3,000,000	8,000,000	BEG	2009	14,450,000	9,650,000	4,300,000	6,600,000	6,390,000	4,870,000	5,630,000	5,660,000	9,810,000	5,800,000
N. SEAK Inside	2,500,000	6,000,000	BEG	2009	5,370,000	1,370,000	5,210,000	1,780,000	4,650,000	1,370,000	1,650,000	2,290,000	3,910,000	3,150,000
N. SEAK Outside	750,000	2,500,000	BEG	2009	5,340,000	2,750,000	2,840,000	1,700,000	2,840,000	1,900,000	1,530,000	1,790,000	1,940,000	1,090,000
Situk River	eliminated			2018	150,500	28,238	69,635	24,949	263,830					
SOCKEYE SALMON														
Hugh Smith Lake	8,000	18,000	OEG[d]	2003	5,946	10,397	21,296	12,865	14,748	2,039	2,240	3,860	3,235	1,657
	8,000	18,000	BEG	2003										
McDonald Lake	55,000	120,000	SEG	2009	15,400	43,400	70,200	15,600	24,000	11,000	24,200	8,200	44,500	34,100
Mainstem Stikine River	20,000	40,000	SEG	1987	27,091	19,691	26,432	28,646	11,678	12,159	23,174	7,126	31,896	45,250
Tahltan Lake[e]	18,000	30,000	BEG	1993	15,828	39,745	33,159	38,458	19,241	16,350	36,787	11,158	42,846	52,772
Speel Lake	4,000	9,000	SEG	2015	6,426	5,062	4,888	5,538	3,435	4,244	6,447	NC	8,643	5,686
Taku River (historical)[f]	eliminated			2022	81,177	92,189	132,523	179,103	108,416	98,465	76,722			

	2022 Goal Range			Initial	Escapement									
System	**Lower**	**Upper**	**Type**	**Year**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Taku River[f]	40,000	75,000	BEG	2022	62,062	49,828	82,059	107,183	59,069	65,540	80,205	99,508	161,348	91,559
Redoubt Lake	7,000	25,000	OEG	2003	48,355	18,694	12,540	22,553	55,397	72,409	59,106	41,289	60,004	85,451
	10,000	25,000	BEG	2003										
Chilkat Lake	70,000	150,000	BEG	2009	115,237	70,470	164,014	87,622	88,197	108,047	136,091	50,746	65,199	95,928
Chilkoot Lake	38,000	86,000	SEG	2009	46,329	105,713	71,515	86,721	43,098	85,463	140,378	60,218	98,672	57,176
East Alsek-Doame River	eliminated			2018	26,500	15,300	15,000	19,200	22,500					
East Alsek River	9,000	24,000	SEG	2018	24,000	9,800	12,000	19,200	20,500	10,500	27,300	13,670	29,700	23,800
Alsek River[g]	eliminated			2018	83,771	87,093	63,709	58,836	101,533					
Klukshu River	7,500	11,000	BEG	2013	3,792	12,148	11,363	7,391	3,711	7,143	18,749	4,287	25,691	29,629
Lost River	eliminated			2018	587	NS	373	449	NS					
Situk River	30,000	70,000	BEG	2003	118,767	102,994	95,093	56,738	91,092	26,704	72,530	63,343	119,072	90,369

Source: Munro & Brenner 2022

Note: NA = data not available; NC = no count; NS = no survey; LB SEG = lower-bound SEG.

a Goals are for large (≥660 mm from METF, or fish age 1.3 and older) Chinook salmon, except the escapement goals for the Klukshu and Alsek Rivers, which are germane to fish age 1.2 and older and can include fish <660 mm METF.

b Chilkat River Chinook salmon inriver goal accounts for inriver subsistence harvests, which average <100 fish.

c Alsek and Klukshu River Chinook salmon escapement goals were bilaterally agreed upon in 2013 (TTC 2014). Escapement to the Alsek River is calculated through expansion of the Klukshu River inriver run by a factor of 4.0 and subtraction of any inriver harvests above Dry Bay in the lower Alsek River.

d Hugh Smith Lake sockeye salmon OEG includes wild and hatchery fish.

e Tahltan Lake sockeye salmon escapement count includes fish collected for broodstock.

f A new goal of 40,000–75,000 Taku River sockeye salmon was adopted by the PSC prior to the 2020 fishing season and formally adopted as a BEG by the State in 2022; revised goal based on reanalysis of mark-recapture data and spawner-recruit analysis (TTC 2020).

g Alsek River sockeye salmon run is not regularly assessed, so escapement numbers for every year are not available. Since 2013, Alsek River sockeye salmon have been managed to meet Klukshu River escapement goal as per the 2013 management plan (TTC 2014).

5.5.2. Effects of Alternatives on non-ESA-Listed Salmon

Alternatives 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2) and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

Under these alternatives, all SEAK commercial, sport, and subsistence fisheries are expected to be managed in a manner similar to that described in this Section and in Section 4. As such, under these alternatives, the State will continue to monitor the fisheries and apply management measures to ensure that spawning escapements goals are met for SEAK stocks. Spawning escapements and the achievement of spawning escapement goals are expected to remain similar to Table 5-7 & Table 5-8. Under these alternatives, across all commercial salmon fisheries—in the near term—harvests of salmon would be expected to be similar to that reported for 2013–2022[36], which have ranged from: 164,048–436,936 Chinook salmon; 453,021–1,663,861 sockeye salmon; 1,159,279–3,789,405 coho salmon; 8,058,812–94,779,875 pink salmon; and 6,678,436–12,570,522 chum salmon. Of these commercial harvests, from 2013–2022 the estimated annual commercial harvest of hatchery salmon of SEAK origin has ranged from: 41,721–95,916 Chinook salmon; 36,904–289,541 sockeye salmon; 345,592–1,360,945 coho salmon; 2,500,909–348,367 pink salmon; and 10,489,177–5,733,451 chum salmon (Wilson 2023). For sport fisheries, under Alternatives 1 and 2, harvests of salmon in saltwater would also be expected to be similar to that reported for 2013–2022[37] and provided in Section 4. However, beyond these alternatives, other factors may impact future harvests of salmon in the SEAK fisheries and these are discussed in the following section (5.5.3).

The impacts of Alternatives 1 and 2 are shown in Table 5-8, which provides an overview of salmon stocks in SEAK for which escapement goals exist, a numerical description of the goal, type of goal, year the current goal was first implemented, and recent years' escapement data for each stock. In Table 5-7, escapements from 2013 through 2022 were compared against escapement goals in place at the time of enumeration to assess outcomes in achieving goals. Escapements for a particular stock were classified as "below" if escapement for a given year was less than the lower bound of the escapement goal range. If escapement fell within the escapement goal range or was greater than a lower-bound goal, escapements were classified as "met." Where escapements exceeded the upper bound of an escapement goal range (if an upper bound was defined), they were classified as "above." Where escapement goals or enumeration methods changed for a stock between 2013 and 2022, outcomes were assessed by comparing escapement estimates with the goal and methods in place at the time of the fishery. From Table 5-7, from 2014 to 2022, when considering all SEAK salmon stocks with escapement goals, annually: 6-

[36] https://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmon_landings. Accessed 11 November 2023.
[37] https://www.adfg.alaska.gov/sf/sportfishingsurvey/index.cfm?ADFG=region.home. Accessed 26 November 2023.

48% of the total realized spawning escapements were below the lower bound of the escapement goals; 41-59% of the escapement goals were achieved (realized escapements were within the goal range); and 11-35% of the goals were exceeded (realized escapements were above the upper bound of the goal range),

The State would continue to use these escapement goals and update them based on new information available through their escapement goal review process. Under Alternatives 1 and 2 the stock of concern system would continue to be used to identify potential yield, conservation, or management concerns and would require management actions if concerns were identified. As noted above, there are seven Chinook stocks of concern and two sockeye stocks of concern in SEAK. While the causes of low abundances that lead to a stock of concern designation are not always apparent, the State continues to monitor and manage these stocks carefully (including restricting harvests) in an effort to achieve spawning escapement goals and associated future yields. As such, the impacts of Alternatives 1 and 2 are minimal given that SEAK salmon fisheries are managed to achieve long-term sustainable harvests of non-ESA listed salmon, spawning escapement goals for these fisheries are established and vetted in a thorough manner that takes a precautionary approach and considers buffers to account for scientific uncertainty, annual spawning escapements are actively monitored to evaluate the achievement of escapement goals, most spawning escapement goals have been achieved (or exceeded) during recent years, and these salmon fisheries have demonstrated a long history of sustainable harvests.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

As Alternative 3 would result in the cessation of salmon fishing in State and Federal waters of SEAK, this alternative would result in a massive increase in spawning escapements to the ~2,500 salmon spawning systems in SEAK (e.g., Zadina et al. 2004). The ranges of SEAK commercial and sport harvests provided previously, while they do not include other sources of harvests (e.g., personal use, subsistence, etc.), represent, by far, the largest portion of overall harvests and therefore provide a plausible range of the number of salmon that could be expected to enter freshwater systems and/or mill around hatchery release locations in the absence of fishing. As a result, with the possible exception of Chinook salmon stocks for which some fish harvested originate outside of SEAK, it is likely that these fish would not be harvested in saltwater resulting in spawning escapements that would greatly exceed the upper bounds of the State's existing spawning escapement goals for SEAK (Munro 2023), which are the recommended upper thresholds for the number of spawning wild salmon in a freshwater system.

Under Alternative 3, the cessation of salmon fisheries would likely result in both an immediate and substantial increase in the number of salmon entering freshwater systems with effects to SEAK salmon stocks that would continue into the future. For at least the length of the generation time (in years) for each species, but potentially longer, Alternative 3 would likely result in declines in the productivity (return per spawner) of many SEAK salmon stocks due to a variety of density-dependent effects in freshwater and possibly also the nearshore marine environments. Coastal stocks of pink and chum salmon, which tend to spawn in streams that originate in steep basins and have limited spawning area, could experience severe crowding (more fish than can reasonably spawn in a given area) and the superimposition of spawning redds that could kill fertilized eggs (Fukushima et al. 1998). High abundances of pink and chum salmon would also likely result in very low levels of dissolved oxygen in many streams (hypoxia), which has been shown to be lethal to salmon (Sergeant et al. 2023; von Biela et al. 2022). Depending upon watershed characteristics and the abundance of spawners, hypoxia may also be a factor that results in the death of coho, sockeye, and Chinook salmon. Unanticipated large returns can also change water quality through the spread of disease: the Klamath River had a large return of Chinook salmon in 2002 that was a likely contributing factor in a fish kill of approximately 34,000 Chinook and coho salmon due to infections from the parasite *Ichthyopthirius multifilis* (ich) and the bacterial pathogen *Flavobacter columnare* (columnaris) (Belchik et al. 2004).

The impacts of Alternative 3 on SEAK salmon stocks and the duration of subsequent effects would be determined by the life history characteristics of individual species (Quinn 2018), the number of fish entering freshwater habitats, habitat characteristics, and environmental factors (e.g., water temperature); with a plausible timeline as follows:

- For pink salmon, which have a fixed 2-year life cycle and primarily spawn in short coastal streams, large overescapements into streams would occur during years 1–2 following the cessation of salmon fishing in SEAK. Crowding on the spawning grounds could result in redd superimposition and the death of adult spawners and fertilized eggs due to hypoxia. Following hatching and smolting into the nearshore marine environment, juvenile pink salmon may also experience increased competition in the nearshore environment the following year if the density of juveniles were unusually high. Density-dependent effects would manifest during years 3–4 and take the form of reduced adult returns relative to the number of spawners (reduced productivity of parent year spawners) and possibly also reduced overall returns of adult pink salmon relative to Alternatives 1 and 2. Depending upon the number of adult spawners returning during years 3–4, overcrowding may continue to occur during additional years. In the absence of SEAK fisheries, in future years the primary factors that limit adult pink salmon returns to spawning streams would include the availability of spawning habitat; rates of stream discharge and associated levels of oxygen, which would also be heavily mediated by stream temperature and the density of spawners (Sergeant et al. 2023); prey availability in the nearshore during the year following spawning; the feeding of predators on juvenile pink salmon in the nearshore marine environment; and predation on adult pink salmon in the offshore environment and as they return to the nearshore prior to spawning.

- For chum salmon, which generally have a 3–6 year life cycle and primarily spawn in short coastal streams, many of the same effects of Alternative 3 would be similar to that of pink salmon. Large overescapements into streams would initially occur during years 1–6 following the cessation of salmon fishing in SEAK. Crowding on the spawning grounds would result in redd superimposition and the death of adult spawners and fertilized eggs due to hypoxia. Following hatching and smolting into the nearshore marine environment, juvenile chum salmon may also experience increased competition in the nearshore environments the following year if the density of juveniles were unusually high. Competition for prey in the nearshore environment may also occur from juvenile pink or sockeye salmon. Density-dependent effects would manifest during years 4–12 and take the form of reduced productivity relative to Alternatives 1-2. Depending upon the number of adult spawners returning during years 4–12, overcrowding may continue to occur during additional years. In the absence of SEAK fisheries, in future years, the primary factors that limit adult chum salmon returns to spawning streams would likely be similar to those listed for pink salmon.

- For coho salmon, which generally have a 3–4 year life cycle and spawn in a variety of stream types, overescapements into streams would initially occur during years 1–4 following the cessation of salmon fishing in SEAK. Crowding on the spawning grounds would result in redd superimposition and crowding may also result in the death of adult spawners from hypoxia. Following spawning, fertilized eggs hatch during the following spring and juveniles generally feed in streams for 1–2 years (sometimes longer). Depending upon the number of juvenile that hatched, juvenile coho salmon may experience increased competition in the freshwater environment, including competition from successive generations of coho. Density-dependent effects would manifest during years 4–8 and take the form of reduced productivity relative to Alternatives 1 and 2. Depending upon the number of adult spawners returning during years 4–8, overcrowding may continue to occur during additional years. In the absence of SEAK fisheries, in future years, the primary factors that limit adult coho salmon returns to spawning streams would likely be similar to those listed previously, but also include prey availability in streams during 1–2 years following spawning.
- For sockeye salmon, which have a 3–7 year life cycle (but generally 4–6 years) and spawn in a variety of freshwater habitats including streams and the shores of lakes, over-escapements into lakes and streams would initially occur during years 1–7 following the cessation of salmon fishing in SEAK. Crowding on the spawning grounds would result in redd superimposition and crowding may also result in the death of adult spawners from hypoxia. Following spawning, fertilized eggs hatch during the following spring and juveniles generally feed in lakes, streams, and other freshwater habitat types for 1-2 years (sometimes longer). Juvenile sockeye salmon would likely experience increased competition in the freshwater environment, including competition from successive generations of sockeye salmon. Density-dependent effects would manifest during years 4-14 and take the form of reduced productivity relative to Alternatives 1 and 2. Depending upon the number of adult spawners returning during years 4-14, overcrowding may continue to occur during additional years. In the absence of SEAK fisheries, the primary factors that are likely to limit adult sockeye salmon returns to spawning systems would likely be similar to those listed for coho salmon, with the exception that increased competition and limited prey availability in lakes may be also a limiting factor for future returns of sockeye salmon.
- For Chinook salmon, which have a 3–7 year life cycle and spawn in larger streams, potential overescapements into streams could occur during years 1–7 following the cessation of salmon fishing in SEAK. Crowding on the spawning grounds could result in redd superimposition. Following spawning, fertilized eggs hatch during the following spring and juveniles generally feed in streams for a year before smolting to the marine environment. Juvenile Chinook salmon would likely experience increased competition in the freshwater environment. Density-dependent effects would manifest during years 4–14 and take the form of reduced productivity relative to Alternatives 1 and 2. Depending upon the number of adult spawners returning during years 4–14, overcrowding may continue to occur during additional years. In the absence of SEAK fisheries, in future years, the primary factors that would limit adult Chinook salmon returns to spawning streams would likely be similar to those listed for coho salmon. However, given recent declines in spawning escapements for SEAK Chinook salmon stocks, and the fact that 17-83% of SEAK's Chinook salmon runs have been below established escapement goals in recent years (Table 3-2 and Munro 2023), the cessation of salmon fishing may also result in a higher proportion of Chinook spawning escapement goals being achieved.

Thus, the severity of impacts or benefits to SEAK Chinook salmon stocks from Alternative 3 would be mediated by the overall abundance of returning adult fish from these stocks if the fisheries were to be discontinued.

For Chinook salmon in particular, under Alternative 3, given the stock composition of the troll and sport fishery compared with other salmon species as mentioned previously, more of the foregone catch would return to southern areas (British Columbia, Washington, Oregon). Increased returns could have some level of benefits to harvesters and marine predators, and for achieving spawning escapements in these areas; however, not all foregone catch in SEAK would survive to reach natal spawning grounds given the gauntlet of fisheries, marine predators, and other human-caused environmental impacts in marine, estuarine, and freshwater habitats along their migratory routes in southern areas (like dams, pollution, etc.).

Many effects of Alternative 3 on non-ESA listed salmon are difficult to predict. Critically, through increased competition among juvenile salmon, Alternative 3 could result in changes (likely declines) to the density of nearshore prey available to juvenile salmon and changes to the number and type of predators on juvenile and adult salmon. For some SEAK stocks, density dependence at high spawning escapements is not well defined due to the historical continuity of fisheries. For this and other reasons, there is high uncertainty about what combined effects would be given the number of species, potential for many types of density dependent interactions (e.g., spawning grounds, inriver feeding, nearshore marine feeding, etc.), potential for interspecific competition (e.g., pink and chum salmon crowding streams used by other species), and interactions with other environmental conditions (e.g., stream water temperature) as previously discussed.

It is assumed that hatchery fish would also not be harvested under Alternative 3, except in some special harvest areas near hatcheries and/or in terminal areas. It is expected that these hatchery salmon would either die near their release locations or stray into streams (Piston and Heinl 2011, Brenner et al. 2013) where they have the potential to interbreed, compete with, and have adverse effects on wild salmon (Grant 2012; Jasper et al. 2013; Sergeant et al. 2023).

Given the large number of salmon that would be left unharvested under Alternative 3, and the potential for adverse effects to all species of non-ESA listed salmon that originate in SEAK, the combined effects of this alternative could be significant. Due to the influx of salmon into freshwater systems described in this section, there are additional potential large-scale effects to the ecosystem described in Section 5.10.

5.5.3. Effects of Reasonably Foreseeable Actions on non-ESA listed Salmon

Non-ESA listed salmon stocks in SEAK are likely to experience effects from climate change, which will continue into the reasonably foreseeable future. As described previously for ESA-listed Chinook salmon, climate change, including increased water temperature, changes in precipitation, ocean acidification, changes to freshwater and marine food webs, and many associated and interrelated effects pose an extremely serious and even existential threat to salmon populations throughout the North Pacific (e.g., Crozier et al. 2021). Salmon are particularly vulnerable to the effects of climate change because their life history characteristics include distinct freshwater, estuarine, and marine components, all of which are and will continue to be impacted by climate change for the reasonably foreseeable future. Climate change may also play a key role in mediating the composition of salmon species in the North Pacific and competition among these species for available prey resources (Ruggerone et al. 2023; Springer and van Vliet 2014), with potential deleterious effects to salmon originating in SEAK. Climate change effects to SEAK salmon are further discussed in Section 5.10. Climate change is also likely to interact with and has the potential to exacerbate hypoxia in the thousands of small coastal streams present throughout SEAK (Sergeant et al. 2023; von Biela et al. 2022).

Other potential future impacts to non-ESA listed salmon stocks in SEAK that are likely to continue in the reasonably foreseeable future include mining, pollution, and various types of human development within the watersheds used by salmon present in SEAK for spawning, migration, and rearing and in the nearshore marine areas. These items are addressed in the Section 5.7. In addition, it is worth noting that in areas with roads, tire wear from automobiles can result in chemicals entering watersheds that are lethal to salmon and this impact to non-ESA listed salmon is expected to continue into the reasonably foreseeable future (Tien et al. 2021).

Considering the expected effects of Alternatives 1 and 2, when added to the impacts of the reasonably foreseeable actions listed above, the impacts of Alternatives 1 and 2 are minimal given that SEAK salmon fisheries are managed to achieve long-term sustainable harvests of non-ESA listed salmon, spawning escapement goals for these fisheries are established and vetted in a thorough manner that takes a precautionary approach and considers buffers to account for scientific uncertainty, annual spawning escapements are actively monitored to evaluate the achievement of escapement goals, most spawning escapement goals have been achieved during recent years, and these salmon fisheries have demonstrated a long history of sustainable harvests.

Considering the expected effects of Alternatives 3, when added to the impacts of the reasonably foreseeable actions listed above, the impacts of Alternatives 3 are significant given that the cessation of the SEAK salmon fisheries under this alternative would allow historically unprecedented numbers of wild and hatchery salmon entering freshwater systems that would result in hypoxia and death of salmon (especially those in small streams in warm years), declines in productivity and the overall abundance of many SEAK stocks for the foreseeable future, and reduced yield for SEAK salmon fisheries when they were permitted to resume.

5.6. Marine Mammals

This section evaluates the potentially affected environment and the degree of the effects of the alternatives on marine mammals together with relevant past, present, and reasonably foreseeable actions (40 C.F.R. 1501.3(b)). This section is split into two sub-sections, ESA-listed and non-ESA listed marine mammals to best analyze the impacts of the alternatives based on the issuance of an ITS for the SEAK salmon fisheries (for which we will consider ESA-listed species), but also as a result of the issuance of an ITS that will have the effect of allowing prosecution of SEAK fisheries (for which we will look at all potentially impacted marine mammals). Marine mammals that will be discussed in this section are the: Steller sea lion (WDPS and EDPS), humpback whale (Mexico and Hawaii DPS), harbor porpoise, Dall's porpoise, harbor seal (multiple stocks), killer whales (multiple stocks), Sea otter (Southeast stock).

Marine mammals that could occur in the action area, but have no known interactions or impacts from the SEAK net fisheries are the: sperm whale, Pacific white sided dolphin, fin whale, Minke whale, blue whale, sei whale, and gray whale; and will not be further considered in this analysis.

Only Steller sea lions and SRKW have critical habitat that occurs within the action area, and only SRKW critical habitat was deemed likely to be adversely affected, but NMFS concluded it was not likely to be adversely modified or destroyed in the 2019 BiOp. Critical habitat for the Mexico DPS of humpback whales does not occur in the analysis area, but does occur elsewhere in Alaska.

5.6.1. ESA-listed Marine Mammals

5.6.1.1. Southern Resident Killer Whale DPS

5.6.1.1.1. Status

The SRKW DPS, composed of J, K, and L pods, range throughout the coastal waters off Washington, Oregon, and Vancouver Island, Canada and are known to travel as far south as central California and as far north as SEAK (NMFS 2008b; Hanson et al. 2013; Carretta et al. 2023), though there has only been one sighting of a SRKW in SEAK. SRKWs are highly mobile and can travel up to 86 miles (160 km) in a single day (Erickson 1978; Baird 2000), with seasonal movements likely tied to the migration of their primary prey, salmon. The SRKW was listed as endangered under the ESA on November 18, 2005 (70 FR 69903). A 5-year review under the ESA completed in 2021 concluded that SRKWs should remain listed as endangered and includes recent information on the population, threats, and new research results and publications (NMFS 2021a). Critical habitat for SRKWs was first established in 2006 (71 FR 69054; November 29, 2006) and was revised in 2021 (86 FR 41668; August 2, 2021). The designated inland critical habitat consists of three areas: (1) The Summer Core Area in Haro Strait and waters around the San Juan Islands, (2) Puget Sound Area, and (3) the Strait of Juan de Fuca Area. Together, these inland areas comprise approximately 2,560 mi^2 (6,630 km^2) of marine habitat. Coastal critical habitat includes six areas (nearly 16,000 mi^2) off the coast of Washington, Oregon, and California. The physical or biological features of SRKW critical habitat include (1) Water quality to support growth and development; (2) Prey species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and (3) Passage conditions to allow for migration, resting, and foraging. NMFS considers SRKWs to be among nine species at high risk of extinction as part of NMFS's Species in the Spotlight initiative[38] because of their endangered status and declining population trend, and because they are a high priority for recovery based on conflict with human activities and recovery programs in place to address threats. The population has relatively high mortality and low reproduction, unlike other resident killer whale populations, which have generally been increasing since the 1970s (Carretta et al. 2023). Current management priorities are outlined in the 2021-2025 Species in the Spotlight Action Plan.[39] The factors limiting recovery described in the final recovery plan included reduced prey availability and quality, high levels of contaminants from pollution, and disturbances from vessels and sound (NMFS 2008b). Oil spills, disease, and the small population size are also risk factors. It is likely that multiple threats are acting together to impact the whales.

Killer whales, including SRKWs, are a long-lived species, and sexual maturity can occur at age 10 (NMFS 2008b). Females produce a low number of surviving calves (n < 10, but generally fewer) over the course of their reproductive lifespan (Bain 1990; Olesiuk et al. 1990). Compared to NRKWs, which are a resident killer whale population with a sympatric geographic distribution ranging from coastal waters of Washington State and British Columbia north to SEAK, SRKW females appear to have reduced fecundity (Ward et al. 2013; Velez-Espino et al. 2014), and all age classes of SRKWs have reduced survival compared to other fish-eating populations of killer whales in the Northeast Pacific (Ward et al. 2013).

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[38] https://www.fisheries.noaa.gov/feature-story/recovering-threatened-and-endangered-species-report-congress-2019-2020

[39] https://www.fisheries.noaa.gov/resource/document/species-spotlight-priority-actions-2021-2025-southern-resident-killer-whale

Since the early 1970s, annual summer censuses have occurred in the Salish Sea using photo-identification techniques (Bigg et al. 1990; Center for Whale Research (CWR) 2023). The population of SRKW was at its lowest known abundance (n = 67) in the early 1970s following live-captures for aquaria display and highest recorded abundance (98 animals) in 1995. Subsequently, the population declined from 1995-2001 (from 98 whales in 1995 to 81 whales in 2001). Although the population experienced growth between 2001 and 2006 and a brief increase from 78 to 81 whales as a result of multiple successful pregnancies (n = 9) in 2013 and 2014, the population has been declining since 2006. At the time of the 2023 summer census, the CWR reported 75 SRKWs in the population (CWR 2023) (Figure 5-2). The previously published historical estimated abundance of SRKWs was 140 animals (NMFS 2008b), which included the number of whales killed or removed for public display in the 1960s and 1970s (summed across all years) added to the remaining population at the time the captures ended.

Figure 5-2 Population size and trend of Southern Resident killer whales, 1960-2023. Data from 1960-1973 (open circles, gray line) are number projections from the matrix model of Olesiuk et al. (1990). Data from 1974-2021 (diamonds, black line) were obtained through photo-identification surveys of the three pods (J, K, and L) and were provided by the CWR (unpublished data) and NMFS (2008). Data for these years represent the number of whales present at the end of each calendar year, or after the summer census for 2012 onwards.

The Northwest Fisheries Science Center (NWFSC) continues to evaluate changes in fecundity and survival rates, and has updated population viability analyses conducted for the 2004 Status Review for SRKW (Krahn et al. 2004), the science panel review (Hilborn et al. 2012; Ward et al. 2013), and previous 5-year status reviews (NMFS 2011; 2016). Subsequently, population estimates, including data from the most recent five years (2017-2021), project a downward trend over the next 25 years (Figure 5-3). The declining trend is, in part, due to the changing age and sex structure of the population (the sex ratio at birth was estimated in the model at 55% male and 45% female following current trends), but also related to the relatively low fecundity rate observed from 2017 to 2021. Though these fecundity rates are declining, average SRKW survival rates estimated by the NWFSC have been slowly increasing since the late 1990s. The population projection indicates the strongest decline if future fecundity rates are assumed to be similar to 2017-2021, and higher but still declining if average fecundity and survival rates over all years (1985-2021) are used (Figure 5-3). The projection using the highest fecundity and survival rates (1985-1989) shows some stability and even a slight increase over the next decade before severely declining. A 25 year projection was selected because as the model projects out over a longer time frame (e.g., 50 years), there is increased uncertainty around the estimates (also see Hilborn et al. 2012).

The scenario using the most recent (2017-2021) survival and fecundity rates may be a more reliable estimation if current levels of survival and poor reproduction continue. This predicted downward trend in the model is driven by the current age and sex structure of young animals and number of older animals in the population. The range of population trajectories reflects the endangered status of the SRKWs and variable periods of decline experienced over the long and short term and is based on a limited data set for the small population. The analysis does not link population growth or decline to any specific threat, but reflects the combined impacts of all past threats. As a long-lived species with a low reproductive rate, it will take time for SRKWs to respond to a reduction in threats. It will be difficult to link specific actions to potential future improvements in the population trajectory. One assumption shared across all scenarios presented here is that female reproduction will be similar to the average (given the age of animals and time period). Because many reproductive-aged females have not produced a calf in the last decade, we would expect the SRKW population to decline even more rapidly if the number of females not reproducing continues to increase, or these females continue to fail to produce calves.

Another factor to consider is the potential effects of inbreeding (generally a risk for any small population). Many of the offspring in recent years were sired by two fathers, meaning that less than 30 individuals make up the effective reproducing portion of the population (Ford et al. 2011). Additionally, several offspring that were tested for paternity resulted from matings between parents and their own offspring. While these inbreeding effects are estimated to be slightly negative, they are difficult relationships to estimate given the small sample size. Recent genomic analyses indicate that the SRKW population has greater inbreeding and carries a higher load of deleterious mutations than do Alaska resident or transient killer whales, and that inbreeding depression is likely impacting the survival and growth of the population (Kardos et al. 2023). Kardos et al. (2023) further point out that inbreeding depression can substantially limit the recovery of endangered populations. These factors likely contribute to the SRKW’s continued poor status.

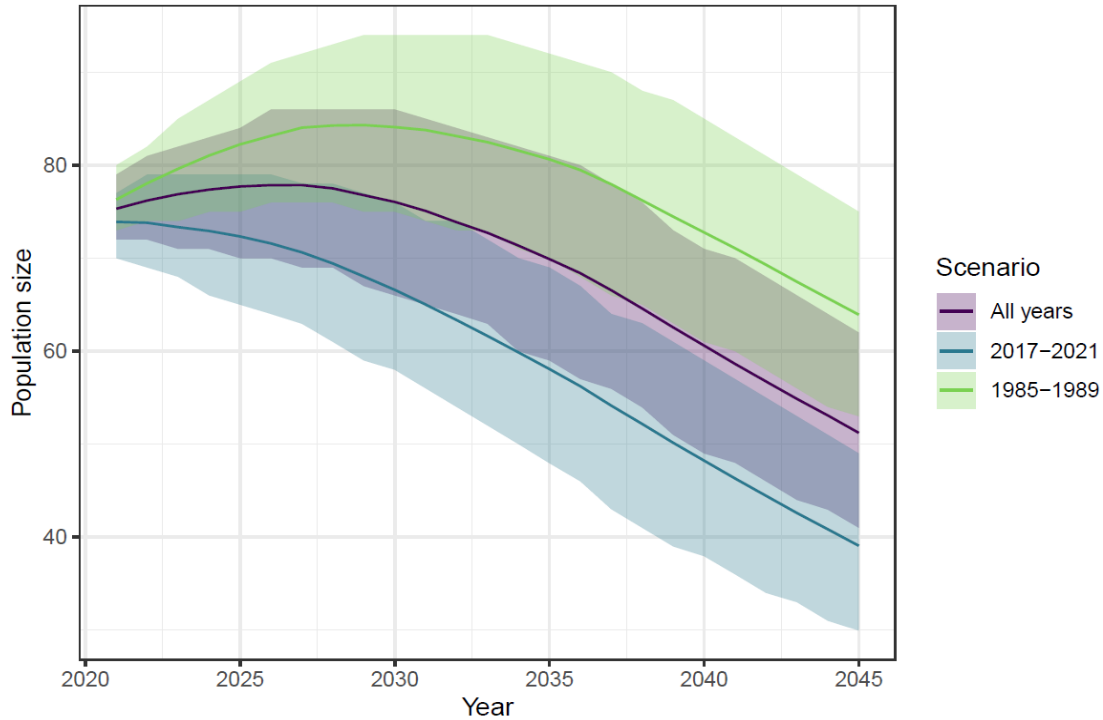

Figure 5-3 Southern Resident killer whale population size projections from 2020 to 2045 using three scenarios: (1) projections using fecundity and survival rates estimated over the entire time series (1985-2021), (2) projections using rates estimated over the last five years (2017-2021), and (3) projections using the highest survival and fecundity rates estimated, during the period 1985-1989 (figure from NMFS 2021).

SRKW consume a variety of fish species (22 species) and one species of squid (Ford et al. 1998; Ford et al. 2000; Ford and Ellis 2006; Hanson et al. 2010; Ford et al. 2016), but salmon are identified as their primary prey. The best available information suggests an overall preference for Chinook salmon (*Oncorhynchus tshawytscha)* during the summer and fall. Chum salmon (*O. keta)*, coho salmon (*O. kisutch)*, and steelhead (*O. mykiss*) may also be important in the SRKW diet at particular times and in specific locations. Rockfish (*Sebastes* spp.), Pacific halibut (*Hippoglossus stenolepis*), and Pacific herring (*Clupea pallasi*) were also observed during predation events (Ford and Ellis 2006), however, these data may underestimate the extent of feeding on bottom fish (Baird 2000). A number of smaller flatfish, lingcod (*Ophiodon elongatus*), greenling (*Hexagrammos* spp.), and squid have been identified in stomach content analysis of resident whales (Ford et al. 1998).

SRKWs are the subject of ongoing research, the majority of which has occurred in inland waters of Washington State and British Columbia, Canada, during summer months and includes direct observation, scale and tissue sampling of prey remains, and fecal sampling. The diet data suggest that SRKWs are consuming mostly larger (i.e., generally age 3 and up) Chinook salmon. Chinook salmon is their primary prey despite the much lower abundance in comparison to other salmonids in some areas and during certain time periods. Factors of potential importance include the Chinook salmon's large size, high fat and energy content, and year-round occurrence in the SRKW geographic range. Chinook salmon have the highest value of total energy content compared to other salmonids because of their larger body size and higher energy density (kilocalorie per kilogram (kcal/kg)) (O'Neill et al. 2014). For example, in order for a killer whale to obtain the total energy value of one Chinook salmon, they would need to consume, on average, approximately 2.7 coho, 3.1 chum, 3.1 sockeye, or 6.4 pink salmon (O'Neill et al. 2014). Research suggests that killer whales are capable of detecting, localizing, and recognizing Chinook salmon through their ability to distinguish Chinook salmon echo structure as different from other salmon (Au et al. 2010). Though SRKW do not only consume Chinook salmon, the degree to which killer whales are able to or willing to switch to non-preferred prey sources from their primary prey (i.e., Chinook salmon) in all times and locations is unknown and likely variable depending on time and location. The overall yearly energetic needs of SRKW from Chinook salmon ranges from 570 million kcal while in inland waters to 2.8 billion kcal while in coastal waters. The highest Chinook salmon kcal requirement occurs in coastal waters during the October-April timeframe, which reflects both the larger number of days in that season, and a greater amount of time spent in coastal waters.

The three primary threats, as identified in the 5-year Species in the Spotlight action plan, for SRKW are insufficient prey, high levels of contaminants (contaminant sources may include contaminated prey, wastewater treatment plants, sewer outfalls, pesticides, etc.), and impacts from vessels and sound (NMFS 2008b; NMFS 2021b). Chinook salmon are the primary prey of SRKW throughout their geographic range, which includes the analysis area. The availability of Chinook salmon to SRKWs is affected by a number of natural and human actions. The most notable human activities that cause adverse effects include land use activities that result in habitat loss and degradation, hatchery practices, harvest, and hydropower systems, as well as anthropogenic climate change. Naturally-occurring climate patterns such as the Pacific Decadal Oscillation and the El Nino/Southern oscillation conditions can cause changes in ocean productivity that can affect natural mortality of salmon. Predation in the ocean also contributes to natural mortality of salmon. Salmonids are prey for pelagic fishes, squid, birds, and marine mammals (including SRKW).

Recent decades have brought rising concern over the adverse environmental effects resulting from the use and disposal of numerous chemical compounds in industry, agriculture, households, and medical treatment. Many types of chemicals are toxic when present in high concentrations. Despite the enactment of modern pollution controls in recent decades, studies have documented high levels of polychlorinated biphenyls (PCBs) in SRKW (Ross et al. 2000, Ylitalo et al. 2005, Krahn et al. 2007). These and other chemical compounds have the ability to induce immune suppression, reproductive impairment, and other physiological effects, as observed in studies of other marine mammals. In addition, high levels of emerging contaminants, such as polybrominated diphenyl ethers (PBDEs; flame retardants), that may have similar negative effects have been found in killer whales and have an expanding presence in the environment (Rayne et al., 2004, Krahn et al. 2007). Contaminants enter marine waters and sediments from numerous sources, but are typically concentrated near areas of high human population and industrialization. Freshwater contamination is also of concern because of its impacts on salmon populations during sensitive life stages. Human growth in the Puget Sound area is projected to continue to increase in the future which may exacerbate contaminants entering marine waters, unless government, industry, and the public work on ways to minimize pollution. The Final Recovery Plan calls for clean-up of contaminated sites, and monitoring and minimizing inputs of toxic chemicals into the SRKW habitat and food chain (NMFS 2008b).

SRKWs also experience high levels of exposure to vessels and associated sounds. Commercial shipping, whale watching, ferry operations, and sport boating traffic have expanded in many regions in recent decades, including the northeastern Pacific. Commercial fishing boats can also be a prominent part of the vessel traffic in many areas. Several studies have linked vessels with short-term behavioral changes in NRKW and SRKW (Kruse 1991, Kriete 2002, Williams et al. 2002a, Foote et al. 2004). Potential impacts from vessels are poorly understood, but may affect foraging efficiency, communication, and/or energy expenditure through physical presence or increased underwater sound levels or both. Collisions with vessels are also a potential source of injury (NMFS 2008b).

Of the threats listed above, only the consideration of prey availability for SRKW overlaps with the proposed actions—the issuance of an ITS that would exempt incidental take in the SEAK salmon fisheries and the continued funding of grants to the State of Alaska, both of which alone do not authorize the fisheries but do facilitate the prosecution of the SEAK fisheries that can affect prey availability for SRKW. SRKW critical habitat does not overlap with the range of effort of SEAK salmon fisheries, however effects to prey (i.e. a physical or biological feature essential to conservation of SRKW critical habitat) are likely to affect SRKW critical habitat. The other identified threats to SRKWs, contaminants and exposure to vessels and associated noise, are concentrated in the Pacific Northwest Region, and the issuance of the ITS and continued funding would not change exposure to contaminants and vessel and noise (as fishing in SEAK does not overlap in time and space with SRKWs, or the other essential features of SRKW critical habitat, and so is not a source of noise or physical disturbance).

5.6.1.1.2. Effects of Alternatives on Southern Resident Killer Whales

The effects on the SRKW DPS from the actions considered in the 2019 BiOp —consultation on the delegation of authority to manage salmon troll and sport fisheries in the EEZ to the State of Alaska, and funding to the State of Alaska for the implementation of the 2019 PST Agreement in SEAK—were extensively analyzed in the 2019 BiOp. The Programmatic Draft Environmental Impact Statement for Funding of the Prey Increase Program for Southern Resident Killer Whales prepared by NMFS also presents updated information on SRKW (NMFS 2024). These documents are incorporated by reference here.

The analysis of the effects of the actions considered in the 2019 BiOp on the SRKW DPS was based on the best available science and supported the determination that the actions analyzed in that BiOp would not jeopardize the continued existence of the SRKW DPS. The 2019 BiOp made a "no jeopardy" determination and a no destruction or adverse modification of designated critical habitat determination, which supported the issuance of an ITS that exempted the incidental take of SRKW DPS in a manner consistent with the terms and conditions of the 2019 BiOp.

In response to the court orders on the 2019 BiOp, however, NMFS must prepare a new BiOp; the proposed 2024 BiOp will be updated based on the best scientific and commercial data available. If the BiOp reaches a "no jeopardy" determination based on the best scientific information, this analysis assumes NMFS would issue an ITS and that the BiOp would contain similar effects analyses as the 2019 BiOp, likely with more clarity on the use of surrogates for monitoring and defining the level of take in the ITS for SRKW.

The harvest of Chinook salmon that may occur in SEAK salmon fisheries subject to provisions of the 2019 PST Agreement is likely to result in some level of harm constituting take of the SRKW DPS by reducing prey availability, which may cause animals to forage for longer periods, travel to alternate locations, or abandon foraging efforts. All individuals of the SRKW DPS have the potential to be adversely affected across their range.

NMFS estimates how the SEAK fisheries are expected to reduce SRKW prey. Annual average prey reductions in Oregon and California are expected to be much lower (0.8% and 0.03%, respectively). On average, under the 2019 PST Agreement, NMFS preliminarily estimates that SEAK fisheries are expected to reduce SRKW prey abundance annually by—

- 3.5% or an annual average of 22,500 fish in SWWCVI,
- 1.3% or an annual average of 13,000 fish in the Salish Sea, and
- 4% or an annual average of 37,500 fish in NOF.

Even if the SEAK fisheries did not occur, some of the fish "saved" by forgone harvest in SEAK salmon fisheries would be captured in other fisheries or consumed by marine predators. These additional mechanisms for capture of Chinook salmon are factored into the reduced prey analysis mentioned above. To understand how this decrease in fish would impact SRKW, NMFS estimates kilocalories (kcals) of Chinook salmon available to SRKW. While NMFS is unable to quantify how prey reductions affect the foraging efficiency of SRKWs, the kcal estimates provide context for the potential impacts on SRKWs. Larger reductions in low abundance years may result in proportionally fewer kcals available to the whales and may present added concern. There are approximately 5.5 billion kcals of Chinook salmon estimated to be available in the Salish Sea following all fisheries at 2019 PST Agreement levels and other likely domestic constraints, which is 8 to 9.6 times greater than the total annual metabolic needs for SRKW in inland waters. This would increase to 5.7 billion kcals of Chinook salmon available in the Salish Sea if SEAK fisheries were not to occur, leaving 8.3 to 10 times greater Chinook salmon than annual inland metabolic needs for SRKW. Additionally, there are approximately 20.7 billion kcals of Chinook salmon estimated to be available following fisheries in coastal waters (SWWCVI to California), which is 7.3 to 8.8 times greater than the total annual metabolic needs for SRKW. This would increase to 21.5 billion kcals of Chinook salmon available in coastal waters if SEAK fisheries were not to occur, leaving 7.6 to 9.2 times greater Chinook salmon than annual coastal metabolic needs for SRKW. Therefore, although the SEAK salmon fisheries reduce the amount of prey available, even with the SEAK salmon fisheries operating at 2019 PST Agreement levels we expect there will be more Chinook salmon kcals available than what is required metabolically by the SRKW, following recent trends of occurrence and Chinook salmon diet composition. Finally, it is worth noting that some priority Chinook salmon stocks for SRKW (NOAA and WDFW 2018) are caught by SEAK salmon fisheries. While the stocks contributing the most to SEAK catch are not priority for SRKW, the Columbia Upriver Brights, third on the priority list for SRKW, make up nearly 20% of the fishery catch (see Appendix B1 in PSC 2022).

NMFS cannot quantify impacts to foraging behavior or any changes to health of individual killer whales in the population from a specific amount of removal of potential prey resulting from the SEAK fisheries because data needed to establish quantitative relationships between prey availability and these effects to SRKW are not available. Therefore NMFS is using the level of Chinook salmon catch in SEAK as a surrogate for incidental take of SRKW. Chinook salmon catch in SEAK, which we can quantify, relates to the extent of effects on prey availability from the proposed actions related to the SEAK fisheries, as we would expect catch to be related to the reduction in prey. The extent of take for SRKW is therefore described by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that define annual catch or total mortality limits on Chinook salmon (including ESA-listed and non ESA-listed Chinook salmon). Post-season percent prey reductions are also used as a surrogate for SRKW take.

Alternatives 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2) and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management

Therefore, the SEAK salmon fisheries would be included in the SRKW ITS issued under the 2019 BiOp and proposed 2024 BiOp, and NMFS therefore assumes the State would authorize the fisheries to proceed. As noted above, the harvest of salmon that may occur in SEAK salmon fisheries subject to provisions of the 2019 PST Agreement is likely to result in some level of harm constituting take to SRKW by reducing prey availability, which may cause animals to forage for longer periods, travel to alternate locations, or abandon foraging efforts. The effects to the SRKW from all SEAK salmon fisheries subject to the 2019 PST Agreement are analyzed in the 2019 BiOp and are incorporated by reference here. In addition, in response to the court orders, NMFS is preparing a new BiOp and if the BiOp reaches a "no jeopardy" determination based on the latest scientific information, this analysis assumes NMFS would issue an ITS and that the BiOp would contain similar effects analyses as the 2019 BiOp, albeit with more clarity on the use of surrogates for monitoring and defining the level of take in the ITS.

NMFS estimates that as a result of the prosecution of the SEAK fisheries an estimated 22,500, 13,000, and 37,000 fewer fish, on average annually, are available for SRKW consumption in the SWWCVI, Salish Sea and NOF areas, respectively. While the prosecution of these fisheries does result in a decrease in available prey for the SRKW, it does not reduce the available amount of Chinook salmon below the total annual metabolic needs for the SRKW. The incidental take of SRKW DPS in SEAK fisheries will be limited on an annual basis by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that define the limits of catch and total mortality or exploitation rate of Chinook salmon for each fishery. In addition, measures of Chinook salmon catch, total mortality, and exploitation rate are used as surrogates for the incidental take of the SRKW DPS, as well as post-season percent prey reductions, because they can be monitored directly and readily assessed for compliance.

The proposed actions (the issuance of an ITS and the continued funding) would facilitate salmon fishing in SEAK that would reduce the prey availability for SRKW; however, the expected catch of Chinook salmon would be limited by the provisions of Chapter 3, Annex IV of the 2019 PST Agreement that define annual catch or total mortality limits on Chinook salmon (including ESA-listed and non ESA-listed Chinook salmon). As analyzed above, catch at this level in the SEAK fisheries does have impacts on SRKW prey availability and energetic needs as analyzed in this EIS, the 2019 BiOp, and other analyses on the effects of fishing on SRKW, as well as other analyses on the effects of PST fisheries including the EIS for funding for prey availability (NMFS 2024). Further analysis on the effects of the SEAK fisheries would be available in a proposed BiOp and ITS under Alternative 2. There are no other potential impacts to SRKW from the operation of the fisheries in SEAK (such as entanglements, vessel strike, or vessel disturbance/noise) because the SEAK fisheries do not overlap with the range and critical habitat of SRKW. Any issued ITS would be based on: (1) the requirements of the ESA, (2) the supporting analysis of the effects of the actions, (3) the "no jeopardy" for ESA listed species and no destruction or adverse modification of designated critical habitat determinations, (4) reasonable and prudent measures and terms and conditions for the issuance of the proposed ITS, and (5) the best scientific and commercial data available.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

Effects of this Alternative could have some beneficial effects on the SRKW compared to Alternatives 1 and 2, since under Alternative 3, there would be no catch of Chinook salmon from SEAK salmon fisheries subject to the PST, because they would not be prosecuted in the absence of the ITS or continued funding. The effects of not exempting SRKW take for the SEAK salmon fisheries under Alternative 3, with the assumed closure of the SEAK salmon fisheries (which precludes the possibility of those catches occurring), reduces the adverse effects to SRKW relative to the reduction of Chinook harvest as a result of closure of the SEAK salmon fisheries subject to the PST. As noted above, as a result of the prosecution of the SEAK fisheries an estimated 22,500, 13,000, and 37,000 fewer fish, annually, are available for SRKW consumption in the SWWCVI, Salish Sea, and NOF areas, respectively. The absence of the SEAK salmon fisheries could have the effect of allowing an increased number of these estimated Chinook to migrate south toward SRKW feeding areas. However, in the absence of SEAK fisheries, Chinook salmon not caught in the SEAK salmon fisheries could still be subject to harvest in a sequence of fisheries and simultaneously exposed to consumption by a variety of marine predators before becoming available as prey to SRKW. From SEAK, the Chinook salmon migratory pathway proceeds through fisheries in northern BC, central BC, Vancouver Island, and Southern BC. More directed Chinook salmon fisheries occur off the coasts of Oregon, Washington, especially near the Columbia River, and in Puget Sound. In considering all PST Chinook salmon landed (not just ESA-listed stocks) in the PST area from 2009–2021, on average, only 17% were harvested in Alaska compared with 35.6% in Canada, and 47.4% for other U.S. states. There could therefore be some beneficial increase in the estimated number of fish available to SRKW.

There are no other relative benefits for SRKW from Alternative 3 (such as reduced entanglements, vessel strike, or vessel disturbance/noise) because the SEAK fisheries do not overlap with the range and critical habitat of SKRW.

5.6.1.1.3. Effects of Reasonably Foreseeable Future Actions on SRKWs

The SRKW DPS has been impacted by a multitude of anthropogenic (pollution, vessel noise, vessel strikes, etc.) and genetic effects that are likely to continue into the reasonably foreseeable future. Pollutants that are ingested by SRKWs have been shown to accumulate inside these animals, especially in blubber, and can lead to a variety of deleterious effects to the health and reproductive potential of these animals. The bodies of SRKWs are known to contain some of the highest concentrations of toxic PCBs of any animal ever tested. Individual SRKWs have also been found to contain high concentrations of other pollutants such as DDT and PBDEs, which can result in pregnancy failures and affect immune system function (EPA study[40]). High levels of these pollutants have been measured in blubber biopsy samples from SRKWs compared to other resident killer whales in the North Pacific (Ross et al. 2000; Krahn et al. 2007; Krahn et al. 2009; Lawson et al. 2020). More recently, these pollutants were measured in fecal samples collected from SRKWs, and fecal toxicants matched those of blubber samples, which provides another resource to evaluate exposure to these pollutants (Lundin et al. 2016a; Lundin et al. 2016b). These pollutants have the ability to cause endocrine disruption, reproductive disruption or failure, immunotoxicity, neurotoxicity, neurobehavioral disruption, and cancer (Reijnders 1986; Subramanian et al. 1987; de Swart et al. 1996; Bonefeld-Jørgensen et al. 2001; Reddy et al. 2001; Schwacke et al. 2002; Darnerud 2003; Legler and Brouwer 2003; Viberg et al. 2003; Ylitalo et al. 2005; Fonnum et al. 2006; Viberg et al. 2006; Darnerud 2008; Legler 2008). Moreover, the toxic

[40] https://www.epa.gov/salish-sea/southern-resident-killer-whales#. Accessed on 5/8/2023

substances stored in the blubber of these animals can be released into their bodies during periods of dietary stress (Lundin et al. 2016b), thereby exacerbating the effects of prey limitations.

Noise associated with vessel traffic can make it difficult for SRKWs to find food and mates. Research has shown that SRKWs spend more time traveling and performing surface behaviors and less time foraging in the presence of all vessel types, including kayaks (Holt 2008; Lusseau et al. 2009; Noren et al. 2009; Williams et al. 2010). New models of SRKW behavior showed that both males and females spent less time foraging, with fewer prey-capture dives and less time spent in prey capture dives, when vessels were near (within 400 yds. on average) (Holt et al. 2021). The impact was greater for females, who were more likely than males to switch from deep and intermediate foraging dives to other activities (e.g., travel and respiration states) when vessels were near (Holt et al. 2021).

Genetic studies of SRKWs suggest that inbreeding depression could also be reducing the survival and growth of SRKWs, and that it is a likely contributing factor in the current level of low abundance (Ford et al. 2018; Kardos et al. 2023). Possibly as a result of inbreeding, SRKWs have a higher load of deleterious genetic mutations than do Alaska resident or transient killer whales. Many of the SRKW offspring in recent years were sired by only two fathers, meaning that less than 30 individuals make up the effective reproducing portion of the population (Ford et al. 2011; Ford et al. 2018). Additionally, several offspring that were tested for paternity resulted from matings between parents and their own offspring (Ford et al. 2018). There are no clear or easily obtainable solutions for measures that could alleviate inbreeding depression for SRKWs. The authors of the most recent study (Kardos et al. 2023) have posited that inbreeding depression could be lessened if NRKWs were transplanted into the SRKW's habitat in the hope that they would breed and increase genetic diversity; however, there are no existing or proposed plans for implementing this idea and it is not known if it would be successful.

Taken as a whole, these studies suggest that several other factors, in addition to prey availability, may be limiting the SRKW population. Considering the direct and indirect impacts of the proposed actions (the issuance of an ITS and continued funding of grants to Alaska) on prey availability, when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the reasonably foreseeable future actions listed above and in other sections of this analysis, the proposed actions are determined to have some impact on SRKW (through impacts on prey availability), although the impacts from the SEAK fisheries are most likely to be minimal relative to impacts from other fisheries and other anthropogenic impacts across the range of SRKWs. Reduced prey availability attributed to the SEAK salmon fisheries is identified as one of the several known impacts to SRKWs, in addition to other factors that occur within critical habitat in the Pacific Northwest (i.e. local fishing, vessel traffic and noise, and pollution).

5.6.1.2. Humpback Whales – Mexico DPS

5.6.1.2.1. Status of the Mexico DPS Humpback Whale

In 1970, the humpback whale was listed as endangered under the Endangered Species Conservation Act, the predecessor of the ESA. When the ESA was passed in 1973, the humpback whale was listed as endangered throughout its range (35 FR 18319. The humpback whale was originally listed as endangered because of past commercial whaling. Additional threats to the species include vessel strikes, fisheries interactions (including entanglement), and noise. On September 8, 2016, NMFS revised the ESA listing for humpback whales to identify 14 DPSs, listing one as threatened, listing four as endangered, and identifying nine others as not warranted for listing (81 FR 62260). Humpback whales from the threatened Mexico DPS and unlisted Hawaii DPS, could both occur in the action area. Additional information can be found in the following documents:

- The Humpback Whale Recovery Plan (NMFS 1991) - https://www.fisheries.noaa.gov/resource/document/final-recovery-plan-humpback-whale-megaptera-novaeangliae
- Final Alaska Marine Mammal Stock Assessments, 2022 - https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region)
- Global Status Review (Fleming and Jackson 2011) - http://www.car-spaw-rac.org/IMG/pdf/Global_review_of_humpback_whales_Megaptera_novaeangliae_.pdf
- Status Review of Humpback Whale (*Megaptera novaeangliae*) (Bettridge et al. 2015) - http://www.nmfs.noaa.gov/pr/species/Status%20Reviews/humpback_whale_sr_2015.pdf
- NMFS species information - (https://www.fisheries.noaa.gov/species/humpback-whale)

Humpback whales (*Megaptera novaeangliae*) are distinguished by long pectoral flippers, a robust body, a pronounced dorsal fin, and long, complex, repetitive vocalizations (Payne and McVay 1971) during courtship. They are generally dark, but the flippers, sides, and ventral surface of the body and flukes have substantial white coloration. (Katona and Whitehead 1981). Humpback whales are generally solitary animals that form fluid associations, primarily for feeding. Humpback whale groups are typically small (e.g., <10 individuals), and associations do not last long, with the exception of the mother/calf pairs (Clapham and Mead 1999). They feed on pelagic zooplankton and small schooling fish including capelin, herring, and sandlance. Diving behavior varies by season, with average lengths of dives ranging from <5 minutes to 10-30 minutes (Clapham and Mead 1999).

Geographic Range and Distribution

Humpback whales are widely distributed in all oceans except the Arctic Ocean. They generally migrate seasonally between tropical and sub-tropical waters in winter months (where they reproduce and give birth to calves) and temperate and sub-Arctic waters in summer months (where they feed). In summer foraging areas and winter calving areas, they tend to occupy shallower, coastal waters, while they disperse widely in deep, pelagic waters during seasonal migrations (Winn and Reichley 1985). Sexual maturity in the Northern Hemisphere occurs at approximately 5-11 years of age (Clapham 1992; Gabriele et al. 2007; Robbins 2007). Reproduction is annually variable (Robbins 2007).

Humpback whales are present in SEAK in all months of the year and are expected to be found in the action area year round. Most SEAK humpback whales winter in low latitudes, but some individuals have been documented over-wintering near Sitka and Juneau (National Park Service (NPS) Fact Sheet available at http://www.nps.gov/glba). Late fall and winter whale habitat in SEAK appears to correlate with areas that have over-wintering herring such as lower Lynn Canal, Tenakee Inlet, Whale Bay, Ketchikan, and Sitka Sound area (Baker 1985; Straley 1990a). Ferguson et al. (2015) identified four Biologically Important Areas (BIAs) for humpback whale feeding in the Gulf of Alaska based on feeding aggregations that have persisted through time. The feeding BIAs in SEAK occur in the spring (March-May), summer (June-August) and fall (September-November) as seen in Figure 5-4. Most whales from the Mexico DPS depart for Mexico in fall or winter and begin returning to SEAK in spring, with continued returns through the summer and a peak occurrence in SEAK during late summer to early fall. Therefore, Mexico DPS humpback whales feeding in SEAK may overlap with the operation of SEAK fisheries. Whales from the unlisted Hawaii DPS and listed Mexico DPSs overlap on feeding grounds off Alaska, including SEAK, and are not easily distinguishable from each other.

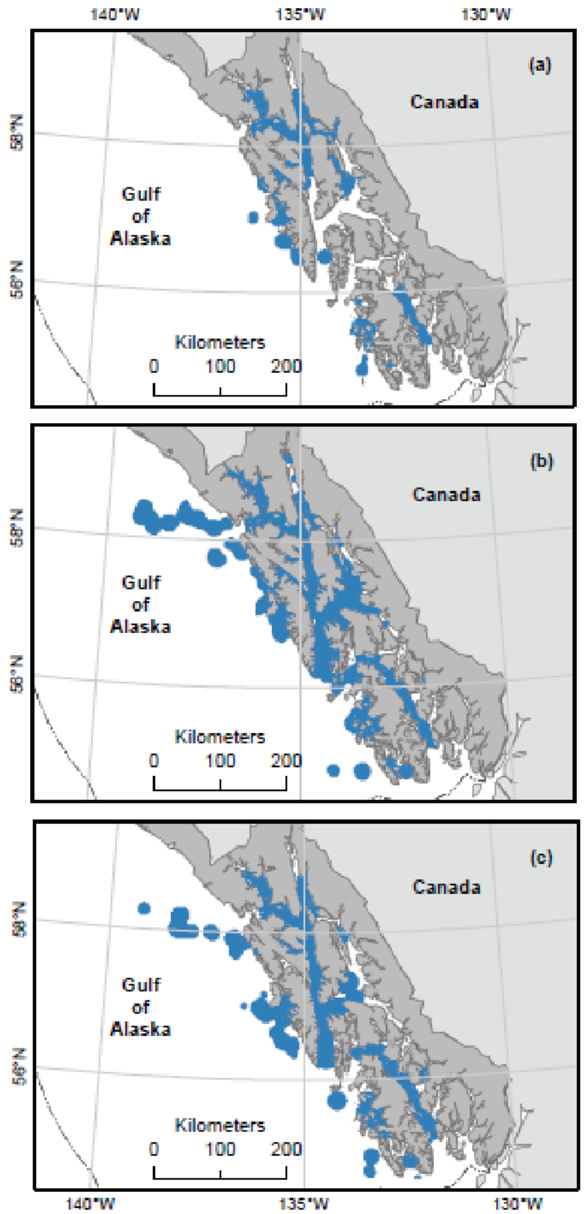

Figure 5-4 Seasonal humpback whale feeding BIAs in Southeast Alaska for (a) spring; (b) summer; and (c) fall (Ferguson et al. 2015).

Abundance, Productivity and Trends

The Final 2022 stock assessment report (SAR) (Young et al. 2023) is the most recent SAR (88 FR 4162; January 24, 2023) for humpback whales and reflects updated Marine Mammal Protection Act (MMPA) stock designations that more closely align with the ESA humpback whale DPSs. In order to use the best available information, the Final 2022 SARs for information on humpback whales is used in this analysis. The Hawaii stock of humpback whales is consistent with the Hawaii DPS and the Mexico – North Pacific stock of humpback whales is consistent with a subset of the Mexico DPS as shown in Table 5-9.

Table 5-9 ESA DPS of origin for North Pacific humpback whale, units, and stocks.

ESA DPS	Units	MMPA Stocks
Mexico	Mexico - North (N) Pacific unit	Mexico - N Pacific stock
	Mainland Mexico - CA-OR-WA DIP*	Mainland Mexico - CA-OR-WA stock

*Demographically independent population

The overall abundances for each DPS have been estimated by Wade (2021) using a Multi-State mark-recapture model, where the Mexico DPS abundance is estimated at 2,913 animals (CV = 0.066) and the Hawaii DPS abundance is estimated at 11,540 animals (CV = 0.042). However, both DPSs distribute broadly on the feeding grounds. Relatively high densities of humpback whales occur throughout much of SEAK and northern British Columbia, particularly during the summer months and is estimated by Wade (2021) at 5,890 animals (CV = 0.075). Of these whales, only a small number (2%) are from the Mexico DPS, with the majority (98%) from the non-listed Hawaii DPS (Wade 2021).

Threats

The humpback whale species was originally listed as endangered because of past commercial whaling. Additional threats to the species include vessel strikes, fisheries interactions (including entanglement), and noise. Brief descriptions of threats to humpback whales follow. More detailed information can be found in the humpback whale recovery plan, Final 2022 SARs (Young et al. 2023), global status review (Fleming and Jackson 2011), and the status review of humpback whales (Bettridge et al. 2015).

Natural Threats

The most common predator of humpback whales is the killer whale (*Orcinus orca*, Jefferson et al. (1991)), although predation by large sharks may also be significant (attacks are mostly undocumented). Attacks by killer whales on humpback whales likely vary in frequency across regions (Ford and Reeves 2008). There is also evidence of shark predation on calves and entangled whales (Mazzuca et al. 1998). Exposure and effects from toxins and parasites are a known threat to humpback whales. Domoic acid and saxitoxin, derived from harmful algal blooms, have been detected in humpback whales (Lefebvre et al. 2016).

Anthropogenic Threats

Human activities are known to threaten humpback whales. Historically, whaling represented the greatest threat to every population of whales and was ultimately responsible for the ESA-listing, but this threat has largely been curtailed. No whaling occurs within the range of Mexico DPS humpbacks. Fleming and Jackson (2011), Bettridge et al. (2015), and the 1991 Humpback Whale Recovery Plan (NMFS 1991) list the following range-wide anthropogenic threats for the species: vessel strikes, fishery interactions including entanglement in fishing gear, subsistence harvest, illegal whaling or resumed legal whaling, pollution, and acoustic disturbance. Vessel strikes (Fleming and Jackson 2011), and fishing gear entanglement (Fleming and Jackson 2011; Bettridge et al. 2015) are listed as the main threats and sources of anthropogenic impacts to humpback whale DPSs in Alaska.

<u>Fishery Interactions including Entanglements</u>

Entanglement in fishing gear is a documented source of injury and mortality to humpbacks. Entanglement may result in minor injury or may potentially significantly affect individual health, reproduction, or survival (Fleming and Jackson 2011). A 2003 and 2004 study in SEAK found at least 53% of humpback individuals showed some kind of scarring from entanglement (Neilson et al. 2005). Bettridge et al. (2015) report that fishing gear entanglements may moderately reduce the population size or the growth rate of the Mexico DPS.

Several known interactions resulting in entanglements, mortality, or serious injury of Mexico - North Pacific stock humpback whales in SEAK are documented in the Final 2022 SAR. The SEAK salmon drift gillnet fishery has a mean estimated annual mortality rate of 5.5 (CV = 1.0) humpback whales, with 0.13 (CV = 1.1) attributed to the Mexico – North Pacific stock/ Mexico DPS. Therefore, Central North Pacific humpback whales (the MMPA stock in SARs prior to the Final 2022 SAR that has since been updated) are listed under the 'Marine Mammal Species and Stocks Incidentally Killed or Injured' in the final 2023 MMPA List of Fisheries (88 FR 16899; March 21, 2023), and the proposed 2024 MMPA List of Fisheries would change for the SEAK salmon drift gillnet fishery the Central North Pacific humpback whale stock to the Hawaii stock and Mexico – North Pacific stock (88 FR 62748, September 13, 2023)). Other sources of serious injury and mortality in SEAK attribute a minimum mean annual mortality and serious injury rate from commercial fishing gear of 0.1 to the Mexico - North Pacific stock humpback whales in 2011-2015 (Young et al. 2023). These include known entanglements with commercial longline gear, commercial and sport pot gear, subsistence gillnet, marine debris, and stationary net pens and mooring systems and are considered minimums because not all interactions and entanglements are observed and not all observations are reported (Young et al. 2023). Within SEAK, information on interactions between humpback whales and fixed gear fisheries are detailed at length in the 2019 BiOp. Additional information is expected in the forthcoming 2024 BiOp.

Vessel Strikes and Disturbance

Vessel strikes often result in life-threatening trauma or death for humpbacks. Vessel strikes on humpback whales are typically identified by evidence of blunt trauma (fractures of heavy bones and/or hemorrhaging) in stranded whales, propeller wounds (deep slashes or cuts into the blubber), and fluke/fin amputations on stranded or live whales (Fleming and Jackson 2011). The Final 2022 SARs report an estimated annual vessel strike of 1.9 humpback whales/year, where 0.05 mortalities/annually are attributed to the Mexico – North Pacific stock. As the vessel traffic and whale watching effort increases in SEAK, whales are increasingly exposed to the underwater noise of vessels and a need to navigate around boats. A 2019 study of whale watching vessels in Juneau, Alaska, and humpback whales found behavioral responses to the presence of whale watching vessels from land-based platforms, including increased swimming speed, direction changes, decrease in inter-breath intervals; increased respiration rate was associated with increased time around vessels (Schuler et al. 2019). If and how these short-term responses to vessel disturbance translate into long term impacts is unknown.

Other Threats

Humpback whales accumulate various contaminants in their blubber, as a result of feeding on contaminated prey or inhalation in areas of high contaminant concentrations (Barrie et al. 1992; Wania and Mackay 1993; Wise et al. 2019). The health effects of different doses of contaminants are currently unknown for humpback whales (Krahn et al. 2004).

Anthropogenic sound has increased in all oceans over the last 50 years (Croll et al. 2001; Weilgart 2007). Low-frequency sound comprises a significant portion of this increase and stems from a variety of sources. Specific impacts of these sounds on humpback whales are not fully understood. However, the geographic scope of potential impacts is vast, as low-frequency sounds can travel great distances under water. It does not appear that humpback whales are often involved in strandings related to noise events. Detrimental effects of anthropogenic noise include masking[41] and temporary threshold shifts[42].

Whaling is no longer a threat to humpback whales, and there are no reported takes of humpback whales by subsistence hunters in Alaska for the 2016-2020 period (Young et al. 2023).

As with most large whales, climate change is likely to have effects on humpback whales. Projected sea surface temperature increases could force humpback whales to search for new breeding grounds as old grounds would no longer be within their historic temperature range by century's end (von Hammerstein et al. 2022). Humpback whale prey species could also shift in distribution, range, and abundance, forcing humpback whales to search for new feeding grounds which could have energetic and reproductive consequences (Fleming et al. 2016). The timing and severity of these potential impacts is unknown.

5.6.1.2.2. Effects of Alternatives on Humpback Whales – Mexico DPS

The effects on the listed humpback whale - Mexico DPS from the actions considered in the 2019 BiOp - the consultation on the delegation of authority to manage salmon troll and sport fisheries in the EEZ to the State of Alaska, and funding to the State of Alaska for the implementation of the 2019 PST Agreement in SEAK - were extensively analyzed in the 2019 BiOp and are incorporated by reference here. Incidental take could occur with the issuance of an ITS as "harm" under the definition of take, as direct interactions with SEAK salmon fisheries (i.e., entanglement).

The analysis of the effects of the action considered in the 2019 BiOp on the humpback whale - Mexico DPS was based on the best available science and supported the determination that the actions analyzed in that BiOp, as well as the level of take exempted in the ITS, would not jeopardize the continued existence of the humpback whale - Mexico DPS. The 2019 BiOp and "no jeopardy" determination supported the issuance of an ITS that exempted the incidental take of the humpback whale - Mexico DPS in a manner consistent with the terms and conditions of the 2019 BiOp. The court did not find any issues with NMFS's analysis on the effects and takes relative to humpback whale – Mexico DPS.

In response to the court orders on the 2019 BiOp, however, NMFS must prepare a new BiOp; the proposed 2024 BiOp will be updated based on the best scientific and commercial data available. If the BiOp reaches a "no jeopardy" determination based on the best scientific information, this analysis assumes NMFS would issue an ITS and that the BiOp would contain similar effects analyses as the 2019 BiOp, but would be revised for the Mexico DPS of humpback whales based on new information, such as new resolution on the distribution of listed species across SEAK.

Take by entanglement is primary adverse effect to listed humpback whale – Mexico DPS from the operation of the SEAK salmon fisheries. NMFS has preliminarily determined that the prosecution of the SEAK salmon fisheries as specified under the 2019 PST Agreement may result in minimal take to humpback whales - Mexico DPS. A maximum of four individuals from the Mexico DPS are reasonably certain to interact annually with the salmon fisheries associated with the Federal actions. This includes momentary contact with fishing gear (blow-through interactions), entanglement and drowning in fishing gear, and extended entanglements that may persist with animals for hours, weeks, or even years. Extended entanglements may result in

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[41] The addition of sound to the auditory environment that may mask other sounds.

[42] A temporary shift in the auditory threshold. It may occur suddenly after exposure to a high level of noise, a situation in which reduced hearing can be experienced. A temporary threshold shift results in temporary hearing loss.

reduced fitness, growth, annual survival, reproductive success, and/or survival of the affected individual. Entanglements may restrict an animal's ability to swim, avoid predators, or foraging efficiently; cause physical injuries; or otherwise increase energy expenditures that reduce overall survival and fitness. Of these interactions, NMFS has preliminarily determined that 0.29 interactions per year would result in M/SI. In other words, one animal from the Mexico DPS is likely to experience M/SI every 3 years as a result of interactions with the SEAK salmon fisheries.

Alternatives 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2), and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA-listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

Under Alternatives 1 and 2, take of the humpback whale - Mexico DPS in the SEAK salmon fisheries would be exempted in the ITS issued, and NMFS therefore assumes the State would authorize the fisheries to proceed. As noted above, the prosecution of the SEAK salmon fisheries subject to provisions of the 2019 PST Agreement is likely to result in take to humpback whales - Mexico DPS. The effects to the humpback whales - Mexico DPS from all SEAK salmon fisheries subject to the 2019 PST Agreement is analyzed in the 2019 BiOp and is incorporated by reference here. In addition, in response to the court orders, NMFS is preparing a new BiOp and if the BiOp reaches a "no jeopardy" determination based on the latest scientific information, this analysis assumes NMFS would issue an ITS and that the BiOp would contain similar effects analyses as the 2019 BiOp, but would be revised for the Mexico DPS of humpback whales based on new information, such as new resolution on the distribution of listed species. NMFS has preliminarily estimated the minimum and maximum numbers of mortalities from each SEAK fishery. NMFS has preliminarily determined that the amount of take reasonably certain to occur in all SEAK salmon fisheries would be 4 Mexico DPS humpback whale interactions occurring on average each year, including 0.29 M/SI occurring on average each year (1 M/SI over three years, Table 5-10). There is no current PBR for this population, nor a current estimate of rate of increase for the population. However, best available data suggests that humpback whale populations in the North Pacific are increasing (Barlow, 2011; Martinez-Aguilar, 2011), therefore a M/SI rate of 0.29 whales per year is not likely to have population level effects for the Mexico DPS of humpback whales.

Table 5-10 Summary of potential interactions and M/SI estimates for humpback whales by SEAK salmon fishing gear type with the specific ESA DPS in question indicated in parentheses. Estimates are broken out by minimum estimates and those that are considered reasonably certain to occur. This is a preliminary estimate that NMFS will update in the final 2024 BiOp based on the best scientific and commercial data available.

Humpback whales					
SEAK Fishery		Minimum		Reasonably Certain	
		All Humpback whales	Mexico DPS only	All Humpback whales	Mexico DPS only
Gillnet Fisheries	Interactions	48.5	0.97	156.5	3.13
	M/SI	6.9	0.14	13.2	0.26
Purse Seine Fishery	Interactions	0.2	0.004	0.2	0.004
	M/SI	0.2	0.004	0.2	0.004
Troll Fisheries	Interactions	0	0	*Rare event possible	
	M/SI	0	0	*Rare event possible	
Humpback whale Totals	**Interactions**	**48.7**	**0.97**	**156.7**	**3.13**
	M/SI	**7.1**	**0.14**	**13.4**	**0.27**

In addition, the SEAK salmon fisheries do not directly compete for prey resources with humpback whales, as SEAK fisheries target adult salmon, whereas humpbacks opportunistically target juvenile salmon, mainly from hatchery releases. Vessel strikes with SEAK salmon commercial fishery vessels are also not likely to occur as vessels are primarily fishing at slow speeds (~2-3 knots) where the risk of vessel strike is greatly reduced. In addition, when transiting, commercial vessels generally travel at speeds of ~7–8 knots, which is below recommended values (i.e. 10 knots) for safely navigating around large whales (Cates et al. 2017). Sport vessels vary widely in travel speeds and often travel faster than commercial vessels, but as sport vessels are generally smaller and more maneuverable, vessel strikes are exceedingly rare. Finally, NMFS has proposed guidelines (85 FR 53763, August 31, 2020) for safely deterring marine mammals that may reduce rates of fishery interactions with humpback whales.

The proposed actions (the issuance of an ITS and the continued funding) would facilitate salmon fishing in SEAK that could impact listed humpback whale – Mexico DPS, primarily through minimal levels of take (harm from potential entanglements). Because any issued ITS would be based on: (1) the requirements of the ESA, (2) the supporting analysis of the effects of the actions, (3) the "no jeopardy" determination for humpback whale – Mexico DPS, (4) reasonable and prudent measures and terms and conditions for the issuance of the proposed ITS, and (5) the best scientific and commercial data available, the issuance of an ITS would be expected to have minimal impacts to humpbacks whales.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

Effects of this Alternative could have some beneficial effects on humpback whales compared to Alternatives 1 and 2, since under Alternative 3, there would be no possibility of incidental takes of humpback whales from SEAK salmon fisheries subject to the PST, because they would not be prosecuted. NMFS has preliminarily estimated the amount of take expected in the SEAK salmon fisheries (above). The effects of not exempting humpback whale take for the SEAK salmon fisheries under this Alternative, with the assumed closure of the SEAK salmon fisheries, eliminates the risk of take to humpback whales as a result of SEAK salmon fisheries subject to the PST.

5.6.1.2.3. Effects of Reasonably Foreseeable Future Actions on Humpback whales - Mexico DPS

Overall, the humpback whale-Mexico DPS is thought to be approaching recovery goals established for the DPS. The Final 2022 SAR states that the population is likely increasing and that whaling, the major threat that resulted in the listing of humpback whales on the ESA, is no longer a threat. Other threats remain such as climate change and a multitude of anthropogenic effects (pollution, vessel noise, vessel strikes, etc.) are likely to continue into the reasonably foreseeable future. Additional effects of these RFAs and their relation to the proposed action are briefly discussed in Section 5.10 of this analysis and are further discussed in the 2019 BiOp, which is incorporated here by reference.

Considering the direct and indirect impacts of the proposed action when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the RFAs listed above, the impacts of the proposed action are determined to be minimal as the humpback whale -Mexico DPS population is likely increasing, the SEAK salmon fisheries do not compete directly for prey resources, entanglements result in a low M/SI rate (1 mortality every three years,) and vessel strikes from fishery vessels are unlikely due to the slow harvest and transit speeds of commercial vessels and the maneuverability of sport vessels.

5.6.1.3. Steller Sea Lions - Western DPS

5.6.1.3.1. Status of the Steller Sea Lion – Western DPS

On November 26, 1990, NMFS issued the final rule to list Steller sea lions as a threatened species under the ESA (55 FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345; May 5, 1997; Figure 5-5). At that time, the eastern DPS (EDPS) was listed as threatened, and the WDPS was listed as endangered. On November 4, 2013, the EDPS was removed from the endangered species list (78 FR 66140).

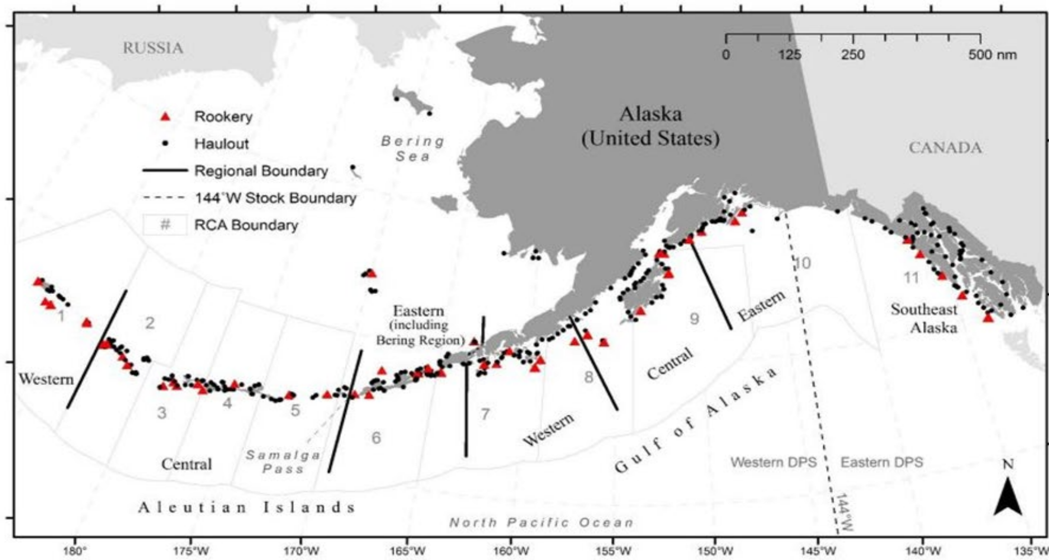

Figure 5-5 NMFS Steller sea lion survey regions, rookeries, haulouts, and longitude 144° West, depicting the separation of eastern and western DPSs distinct population segments. (Fritz et al, 2016).

The WDPS Steller sea lion decreased from 220,000 to 265,000 animals in the late 1970s to less than 50,000 animals by 2000 (Loughlin et al. 1984, Loughlin and York 2000, Burkanov and Loughlin 2005). The most recent comprehensive aerial photographic and land-based surveys of WDPS Steller sea lions in Alaska were conducted during the 2021 (SEAK and Gulf of Alaska east of Shumagin Islands) and 2022 (Aleutian Islands west of Shumagin Islands) breeding seasons (Sweeney et al. 2022, 2023). The minimum population estimate for the U.S. portion of the range of WDPS Steller sea lions in 2022 was 49,837 animals (Young et al. 2023). The WDPS Steller sea lion non-pup and pup model-predicted counts were 37,333 animals (34,274–40,245) and 11,987 animals (95% credible interval of 11,291–12,703), respectively. In Russia, the modeled count estimate in 2022 was 17,342 (95% credible interval of 13,944–21,354) for non-pups and 6,032 (95% credible interval of 5,555–6,541) for pups (Johnson 2018, Burkanov 2020).

Data from 1978–2022 indicate that WDPS Steller sea lions were at their lowest levels in 2002. Between 2007 to 2022, WDPS non-pup and pup counts increased 1.05% and 0.50% per year, respectively (Sweeney et al. 2023). However, there was high variability among regions. Steller sea lions in the western Aleutian Islands region continued to decline, along with pups in the adjacent central Aleutian Islands region. East of Samalga Pass, Aleutian Islands, pup production slowed or plateaued in the early 2010s, with subsequent non-pup plateauing or declines starting in the late 2010s in all regions (Sweeney et al. 2023). The 2014-2016 North Pacific marine heatwave (PMH), one of the most severe heat waves ever recorded, resulted in reduced survival of adult female Steller sea lions in the Gulf of Alaska and reduced survival of adult female and adult male Steller sea lions in Southeast Alaska (Hastings et al. 2023). It appears that adult females may have recovered from the effects of the PMH, based on recent data (Hastings et al. 2023).

More detailed background information on the status of WDPS Steller sea lions can be found in the latest stock assessment report (Muto *et al.* 2022), the recovery plan for Steller sea lions (NMFS 2008c), and the WDPS Steller sea lion 5-Year Status Review (NMFS 2020). Additional information on Steller sea lion biology, threats, and habitat (including critical habitat) is available online at:

- NMFS website: https://www.fisheries.noaa.gov/species/steller-sea-lion
- WDPS Steller sea lion 5-Year Status Review: https://www.fisheries.noaa.gov/resource/document/western-distinct-population-segment-steller-sea-lion-5-year-review-summary-and
- Steller Sea Lion Recovery Plan: https://www.fisheries.noaa.gov/resource/document/recovery-plan-steller-sea-lion-revision-eastern-and-western-distinct-population
- Most recent stock assessment report: (https://www.fisheries.noaa.gov/s3/2023-06/STELLERSEALIONEumetopiasjubatusWesternU.S.Stock-.pdf).

Distribution, Feeding, and Reproduction
The WDPS of Steller sea lions includes animals born west of Cape Suckling, Alaska (144° W; 62 FR 24345, 50 C.F.R. 224.101). However, individuals move between rookeries and haul out sites regularly, even over long distances between eastern and western DPS locations (Jemison et al. 2013, Jemison et al. 2018, Hastings et al. 2020). Most adult Steller sea lions occupy rookeries during the summer pupping and breeding season and exhibit a high level of site fidelity (Raum-Suryan et al. 2002, Hastings et al. 2017). During the breeding season, some juveniles and non-breeding adults occur at or near the rookeries, but most are on haulouts (sites that provide regular retreat from the water on exposed rocky shoreline, gravel beaches, and wave-cut platforms or ice (Rice 1998, Ban 2005, Call and Loughlin 2005). Steller sea lions disperse widely after the breeding season (late May to July), likely to access seasonally important prey resources. During fall and winter many sea lions disperse from rookeries and increase use of haulouts, particularly on terrestrial sites but also on sea ice in the Bering Sea (Calkins 1998, Sinclair and Gearin 2019).

Steller sea lions are composed of two genetically distinct DPSs, with the dividing line at Cape Suckling (144° W), but listed WDPS Steller sea lions do occur in SEAK and within the action area. Hastings et al. (2020) used mark-recapture models and 18 years of brand resighting data of over 3,500 Steller sea lions to estimate minimum proportions of Steller sea lions with western genetic material in regions within SEAK. Using the approach of applying regional occurrence proportions to regional estimates, 3% of the overall abundance of non-pup Steller sea lions throughout SEAK are from the WDPS. Womble et al. (2005, 2009) studied the seasonal ecology of Steller sea lions in SEAK by relating the distribution of Steller sea lions to prey availability. Figure 5-6 depicts a likely seasonal foraging strategy for Steller sea lions in SEAK. Their results suggest that seasonally aggregated high-energy prey species, such as eulachon and herring in late spring and salmon in summer and fall, influence the seasonal distribution of Steller sea lions in some areas of SEAK. Concentrated numbers of Steller sea lions in the action area are most likely to occur during seasonal prey aggregation. Herring, walleye pollock, salmon, and eulachon are among the species that congregate ephemerally. Similarly, the NMFS 2014 Status Review of SEAK Pacific herring generalizes that sea lions forage on herring aggregations in winter, on spawning herring and eulachon in spring, and on various other species throughout the year. Kruse (2000) reported that herring fishery managers use the presence of Steller sea lions on the spring spawning grounds as an indicator that spawning is imminent.

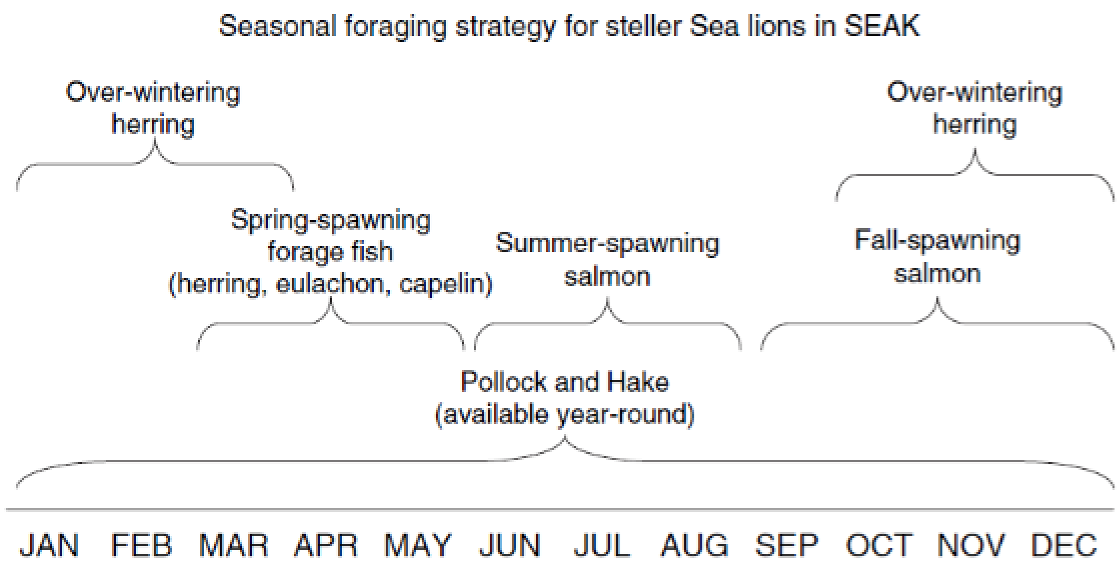

Figure 5-6 Seasonal foraging ecology of Steller Sea Lions. Reproduced with permission from Womble et al. 2009

NMFS expects that Steller sea lion presence in the action area will vary due to their spatial distribution during breeding versus non-breeding seasons. Steller sea lions are predatory and consume a wide range of prey, foraging and feeding primarily at night on over a hundred species of fish and cephalopods. Their diet varies in different parts of their range and at different times of the year, depending on the abundance and distribution of prey species (Gende and Sigler 2006, Womble and Sigler 2006, Womble et al. 2009). Steller sea lions prey on Pacific herring during winter, forage fish spawning aggregations during spring, and migrating Pacific salmon during summer and fall (Womble et al. 2009, Lander et al. 2020, Figure 4-6).

Steller sea lions gather on haulouts year-round and rookeries during the breeding season and regularly travel as far as 250 miles to forage for seasonal prey. However, females with pups likely forage much closer to their rookery. Overall, available data suggest distribution at sea by Steller sea lion in two regions: 1) less than 20 km (12 mi) from rookeries and haulout sites for adult females with pups, pups, and juveniles, and 2) much larger areas (greater than 20 km [12 mi]) where they may range to find optimal foraging conditions once they are no longer tied to rookeries and haulout sites for nursing and reproduction. Merrick and Loughlin (1997) observed large seasonal differences in foraging ranges that may have been associated with seasonal movements of prey, and concluded on the basis of available telemetry data that seasonal changes in home ranges were related to prey availability. Steller sea lions consume a variety of demersal, semi-demersal, and pelagic prey, indicating a potentially broad spectrum of foraging styles, probably based primarily on availability. Primary prey items include eulachon, herring, salmon, Pacific cod, Atka mackerel, pollock, and squid. Diving is generally to depths of 600 feet or less, and diving duration is usually 2 minutes or less.

Female Steller sea lions reach sexual maturity and first breed between three and eight years of age and the average age of reproducing females (generation time) is about 10 years (Pitcher and Calkins 1981, Calkins and Pitcher 1982, York 1994). They give birth to a single pup from May through July and then breed about 11 days after giving birth.

Additional information on Steller sea lion distribution can be found in the Steller Sea Lion Recovery Plan and in the most recent stock assessment report listed at the beginning of this section.

Threats
Brief descriptions of threats to Steller sea lions follow. More detailed information can be found in the Steller sea lion Recovery Plan, the most recent Stock Assessment Report, the Alaska Groundfish Biological Opinion (NMFS 2014), and the WDPS Steller Sea Lion 5-Year Review (NMFS 2020). Table 5-11 lists potential threats and their potential impact on WDPS Steller sea lions' recovery.

Table 5-11 Potential threats and impacts to WDPS Steller sea lion recovery (reproduced from Muto et al. 2019).

Threat	Impact on Recovery	Level of Uncertainty	Reference Examples
Environmental variability	Potentially high	High	Trites and Donnelly 2003, Fritz and Hinckley 2005
Competition with fisheries	Potentially high	High	Fritz and Ferrero 1998, Hennen 2004, Fritz and Brown 2005, Dillingham et al. 2006
Predation by killer whales	Potentially high	High	Springer et al. 2003, Williams et al. 2004, DeMaster et al. 2006, Trites et al. 2007
Toxic substances	Medium	High	Calkins et al. 1994, Lee et al. 1996, Albers and Loughlin 2003, Rea et al. 2013
Incidental take by fisheries	Low	High	Wynne et al. 1992, Nikulin and Burkanov 2000, Perez 2006
Subsistence harvest	Low	Low	Haynes and Mishler 1991, Loughlin and York 2000, Wolfe et al. 2005
Illegal shooting	Low	Medium	Loughlin and York 2000, NMFS 2001
Entanglement in marine debris	Low	Medium	Calkins 1985
Disease and parasitism	Low	Medium	Burek et al. 2005
Disturbance from vessel traffic and tourism	Low	Medium	Kucey and Trites 2006
Disturbance or mortality due to research activities	Low	Low	Calkins and Pitcher 1982, Loughlin and York 2000, Kucey 2005, Kucey and Trites 2006, Atkinson et al. 2008, Wilson et al. 2012

Fisheries
In the action area, NMFS, ADF&G, the Alaska Trollers Association, and others are actively working toward deterrent solutions to reduce interactions between Steller sea lions and salmon hook-and-line fisheries, which include attaching pingers to gear (K. Raum-Suryan, personal communication, May 2023). Commercial fisheries may also indirectly affect Steller sea lions by reducing the amount of available prey or affecting prey species composition. In Alaska, commercial fisheries target known prey species such as salmon, pollock, herring, and Pacific cod in the eastern portion of their range (NMFS 2008c). In some regions fishery management measures appear to have reduced this potential competition (e.g., no trawl zones and gear restrictions on various fisheries in SEAK), and in others the very broad distribution of prey and seasonal fisheries that differs from that of sea lions may minimize competition as well.

There have been multiple cases of serious injuries to Steller sea lions in SEAK from interactions with fishing gear and marine debris. Because EDPS and WDPS animals overlap in SEAK, some of these interactions may have occurred to WDPS animals. Raum-Suryan et al. (2009) observed a minimum of 386 animals either entangled in marine debris or having ingested fishing gear over the period 2000-2007 in SEAK and northern British Columbia. From 2016-2020, a total of 106 incidents (21.2 per year) of interactions between Steller sea lions and fishing gear in SEAK that may involve salmon fishing gear were reported in the SAR (Muto et al. 2021). Of the 106 interactions, 93 interactions (18.6 per year) are reports of Steller sea lions with flashers hanging from their mouths (which may be attributed to either commercial or sport salmon fisheries and the source cannot be readily differentiated). In these cases, the salmon troll hook is generally swallowed and the entanglement is likely fatal. Consequently these are recorded as a full M/SI (=1/each). Two of the 93 flasher/hook entanglements were deemed serious injuries, but the animals were anesthetized and disentangled and thought to have a much higher chance of survival after the intervention. Of the 106 interactions, 13 were from unidentified SEAK fishing gear (gear that could potentially be salmon fishing gear - monofilament, hooks, etc.). Of these, 4 were assigned 0 M/SI based on the orientation of the gear and the other 9 interactions were assigned 1 M/SI each, resulting in 0.8 M/SI per year. From 2016-2020, no incidents involving SEAK gillnet fisheries or the SEAK purse seine fishery were documented.

Harvest
Steller sea lions are hunted for subsistence purposes. From the 5-year period from 2004 to 2008 (more recent data are not available), the annual statewide (excluding St. Paul Island) harvest is 172.3 individuals. More recent data (from 2011 to 2015) from St. Paul and St. George indicate the annual harvest was 30 and 2.4 sea lions, respectively. This results in a total take of 204 individuals (Muto et al. 2022). In addition, the Alaska Native Harbor Seal Commission and ADF&G estimated a total of 20 adult sea lions were harvested on Kodiak Island in 2011, and 7.9 sea lions (confidence interval (CI) = 6-15.3) were harvested in Southcentral Alaska in 2014, with adults comprising 84% of the harvest (Muto et al. 2022).

Illegal Shooting
Illegal shooting of sea lions may occur to an unknown extent in the action area. The Steller Sea Lion Recovery Plan (NMFS 2008) ranked illegal shooting as a low threat to the recovery of the WDPS. Illegal shooting of sea lions was thought to be a potentially significant source of mortality prior to the listing of sea lions as threatened under the ESA in 1990. NMFS has recently documented instances of the shooting of 24 Steller sea lions, including numerous sea lions killed in the Copper River Delta during commercial salmon fishing, resulting in two convictions to date for harassing and killing Steller sea lions with shotguns and obstructing the government’s investigation into criminal activities (Wright 2016, 2017, 2019, DOJ 2018).

Natural and Anthropogenic Noise
Steller sea lions in the action area are exposed to several sources of natural and anthropogenic noise. Natural sources of underwater noise include sea ice, wind, waves, precipitation, and biological noise from marine mammals, fishes, and crustaceans. Anthropogenic sources of noise in the action area include: vessels (e.g., shipping, cruise ships, transportation, and research); construction activities (e.g., drilling, dredging, and pile-driving); sonars; aircraft, and military exercises. The combination of anthropogenic and natural noises contributes to the total noise at any one place and time.

Because responses to anthropogenic noise vary among species and individuals within species, it is difficult to determine long-term effects. Habitat abandonment due to anthropogenic noise exposure has been found in terrestrial species (Francis and Barber 2013).

Noise Related to Construction Activities
NMFS has conducted numerous ESA section 7 consultations related to construction activities in SEAK waters. Many of the consultations have exempted the nonlethal take (by harassment) of marine mammals from sounds produced during pile driving, drilling, and vessel operations. However, because WDPS Steller sea lions are found only in some areas of SEAK, not all consultations in this area result in WDPS Steller sea lion take exemptions.

Anticipated impacts by harassment from noise associated with construction activities generally include changes in behavioral state from low energy states (i.e., foraging, resting, and milling) to high energy states (i.e., traveling and avoidance).

Through the ESA Section 7 consultation process NMFS analyzes the expected take and impacts on WDPS Steller sea lions from construction activities and summarizes their findings in Letters of Concurrence and Biological Opinions that are publicly available through NOAAs Environmental Consultation Organizer.[43]

Pollutants and Discharges

Previous development and discharges in portions of the action area are the source of multiple pollutants that may be bioavailable (i.e., may be taken up and absorbed by animals) to ESA-listed species or their prey items (NMFS 2013a).

The CWA has several sections or programs applicable to activities in offshore waters. Section 402 of the CWA authorizes the U.S. EPA to administer the NPDES permit program to regulate point source discharges into waters of the United States. Section 403 of the CWA requires that EPA conduct an ocean discharge criteria evaluation for discharges to the territorial seas, contiguous zones, and the oceans. The Ocean Discharge Criteria (40 CFR Part 125, Subpart M) sets forth specific determinations of unreasonable degradation that must be made before permits may be issued.

The EPA issued a NPDES vessel general permit that authorizes several types of discharges incidental to the normal operation of vessels, such as gray water, black water, coolant, bilge water, ballast, and deck wash (EPA 2013). In 2018, the President signed into law the Vessel Incidental Discharge Act (VIDA). VIDA requires EPA to develop new national standards of performance for commercial vessel incidental discharges and the USCG to develop corresponding implementing regulations. Interim requirements apply until EPA publishes future standards and the USCG publishes corresponding implementing regulations under VIDA.[44]

The USCG has regulations related to pollution prevention and discharges for vessels carrying oil, noxious liquid substances, garbage, municipal or commercial waste, and ballast water (33 CFR Part 151). The State of Alaska regulates water quality standards within three miles of the shore.

Vessel Interactions

NMFS Alaska Region Stranding Program has records of four occurrences (three confirmed, one unconfirmed) of Steller sea lions being struck by vessels in SEAK (NMFS Alaska Region Stranding Database, accessed May 2, 2023). Although risk of vessel strike has not been identified as a significant concern for Steller sea lions (Loughlin and York 2000), the recovery plan for this species states that Steller sea lions may be more susceptible to vessel strike mortality or injury in harbors or in areas where animals are concentrated (e.g., near rookeries or haulouts; NMFS 2008c). NMFS's guidelines for approaching marine mammals are intended to dissuade vessels from approaching within 100 yards of haulouts and rookeries locations.

Scientific Research

NMFS issues scientific research permits that are valid for five years for ESA-listed species. When permits expire, researchers often apply for a new permit to continue their research. There were 24 active research permits exempting takes of Steller sea lions in Alaskan waters in 2022 (APPS

[43] https://www.fisheries.noaa.gov/resource/tool-app/environmental-consultation-organizer-eco

[44] https://www.epa.gov/vessels-marinas-and-ports/vessels-vgp

2023). Additionally, applications for new permits are issued on an on-going basis; therefore, the number of active research permits is subject to change in the future. Steller sea lions are exposed to research activities documenting their distribution and movements throughout their ranges. Activities associated with scientific research may cause stress to individual Steller sea lions, but, in most cases, harassment is not expected to rise to the level where injury or mortality is expected to occur.

Recovery Goals

In the 2008 recovery plan, NMFS outlined a strategy to meet its goal of promoting the recovery of the WDPS and its ecosystem to a level that would warrant delisting (NMFS 2008c). Since the early 1990s when management actions reduced incidental takes from commercial fishing and legal and illegal shooting of sea lions, recovery efforts have focused on implementing fishery management plans aimed at reducing the impact of commercial fishing on Steller sea lion prey. While counts of pups and non-pups at rookeries in western Alaska increased at a rate of over 2 percent per year between 2003 and 2016, it is unclear if fisheries regulations implemented in the late 1990s contributed to this trend by limiting the catch of prey species or if the management changes and the positive population trend are simply coincidental (NMFS 2008c, Fritz et al. 2016, Muto et al. 2018).

The highest priority goal set by NMFS is to continue to improve estimates of population abundance, trends, distribution, health, and essential habitat characteristics through monitoring and research and to identify key threats to the population. In addition to identifying individual threats, research needs to expand our understanding of how multiple interrelated threats combine to create long-term cumulative impacts on the WDPS. Given the correlation between implementation of fishery management practices and the stabilizing (or slightly increasing) trend in the WDPS, a second priority in the recovery plan is to maintain the current or similar fishery conservation measures (NMFS 2008c).

Critical Habitat

On August 27, 1993, NMFS designated critical habitat for Steller sea lions based on the location of terrestrial rookery and haulout sites, spatial extent of foraging trips, and availability of prey items (58 FR 45269). Designated critical habitat is listed in 50 CFR § 226.202, and includes 1) a terrestrial zone that extends 3,000 ft. (0.9 km) landward from the baseline or base point of each major rookery and major haulout; 2) an air zone that extends 3,000 ft. (0.9 km) above the terrestrial zone of each major rookery and major haulout, measured vertically from sea level; 3) an aquatic zone that extends 3,000 ft. (0.9 km) seaward in state and federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska that is east of 144° W longitude; 4) an aquatic zone that extends 20 nm (37 km) seaward in state and federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska that is west of 144° W longitude; and 5) three special aquatic foraging areas in Alaska: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area.

There are designated haulouts and rookeries in northern SEAK (Figure 5-7). The only meaningful way that SEAK fisheries could affect critical habitat is through prey removal. Steller sea lions are generalist predators that eat a variety of fishes and cephalopods. Thus, we anticipate prey reductions caused in critical habitat (i.e., aquatic zone) will be insignificant.

Figure 5-7 Designated Steller sea lion critical habitat in SEAK.

5.6.1.3.2. Effects of Alternatives on Western Steller Sea Lions

The effects on the Steller sea lion, WDPS from the actions considered in the 2019 BiOp —the consultation on the delegation of authority to manage salmon troll and sport fisheries in the EEZ to the State of Alaska, and funding to the State of Alaska for the implementation of the 2019 PST Agreement in SEAK—were extensively analyzed in that document and are incorporated by reference here. Incidental take could occur in several ways with the issuance of an ITS, with competition for prey resources and direct interactions with gear a possibility.

The analysis of the effects of the action considered in the 2019 BiOp on the Steller sea lion, WDPS was based on the best available science and supported the determination that the actions analyzed in that BiOp, as well as the level of take exempted in the ITS, would not jeopardize the continued existence of the WDPS of Steller sea lion. The 2019 BiOp and "no jeopardy" determination supported the issuance of an ITS that exempted the incidental take of WDPS Steller sea lion in a manner consistent with the terms and conditions of the 2019 BiOp. The court orders did not find any issues with NMFS's analysis on the effects and takes relative to the WDPS Steller sea lion.

In response to the court orders on the 2019 BiOp, however, NMFS must prepare a new BiOp; the proposed 2024 BiOp will be updated based on the best scientific and commercial data available. If the BiOp reaches a "no jeopardy" determination based on the best scientific information, this analysis assumes NMFS would issue an ITS and that the BiOp would contain similar effects analyses as the 2019 BiOp, but would be revised for the WDPS Steller sea lion based on new information, such as new resolution on the distribution of listed species across SEAK.

The issuance of an ITS for SEAK salmon fisheries may result in minimal take to Steller sea lions , WDPS. Take by entanglement is the primary adverse effect to the WDPS Steller sea lion from the operation of the SEAK salmon fisheries. NMFS has preliminarily estimated that a maximum of one individual from the WDPS is reasonably certain to interact annually with the salmon fisheries associated with the Federal actions analyzed in this EIS and that this interaction could result in M/SI. The current PBR is 318 sea lions for the WDPS. M/SI related to entanglement and hook ingestion may reduce fitness, growth, reproductive success, and may cause death of the affected individual. Entanglements may restrict an animal's ability to swim, avoid predators, or foraging efficiently; cause physical injuries; or otherwise increase energy expenditures that reduce overall fitness. However, since the M/SI rate is well below the annual PBR for WDPS of Steller sea lions, the operation of the SEAK fisheries is unlikely to have population level effects.

Alternatives 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2) and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

As noted above, the prosecution of the SEAK salmon fisheries subject to provisions of the 2019 PST Agreement is likely to result in take to Steller sea lions, WDPS. The effects to the Steller sea lions, WDPS from all SEAK salmon fisheries subject to the 2019 PST Agreement is analyzed in the 2019 BiOp and is incorporated by reference here. In addition, in response to the court orders, NMFS is preparing a new BiOp and if the BiOp reaches a "no jeopardy" determination based on the latest scientific information, this analysis assumes NMFS would issue an ITS and that the BiOp would contain similar effects analyses as the 2019 BiOp, but would be revised for the Steller sea lions, WDPS based on new information, such as new resolution on the distribution of listed species.

NMFS has preliminarily estimated that the amount of take reasonably certain to occur in the SEAK fisheries as ~ 1 WDPS Steller sea lion interaction on average each year, including 1 M/SI occurring on average each year. NMFS also preliminarily estimates the minimum and reasonably certain to occur numbers of interactions and M/SI from each SEAK fishery (Table 5-12). Additionally, Steller sea lions are known to consume salmon, however as generalist predators they have the ability to consume a wide range of prey. So while SEAK salmon fisheries may harvest salmon that otherwise may have been consumed by Steller sea lions, Steller sea lions are not likely to be prey limited as they can opportunistically prey on other fish species, or on salmon that avoid capture in SEAK salmon fisheries. Other impacts from fishing in SEAK, such as vessel strikes or pollution, are expected to be de minimus. Finally, NMFS has proposed guidelines (85 FR 53763, August 31, 2020) and is testing methods (e.g., targeted acoustic startle technology, Goetz (2016)) for safely deterring marine mammals away from troll fishing gear and other in-water gear that may reduce Steller sea lion interaction rates.

Table 5-12 Summary of potential interactions and M/SI estimates for Steller sea lions by SEAK salmon fishing gear type with the specific ESA DPS in question indicated in parentheses. Estimates are broken out by minimum estimates and those that are considered reasonably certain to occur. This is a preliminary estimate that NMFS will update in the final 2024 BiOp based on the best scientific and commercial data available.

Steller sea lions					
SEAK Fishery		Minimum		Reasonably Certain	
		All Steller sea lions	WDPS only	All Steller sea lions	WDPS only
Gillnet Fisheries	Interactions	0	0	*Rare event possible	
	M/SI	0	0	*Rare event possible	
Purse Seine Fishery	Interactions	0	0	*Rare event possible	
	M/SI	0	0	*Rare event possible	
Troll Fisheries	Interactions	31.6	0.95	33.8	1.0
	M/SI	31.6	0.95	33	0.99
Steller sea lion Totals	**Interactions**	**31.6**	**0.95**	**33.8**	**1.0**
	M/SI	**31.6**	**0.95**	**33**	**0.99**

The proposed actions (the issuance of an ITS and the continued funding) would facilitate salmon fishing in SEAK that could impact listed Steller sea lion – WDPS, primarily through minimal levels of take (harm from potential entanglements). Because any issued ITS would be based on: (1) the requirements of the ESA, (2) the supporting analysis of the effects of the actions, (3) the "no jeopardy" determination for WDPS Steller sea lion, as well as the no destruction or adverse modification of designated critical habitat determination, (4) reasonable and prudent measures and terms and conditions for the issuance of the proposed ITS, and (5) the best scientific and commercial data available, the issuance of an ITS is expected to have minimal impacts to Steller sea lions.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

Effects of this Alternative could have some beneficial effects on Steller sea lions compared to Alternatives 1 and 2, since under Alternative 3, there would be no possibility of incidental takes of Steller sea lions from SEAK salmon fisheries subject to the PST, because they would not be prosecuted. NMFS has preliminarily estimated the amount of take expected in the SEAK salmon fisheries (above). The effects of not exempting Steller sea lions take for the SEAK salmon fisheries under this Alternative, with the assumed closure of the SEAK salmon fisheries, eliminates the risk of take to Steller sea lions through gear interactions as a result of SEAK salmon fisheries subject to the PST. In addition, the assumed closure of the SEAK salmon fisheries could have some marginal increase in prey availability because Steller sea lions are known to consume salmon at certain times of the year based on existing foraging strategies.

5.6.1.3.3. Effects of Reasonably Foreseeable Future Actions

Steller sea lion abundance has increased overall since their listing in 1990, however in recent years, population growth has plateaued or begun to decrease in several regions, including SEAK. It is possible that environmental changes related to the unparalleled northeast Pacific marine heatwave in the Gulf of Alaska may be a major contributor. The northeast Pacific marine heatwave persisted from 2014-2016, with some cooling in 2017, then continued with warming conditions through 2019 (Litzow et al. 2020, Suryan et al. 2021). This warming could have impacted pup production, juvenile and adult survival and/or movement of Steller sea lions in or out of SEAK (Sweeney et al. 2022). Fisheries competition for prey and direct interactions (i.e. entanglement, ingestion of lures, capture) could play a role in the decline, but other threats, such as climate change and a multitude of anthropogenic effects (e.g. contaminants, illegal shooting, marine debris) are likely also at play. These effects are likely to continue into the reasonably foreseeable future. Additional effects of these RFAs and their relation to the proposed action are further discussed in the 2019 BiOp and is incorporated here by reference.

Considering the direct and indirect impacts of the proposed action when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the RFAs reasonably foreseeable future actions listed above, the impacts of the proposed action are determined to be minimal as the SEAK salmon fisheries have little direct take of Steller sea lions with entanglement resulting in 1 M/SI every year (relative to an annual PBR of 318), and the SEAK fisheries do not severely limit prey availability for WDPS Steller sea lions.

5.6.2. Non-ESA Listed Marine Mammals

5.6.2.1. Harbor Porpoise

Harbor porpoises in the United States are not endangered or threatened. Like all marine mammals, they are protected under the MMPA. Harbor porpoises primarily frequent the coastal waters of the Gulf of Alaska and Southeast Alaska (Dahlheim et al. 2000, 2009), typically occurring in waters less than 100 m deep; however, occasionally they occur in deeper waters (Hobbs and Waite 2010). Within the inland waters of Southeast Alaska, harbor porpoise distribution is clumped with the greatest densities observed in the Glacier Bay/Icy Strait region, near Wrangell and Zarembo Islands, and in the adjacent waters of Sumner Strait (Dahlheim et al. 2009, 2015). Harbor porpoises were recently reclassified into three discrete stocks within SEAK: 1) the Northern Southeast Alaska (N-SEAK) Inland Waters stock, which includes Cross Sound, Glacier Bay, Icy Strait, Chatham Strait, Frederick Sound, Stephens Passage, Lynn Canal, and adjacent inlets; 2) the Southern Southeast Alaska (S-SEAK) Inland Waters stock, which encompasses Sumner Strait, including areas around Wrangell and Zarembo Islands, Clarence Strait, and adjacent inlets and channels within the inland waters of Southeast Alaska north-northeast of Dixon Entrance; and 3) the Yakutat/Southeast Alaska (Y-SEAK) Offshore Waters stock, which includes offshore habitats in the Gulf of Alaska, west of the Southeast Alaska inland waters, and the areas around Yakutat Bay (Zerbini et al. 2022).

The 2022 SAR (Young et al 2023) indicates that the minimum population estimate for harbor porpoise are 1,250 and 610 harbor porpoise for the N-SEAK and S-SEAK Inland Waters stocks, respectively, and there is currently no minimum population estimate for the Y-SEAK Offshore Waters stock.

Harbor porpoise feed on schooling fishes such as cod, herring, pollock, sardines, and whiting, as well as squid and octopus. They usually feed individually, consuming approximately 10% of their body weight each day. In general, harbor porpoises are often seen alone, but at times form small groups of less than ten individuals. They are shy animals: they rarely show curiosity towards vessels and at times will actively avoid them. The harbor porpoise will occasionally "porpoise" out of the water, but generally they surface to breathe in a slow, gentle roll. Diving for an average of four minutes, they are frequent and shallow divers, although they have been observed diving to depths of up to 200 feet.

Additional information on harbor porpoise biology, status, and threats is available at:

Harbor Porpoise Species Description

Marine Mammal Stock Assessment Reports: Cetaceans-Porpoises

Threats

Harbor porpoise are mostly found in nearshore areas and inland waters, including bays, tidal areas, and river mouths (Dahlheim et al. 2009, 2015; Hobbs and Waite 2010). As a result, harbor porpoise are vulnerable to physical modifications of nearshore habitats resulting from urban and industrial development (including waste management and nonpoint source runoff) and activities such as construction of docks and other over-water structures, filling of shallow areas, dredging, and noise (Linnenschmidt et al. 2013). Harbor porpoise are also vulnerable to interactions with fishing gear, and algal toxins are a growing concern in Alaska marine food webs, in particular the neurotoxins domoic acid and saxitoxin. While saxitoxin was not detected in harbor porpoise samples collected in Alaska, domoic acid was found in 40% (2 of 5) of the samples and, notably, in maternal transfer to a fetus (Lefebvre et al. 2016). Predation by large sharks, and killer whales is also of concern.

Interaction with SEAK Salmon Fisheries

The potential threat most likely to result in direct human-caused mortality or serious injury of these stocks is entanglement in fishing gear. There are no other known causes of human-caused mortality and serious injury for these stocks. No recent estimates are available on the rate of interactions between harbor porpoises and SEAK salmon fisheries. In 2012 and 2013, the Alaska Marine Mammal Observer Program (AMMOP) placed observers on independent vessels in the state-managed Southeast Alaska salmon drift gillnet fishery in ADF&G Management Districts 6, 7, and 8 to assess mortality and serious injury of marine mammals (Manly 2015). No mortality or serious injury of harbor porpoise was observed in 2012. However, in 2013, four harbor porpoise were observed entangled and released in drift gillnets. Based on observed mortality and serious injury in two commercial fisheries in 2007-2008 and 2012-2013 and an MMAP fisherman self-report in 2019, the minimum estimated mean annual mortality and serious injury rate incidental to U.S. commercial fisheries between 2016 and 2020, by stock, is: 1) N-SEAK Inland Waters stock = 5.6 harbor porpoise from observed fisheries, 2) S-SEAK Inland Waters stock = 7.4 harbor porpoise from observed fisheries; and 3) Y-SEAK Offshore Waters stock = 22 harbor porpoise from observed fisheries and 0.2 from an MMAP fisherman self-report.

5.6.2.2. Dall's Porpoise

Dall's porpoises in the United States are not endangered or threatened. Like all marine mammals, they are protected under the MMPA. Dall's porpoises are common in the North Pacific Ocean and can be found off the U.S. West Coast from California to the Bering Sea in Alaska. These porpoises are considered the fastest swimmers among small cetaceans, reaching speeds of 34 miles per hour over short distances. There is one stock of Dall's porpoise recognized in Alaska, the Alaska stock. The best available population estimate for this stock is 13,110 in the Gulf of Alaska (Young et al. 2023); however this estimate is based on data from 2015 and only for a portion of the stocks range, therefore it is reasonable to assume that stock size is equal to or greater than that estimate.

Dall's porpoises can dive up to 1,640 feet to feed on small schooling fish (e.g., anchovies, herring, and hake), mid- and deep-water fish (e.g., lanternfish and smelts), cephalopods (e.g., squid and octopus), and occasionally crustaceans (e.g., crabs and shrimp). Feeding usually occurs at night when their prey migrates up toward the surface. They have 38 to 56 very small, spade-shaped teeth (about the size of a piece of grain or rice) on each jaw that are useful for grasping.

Dall's porpoises are usually found in groups averaging between two and 12 individuals, but they have been occasionally seen in larger, loosely associated groups in the hundreds or even thousands of animals. Groups may be fluid as they form and break-up to feed and play. They are known to associate with Pacific white-sided dolphins and short-finned pilot whales but have also been seen swimming alongside large whales. As rapid, social swimmers, Dall's porpoises are also attracted to fast moving vessels and commonly bowride beside ships. They briskly surface while swimming, creating a "rooster tail" of water spray that is a unique characteristic of the species.

Additional information on Dall's porpoise biology, status, and threats is available at:

Dall's Porpoise Species Description

Marine Mammal Stock Assessment Reports: Cetaceans-Porpoises

Threats
Dall's porpoise are faced with several primary threats including entanglement in commercial fisheries gear drift nets, gillnets, and trawls, contaminants and ocean noise.

Interaction with SEAK Salmon Fisheries
Based on historical reports and the stock's geographic range, Dall's porpoise mortality and serious injury is known to occur in gillnet fisheries and, to a lesser extent, in trawl and purse seine fisheries. While trawl fisheries have relatively high levels of observation, gillnet and purse seine fisheries do not. There has only been limited observation of gillnet fisheries in discrete years. Still, mortality and serious injury of Dall's porpoise was documented only in the Southeast Alaska salmon drift gillnet fishery in 2012 and 2013 and the Alaska Peninsula/Aleutian Islands salmon drift gillnet fishery in 1990. In 2012 and 2013, the AMMOP placed observers on independent vessels in the state-managed Southeast Alaska salmon drift gillnet fishery to assess mortality and serious injury of marine mammals. Areas around and adjacent to Wrangell and Zarembo Islands (ADF&G Districts 6, 7, and 8) were observed during the 2012-2013 program (Manly 2015). In 2012, one Dall's porpoise was seriously injured in the drift gillnet fishery. Based on the one observed serious injury, 18 serious injuries in the drift gillnet fishery were estimated for Districts 6, 7, and 8 in 2012. No mortality or serious injury was observed in 2013, resulting in an estimated mean annual mortality and serious injury rate of 9 Dall's porpoise in 2012-2013 in the drift gillnet fishery. Since these three districts represent only a portion of the overall fishing effort in this fishery, we expect this to be a minimum estimate of mortality for the

fishery. There were no Dall's porpoise entanglements reported to the Alaska Region marine mammal stranding network between 2015 and 2019 and a minimum mean annual mortality and serious injury rate of 0.2 Dall's porpoise was calculated between 2015 and 2019. No vessel strikes were reported between 2015 and 2019.

5.6.2.3. Killer whales (multiple stocks)

Several stocks of non-ESA listed killer whales occur in SEAK waters which include the following; Eastern North Pacific Alaska Resident Stock; Eastern North Pacific Northern Resident Stock; Eastern North Pacific Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stock; and the West Coast Transient Stock. Killer whales occur in a wide range of habitats, in both open seas and coastal waters. Killer whales are highly social, and most live in social groups called pods (groups of maternally related individuals seen together more than half the time). Individual whales tend to stay in their natal pods. Pods typically consist of a few to 20 or more animals, and larger groups sometimes form for temporary social interactions, mating, or seasonal concentrations of prey.

Killer whales rely on underwater sound to feed, communicate, and navigate. Pod members communicate with each other through clicks, whistles, and pulsed calls. Each pod in the eastern North Pacific possesses a unique set of calls that are learned and culturally transmitted among individuals. These calls maintain group cohesion and serve as family badges.

Although the diet of killer whales depends to some extent on what is available where they live, it is primarily determined by the culture (i.e., learned hunting tactics) of each ecotype. For example, one ecotype of killer whales in the U.S. Pacific Northwest (called Residents) exclusively eats fish, mainly salmon, and another ecotype in the same area (Transients or Bigg's killer whales) primarily eats marine mammals and squid.

Killer whales often use a coordinated hunting strategy and work as a team to catch prey. They are considered an apex predator, eating at the top of the food web.

Additional information on killer whale biology, status, and threats is available at:

Killer Whale Species Description

Marine Mammal Stock Assessment Reports: Cetaceans-Dolphins

Threats

Killer whales are vulnerable to entanglement in fishing gear, prey limitations due to habitat loss and overfishing; contaminants such as wastewater treatment plants, sewer outfalls, and pesticide application; oil spills and disturbance from vessels and sound.

Interaction with SEAK Salmon Fisheries
No direct mortality of serious injury between SEAK salmon fisheries and killer whales have been documented. Competition for prey resources may occur between fish eating (resident) and SEAK salmon fisheries. No recent vessel strikes for killer whales have been reported in SEAK.

5.6.2.4. Sea otter (Southeast Stock)

Sea otters primarily inhabit nearshore habitats within the 40 meters (m) depth contour where they forage for benthic invertebrates in shallow subtidal and intertidal zones (Riedman and Estes 1990), though they can forage and will occur at depths over 100 m (Bodkin et al. 2004). Sea otters are not migratory and generally do not disperse over long distances, although movements of tens of kilometers (km) (tens of miles [mi]) are common (Garshelis and Garshelis 1984). Annual home range sizes of adult sea otters are relatively small, with male territories ranging from 4 to 11 square kilometers (km2) and adult female home ranges from a few to 24 km2 (Garshelis and Garshelis 1984, Ralls et al. 1988, Jameson 1989). Sea otter distribution and density can vary at small spatial scales seasonally and across years as sea otters seek refuge from storms (Stewart et al. 2015) and populations recover across their historic range (Larson et al. 2014). The trend for the Southeast stock of sea otters has generally been one of growth and expansion (Pitcher 1989, Agler et al. 1995, Esslinger and Bodkin 2009, Tinker et al. 2019, Eisaguirre et al. 2021). The estimated population size (22,359 individuals) of this stock has increased steadily over time (Schuette et al. 2023).

Additional information on sea otter biology, status, and threats is available at:

USFWS Sea Otter Program

Marine Mammal Stock Assessment Reports: Sea Otters

Threats

Sea otters are vulnerable to activities associated with exploration, development, and transport of oil and gas resources, vessel strikes, illegal take of sea otters, predation from wolves, killer whales, bears and eagles; and biotoxins and pathogens. In addition, subsistence harvest of sea otters is allowed in Alaska.

Interaction with SEAK Salmon Fisheries

NOAA Fisheries conducts a marine mammal observer program. Over the last 5 years (2017–2021), there have been no serious sea otter injuries or mortalities in the observed Alaska fisheries. An additional source of information on the number of sea otters killed or injured incidental to commercial fishery operations in Alaska is found in fisher self-reports required of vessel owners by NOAA Fisheries. There also have been no self-reported interactions with sea otters in Alaska over the past five calendar years (2017–2021) from fisheries. Anecdotal observations have been reported to the FWS within the last 5 years, suggesting that sea otters do interact with pot fisheries in Southeast Alaska, but not with SEAK salmon fisheries.

5.6.2.5. Steller sea lion (EDPS)

The eastern DPS includes Steller sea lions originating from rookeries east of Cape Suckling (144° W.) (50 C.F.R. 224.101). The EDPS increased at a rate of 4.25 percent per year (95 percent credible intervals of 3.77-4.72 percent) between 1987 and 2017, based on an analysis of pup counts in California, Oregon, Washington, British Columbia, and Southeast Alaska. The EDPS of Steller sea lions has historically bred on rookeries located in Southeast Alaska, British Columbia, Oregon, and California. However, within the last several years a new rookery has become established on the outer Washington coast (at the Carroll Island and Sea Lion Rock complex), with >100 pups born there in 2015 (R. DeLong and P. Gearin, NMFS-AFSC-MML, pers. comm.).

Behavior, diet, and threats are the same as for the WDPS of Steller sea lions and can be found above in Section 5.6.1.3.

Additional information on Steller sea lion biology, status, and threats is available at:

Steller Sea Lion Species Description

Marine Mammal Stock Assessment Reports: Pinnipeds-Otariids

Interaction with SEAK Salmon Fisheries

Mortality and serious injury of all Steller sea lions from the SEAK salmon fisheries were analyzed in the WDPS analysis. From these totals, the proportion of WDPS Steller sea lions from all Steller sea lions was derived. This analysis inherently gives us the proportion of EDPS Steller sea lions. As noted in Table 5-12, NMFS has preliminarily determined that there are a total of 33 Steller sea lions that are reasonably likely to have M/SI from southeast Alaska salmon fisheries. Of these, 0.99 (rounded to 1 animal) is expected to be from the WDPS and the remaining 32 animals are expected to be from the non-listed EDPS.

5.6.2.6. Humpback whale (Hawaii DPS)

The Hawaii DPS of humpbacks whales breed in the main Hawaiian Islands and feed in most of the known feeding grounds in the North Pacific, including the Aleutian Islands/ Bering Sea, Gulf of Alaska, Southeast Alaska, and northern British Columbia.

Behavior, diet and threats are the same as for the Mexico DPS of humpback whales and can be found above in Section 5.6.1.2.

Additional information on humpback whale biology, status, and threats is available at:

Humpback Whale Species Description

Marine Mammal Stock Assessment Reports: Cetaceans-Large Whales

Interaction with SEAK Salmon Fisheries
Mortality and serious injury of all humpback whales from the SEAK salmon fisheries were analyzed in the Mexico DPS analysis. From these totals, the proportion of Mexico DPS humpback whales from all humpback whales was derived. This analysis inherently gives us the proportion of Hawaii DPS humpback whales. As noted in Table 5-10, NMFS has preliminarily determined that there are a total of 13.4 humpback whales that are reasonably likely to have M/SI from southeast Alaska salmon fisheries. Of these, 0.27 (or one animal every three years) is expected to be from the Mexico DPS and the remaining 13.13 animals are expected to be from the non-listed Hawaii DPS.

5.6.2.7. Effects of Alternatives on Non-ESA Listed Marine Mammals

Alternative 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2), and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA-listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

As non-ESA-listed marine mammals, no ITS is required under either Alternative 1 or 2 for the species discussed in this section. With the prosecution of the SEAK salmon fisheries, the mean annual MMPA take and other potential adverse impacts from the SEAK fisheries, described in Table 5-13 can be expected.

Table 5-13 Takes/Impacts of Marine Mammals in SEAK Salmon Fisheries

Species	Takes in SEAK Salmon Fisheries (Est. Mean Annual Mortality)	Prey Competition
Harbor Porpoise	N-SEAK 5.6 (2012-2013) S-SEAK 7.4 (2012-2013)	None
Dall's Porpoise	9 (2012-2013)	None
Killer Whales	0	Possibly (for salmon eating, or resident, killer whales)
Sea Otter	0	None
Steller Sea Lion *(EDPS)*	Commercial, Sport and Unknown Combined Troll: 32.01	Yes
Humpback Whale *(Hawaii DPS)*	Gillnet: 13.13	None (Target different life stages)

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

The resultant effect of a closure to the SEAK salmon fisheries would be an elimination of the risk of take and other adverse impacts for the marine mammals discussed in this section. In other words, the take described in Table 5-13 would not occur. In addition, any competition that occurred for prey resources under Alternatives 1 and 2 would also not occur.

5.6.2.8. Effects of Reasonably Foreseeable Future Actions

Overall, the marine mammal populations discussed in this section are in general healthy and at robust population levels (see 2022 SAR, Young et al. 2022). An exception to this statement may be warranted for harbor porpoises as there is not enough information to determine their exact status. Other main threats to marine mammals discussed in this section are climate change and a multitude of anthropogenic effects (pollution, vessel noise, vessel strikes, etc.) are likely to continue into the reasonably foreseeable future. Additional effects of these RFAs and their relation to the proposed action are briefly discussed in Section 5.10 of this analysis. Considering the direct and indirect impacts of the proposed action when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the RFAs listed above, the impacts of the proposed action are determined to be generally minimal to moderate as the marine mammals discussed in the section have populations that are generally stable, the SEAK salmon fisheries do not deplete prey resources to a level that would warrant concern for foraging marine mammals in SEAK, entanglements occur at a rates below PBR for all species discussed except harbor porpoises[45] and vessel strikes are unlikely due to the slow harvest and transit speeds of commercial vessels and the maneuverability of sport vessels.

5.7. Habitat

5.7.1. Essential Fish Habitat

The Magnuson-Stevens Act defines Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). Regional Fishery Management Councils and NMFS must describe and identify EFH in fishery management plans (FMPs) (50 C.F.R. 600.815). The analysis area is identified as EFH for the five species of Pacific salmon (NPFMC 2021), 35 species of Gulf of Alaska groundfish (NPFMC 2020), and weathervane scallops (NPFMC 2014). The Pacific salmon species are Chinook, chum, coho, pink, and sockeye salmon. In alphabetical order, the Gulf of Alaska groundfish species are Alaska plaice, Alaska skate, Aleutian skate, arrowtooth flounder, Atka mackerel, Bering skate, blackspotted rockfish, Dover sole, dusky rockfish, flathead sole, greenstriped rockfish, harlequin rockfish, longspine thornyhead rockfish, northern rock sole, northern rockfish, octopus, Pacific cod, Pacific ocean perch, pygmy rockfish, quillback rockfish, redbanded rockfish, redstriped rockfish, rex sole, rosethorn rockfish, rougheye rockfish, sablefish, sharpchin rockfish, shortraker rockfish, shortspine thornyhead rockfish, silvergrey rockfish, southern rock sole, walleye pollock, yelloweye rockfish, and yellowfin sole.

The North Pacific Fishery Management Council is in the process of updating the FMP for Groundfish of the Gulf of Alaska (NPFMC 2020) and the Salmon FMP (NPFMC 2021), as well as three other North Pacific FMPs, with an EFH Omnibus Amendment Package (NPFMC 2023). The updates are summarized in the *Essential Fish Habitat 2023 5-year Review Summary Report* (Harrington et al. *In prep*).

Foreign waters (i.e., off British Columbia in the Gulf of Alaska) and international waters are not included in EFH because they are outside United States jurisdiction.

5.7.2. Habitat Description

The Gulf of Alaska has approximately 160,000 km^2 of continental shelf and is a relatively open marine system with land masses to the east and the north. The dominant circulation in the Gulf of Alaska (Musgrave et al. 1992) is characterized by the cyclonic flow of the Alaska gyre. The circulation consists of the eastward-flowing Subarctic Current system at approximately 50º N. latitude and the Alaska Coastal Current (Alaska Stream) system along the northern Gulf of Alaska. Large seasonal variations in the Alaska Stream and nearshore eddies affect much of the region's biological variability.

Benthic habitat in the eastern Gulf of Alaska is characterized as having a variety of seabed types such as gravel sand, silty mud, and muddy to sandy gravel, as well as areas of hardrock (Hampton et al. 1986). The continental shelf (less than 200 m depth) in the northern part of the action area is

[45] Take of harbor porposise is based on observer information (data from 2012 and 2013) and limited abundance estimates of harbor porpoise. The collection of additional data is planned to provide clarity of the magnitude of effect of SEAK gillnet fisheries on harbor porpoise. Based on the 2012 and 2013 observer data, take of harbor porpoise exceeds PBR for one of three stocks in the action area, the S-SEAK stock (PBR = 6.1) by 1.3 takes per year (7.4 estimated takes per year) (Young et al. 2023). NMFS assumes take that exceeds PBR could have moderate impacts, while take below PBR would have minimal impacts.

relatively wide (Figure 5-8) and the sediment is predominantly clay silt from glacially-fed rivers. Sand dominates nearshore sediments.

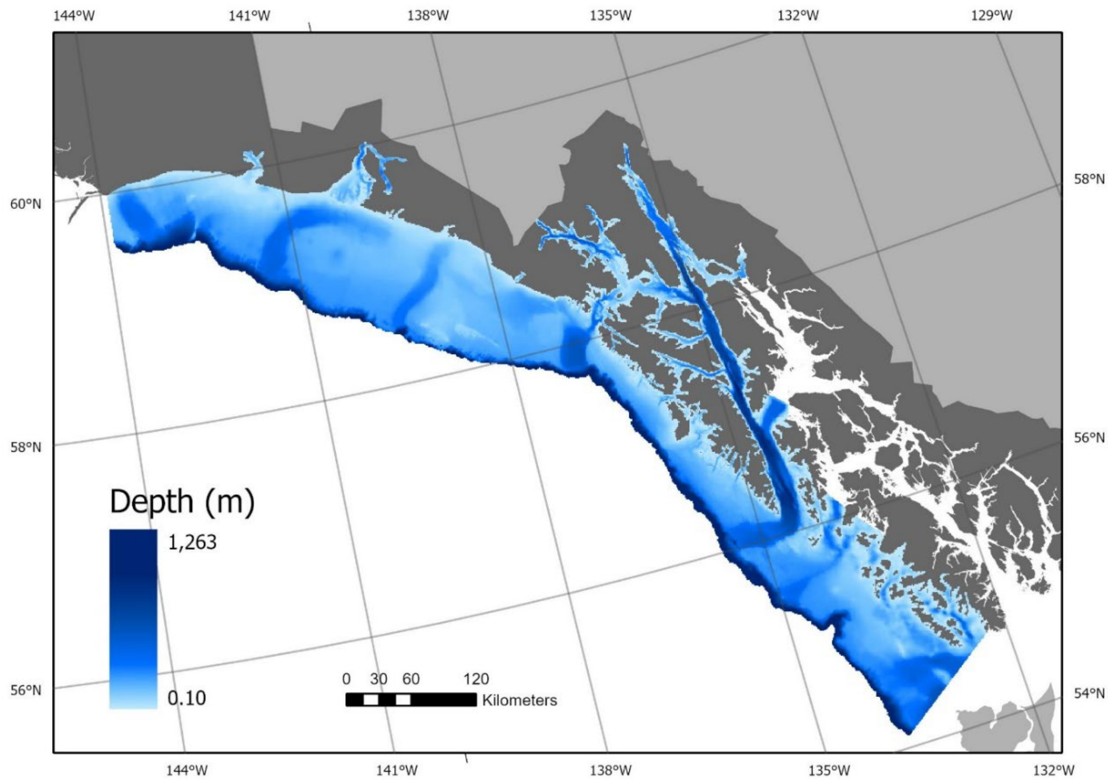

Figure 5-8 Bathymetric map of the eastern Gulf of Alaska action area.

Temperature plays an important role in the Gulf of Alaska habitat. Changes in water temperature can influence physiological processes of fish (e.g., metabolic rates and growth rates), distribution, trophic interactions, availability of spawning sites, and energetic value of prey (Yang et al. 2019, Laurel and Rogers 2020). Local temperatures can influence survival or condition of critical life history periods of certain species, such as salmon in the inside waters of southeast Alaska. For example, during a period of high water temperatures and drought, observations of widespread salmon mortalities were consistent with death due to heat stress (von Biela et al. 2022).

On a larger time scale, there is evidence of biological responses to decadal-scale climate changes through fishery expansions or collapses of similar species complexes. For example, salmon stocks in the Gulf of Alaska and the California Current are out of phase: when salmon stocks do well in the Gulf of Alaska, they do poorly in the California Current and vice versa (NPFMC 2021).

Freshwater habitat for the salmon fisheries in Alaska includes all streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon (NPFMC 2021). ADF&G specifies the various streams that are important for spawning, rearing, or migration of anadromous fishes in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes*. The Catalog is divided into six volumes for the six resource management regions established by the Joint Boards of Fisheries and Games in 1982. The anadromous streams that could be impacted by this proposed action are represented in the Southeastern Region catalog (Giefer and Graziano 2023).

The information in the following four paragraphs were provided by ADF&G and gives an overview of major freshwater salmon habitat identified in SEAK, habitat protection areas, and some current non-fishing actions that cause adverse stream and downstream impacts (see Section 5.7.6 for more discussion on actions with potential adverse impacts to SEAK EFH):

Most of Southeast Alaska rivers are glacially influenced and have pristine or relatively pristine habitat owing to being both remote and roadless. The Situk River is surrounded by old growth spruce and hemlock with limited road access and is among the most productive steelhead habitat in Alaska. The Alsek River habitat, including the Klukshu River, is considered pristine (Hoffman and Thynes 2022). It originates in Kluane National Park and Preserve in Yukon Territory and flows through the glaciated valleys of the St. Elias Mountains and empties into Glacier Bay National Park and Preserve. The entire length of the Alsek River falls within the Kluane / Wrangell–St. Elias / Glacier Bay / Tashenshini–Alsek UNESCO World Heritage Site. The King Salmon River is within the Admiralty Island National Monument and the Kootznoowoo Wilderness Area, both of which provide habitat protections. Similarly, the Unuk, Chickamin, Blossom, and Keta rivers are within the Misty Fjords National Monument in southern SEAK. In the Unuk River, there is some exploratory mining work on the British Columbia side of the drainage, though terrestrial and aquatic habitat remains pristine at this point in time.

The Taku River is a transboundary river flowing south of Juneau, Alaska. In the Taku River, mining activities have occurred and are proposed in various areas in the Canadian portions of the drainage and exploratory work is ongoing in some tributaries. The Tulsequah Chief, Big Bull, and Polaris Mine operations near the U.S./Canada border appear dormant and abandoned; however, the Tulsequah Chief mine site continues releasing small amounts of acid mine drainage into the Tulsequah River about 10 km upstream of the confluence with the Taku River. Further south, the Stikine River is relatively pristine with road access at Telegraph Creek in Canada, though historical mining activities have occurred in the upper Canadian portion of the drainage and the Red Chris Mine is currently active. The largest habitat impacts have resulted from naturally-occurring landslides in the Tahltan River, the Stikine River tributary with largest Chinook and sockeye production (Salomone et al. 2022).

Habitat in the McDonald Lake watershed is considered pristine, and there are no habitat related concerns identified, particularly for the local sockeye stock. Virtually no logging has occurred in the drainage, aside from limited timber removal and other habitat alterations that may have taken place in the early 1900s in association with operation of the federal hatchery at the head of the lake (Walker et al. 2018).

Unlike most other large mainland watersheds in SEAK, the Chilkat River watershed has substantial road access and proximity to a population center with associated infrastructure. As such, the risk of negative anthropomorphic impacts is higher in the Chilkat River mainstem than in other remote salmon producing watersheds. The watershed contains over 300 km of roads, a large portion of which are near the Chilkat River mainstem, including some major tributaries used by Chinook salmon for spawning, rearing, or migration. The roads cross several anadromous tributaries of the Chilkat River, which have the potential to obstruct or hinder fish passage, although Chinook salmon are likely the least impacted salmonid given their preferred habitat and the location of such crossings. Iron, gold, copper, platinum, and palladium deposits exist within the Chilkat River watershed. Placer mining is ongoing in the Porcupine Creek mining district. Exploration of a volcanogenic massive sulfide deposit is underway in a tributary of the Klehini River. The Haines State Forest includes the sub-basins of some of the major tributaries to the Chilkat River. About 15% of the state forest is dedicated to timber harvest, which has occurred since the 1960s. While historical timber harvest in the watershed potentially occurred in *less restrictive settings, all planned timber harvest in future years should have minimal impacts on anadromous fish. A portion of the Alaska Chilkat Bald Eagle Preserve surrounds the Chilkat River and its tributaries upstream of Haines Highway milepost 8 and contains the drainage's waterways and riparian lowlands which provide habitat for Chinook salmon juvenile rearing, emigrating smolt corridors, immigrating adult corridors, and spawning areas (Hagerman et al. 2022d).*

5.7.3. Habitat Protections and Area Closures

There are no national marine sanctuaries or monuments in the analysis area for this proposed action, and therefore this action would not impact national marine sanctuaries or monuments. The Sitka Pinnacles Marine Reserve does fall within the analysis area, but its intended purpose is to function as a groundfish reserve by limiting bottom contact (65 FR 67305; November 9, 2000). Salmon fisheries are thus allowed to operate within the reserve. In addition, the Gulf of Alaska Coral Habitat Protection Area occurs within the analysis area, however, as with the Sitka Pinnacles Marine Reserve, protections are focused on limiting bottom contact and anchoring within the areas specified and salmon fishing is allowed (71 FR 36694; June 28, 2006). Gulf of Alaska Coral Habitat Areas of Particular Concern are three polygons in SEAK, Cape Ommaney, Fairweather Ground NW Area, and Fairweather Ground Southern Area, but they do not carry any fishery management regulations.

The use of trawl gear in the Southeast Outside district (NMFS reporting area 650) is prohibited. This does not affect the prosecution of salmon fisheries, but is noted for overlapping with the analysis area (50 C.F.R. 679.7(b)(1)).

5.7.4. Fishing Effects From Non-Magnuson-Stevens Act Fisheries

Fishing gear can impact habitat used by a fish species for the processes of spawning, breeding, feeding, or growth to maturity. The EFH regulations base the evaluation of the adverse effects of fishing regulated under FMPs on EFH on a "more than minimal and not temporary" standard (50 CFR 600.815(a)(2)). During the 2023 EFH 5-year Review, the fishing effects evaluation modeled habitat disturbance from bottom contact by fishing gear from federally managed fisheries (Zaleski et al. *In prep*); it did not include an evaluation of Non-Magnuson-Stevens Act fishing activities that may adversely affect EFH. The EFH regulations say, "FMPs must identify any fishing activities that are not managed under the Magnuson-Stevens Act that may adversely affect EFH. Such activities may include fishing managed by state agencies or other authorities." (50 CFR 600.815(a)(3)). Here, we offer a qualitative analysis of SEAK salmon fisheries gear impacts to identify which fishing activities, if any, may adversely affect EFH for FMP species in SEAK.

No evidence suggests salmon troll, sport, drift gillnet, set gillnet, or purse seine gear impacts benthic habitat. The activity targets only adult salmon in the water column, successfully avoiding any significant disturbance of the benthos, substrate, or intertidal habitat. The estimated bottom contact during active salmon fishing would be negligible. In a study modeling cumulative human impacts to marine habitats within the EEZ of Canada's Pacific coast, salmon netting and trolling had the lowest estimated impact scores to the benthic habitats compared to all other commercial and sport fisheries, though their impacts to the pelagic habitats scored higher (Ban et al. 2010). There are few studies on direct gillnet impacts, though some note that while the gear can snag on benthic structures, the effects are minimal (Johnson 2002, Whitmire and Wakefield 2019).

Personal use and subsistence fishers access SEAK watersheds for their fishing activities. Hiking into an area can cause damage to riparian vegetation and disturbance of stream beds. Small boat traffic in spawning streams can displace sediment, increase turbidity, have fuel spills, and disturb spawning and juvenile fish habitat (Asplund 2000). The use of off-road vehicles to access streams also has adverse impacts to habitat. These include, but are not limited to, vegetation loss, destabilization of stream banks, disturbance of stream beds, and fuel spills (Davenport and Davenport 2006).

Derelict fishing gear from salmon fisheries is a possible source of adverse impacts to benthic habitat. Derelict gear, along with other types of marine debris, can cause losses to the physical, biological, and chemical ecosystem services of benthic habitats (Gilardi et al. 2010, Whitmire and Wakefield 2019). It is unknown if there are long term effects to EFH if derelict gillnets are fully covered by concentrated sedimentation. The risk of gear loss applies to all in-water fishing gear types and, in a global review, drift gillnets and set gillnets lost 3% and 8% of their gear (for the year 2017), and purse seines lost 7% of their nets or net fragments (Richardson et al. 2019); these gear loss metrics represent a larger scale and do not take into account regional differences or target species. While marine debris is noted in the report on Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska (Section 5.3, Limpinsel et al. 2023), it is not typically incorporated into fishing effects evaluations.

5.7.5. Effects of the Alternatives on Habitat

Alternatives 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2), and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

The estimated impact of SEAK salmon fishing gear on habitat identified in the analysis area is minimal. Under both Alternatives, no changes to fishing location, effort, or gear types are expected and therefore no additional parameters are considered when evaluating the fishing effects of non-Magnuson-Stevens Act fisheries on EFH, as discussed in Section 5.7.4. The impacts to habitat would therefore maintain minimal disturbances to benthic marine habitats, continue some disturbances to freshwater habitat through stream access, and maintain the risk of gear loss that is inherent in fishing operations.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA’s prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

Without an active fishery, there would be no fishing gear effect on bottom habitat, though the impact from SEAK salmon fishing gear is estimated to be minimal. The lack of active fishing would mean any benthic habitat that had been disturbed by fishing gear would have more time to recover from any bottom contact, barring any other non-fishing activity disturbances. There would be a decrease in the risk of introducing new derelict gear to the marine environment from these fisheries, and this could lead to less marine debris on bottom habitat and intertidal areas. Consideration needs to be taken on the impacts of returning salmon to spawning streams and the influx of marine-derived nutrients to habitats that are otherwise fished to meet escapement goals. Additionally, beyond physical impacts to habitat, under Alternative 3 there would likely be a variety of impacts to salmon populations (see Section 5.5.2 for a discussion on possible cascading effects from overescapement), and marine, freshwater, and terrestrial ecosystem components (see Section 5.10.2 for further discussion on nutrient loading).

5.7.6. Effects of Reasonably Foreseeable Future Actions on Habitat

This section considers cumulative effects from reasonably foreseeable fishing and non-fishing actions on habitat in the SEAK analysis area.

Fishing effects from federal fisheries: Fishing gear that contacts the seafloor can impact habitat used by a fish species for the processes of spawning, breeding, feeding, or growth to maturity. The footprint of habitat disturbance varies with gear (type, weight, towing speed, depth of penetration), the physical and biological characteristics of the areas fished, and the susceptibility and recovery rates of biological and geological substrates in the areas fished. When quantifying habitat disturbance for the 2023 EFH 5-year Review, gear parameters were included in a fishing effects model to incorporate the nominal width and bottom contact adjustments for different gear types (Zaleski et al. *In prep*). A time series was developed from 2003, when widespread VMS data became available, and is available through August 2022, and shows a very slight decrease in estimated habitat disturbance for the Gulf of Alaska (Figure 5-9). This decrease could represent gear modifications, shifts in gear types, and changes in effort. Much of the estimated habitat disturbance in the analysis area is likely from fixed gear fisheries since bottom trawling is not permitted in the Southeast Outside district (Figure 5-10).

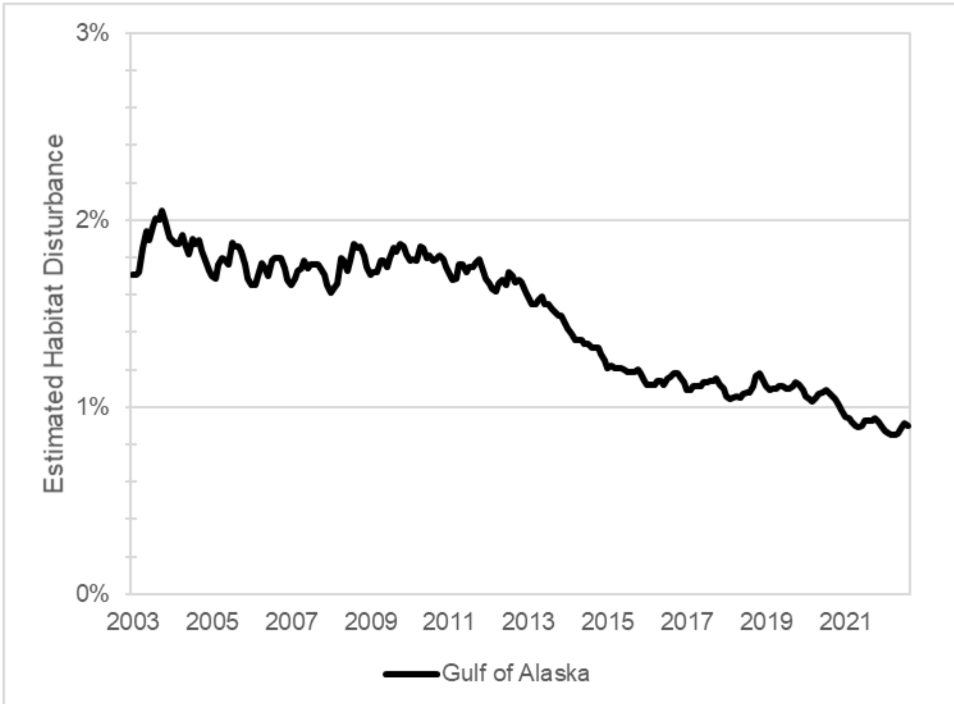

Figure 5-9 Estimated % habitat disturbance by bottom contact of federally managed commercial fishing gear (all gear types) in the Gulf of Alaska.

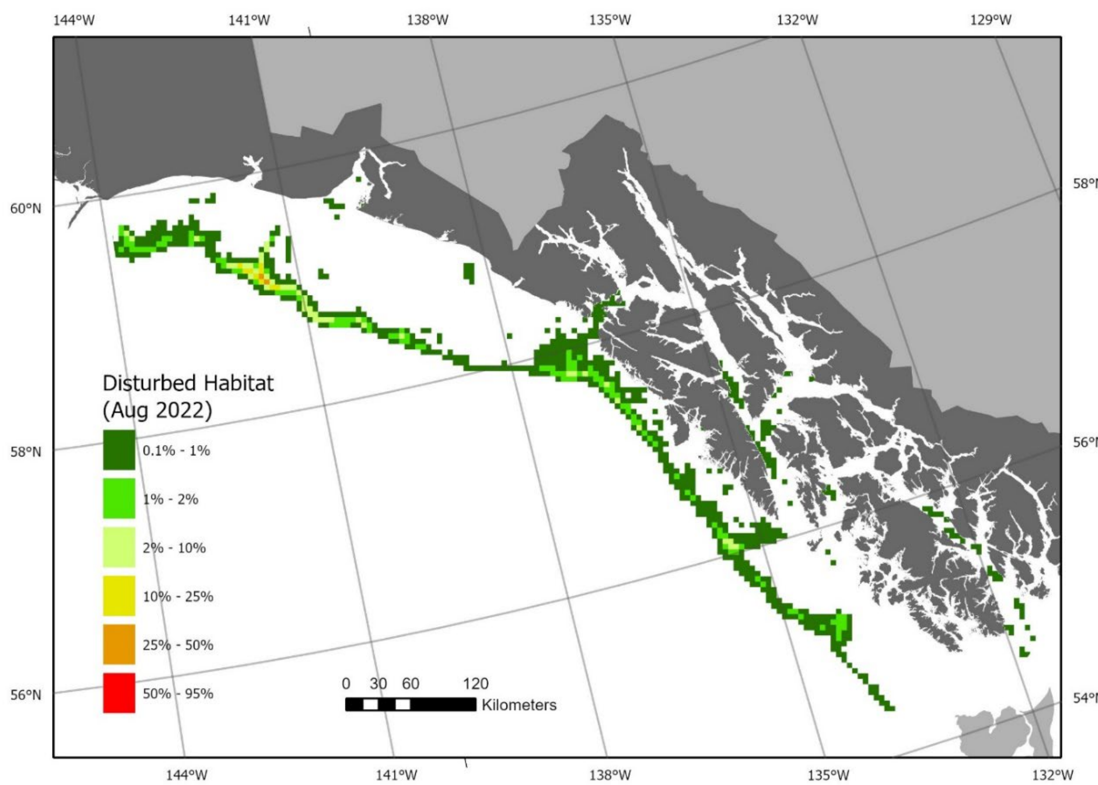

Figure 5-10 Cumulative percentage of estimated habitat disturbed, all gears combined, in the eastern Gulf of Alaska action area.

Vessel noise pollution: Motorized vessels provide a large proportion of anthropogenic noise in marine habitats (Popper and Hawkins 2019). These include fishing vessels, large ships, and personal or sport craft. Most vessels produce predominantly low frequency sounds from onboard machinery and cavitation at propeller blades (Ellison et al. 2012, Ross 1993). Vessel noise production is increasing with increasing vessel traffic, particularly in busy shipping lanes, and vessel noise can increase the ambient noise levels over wide areas of the ocean (Hildebrand 2009, Ellison et al. 2012). Low frequency noise in fish habitats may cause temporary shifts in behavior (de Jong et al. 2020), though the noise produced does not likely exceed mortality or potential mortal injury thresholds to fish (see Table 2, Popper and Hawkins 2019). Short-term behavioral changes may not lead to long-term impacts to fitness or survival (Bejder et al. 2009, Popper and Hawkins 2019). However, there may be unanticipated localized impacts as vessel use increases in certain high-traffic areas.

Docks, harbors, roads, and bridge construction: Docks, harbors, and other coastal construction projects are commonly permitted in SEAK and often require EFH consultations. Through the consultation process, EFH Assessments are prepared by the action agencies and reviewed by NMFS when the action is determined to have an adverse effect, or “any direct or indirect effect that reduces the quality or quantity of habitat” (50 CFR 600.810(a)). NMFS Habitat Conservation Division staff have performed EFH consultations for about 20 projects per year from 2019 through 2023, with fewer projects in 2020 and 2021. Those projects included components of dock or pier construction, seaplane base repairs, dredging and/or filling, pile driving, harbor repairs, road repairs, culvert installation, and bridge construction (see Limpinsel et al. 2023 for impacts and recommendations for these actions). If the rate and type of projects are similar in the foreseeable future, impacts are expected to be avoided, minimized, or mitigated against by agencies establishing best management practices during early coordination and/or adopting conservation recommendations after EFH consultation. A record of projects can be found at the Environmental Consultation Organizer, an information management application covering NMFS consultations pursuant to ESA Section 7 and Magnuson-Stevens Act.

Mining operations: Current and proposed mining operations in SEAK and British Columbia are and have the potential to adversely impact habitat. When considering mining operations, it is important to note the immediate freshwater impacts and the downstream impacts to nearshore marine habitats. Two active mines, Coeur Kensington Mine and Hecla Greens Creek Mine, are in the process of expanding their tailings storage and had EFH consultations with NMFS through action agencies USFS and USACE to evaluate the subsequent increased risk of heavy metal contamination in the watershed and downstream habitats. There is also exploratory mining proposed in the Chilkat River watershed, Palmer Project, and the action of exploration can have adverse impacts as well as the active mining operations. Two proposed transboundary mines in British Columbia are Eskay Creek Mine on the Unuk River and New Polaris Mine on the Taku River. Impacts from mining include heavy metal contaminants, stream dynamic changes, and permanent habitat loss (Limpinsel et al. 2023). See Section 5.7.2 for additional information on mining operations actively impacting and proposed within salmon watersheds.

Climate change: Extended periods of increased SST can lead to marine heat waves (Hobday et al., 2016). The Gulf of Alaska experienced a historic heat wave from 2014-2016, referred to as the “Warm Blob” (Bond et al. 2015, Yang et al. 2019). In early 2014, the warm blob covered an area of ~ 2 million km^2, extending from Baja California to the Gulf of Alaska. The upper 100 m of the water column was more than 2.5°C warmer than the long-term climatological mean (1981–2010). Upper ocean temperatures remained warmer than average through 2016, especially in the Gulf of Alaska and in the vicinity of the Alaska Peninsula (Yang et al. 2019). Extreme biological impacts occurred throughout the marine ecosystem including prey availability, diet composition, shifts in distribution, and shifts in abundance (Cavole et al., 2016).

Temperature conditions in 2022 began persistently cooler at the surface than the previous few years, but increased to persistent warmer conditions in the summer and fall with potential implications for young of year groundfish survival in their first winter. Fall 2022 SSTs were warmer than average across the Gulf of Alaska, with persistent marine heat wave conditions for the month of October across the eastern Gulf of Alaska continental shelf (Ferris and Zador 2022). The marine heat wave conditions in the eastern Gulf of Alaska in the fall could present challenging conditions for adequate lipid storage for winter survival. The continued above-average temperatures at depth remain within the known thermal ranges of groundfish but could present accumulative stress on the demersal and benthic environment (Ferris and Zador 2022).

Warmer temperature conditions can be detrimental to salmon survival in freshwater spawning habitats. Warming temperatures can change run timing for salmon, which can cause a mismatch on habitat suitability for spawning (Taylor 2008). As mentioned in Section 4.7, high instream temperatures can lead to pre-spawning mortality events. It can also exacerbate other stressors such as the spread of disease, stream flow, and hypoxic or anoxic conditions (Belchik et al. 2004, Jones et al. 2020).

Considering the expected effects of the proposed action alternatives, when added to the impacts of the reasonably foreseeable actions listed above, the impacts of the Alternatives 1 and 2 are minimal. This is because the estimated benthic habitat disturbance from SEAK salmon fisheries is little to none depending on the gear type and the risk of pollution, through gear loss, compared to the non-fishing actions listed above is relatively small compared to other fisheries. The impacts of Alternative 3 may be compounded by climate change described above, with warmer stream temperatures and changes in stream flow rates possibly leading to a greater frequency of fish kills during higher-than-expected salmon returns.

5.8. Marine Birds

This section evaluates the potentially affected environment and the impacts of the alternatives on marine birds in SEAK; together with relevant past, present, and reasonably foreseeable actions. The larger grouping of marine birds is divided into “seabird” and “nearshore” subgroups, which represent different ecotypes based on the areas and habitats used by species in each subgroup. Seabirds are defined as species that spend the majority of their time on the open ocean when they are not nesting. Nearshore birds are defined as species that utilize waters closer to shore and can usually be found in sheltered inlets, bays, and inside waters that are protected by the many islands of SEAK.

5.8.1 Status of Marine Birds

5.8.1.1. Seabirds

There are 37 species of seabirds known to occur in SEAK; these include:

- **Tubenoses-Albatrosses and relatives:** northern fulmar, fork-tailed storm-petrel, Leach’s storm-petrel, short-tailed albatross, black-footed albatross, Laysan albatross, sooty shearwater, short-tailed Shearwater
- **Kittiwakes and terns:** black-legged kittiwake, Arctic tern, Aleutian tern, Caspian tern
- **Pelicans and cormorants:** double-crested cormorant, Brandt’s cormorant, pelagic cormorant

- **Jaegers and gulls:** pomarine jaeger, parasitic jaeger, long-tailed jaeger, Bonaparte's gull, herring gull, glaucous-winged gull, Sabine's gull, Thayer's gull
- **Auks:** common murre, thick-billed murre, pigeon guillemot, marbled murrelet, Kittlitz's murrelet, ancient murrelet, Cassin's auklet, parakeet auklet, rhinoceros auklet, tufted puffin, horned puffin
- **Eiders:** common eider, king eider

Of these seabirds, only the double-crested cormorant, glaucous-winged gull, common murre, pigeon guillemot, marbled murrelet, rhinoceros auklet, and Cassin's auklet are known to have directly interacted with or to have been indirectly impacted by SEAK salmon fisheries. Therefore, the rest of this section will focus only on those seabirds that have documented effects from SEAK salmon fisheries.

Life History and Abundance of Seabirds

Seabird life history traits include low reproductive rates—with most species only laying one egg a year— and low adult mortality rates, long life span, and slow maturation rates. These traits make seabird populations extremely sensitive to changes in adult survival, while more robust in adapting to short term fluctuations in reproductive trends. Diets of seabirds vary greatly depending on the species, with food sources ranging from zooplankton to fish. The largest fish targeted as food are the size of eulachon (*Thaleichthys pacificus*) and Pacific herring (*Clupea pallasi*).

For many of the SEAK seabirds there are no sources of population data identified; however, the USFWS, Alaska Maritime Wildlife Refuge monitors seabirds that nest on St. Lazaria Island, the southernmost island in the refuge located southwest of Sitka, Alaska (Parsons et al. 2022). The data for St. Lazaria Island might provide an index of the health of these seabird populations across SEAK. This study tracks nesting populations of pelagic cormorant, glaucous-winged gull, common murre, thick-billed murre, pigeon guillemot, fork-tailed storm petrel, Leach's storm-petrel, and rhinoceros auklet. The following is a summary of findings from Parsons et al. 2022 that describes abundance trends of seabirds on St. Lazaria Island:

- The pelagic cormorant population exhibits large fluctuations with no year-to-year trends.
- The glaucous-winged gull population on St. Lazaria Island has steadily increased from the low in 1994 when monitoring began.
- Common murre and thick-billed murre populations were historically reported together. These populations have shown a slight decrease in abundance since monitoring began in 1994, but appear to have stabilized since 2000.
- The pigeon guillemot population increased from the late 1990s and peaked in 2004 before decreasing slightly. There were no population estimates for pigeon guillemot from 2017 to 2020 but the 2021 estimate is similar to the average population number between 2005 and 2016.
- Population data are not available for the colonies of fork-tailed storm petrel and Leach's storm-petrel; however, burrow density and occupancy data suggest that both species saw a decrease in population from 1994 through 2014, but have increased to historic levels since 2014.
- There are no published population numbers for the rhinoceros auklets, but the apparent occupancy rate for this species in 2022 was the lowest observed since 2005.

The St. Lazaria Island study also tracks reproductive productivity for fork-tailed storm-petrel, Leach's storm-petrel, glaucous-winged gull, common murre, and thick-billed murre compared to the long term average success (NMFS 2022c). Relative reproductive productivity is the number of successful fledglings in a given year compared to the long-term average. In 2021, reproductive productivity was above average for glaucous-winged gull and common murre; average for the forked-tailed storm petrel; and below average for thick-billed murre and Leach's storm petrel. In 2022, reproductive productivity was above average for glaucous-winged gull, thick-billed murre, forked-tailed storm-petrel, and Leach's storm-petrel, and below average for the common murre (H. Renner, pers comm, USFWS, November 27, 2023). These data show a positive trend for long-term relative reproductive success for the seabird colonies on St. Lazaria Island.

Of the seabirds present in SEAK, only the short-tailed albatross (*Phoebastria albatrus*) is listed as endangered (65 FR 46643, July 31, 2000). The short-tailed albatross does not nest in Alaska, but the ESA protects the short-tailed albatross in Alaskan waters and throughout its range. The current short-tailed albatross population estimate is 7,365 and the average growth rate for the population is estimated at 8.9% (USFWS 2020). The population growth is on track to meet the targeted downgrade of the short-tailed albatross from endangered to threatened status under the ESA by 2028 (USFWS 2020). The short-tailed albatross feed mainly on squid and are known to follow fishing vessels and feed off offal discharge.

Previously, Kittlitz's murrelet (*Brachyramphus brevirostris*) was listed as an ESA candidate species. However, USFWS lowered the listing priority for the species from a 2 (highest possible priority for the species) to an 8 (out of 12) (76 FR 66370, October 26, 2011), and then eventually removed Kittlitz's murrelets from the ESA candidate list in 2013 (78 FR 61764, October 3, 2013). This change was based on growing doubts about the severity of the population decline and lack of a clear link between melting glaciers and population change. USFWS has shifted focus from the loss of glaciers to poor reproductive success. Poor nest success (as opposed to adult mortality) could be the underlying reason for the population decline, and if it is occurring range-wide, the population would be expected to continue to decline. USFWS maintains that loss of the adult Kittlitz's murrelets is particularly important and has identified several sources of adult mortality such as hydrocarbon contamination, entanglement in gillnets, and predation. Although none of these sources of mortality alone rises to the level of a threat, in total, the chronic, low level loss of adults, in combination with evidence that a small proportion of the population is breeding, and the low reproductive success led the USFWS to conclude that it will be difficult for this species to maintain a stable population level or rebound from a stochastic event that causes population loss. The USFWS concludes that the magnitude of threat from these sources is low to moderate, depending on events that occur in a given year (number and location of oil spills/shipwrecks, number and location of gillnets) (76 FR 66370, October 26, 2011).

Prey for Kittlitz's murrelets, and most other seabirds, include schooling fishes (capelin, Pacific sand lance, Pacific herring, and juvenile walleye pollock), zooplankton, and other invertebrates.

5.8.1.2. Nearshore Birds

At least 28 nearshore birds occur within the SEAK portion of the action area, including:
Tubenoses: glaucous gull, mew gull
Ducks: green-winged teal, mallard, bufflehead, northern pintail, northern shoveler, American wigeon, greater scaup, lesser scaup, harlequin duck, long-tailed duck, surf scoter, white-winged scoter, common goldeneye, Barrow's goldeneye, red-breasted merganser
Loons: red-throated loon, Pacific loon, common loon
Geese: greater white-fronted goose, snow goose, Canada goose
Miscellaneous: tundra swan, Arctic tern, belted kingfisher, red-necked phalarope, wandering tattler

Of these nearshore birds, only the Pacific loon, wandering tattler, red-throated loon, and white-winged scoter are known to have directly interacted with or to have been indirectly impacted by SEAK salmon fisheries. Therefore the rest of this section will focus only on those nearshore birds that have documented effects from SEAK salmon fisheries.

Life History and Abundance of Nearshore Birds

The nearshore waters provide a different habitat than the open ocean and there are a number of nearshore bird species that use this nearshore area. These birds include members of the ducks, loons, geese, and other miscellaneous species, many of which also use freshwater habitats. Nearshore birds' diets vary depending on the species, with food sources ranging from zooplankton, aquatic plants, and fish. As with seabirds, the largest fish targeted as food for nearshore birds are around the size of eulachon or Pacific herring, but many nearshore birds focus on smaller fish, which are more abundant in the nearshore habitat.

Relative to seabirds, nearshore bird life history traits include slightly higher reproductive rates, with many species of nearshore birds laying multiple eggs in a clutch, higher mortality rates, shorter life spans, and faster maturation rates. While no studies with species-specific population numbers for nearshore bird species could be identified for SEAK, the Alaska Department of Fish and Game has developed the Alaska Species Ranking System (ASRS) to evaluate a species status to determine which species should be the focus of conservation efforts (Gotthard et al. 2012). The ASRS generates a Numerical Category rank for a given species to determine status, biological vulnerability, and if action is needed to conserve the species. Numerical Categories are “I” through “IX”, with “I” being the highest status, most biologically vulnerable, and most in need of action. Numerical Category II signifies a high level of conservation need, these species are known to be in declining population trends, have a high biological vulnerability, and/or high action need (Gotthard et al. 2012). Numerical Categories III and V denote moderately high need for conservation; these species have declining population trends, low biological vulnerability, and low action need or taxa with unknown trends and high biological and/or high action need. Numerical Category VIII indicates moderate conservation need, and these birds are considered “watchlist” species, with stable or increasing population trends, high biological vulnerability and/or high action need. Numerical Category IX are species with a lower need for conservation and species probably do not require as much attention as the other species (Gotthard et al. 2012). Category IX species have unknown, stable, or increasing population trends, low biological vulnerability, and low conservation action needs; while IX is the lowest status, lowest biologically vulnerable and the least in need of action. The following is a summary of the Numerical Category rankings from the ASRS for SEAK near shore bird species:

- **Numerical Category II** – common loon, Arctic loon, belted kingfisher
- **Numerical Category III** – Arctic tern
- **Numerical Category V** – mew gull, common goldeneye, Barrow’s goldeneye, red-necked phalarope
- **Numerical Category VII** – glaucous gull, green-winged teal, surf scoter, white-winged scoter, red-breasted merganser, snow goose, wandering tattler
- **Numerical Category IX** – mallard, bufflehead duck, northern pintail, northern shoveler, American wigeon, greater scaup, lesser scaup, harlequin duck, long-tailed duck, red-throated loon, greater white-fronted goose, Canada goose, tundra swan

There are no nearshore bird species in SEAK that are protected under the ESA.

5.8.1.3. Threats to Marine Birds

Effects of fishing activity on marine birds occur through direct and indirect interactions. Direct interactions include mortality from collisions with vessels, and entanglement with fishing gear (Tide and Eich 2022; Tasker et al. 2000). Many important life history processes of seabird species, such as nesting and mating, do not cause interactions with the fishing fleet. However, when feeding there is the potential for seabirds to interact with gillnet and purse seine salmon fisheries in SEAK. These interactions may result in birds being tangled in fishing gear and either being injured or killed. There are a variety of indirect impacts to seabirds from commercial fisheries, include competition with some fisheries for prey, alteration of the food web dynamics due to commercial fishery removals, disruption of avian feeding habits resulting from developed dependence on fishery waste, fish-waste related increases in gull populations that prey on juveniles of other bird species, and marine pollution and changes in water quality (Tasker et al. 2000). Fluctuations in seabird food availability affect survival (and therefore reproductive output). Fish processing provides food directly to scavenging species of marine birds such as northern fulmars and large gulls. This can increase populations of some species, but it can be detrimental to other species, which may be displaced or preyed upon by gulls. Impacts from birds feeding on fish can result in minor to significant effects on fish populations (Hoffman et al. 1981; Scheel and Hough 1997; Bishop and Green 2001). Because seabirds are long-lived animals, it may take years or decades before relatively small changes in survival rates result in observable impacts on the breeding population; therefore, it is difficult to attribute population changes to specific impacts.

5.8.1.4. Interaction of Marine Birds with SEAK Salmon Fisheries

Under Section 118 of the MMPA, NMFS is required to establish a program to monitor the incidental mortality and serious injury of marine mammals in commercial fisheries. To accomplish this and other requirements of the MMPA, NMFS established the AMMOP to observe State salmon fisheries in order to estimate take of marine mammals. Observers for this program have also collected information related to marine bird bycatch.

AMMOP has done two studies in the SEAK area salmon fisheries. The first occurred in the Yakutat set gillnet fisheries in 2007 and 2008 (Manly 2009), and covered four areas between Cape Suckling and Cape Fairweather, the Alsek River area, the Situk River area, the Yakutat Bay area, and the Kaliakh River and Tsiu River area. The second AMMOP study occurred in 2012 and 2013 and covered SEAK salmon drift gillnet fisheries across three districts and 5 sub-districts, Prince of Wales (Subdistricts 6A, B), Anita Bay (Subdistricts 7A), and Stikine (Subdistricts 8A, B) (Manly 2015). For each study the areas were sampled and reported on separately. AMMOP observers collected seabird bycatch information, but the study methodologies were designed for estimating marine mammal take, not seabird take. Despite this, the seabird bycatch information collected by this program is the best available information to assess the potential impact of the SEAK salmon gillnet fishery on seabirds.

AMMOP for the Yakutat set gillnet fishery (2007 and 2008) had observer coverage ranging from a low of 3.2% in the Alsek River area fishery in 2007 to a high of 10.3% in Kaliakh River and Tsiu River Area in 2008. A total of 13 different species interacted with the Yakutat set gillnet gear; of these, only three species, the common murre, red-throated loon, and marbled murrelet were taken in both 2007 and 2008. Across years, these interactions resulted in takes of individuals from seven different species (See Table 5-14) and six species for which all individuals were released alive. The six species that interacted with fishing gear, but that were released alive in 2007, included one individual from each of these species: glaucous-winged gull, wandering tattler, Pacific loon, and double-crested cormorant. In 2008, one long-tailed duck, and one unidentified murrelet were released alive. The number of observed seabird takes in the Yakutat set gillnet fishery ranged from 1 individual for many species to a high of 11 marbled murrelets in 2007. The yearly observed takes and the extrapolated total takes of each species in the observed area of the Yakutat salmon set gillnet fishery are shown in Table 5-14. These fisheries have not been observed since 2008; therefore, no additional observer data are available.

Table 5-14 The observed and estimated total marine bird takes for all observed areas of the Yakutat salmon set gillnet fishery during the 2007 and 2008 fishing seasons (Data from Manly 2009).

	2007		2008	
Species	Observed	Estimated	Observed	Estimated
Common murre	4	64	1	14
Marbled murrelet	11	177	0	0
Pigeon guillemot	1	16	4	54
Red-throated loon	1	16	2	28
White-winged scoter	2	32	0	0
Arctic loon	0	0	1	14
Kittlitz's murrelet	0	0	1	14

AMMOP for the SEAK drift gillnet fishery occurred across five sub-districts in 2012 and 2013, during which observer coverage ranged from a low of 5.5% in subdistrict 6B in 2012 to a high of 8.9% in subdistrict 7A in 2013. There were a total of five different species that interacted with the SEAK drift gillnet gear, of these, only the common murre was taken in both 2012 and 2013. The number of observed seabird takes in this fishery ranged from 1 individual for Cassin’s auklet and red-throated loon, to a high of 74 common murres in 2013. There were also three common murres released alive one in 2012 and two in 2013. The vast majority of the 2013 common murre takes, 72 of 74, occurred in subdistrict 6A, which is at the north end of Prince of Wales Island. Manly (2015) concluded that this increase in common murre takes during 2013 was due to a much larger return in pink and coho salmon that resulted in a higher fishing effort later in the season when marine bird takes occur at a higher rate. The yearly observed and the estimated total of each species taken in the observed areas of the SEAK salmon drift gillnet fishery are shown in Table 5-15. This fishery has not been observed since 2013; therefore, no additional observer data are available.

Table 5-15 The observed and estimated total marine bird takes in Prince of Wales (subdistricts 6A,B), Anita Bay (Area 7A), and Stikine (Areas 8A,B) of the Southeast Alaska salmon drift gillnet fishery during the 2012 and 2013 fishing seasons (Data from Manly 2015).

	2012		2013	
Species	Observed	Estimated	Observed	Estimated
Common murre	12	165	74	1096
Marbled murrelets	0	0	6	17
Rhinoceros auklet	0	0	8	128
Cassin's auklet	0	0	1	15
Red throated loons	0	0	1	15

As noted above, there is one former candidate species for listing (the Kittlitz's murrelet) and one ESA-listed species (the short-tailed albatross) in SEAK. The habitat for Kittlitz's Murrelets overlaps with the Yakutat set gillnet fisheries, the Icy Strait district 14 purse seine fishery, and districts 114, 116, 181 and 183 troll fisheries as well as sport salmon fisheries. Of all the SEAK salmon fisheries, the only documented interaction with Kittlitz's Murrelets occurred in 2008 in the Yakutat set gillnet fishery (Manly 2009). There was one individual observed as a take which, after extrapolation, resulted in an estimated 14 individuals taken during the entire fishery. This fishery was observed for two years with an average annual take of seven Kittlitz's Murrelets per year. The large gillnet meshes used in the SEAK salmon drift gillnet fishery (max six inches) are not selective for these forage species. Given the estimated low number of takes from these fisheries, they are not expected to have a negative effect on the Kittlitz's murrelet population.

Short-tailed albatross were not encountered in either the Yakutat or SEAK AMMOP studies, which means they were not observed within 10 m of active gillnets in either area. It is expected that there is very little, if any, interactions between short-tailed albatross and the SEAK salmon set gillnet or drift gillnet fisheries. The low potential for interaction is because the range of short-tailed albatross is generally further offshore (Piatt et al. 2006), while the SEAK salmon set gillnet or drift gillnet fisheries occur close to shore or on the inside waters; thus, there is very little overlap in range. SEAK salmon gillnet fisheries do not use bait or produce offal discharge further reducing the likelihood that short-tailed albatross would be attracted by this fishing effort.

While there have been no studies that document impacts on marine birds from the SEAK salmon troll fishery, it is expected that impacts are minimal, if any. The FPEIS concludes that troll gear is not known to take birds and salmon troll fishing is not known to provide significant waste or offal that would attract scavenging birds (NMFS 2003). The salmon harvested in the troll fishery are mature, fully grown salmon, not the size range of forage fish utilized by marine bird populations. When gear is deployed the down rigger weight quickly drops the hooks below the ten foot depth where interactions with marine birds are likely to occur. Likewise, seabirds are not known to become entangled in the gear used in this fishery. Thus, while there is an overlap between the range used by short-tailed albatross and where the SEAK troll fishery occurs, these factors minimize the potential interactions between short-tailed albatross or other marine birds and troll gear.

Most sport fishermen also use trolling gear when targeting salmon in SEAK although the gear setup differs from the commercial troll fishery. While commercial trollers may use multiple hooks on a single line, sport fishermen only have one hook per line, further reducing the potential interactions with marine birds. These factors minimize the likely interactions between SEAK salmon troll gear and marine birds resulting in very low potential for takes and there are no studies identified which document any interaction between marine birds and the SEAK sport troll salmon fisheries.

Purse seines are also used to target salmon in SEAK, and the nets consist of a mesh size that is not likely to entangle marine birds. Purse seines have a quick deployment, with a short duration in the water while the net is closed up, followed by a quick retrieval minimizing their soak time compared to gillnet gear. These factors minimize the potential interactions between marine birds and the SEAK salmon purse seine fisheries. There were no studies identified that document any interaction between marine birds and the SEAK salmon purse seine fisheries.

Of the four types of fishing gear used in the SEAK commercial salmon fisheries, set and drift gillnet gear has been shown to have potential interaction with marine birds (Manly 2009, 2015). Potential marine bird interactions are of concern in the gillnet fisheries, because of longer soak times and the high numbers of marine birds overlapping with these fisheries. As previously discussed and shown in the tables there has been little to no interaction observed with commercial troll and purse seine gear or with sports fisheries (Bertram 2023).

5.8.2. Effects of the Alternatives on Marine Birds

Alternative 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2) and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

Therefore, NMFS assumes prosecution of the SEAK salmon fisheries would occur and would have some impacts on marine birds. The primary impacts to marine birds are direct interactions that could lead to mortality such as entanglement in gear and collisions with vessels. Other impacts, such as vessel disturbance and noise, are likely minimal given the areas available to marine birds for feeding and other activities and the dispersal of the SEAK salmon fleet. Also, the SEAK salmon fisheries do not target prey for marine birds.

With the prosecution of the SEAK fisheries, direct interactions of marine birds with these fisheries would likely result in similar interactions as to those documented as a part of the data collected by AMMOP. The AMMOP program showed a low level of interactions between marine birds and SEAK salmon fisheries, with the common murre having the most interactions. The Alaska population of common murres is estimated at 2.8 million individuals, is considered stable (Alaska Sea Life Center 2023a), and the estimated takes in SEAK relative to the size of the population would not have an impact at the species level. The species with the next highest level of takes is the rhinoceros auklet, which has an estimated population of 2–3 million individuals that are spread along the West Coast of the U.S. (Alaska Sea Life Center 2023b). Rhinoceros auklets occur in low concentrations (Alaska Sea Life Center 2023b), meaning they are spread out such that takes from SEAK are likely to be infrequent and the level of takes would not impact the population. In general, the AMMOP program documented one or fewer interactions with most marine birds and SEAK gillnet fisheries per year. And, there are likely few direct interactions with most marine birds and the commercial troll, purse seine, and sport salmon fisheries in SEAK. Therefore, the continued operation of the SEAK salmon fisheries is not expected to have population level impacts.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

The resultant effect of a closure to the SEAK salmon fisheries would be an elimination of the risk of interaction between marine birds and the SEAK salmon fisheries. However, given the low levels of historical marine bird takes from the SEAK salmon fisheries, there would be minimal expected population-level benefits to marine birds if the SEAK salmon fisheries were not prosecuted.

5.8.3. Effects of Reasonably Foreseeable Actions on Marine Birds

This section considers cumulative effects from reasonably foreseeable actions on marine birds in the SEAK.

Effects of Future Fisheries Changes: Of the federal fisheries in SEAK, only the federal sablefish fishery is expected to change in future years. This fishery has been steadily changing the gear used to target sablefish, as boats have switched from hook and line gear to longline pot gear. This change is expected to continue as longline pot gear experiences a much lower rate of whale depredation. As more boats change to pot gear it is expected that there will be a slight reduction in the number of seabirds taken in this fishery as seabirds interact less with pot gear than hook-and-line gear (Tide and Eich, 2022). This change will affect seabird species that occur farther offshore where this fishery takes place. This change, while a positive effect, is not expected to result in a noticeable change in the seabird populations.

Marine Debris: Plastics are one type of marine debris known to impact marine birds across the Pacific Ocean (Hyrenbach et al. 2020; Rapp et al. 2017), and within Alaskan waters (Nevins et al. 2005). Marine birds consume plastics because birds often misidentify plastics as potential food sources. While no studies covering plastics in marine birds in SEAK could be identified, Nevins et al. (2005) examined dead seabirds from the squid fisheries in British Columbia, Canada. The potential impacts of plastics vary based on species and how they feed. Of the 58 birds and 11 taxa they examined, 100% of five surface-feeding species contained plastics while only 50% of the diving species had ingested plastics (Nevins et al. 2005). While there are numerous marine debris cleanup efforts, the continued worldwide use of plastics means that this threat is not going away any time soon. It is expected that the number of marine bird deaths will remain constant at the same levels as about where they are but may vary as the use of plastic increases or if they are phased out.

Docks, harbors, roads, and bridge construction: Docks, harbors, and other coastal construction projects are commonly permitted in SEAK and tend to occur along shorelines often in sheltered bays that provide feeding habitat for marine birds. Many of these structures, such as docks and piers, often have a positive effect on marine birds as smaller bait fish tend to concentrate around the structure resulting in a higher foraging success. These activities do not take place near the steep shoreline cliffs that provide high density area for marine bird nesting, thus there are little to no expected effects on marine bird nesting habitat. Overall, there is expected to be a negligible effect from these types of projects on marine bird populations.

Mining operations: Mining operations tend to occur in the headwater areas of rivers and streams. While these headwater areas provide habitat for some species of marine birds such as loons, ducks, and murrelets, marine birds using this area are at low densities and are expected to move to adjacent habitat, thus there is expected to be no effect on marine birds from expanded mining operations.

Climate change: As described in Section 5.10 the extended increase in SST resulted in a shift in prey availability and led to a mass die off event in 2014 through 2016 (Piatt et al. 2020). Seabird die offs in the North Pacific Ocean, Bering Sea, and Chukchi Sea have become more common since 2014. The species which have suffered the largest die offs, such as the common murre, are considered species of least concern. The die off events seem to occur in different locations each year and involve different species and or colonies (Kaler and Kuntz, 2022). Overall marine bird populations in SEAK appear to be stable over the long term.

As an overall consideration for evaluating reasonably foreseeable actions on marine birds, except as previously described, there is a general lack of detailed population data available for many species. Given the vast area covered by the analysis area, the number of different bird colonies, and the cost associated with in-depth population surveys, it is not feasible to collect this information for most marine bird colonies.

Considering the expected effects of the proposed action alternatives discussed in Section 5.8.3, when added to the impacts of the reasonably foreseeable actions listed above, the impacts of the proposed action are minimal given that the level of marine bird take in SEAK salmon fisheries is low relative to the size of the population. Therefore, the impacts of the proposed action are determined to be minimal as direct interactions with SEAK salmon fisheries is low, SEAK salmon fisheries do not harvest forage fish that marine birds primarily rely on, and, while acknowledging the data limitations for marine bird populations, the SEAK salmon fisheries would not result in measurable impacts to those populations.

5.9. Bycatch of Other Fish Species

This section focuses on SEAK's salmon fisheries and the bycatch of fish species other than the five species of Pacific salmon (Chinook, sockeye, coho, pink, and chum salmon) that are the focus of those fisheries. For this EIS, bycatch in Alaska's commercial and sport salmon fisheries is defined as the catch of non-salmon species, which primarily consist of groundfish species. State and Federal management measures minimize bycatch to the extent practicable and minimize the mortality of bycatch (Table 5-16).

For commercial salmon fisheries, a combination of factors work together to keep both the number of fish taken as bycatch and the associated mortality of those fish at a negligible amount. First, ADF&G fish tickets serve as a standardized reporting method documenting all retained harvest from both state and EEZ waters in the East Area. A standardized reporting methodology means an established, consistent procedure or procedures used to collect, record, and report catch and bycatch in the fisheries. There are no reporting requirements for the at-sea discards of bycatch in the SEAK fisheries; however, discards may be voluntarily reported on fish tickets. At-sea discards and bycatch concerns are very low in these fisheries due to the selectivity of gear, seasonality, and the implementation of closed areas during times of the year when bycatch is generally highest. ADF&G regulations require that fish tickets record the type of gear used as well as the number, pounds, delivery condition, and disposition of fish species harvested and retained for both commercial and personal use (5 AAC 39.130(c)). Maximum retainable allowances (MRAs) of certain non-salmon allow for bycatch to be utilized. In addition, non-retention requirements when MRAs are achieved create incentives to avoid those species being targeted. Specified closure areas during those times of the year when bycatch is generally highest also serves to significantly reduce the amount of bycatch taken. Finally, the nature of the gear utilized in the SEAK fisheries allow for some discarded species to be released with limited mortality, particularly for the troll fishery. Additional management measures are not necessary to document bycatch interactions within salmon fisheries.

For the sport fisheries, the Division of Sport Fish has conducted a mail survey (Statewide Harvest Survey or SWHS) to estimate sport fishing annual effort (angler-days), harvest (fish kept) since 1977, and total catch (fish kept plus fish released) since 1990. Harvest and catch estimates are available for species commonly targeted by sport anglers. Effort, harvest, and catch estimates are available by region and area, but are not specifically available for the EEZ. In Southeast Alaska, the Division of Sport Fish has conducted a marine creel survey to estimate effort (angler days), harvest, and catch. The combination of the SWHS and creel surveys constitute the Standardized Bycatch Reporting Methodology for the sport fishery. The standardized reporting methodology means established, consistent procedures are in place and used to collect, record, and report catch and bycatch in the fisheries.

In addition, the Alaska Division of Sport Fish administers the Charter Logbook Program which requires all guided businesses and guides to register with the State. Saltwater sport fishing operators must maintain an ADF&G-issued logbook where a logbook page is completed for each guided trip and records name of anglers, location fished, hours fished, harvest, and catch of common sport species. Logbook data are available specifically for State and Federal saltwaters in Southeast Alaska since 2010. Data reported in the logbooks are used by ADF&G for the development and management of fisheries, discussion and decisions by state and Federal regulatory bodies, program evaluation, and development of new ADF&G policies.

5.9.1 Groundfish Incidental Catch Management Measures in the Troll Fishery

The State of Alaska reports the amount and type of groundfish harvested incidentally in the Southeast Alaska troll fishery in the Southeast region groundfish report prepared for the Board of Fisheries on a 3-year cycle. The Southeast Alaska troll fishery incidentally harvests state managed groundfish species; including lingcod, black rockfish, dark rockfish, blue rockfish, and demersal shelf rockfish (DSR). The seven species of rockfish in the DSR assemblage are yelloweye, quillback, canary, rosethorn, copper, china, and tiger rockfish. Bycatch allowances for Federal waters are the same as in state waters only for the state managed groundfish species. For Federally managed groundfish species, trollers are restricted to a Federal retainable percentage found at http://www.alaskafisheries.noaa.gov/rr/tables/tabl10.pdf. To this end, vessels trolling for salmon in EEZ waters of the Gulf of Alaska that retain groundfish as bycatch must have a Federal

Fisheries Permit endorsed for troll gear. This requirement identifies the number of troll vessels that can fish in the EEZ and retain groundfish.

In the East Area, all groundfish incidentally taken by hand and power troll gear being operated to take salmon (consistent with applicable laws and regulations) can be legally taken and possessed. The bycatch allowance for each species or species group reflects the percentage that may be retained and sold and is based on the round weight of salmon on board. State bycatch allowances that apply in adjacent federal waters (3-200 nmi) are noted:

Table 5-16 Bycatch provisions for the 2022 Commercial Troll Salmon Fishery in State Waters.

BYCATCH SPECIES	BYCATCH ALLOWANCE
Lingcod	100%, Icy Bay Subdistrict, Central Southeast Outside, Northern Southeast Inside, and Southern Southeast Internal Waters. 50%, East Yakutat 10%, Southern Southeast Outer Coast 5%, Northern Southeast Outside. Lingcod bycatch allowances also apply in federal waters.
Demersal Shelf Rockfish (DSR)	10%. Demersal shelf rockfish bycatch allowance also applies in federal waters, excluding Icy Bay Subdistrict.
Black, Blue, and Dark Rockfish	No limit on incidental harvest. Also applies in federal waters.
Other Rockfish	No limit on incidental harvest in state waters.
	5% in aggregate in federal waters. In Icy Bay Subdistrict federal waters, demersal shelf rockfish are included as part of this "Other Rockfish" Category when computing bycatch allowances.
Spiny Dogfish	35%.
Sablefish	0%, no retention.
Other Groundfish	No limit on incidental harvest.

Lingcod may be taken and sold as bycatch in the commercial salmon troll fishery from May 16 through November 30. Lingcod must measure at least 27 inches from the tip of the snout to the tip of the tail, or 20.5 inches from the front of the dorsal fin to the tip of the tail. Harvest allocations for the troll fishery are set by Lingcod Management Area, and area closures will occur as allocations are taken. Inseason closures will be announced by news release and marine radio broadcast.

Halibut incidentally taken during an open commercial halibut season by power and hand troll gear being operated for salmon consistent with applicable state laws and regulations are legally taken and possessed. Commercial halibut may be legally retained only by IFQ permit holders during the open season for halibut. Trollers making an IFQ halibut landing of 500 pounds or less of IFQ weight are exempted from the 3 hour Prior Notice of Landing if landed concurrently with a legal landing of salmon. Halibut taken incidentally during the troll fishery must be reported on an ADF&G fish ticket using the CFEC salmon permit.

Trollers are allowed to longline for groundfish and troll for salmon on the same trip as long as fish are not onboard the vessel in an area closed to commercial fishing or closed to retention of that species and the fisher has both a commercial salmon permit and the appropriate commercial longline permit.

A vessel may not participate in a directed fishery for groundfish with dinglebar troll or mechanical jig gear if they have commercial salmon on board. A vessel fishing for groundfish with dinglebar troll gear must display the letter "D" and a vessel fishing for groundfish with mechanical jigging machines must display the letter "M" at all times when fishing with or transporting fish taken with dinglebar troll gear or mechanical jigging machines. A vessel displaying one of these letters may not be used to fish for salmon.

All harvest information on bycatch in the commercial troll fishery comes from catch reported on fish tickets. Table 5-17 shows that lingcod and black rockfish, both state managed species, make up the primary bycatch in the commercial troll fishery. Reported harvest of groundfish from EEZ waters is small when compared to harvest totals from all of Southeast Alaska and occurs during the months of July, August, and September when the summer troll season is open. Unreported harvest and discard-at-sea mortality is not estimated, but is thought to be low given the nature of troll gear and the times and locations fished.

A significant management measure taken by the State of Alaska, which affects both the bycatch of groundfish and the incidental catch of non-target salmon species, is the closure of Chinook salmon high abundance waters after the first summer Chinook salmon retention period, which typically ends in early to mid-July (4-1). The purpose of this regulation (5 AAC 29.025) is to slow the Chinook salmon harvest rate during the Chinook salmon retention fishery and to reduce the number of Chinook salmon incidentally hooked and released during a non-retention fishery. While a portion of the closed waters is in state waters, a large portion (the Fairweather Grounds) is within waters of the EEZ. In addition, lingcod and other groundfish may not be taken in the waters off Cape Edgecumbe (Edgecumbe Pinnacles Marine Reserve) enclosed by a box defined as 56° 55.50' N. lat., 56° 57.00' N. lat., 135° 54.00' W. long., and 135° 57.00' W. long. (5 AAC 28.150(c)). These waters are entirely in the EEZ (Figure 5-11).

Table 5-17 All groundfish species (round pounds) reported on salmon troll fish tickets for all Southeast Alaska, 2013-2022.

Species Name	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Black rockfish	8,205	9,185	8,539	15,185	9,266	11,297	8,299	7,662	6,222	9,471
Blackgill rockfish					106					
Bocaccio rockfish	62	106	18	219	63	643	250	114	75	63
Canary rockfish	528	562	796	1,639	670	806	585	325	335	425
Chilipepper rockfish						3				
China rockfish		5	29	132	33	27	17	40		
Copper rockfish	14	61	6	46	40	10	15	51	215	12
Dark rockfish	15	84	8	82	636	26		31		2
Darkblotched rockfish	50					206				
Dusky rockfish	2,354	3,009	4,605	12,317	5,456	11,404	6,122	3,944	1,796	2,450
General pomfret							40		1	
General shark									110	
Greenstripe rockfish		35	1	1				45		
Harlequin rockfish						5		27		
Kelp greenling					40	2		16		1
Lingcod	18,815	14,004	23,920	32,730	20,047	38,007	13,526	20,265	42,252	52,729
Northern rockfish	2			28	21			1		
Pacific cod	6	77	95	32	11	369	109	197	334	26
Pacific ocean perch	11	9	57	85	29	42	26	40		12
Pacific tomcod							119			
Pygmy rockfish					24					
Quillback rockfish	370	310	550	817	686	344	207	260	195	335
Redbanded rockfish	3	5	29		15					
Redstripe rockfish	79	41	34	118	69	133	82	110	4	52
Rex sole								2		
Rock sole				5			2			
Rosethorn rockfish	5	3	2	369	469	71	42	30	10	3
Rougheye rockfish	7	4	7	26	12	31	5	6		41
Salmon shark								57	89	
Sharpchin rockfish								13		
Shortraker rockfish		35	10		3	58	31	26	17	32
Silvergray rockfish	2,448	2,137	2,721	5,258	3,353	3,666	1,769	1,359	2,233	2,860
Starry flounder							82			
Thornyhead rockfish	557	30				27	4			38
Tiger rockfish						8	3			
Vermilion rockfish					8	11	17	5	22	2
Walleye pollock			115			5		4	5	4
Widow rockfish	90	101	109	90	362	20	156	141	12	47
Yelloweye rockfish	940	815	2,208	3,949	2,226	3,620	2,750	2,778	1,111	2,446
Yellowfin sole									4	
Yellowmouth rockfish		2		2	3					
Yellowtail rockfish	1,701	2,926	2,526	3,130	1,417	2,511	2,286	1,355	951	331
Total	**36,262**	**33,545**	**46,468**	**76,258**	**45,065**	**73,354**	**36,545**	**38,906**	**55,994**	**71,384**

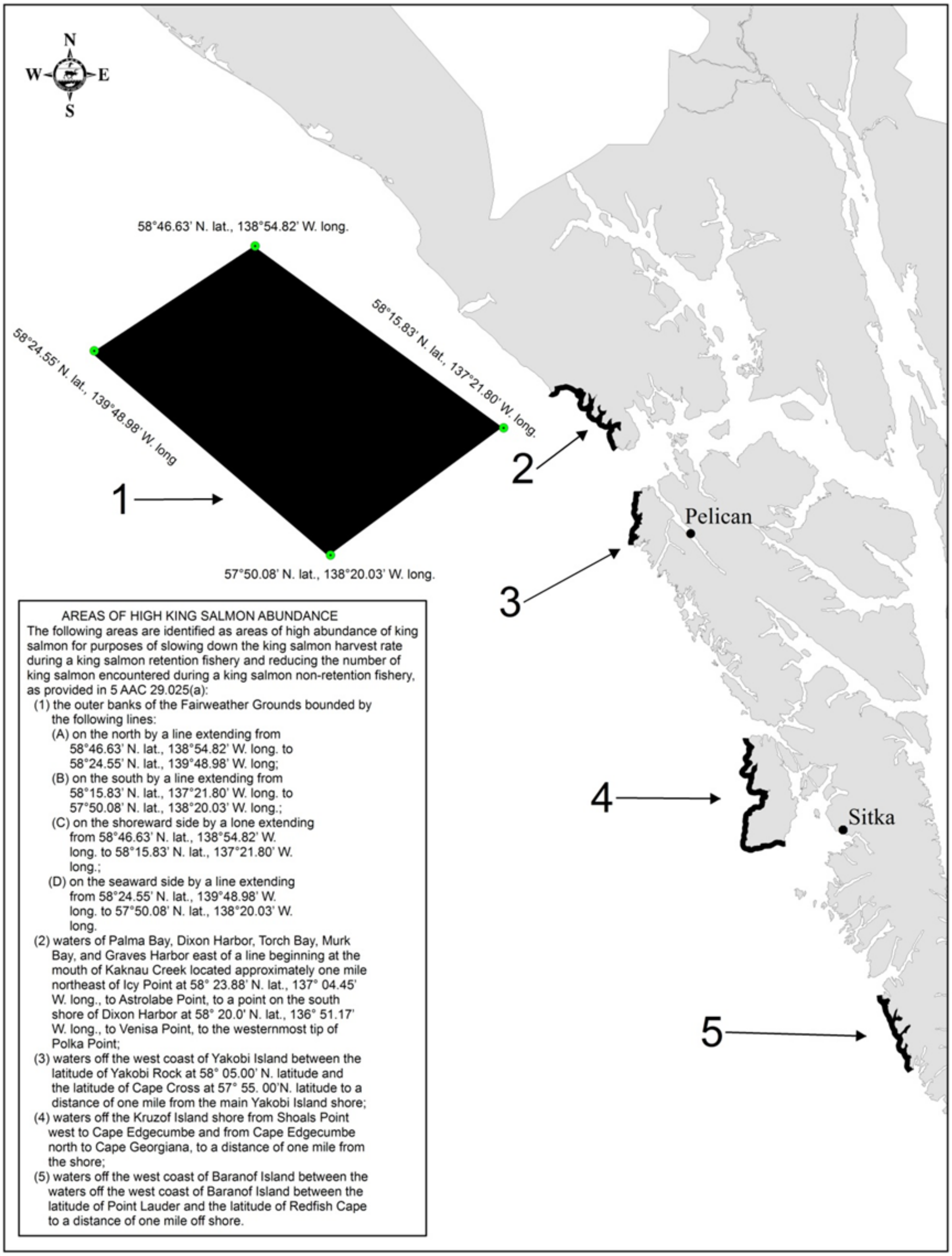

Figure 5-11 ADF&G's map of areas of high Chinook salmon abundance.

5.9.2 Bycatch in the net fisheries

Incidental harvest of groundfish in SEAK salmon net fisheries is minimal. From 2013 through 2022, there were only 2 reported incidences for a total of 3 fish; 1 lingcod in 2016 and 2 black rockfish in 2022. Net fisheries are not allowed to sell incidental catch, but are allowed to keep it for personal use. Any fish retained for personal use must be recorded on an ADF&G fish ticket.

5.9.3 Bycatch in the sport fisheries

Bycatch in the salmon sport fishery primarily involves incidental harvest of groundfish species such as rockfish, lingcod and halibut. When encountered while fishing for salmon this incidental catch is often retained following the bag, possession, size, and annual limits defined for these species within state and federal sport fishing regulations. The selectivity of sport fishing gear, the use of no more than one line per angler (with rare exceptions), and a State of Alaska requirement that sport fishing lines must be closely attended, reduces overall bycatch and ensures minimal incidental mortality of non-salmon species. Additionally, the State of Alaska has adopted regulations that requires all rockfish to be released at depth which research has shown greatly improves survival of released rockfish.

Common salmon sport fishing gear in SEAK involves the use of a single line attached to a pole with terminal gear consisting of either an artificial lure or baited hook(s). This line is most commonly fished while trolling or mooching from small boats. Shoreline fishing with similar gear but by casting techniques is also common in marine waters at some road accessible locations.

While harvest and catch information is collected within the SWHS, charter logbook and SEAK marine creel project, it is often not possible to ascertain which portion of this harvest and catch occurred while targeting salmon. Sport anglers may retain their catch of other species when fishing for salmon in accordance with state and federal sport fishing regulations.

5.9.4 Effects of the Alternatives on the Bycatch of Other (non-salmon) Fish Species

Alternative 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2) and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

As such, NMFS assumes the prosecution of the SEAK salmon fisheries would occur, and it is expected that the bycatch of other fish species would occur with rates and overall amounts similar to those described above and as presented in Table 5-17. Given the low level of bycatch and the existing management measures, the overall impacts of Alternatives 1 and 2 on other fish species caught as bycatch are negligible.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

As such, in the absence of salmon fishing in SEAK, bycatch rates of other fish species would be at or near zero. Since the result of Alternative 3 would be no, or very low, amounts of bycatch of other fish species, the overall impacts of Alternative 3 would be beneficial for fish species caught as bycatch. These benefits are likely nominal, however, given the low level of bycatch in the SEAK salmon fisheries, as well as the existing state and federal management measures in place, such as area closures and measures to regulate and monitor bycatch in the fisheries.

5.9.4 Effects of Reasonably Foreseeable Actions on the Bycatch of Other Fish Species

Beyond the effects of the alternatives that have been discussed there are no reasonably foreseeable future actions beyond climate change expected to result in changes to the magnitude or composition of bycatch of other fish species in SEAK salmon fisheries. For example, in the reasonably foreseeable future, there are no known or expected changes to the timing, area, gear, or number of participants in SEAK salmon fisheries that would be expected to result in changes to bycatch. There are also no known changes to Federal fisheries that are expected to result in changes to bycatch for the SEAK salmon fisheries. Other potential changes in the reasonably foreseeable future such as mining, human development, and the construction of new roads, bridges, and harbors are also not expected to result in any changes to the bycatch of other fish species.

Climate change, as discussed in other sections of this EIS, may result in substantial changes to the composition and distribution of fish assemblages in the North Pacific (Cheung and Frölicher 2020; Yati et al. 2020). However, there is a high degree of uncertainty pertaining to the timing of these climate-induced changes, the future composition of fish species in SEAK, and how bycatch in the SEAK salmon fisheries may be impacted as a result.

Considering the direct and indirect impacts of the proposed action when added to the impacts of the reasonably foreseeable actions listed above, the impacts of the proposed action are negligible given that the levels of bycatch in SEAK salmon fisheries is considered to be at a low level, none of the species of bycatch in SEAK salmon fisheries are threatened or endangered, bycatch levels are far below what would have impacts to populations or other fisheries, and bycatch levels are not expected to increase in the reasonably foreseeable future by any of the alternatives considered in this EIS.

5.10. Ecosystem and Climate Change

The section provides a description of the ecosystem characteristics of the SEAK portion of the analysis area while also describing climate change[46] and associated effects on salmon (e.g., Cozier et al. 2021) in freshwater, estuarine, and marine ecosystem components of the Pacific Northwest—where many Chinook salmon harvested in the SEAK salmon fisheries originate—and the marine waters of SEAK, where the SEAK salmon fisheries occur. Given the potential for large effects from ongoing and future climate change on salmon, this section describes the ecosystem and ecology of salmon in the analysis area through the lens of climate change. As

[46] https://nca2023.globalchange.gov/. Accessed 11/21/2023

Pacific salmon are obligate cold water species in a rapidly warming environment, climate change is already having effects on all species of salmon, and these are likely to intensify in the future through: direct heat stress and higher metabolic demand (need for increased feeding), more acidic marine waters and associated changes to food webs, changes to competition and predation, and changes to freshwater flow and availability[47] (e.g., Ward et al. 2015). Additional descriptions of the ecosystem and associated habitat are provided in Section 5.7.

Climate change is predicted to cause a variety of impacts to Pacific salmon and their ecosystems (Mote et al. 2003; Crozier et al. 2008b; Martins et al. 2012; Wainwright and Weitkamp 2013). The complex life cycles of salmon necessitates that they spend time in multiple habitat types, making them particularly vulnerable to environmental variation (Morrison et al. 2016). Climate change and associated effects, including increased water temperature (freshwater and marine), changes in precipitation, ocean acidification, and changes to freshwater and marine food webs, pose an existential threat to salmon populations throughout the North Pacific, including populations that spawn and rear in the Pacific Northwest and SEAK. The U.S. Global Change Research Program (USGCRP)[48] projects an increase in average annual temperature of 3.3ºF to 9.7ºF after 2070 (CCSP 2014). Climate change has negative implications for designated critical habitats of salmon originating from natal streams in the Pacific Northwest (Climate Impacts Group 2004; Scheuerell and Williams 2005; Zabel et al. 2006; ISAB 2007). According to the Independent Scientific Advisory Board,[49] these effects will pose impacts into the future. The following sections discuss the physical environment of SEAK and specific types of climate effects on salmon pertinent to the larger analysis area.

Physical Environment

The Southeast Alaska portion of the analysis area includes all marine and estuarine waters between Dixon Entrance and Cape Suckling, from the upper high-tide line to 200 miles from the westernmost landmass. The region, approximately 150 miles wide and 450 miles long, consists of seven major and more than 1,000 minor islands making up the Alexander Archipelago, which lies adjacent to the Coast Mountain range separating Alaska from Canada. A labyrinth of deep fjords, inlets, and passages, the Alexander Archipelago has thousands of miles of marine shoreline. The terrestrial environment consists of North America’s largest icefields and coastal low-elevation rain forest. Most of the terrestrial area is within the Tongass National Forest, which contains approximately 42,500 miles of streams and 20,200 lakes and ponds, totaling 260,000 acres. In the streams, 12,200 miles of anadromous fish habitat exists (Forest Service 1991). Given the estimate of approximately 2,500 streams that contain spawning pink salmon (Zadina et al. 2004), and the fact that pink salmon are prevalent in most streams with available salmon spawning habitat, 2,500 is probably also a reasonable estimate for the number of streams containing salmon in SEAK. Most of the streams in SEAK are relatively small and short due to their origin in steep mountain basins. The State of Alaska has compiled a database and associated maps of “Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes" that includes salmon, trout, and other species.[50]

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[47] https://www.climatehubs.usda.gov/hubs/northwest/topic/alaska-and-changing-climate. Accessed 11/21/2023

[48] https://www.globalchange.gov

[49] The Independent Scientific Advisory Board (ISAB) serves NMFS, Columbia River Indian Tribes, and Northwest Power and Conservation Council by providing independent scientific advice and recommendations regarding scientific issues that relate to the respective agencies' fish and wildlife programs. https://www.nwcouncil.org/fw/isab/

[50] ADF&G Anadromous Waters Catalog. https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.home

Precipitation at sea level in Southeast Alaska ranges from 27 inches per year at Skagway to 220 inches per year at Little Port Walter. The average annual precipitation has been estimated to be as high as 400 inches on the southern end of Baranof Island and approximately 260 inches over the Juneau icefield. Southeast Alaska has complete cloud cover about 85 percent of the year. Snowfall varies according to elevation and distance inland from the coast. The Pacific maritime influence holds the daily and seasonal temperatures within a narrow range. Winter temperatures range from 20 to 40 degrees Fahrenheit (°F), but may decrease when skies clear. Summer temperatures are generally in the mid-60s and may extend into the 70s; about every other year, temperatures rise into the 80s (National Weather Service Juneau 1984). Water depth in the southeastern part of the Gulf of Alaska ranges from zero feet at the high tide line to 650 feet in the inside waters and drops to 6,500 feet just beyond the continental shelf. In general, the inside waters are more protected from ocean swell, wind, and storm disturbance. Open ocean conditions prevail west of the islands and in the wider channels between islands. Tidal range is up to 20 feet, varying by latitude and location. Currents offshore are northerly along a continental shelf that is less than 60 miles wide (Weingartner et al. 2005; Hood and Zimmerman 1987). Extensive input of freshwater from glacial and non-glacial rivers reduce the salinity of the marine waters within Southeast Alaska and the salinity gradient from these freshwater inputs and along-shore winds are a primary driver of the east-to-west (anti-clockwise) flow of the Alaska Coastal Current (Stabeno et al. 2016). Most of the glacial rivers are located on the mainland and have their origins in the Coast Range. The Taku and Stikine rivers, the largest of the mainland rivers, have glacial origins in Canada. Glacial streams carry large sediment loads into marine waters but the non-glacial streams usually do not.

Southeast Alaska's terrestrial ecosystem remains relatively intact with respect to industrial development, although some areas have been extensively logged in the past. Primary land use activities beyond the boundaries of villages and small cities are logging and mining. Few industries operate in Southeast Alaska and water quality is high. The main potential threats of chemical pollutants are from petroleum product spills, sewage outfalls, and logging and mining operations.

Temperature Effects
Salmon are cold-blooded animals, and increasing temperatures in all habitats can have pronounced effects on their physiology, growth, and development rates (Whitney et al. 2016). In the northeast Pacific Ocean, exceptionally high sea surface temperatures from 2013–2020 coincided with widespread declines and low abundances for many west coast salmon and steelhead populations (SWFSC 2022). Increases in water temperatures will likely be detrimental to salmon by means of: increased metabolic rates (and higher demand for food), decreased disease resistance, increased physiological stress, and reduced reproductive success. As trends progress toward warmer oceans and streams and loss of snowpack in the mountains, salmon face increasing threats in the future (Ford 2022). All of these processes are likely to reduce salmon survival (Beechie et al. 2013; Wainwright and Weitkamp 2013; Whitney et al. 2016).

Freshwater Effects
Climate change is predicted to increase the intensity of storms, increase water temperatures, and change the capacity of the landscape to hold water, thereby altering stream flows (Crozier et al. 2008a; Martins et al. 2012). Salmon populations inhabiting regions that are already near or exceeding their temperature tolerances will be most affected by further increases in temperature (Crozier et al. 2008a; Beechie et al. 2013; Von Biela et al. 2022). River flow is already becoming more variable in many rivers, and is believed to negatively affect salmon survival more than other environmental parameters (Ward et al. 2015). This increasingly variable flow is likely to be detrimental to multiple salmon and steelhead populations. Changes in stream temperature and flow regimes will also likely lead to shifts in the distributions of native species and facilitate the introduction of exotic species, resulting in novel interactions where native salmon may be either predators or prey (Lynch et al. 2016; Rehage and Blanchard 2016).

Climate change is projected to increase the amount of available salmon spawning habitat in portions of their existing range that currently contain glaciers (Pitman et al. 2021; Pitman et al. 2020). As outlined in Pitman et al. 2021, the SEAK portion of the analysis area east of Cape Suckling is projected to have the largest increase in new salmon habitat in North America. For that area, by the year 2100, as the climate warms and glaciers continue to retreat, thousands of kilometers of potential new freshwater habitat are projected to open up and be habitable to salmon for spawning and rearing. However, the extent to which salmon are able to utilize this potential new habitat will also depend upon other climate change effects, including temperature in the marine and freshwater environments, competition, and ocean acidification.

Estuarine Effects
Estuaries are used by juvenile Pacific salmon as they exit streams. For estuarine environments, the two big concerns associated with climate change are rates of sea level rise and temperature warming (Wainwright and Weitkamp 2013; Limburg et al. 2016). Estuaries will be affected directly by sea-level rise: as sea level rises, terrestrial habitats will be flooded and tidal wetlands will be submerged (Kirwan et al. 2010; Wainwright and Weitkamp 2013; Limburg et al. 2016). The widespread presence of dikes in Pacific Northwest estuaries will restrict upward estuary expansion as sea levels rise, likely resulting in a near-term loss of wetland habitats for salmon (Wainwright and Weitkamp 2013).

Marine Impacts
In marine waters, increasing temperatures are associated with poleward range expansions of fish and invertebrates (Lucey and Nye 2010; Asch 2015; Cheung et al. 2015). Rapid poleward species shifts in distribution in response to anomalously warm ocean temperatures have been well documented in recent years, confirming this expectation at short time scales. Range extensions were documented in many species from southern California to Alaska during unusually warm water associated with “The Blob” in 2014 and 2015 (Bond et al. 2015; Di Lorenzo and Mantua 2016), and past strong El Niño events (Pearcy 2002; Fisher et al. 2015). Overall, the marine heat wave from 2014 to 2016 had the most drastic impact on marine ecosystems in 2015, with lingering effects to 2017. Conditions had somewhat returned to “normal” in 2018, but another marine heat wave in 2019 again set off a series of marine ecosystem changes across the North Pacific (Suryan et al. 2021). One reason for lingering effects of ecosystem response is due to biological lags. These lags result from species impacts at larval or juvenile stages, which are typically most sensitive to extreme temperatures or changes in food supply. It is only once these species grow to adult size or recruit into fisheries that the impact of the heat wave is apparent (Ford 2022).

Exotic species benefit from these extreme conditions as they increase their distributions. Humboldt squid (*Dosidicus gigas*) dramatically expanded their range during warm years from 2004–2009 (Litz et al. 2011). The frequency of extreme conditions, such as those associated with El Niño events or "blobs" are predicted to increase in the future (Di Lorenzo and Mantua 2016) and may impact salmon through competition or predation. In addition, warming ocean temperatures have increased the range and frequency of harmful algal blooms (Gobler et al. 2017), which can damage gills and reduce foraging opportunities for wild salmon (Esenkulova et al. 2022).

Pacific Northwest anadromous fish inhabit as many as three marine ecosystems during their ocean residence period: the Salish Sea, the California Current, and the Gulf of Alaska (Brodeur et al. 1992; Weitkamp and Neely 2002; Morris et al. 2007). The response of these ecosystems to climate change is expected to differ, although there is considerable uncertainty in all predictions. It is also unclear whether overall marine survival of anadromous fish in a given year depends on conditions experienced in one versus multiple marine ecosystems. Several are important to Columbia River Basin and Puget Sound species, including the California Current and Gulf of Alaska.

In addition to becoming warmer, the world's oceans are becoming more acidic as increased atmospheric carbon dioxide (CO_2) is absorbed by water and forms carbonic acid. The North Pacific is already acidic compared to other oceans, and it is particularly susceptible to further increases in acidification (Lemmen et al. 2016). Laboratory and field studies of ocean acidification show it has the greatest effects on invertebrates with calcium-carbonate shells but relatively little direct influence on finfish (see reviews by Haigh et al. (2015) and Mathis et al. (2015). Consequently, the largest impact of ocean acidification on salmon will likely be its effects on lower trophic levels, which supports the entire marine food web (Haigh et al. 2015; Mathis et al. 2015).

Uncertainty in Climate Predictions

Many of the effects of climate change (e.g., increased temperature, altered flow, coastal productivity, etc.) will have direct impacts on the food webs that species examined in this analysis rely on in freshwater, estuarine, and marine habitats to grow and survive. Such ecological effects are extremely difficult to predict even in fairly simple systems, and minor differences in life history characteristics among stocks of salmon may lead to large differences in their response (e.g., Crozier et al. (2008a); Martins et al. (2011); Martins et al. (2012). This means it is likely that there will be "winners and losers;" some salmon populations may enjoy different degrees or levels of benefit from climate change (Pitman et al. 2021) while others will suffer varying levels of harm.

Climate change is expected to impact anadromous fish (e.g., salmon, steelhead, and green sturgeon), during all stages of their complex life cycle and many of these impacts are generally thought to be detrimental to salmon populations. In addition to the direct effects of rising temperatures, indirect effects include alterations in stream flow patterns in freshwater and changes to food webs in freshwater, estuarine, and marine habitats. There is high certainty that predicted physical and chemical changes will occur; however, the ability to predict bio-ecological changes to fish or food webs in response to these changes is limited, leading to considerable uncertainty.

5.10.1. Greenhouse Gas Emissions

Humans are increasing atmospheric concentrations of planet-warming gasses, including the three main greenhouse gasses produced by human activities: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O; Table 2.1; Figure A4.3). Since 1850, atmospheric concentrations of carbon dioxide have increased by more than 47%, nitrous oxide by 23%, and methane by more than 156%.1 Methane is a more potent greenhouse gas than CO_2 but is shorter-lived and present in lower concentrations than CO_2. Nitrous oxide is both long-lived and more potent, but its concentrations are also lower than CO_2. The evidence for warming across multiple aspects of the Earth system is incontrovertible, and the science is unequivocal that increases in atmospheric greenhouse gasses are driving many observed trends and changes (KM 3.1). The concentrations of greenhouse gasses in the atmosphere continue to increase primarily because humans have burned and continue to burn fossil fuels for transportation and energy generation. In addition, industrial processes, deforestation, and agricultural practices also increase greenhouse gasses in the atmosphere. As a result of increases in the atmospheric concentrations of these heat-trapping gasses, the planet is on average about 2°F (1.1°C) warmer than it was in the late 1800s (USGCRP 2023).

SEAK salmon fisheries can contribute to greenhouse gas emissions either directly or indirectly in the following ways:

- Emissions from fishing vessels
- Emissions from processing facilities
- Emissions from transportation of processed fish
- Emissions from vessel maintenance and repairs
- Emissions related to traveling to and from fishing vessels
- Emissions related to vessel supplies

Greenhouse gas emissions associated with the operation of SEAK salmon fisheries are, in the short term, expected to remain similar to current levels at current harvest levels. However, there is the potential for long term reductions in greenhouse gas emissions as transportation related to movement of goods and fishing vessels shift to renewable and more low-carbon, sustainable energy sources[51].

5.10.2. Effects of the Alternatives on the Ecosystem and Climate

Alternative 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2) and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

[51] https://www.nrel.gov/news/program/2023/battery-electric-fishing-vessel-marks-a-sea-change-for-small-commercial-fishers.html

As such, SEAK salmon fisheries are expected to be prosecuted as they have during recent decades. With respect to the prosecution of SEAK salmon fisheries under these Alternatives, no evidence suggests that SEAK salmon fisheries impact the ecosystem in a significant manner. These fisheries target only adult salmon in the water column, successfully avoiding any significant disturbance to benthos, substrate, or intertidal habitat, all of which are components of the larger ecosystem. Alternatives 1 and 2 would not increase the amount of harvest above the limits from the PST, the intensity of harvest, or the location of harvest; therefore, those alternatives are presumed to not increase the impacts of the fishery to various prey items eaten by Pacific salmon (forage fish, zooplankton, squid, etc.). In addition, under Alternatives 1 and 2 and as stated previously, the State's spawning escapement goals for salmon are generally expected to be achieved. These scientifically-derived escapement goals are designed to result in the highest potential for future yields without jeopardizing the conservation of the stock, from too few spawners, or the productivity of the stocks due to too many spawners.

The effects of Alternative 1 and 2 on the climate would be minimal. For example, there is no evidence to suggest that these Alternatives would result in substantial changes to the amount of greenhouse gasses in the atmosphere as emissions from the SEAK salmon fisheries and associated transportation and processing are extremely small relative to global emissions. There is also no evidence to suggest that these Alternatives would exacerbate any associated effects of climate change. However, climate change and associated effects are likely already affecting salmon throughout the North Pacific, and climate change effects pose a substantial and, especially for some species and populations of salmon, an existential threat to salmon as these effects intensify in the future.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

As noted in Section 5.5, there is the potential for substantial effects of Alternative 3 on salmon stocks throughout SEAK, which would have potential consequences for the larger ecosystem. Native peoples in SEAK relied on salmon runs for their survival for thousands of years prior to the arrival of people of European origin. Native inhabitants largely continued traditional harvests of salmon throughout the late 1700s and much of the 1800s. However, that changed in the late 1870s with the industrialization and commodification of Alaska's salmon as canning became prevalent and Alaska Native salmon harvests were largely replaced by harvests for profit (Arnold 2008; 1878-1999 commercial salmon harvest records in Byerly et al. 1999). As such, Alternative 3 would amount to a break in the continuity of humans harvesting salmon—and therefore having a control on spawning abundances and future returns—in SEAK for thousands of years (Price 1990), which would be an ecosystem-level perturbation under that alternative.

Under Alternative 3 and as discussed in Section 5.5, the cessation of fishing activity would potentially result in runs of tens of millions of salmon into freshwater habitats. Salmon runs far in excess of the State's spawning escapement goals may result in the crowding of streams, the superimposition of spawning redds and associated death of fertilized eggs (Sections 5.5 and 5.7), and anoxic conditions that result in the death of salmon and other fish species. In the absence of salmon fisheries, these salmon would be available to be consumed by seals, sea lions, bears, wolves, eagles, and other predators and scavengers.

In addition, under Alternative 3, given the potential for large numbers of adult salmon entering freshwater habitat that would likely be far in excess of established spawning escapement goals, there are potential impacts to salmon and other species from the influx of marine-derived nutrients. Salmon provide a source of nitrogen and other nutrients to freshwater and terrestrial habitats (Schindler et al. 2003), and there are concerns for changes to streamwater chemistry from large returns of salmon. Fluxes of dissolved nutrients, like ammonium and phosphorous, increase in streams and estuaries after salmon runs (Cak et al. 2008); however, higher carcass loads can lead to an excess of what local stream biota can utilize and the nutrients can reach a trophic capacity (Wipfli et al. 1999). Changes to marine derived nutrients into terrestrial ecosystems would likely feed back into many other ecosystem components, including freshwater and nearshore productivity and the abundance of zooplankton available for juvenile salmon.

Alternative 3 is expected to have an array of plausible ecosystem-level effects and many potential and unknown effects that would last into the reasonably foreseeable future. The closure of the SEAK salmon fisheries would likely result in many of the State's salmon escapement goals being exceeded by large amounts, and, in several cases, the amount of salmon into freshwater environments in SEAK would likely exceed any historical precedent. Immediate potential effects from these large numbers of salmon in the freshwater were considered in previous sections (5.5 for non-ESA salmon and 5.10 for the Ecosystem and Climate Change) with longer-term impacts to salmon populations discussed in Section 5.4.3 and 5.5.3. Assuming that SEAK salmon fisheries remained closed, salmon population dynamics would eventually stabilize at a new equilibrium of escapements and subsequent returns. However, beyond the density dependent effects of salmon on productivity and returns at the stock and region level, it is extremely difficult to predict how other drivers would also respond to Alternative 3 and how these responses may also impact salmon abundances or other ecosystem components or processes. In the absence of salmon fisheries, there may also be substantial changes to marine and freshwater predator assemblages that could feedback into the regulation of salmon populations and have spillover effects to many other species. In the marine environment, seals, sea lions, and sharks may benefit from the lack of competition with salmon fisheries and predators may follow the large numbers of adult salmon into close proximity to freshwater. Increased survival of seal and sea lion populations and subsequent increases in populations of these pinnipeds could result in increased predation on a variety of fish species, including salmon and other species. In the terrestrial environment, higher survival of wolf and bear populations as a result of increased salmon could result in increased population abundances of those species, and, in turn, have negative effects on populations of deer or other species.

Alternative 3 may be nominally beneficial for populations of non-salmon fish species caught as bycatch, to populations of marine birds, and possibly beneficial to some stocks of Chinook salmon in SEAK in some years; however, this alternative would likely induce large changes to many other marine, freshwater, and terrestrial components of the ecosystem. In considering that contemporary commercial harvests of SEAK salmon stocks have occurred since the late 1880s, that these stocks are thought to have been harvested by Native peoples for many thousands of years prior to these commercial harvests, and the many plausible and large-scale changes to a variety of the chemical and biological components of the ecosystem provided in this EIS, the cessation of these salmon fisheries under Alternative 3 would likely result in substantial impacts to the overall SEAK ecosystem.

The effects of this Alternative on the climate would be minimal. For example, there is no evidence to suggest that the cessation of fishing under Alternative 3 would result in substantial reductions to the amount of greenhouse gasses in the atmosphere as emissions from the SEAK salmon fisheries and associated transportation and processing are extremely small relative to global emissions. There is also no evidence to suggest that Alternative 3 would exacerbate, or reduce, any associated effects of climate change. However, as noted, climate change and associated effects are likely already affecting salmon throughout the North Pacific. Climate change effects pose a substantial and, especially for some species and populations of salmon, an existential threat to salmon as these effects intensify in the future.

5.10.3. Effects of Reasonably Foreseeable Actions on the Ecosystem

The atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years (IPCC 2022) and carbon dioxide concentrations have increased by 40% since pre-industrial times (IPCC 2022). Climate-related impacts on the environment are possible through ecosystem-level changes in habitat, prey species, and food availability. Migration, feeding, and breeding locations influenced by ocean currents and water temperature could be impacted, which could, ultimately, affect productivity of the environment (Albouy et al. 2020; Shelton et al. 2021).

General trends are for the North Pacific to warm, and climate-enhanced heat waves to become more frequent and severe, with these trends driven by global greenhouse gas levels (IPCC 2022). Marine heat wave events have increased in frequency globally, and this trend will likely continue as the global temperatures and ocean heat content increases (Smale et al. 2019). The Gulf of Alaska has experienced one well-studied ecosystem and sustained regime shift that occurred in the late 1970s (Hare and Mantua, 2000) as well as other ecosystem changes that have been less persistent (e.g., Litzow et al 2006). Regime shifts in the Gulf of Alaska are correlated with basin-scale climate variables such as the Pacific Decadal Oscillation, El Niño Southern Oscillation, and North Pacific Gyre Oscillation. The Gulf of Alaska has also recently experienced an anomalous warm period from 2014–2016 called the Pacific marine heatwave that resulted in changes across trophic levels, with responses persisting after the onset of the heatwave (Suryan et al. 2021). The Gulf of Alaska again experienced a heatwave in 2019 before cooling to more typical SST temperatures in the 2021–2022.

The impacts of climate change are expected to continue with increased marine and terrestrial temperatures, more frequent and severe storms and increased wetness in northern latitudes and increased dryness in southern latitudes of the US[52]. The main contributor to climate change is anthropogenic derived greenhouse gas emissions that primarily come from the burning of fossil fuels for electricity, heat, and transportation[53].

The effects of climate change and associated effects are likely already affecting salmon throughout the North Pacific, and the deleterious effects of climate change on salmon are likely to continue and worsen into the reasonably foreseeable future. Climate change effects pose a substantial and, especially for some species and populations of salmon, an existential threat to salmon as these effects intensify in future years. As salmon populations continue to be harmed by warming marine and freshwater, ocean acidification, competition, and changes to prey availability, the climate change-induced declines in salmon populations are likely to have far reaching consequences to ecosystems. Reductions in salmon populations in SEAK would result in

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[52] https://nca2018.globalchange.gov/

[53] https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#:~:text=The%20largest%20source%20of%20greenhouse,Greenhouse%20Gas%20Emissions%20and%20Sinks.

large-scale changes to marine and freshwater ecosystems as the consumption of various prey items by salmon declines (e.g., many types of zooplankton and forage fish) and as the availability of salmon as prey and carrion too many predators and scavengers declines in the future.

While the effects of climate change on the ecosystem are expected to continue, considering the direct and indirect impacts of Alternatives 1 and 2 discussed in Section 5.10.2, when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the reasonably foreseeable future actions listed above, the impacts of Alternatives 1 and 2 are determined to be negligible as the SEAK commercial salmon fisheries are not expected to dramatically increase fossil fuel emissions from current levels, and direct impacts from the fishery on the ecosystem are not anticipated as the fishery occurs within the water column, which avoids any significant disturbance to benthos, substrate, or intertidal habitat, all of which are components of the larger ecosystem.

Considering the expected effects of proposed action when added to the impacts of the reasonably foreseeable actions listed above, the impacts of the proposed action are not determined to be significant, whereas the impacts under Alternative 3 would be significant given that there would be historically unprecedented increases of salmon into freshwater systems that may result in changes to nutrient loads in watersheds, hypoxia and death of salmon, changes to terrestrial and marine predator assemblages, and density dependent effects to salmon that would likely result in declines in stock productivity and declines in the overall abundance of SEAK salmon returns for the foreseeable future.

6. Human Dimensions of Salmon

The economic, tribal, and community impacts of the SEAK salmon fisheries under the PST have been analyzed in a few relatively recent publications (Conrad and Thynes 2023, Nichols 2021, McDowell Group 2019, Gislason et al. 2017, and TCW Economics 2010). This Section contains the available economic information from ADF&G, CFEC, tribal information provided by Central Council of Tlingit and Haida Indian Tribes of Alaska, and other economic and community information available from other sources, such as white papers, comment letters, newspaper articles, and other published sources.

Of relevance to this analysis is Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994) supplemented by Executive Order 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All (April 21, 2023), which directs federal agencies, as appropriate and consistent with applicable law to: identify, analyze, and address disproportionate and adverse human health and environmental effects (including risks) and hazards of Federal activities, including those related to climate change and cumulative impacts of environmental and other burdens on communities with environmental justice concerns. Section 6 of this EIS, paired with effects discussed in Section 5, provide information and perspectives on the range of alternatives and their effects on SEAK communities, with specific information provided in Section 6 on tribal and rural communities, which provide a first step in addressing E.O. 12898 and E.O. 14096.

6.1. Existing Economic Conditions

Economic impacts from the commercial troll, purse seine, and gillnet fisheries include direct value from fishing (ex-vessel value, or the value to fishermen), as well as cascading impacts throughout the supply chain including handling, processing, wholesaling, and retailing. Each activity increases the value of the fish from the initial price paid to fishermen to the final retail price paid by consumers. In addition to direct impacts, a high percentage of fishermen are from Alaska and rely on support services (ex. groceries, fuel, cold storage, restaurants, bars, and mechanic shops) creating an indirect impact on SEAK communities. All activities in this chain constitute important elements of the SEAK economy. This section focuses on the existing economic conditions for the commercial and sport fisheries.

This section is divided by sector to provide a snapshot of the existing economic conditions in SEAK communities that are reliant on salmon commercial fisheries. Once salmon enters a processing facility, which is the next step to bringing salmon to market, there is not a clear way to distinguish if the salmon is managed under the PST Agreement or not; therefore, this analysis describes an economy that is reliant on a consistent, renewable resource and includes data on all SEAK salmon, not just salmon managed under the PST Agreement . For information on the salmon fisheries subject to the PST Agreement, see Section 4 and Table 4-1.

For SEAK, total commercial harvests in 2022 was 24.98 million salmon valued at $119.6 million in ex-vessel value.[54] Pink and chum salmon make up 91 percent of the total salmon harvest by volume, followed by sockeye and coho both with 4 percent, and Chinook with the remaining 1 percent.

[54] This includes Yakutat set gillnet fishery confiscations, commercial test fisheries, and sport derbies where the fish were sold, but does not include Annette Island or cost recovery.

6.1.1. Ex-vessel Value and Harvest Sector

Ex-vessel value measures the dollar value of commercial landings and is usually calculated by considering the price per pound at the first purchase multiplied by the total pounds landed. The annual ex-vessel value from SEAK traditional salmon fisheries (excluding hatchery terminal, cost recovery, hatchery access fisheries) landed in Alaska is substantial. In 2022, salmon harvested in SEAK were landed and processed in 18 Alaska ports, and the combined ex-vessel value was estimated at $119 million (Conrad and Thynes, 2023). According to information from scoping comments, SEAK residents own 2,655 commercial fishing vessels—a third of Alaska's fishing fleet and more than any other region in the state[55].

Table 6-1 Southeast Alaska commercial fisheries ex-vessel value estimated by prices reported on fish tickets by gear type, area and species, 2022.

Fishery	Chinook	Jacks	Sockeye	Coho	Pink	Chum	Total
Exvessel value in dollars							
Purse seine	$ 1,295,244	$ 1,747	$ 6,572,553	$ 526,920	$ 19,086,029	$ 28,800,669	**$ 56,283,161**
Drift gillnet	$ 849,588	–	$ 5,722,196	$ 1,333,701	$ 765,177	$ 20,374,523	**$ 29,045,185**
Setnet	$ 10,888	–	$ 454,716	$ 549,201	$ 22,798	$ 170	**$ 1,037,772**
Troll	$ 14,464,832	–	$ 20,457	$ 9,639,583	$ 117,508	$ 9,036,697	**$ 33,279,077**
Total exvessel value	**$ 16,620,552**	**$ 1,747**	**$ 12,769,922**	**$ 12,049,405**	**$ 19,991,512**	**$ 58,212,059**	**$ 119,645,195**
Number harvested							
Purse seine	26,175	1,300	629,374	162,379	14,738,246	3,460,787	**19,018,261**
Drift gillnet	16,174	–	479,728	132,522	632,901	2,394,186	**3,655,511**
Setnet	423	–	48,374	62,888	22,798	97	**134,580**
Troll	196,672	–	2,214	854,270	79,397	1,045,914	**2,178,467**
Total harvested	**239,444**	**1,300**	**1,159,690**	**1,212,059**	**15,473,342**	**6,900,984**	**24,986,819**

a Ex-vessel value calculation = (number caught) x (average weight) x (average ex-vessel price).
b In addition to adults, jack Chinook salmon <28 inches may only be sold in the drift gillnet fishery and jack salmon <28 inches may be sold in the purse seine fishery if harvested in a hatchery terminal harvest area.
d Includes confiscations, commercial test fisheries, and sport derbies where fish were sold.
Source: Conrad and Thynes, 2023.

Table 6-2 Commercial Fishing Permits Fished in SEAK, 2018-2022

	Purse Seine Fished	Drift Gillnet Fished	Set Gillnet Fished	Hand Troll Fished	Power Troll Fished	Total Permits Fished
2018	242	421	102	235	669	1,669
2019	240	419	94	227	661	1,641
2020	200	368	91	218	628	1,505
2021	208	371	95	202	629	1,505
2022	194	167	77	173	608	1,425
5 yr. average	217	349	92	211	639	1549

Source: Conrad and Thynes, 2023

6.1.1.1. Commercial Troll Fishery

The commercial troll fishery predominantly targets Chinook and coho salmon, which contribute more than 90% of the annual earnings of the troll fishery in most years. The remaining earnings come from chum salmon harvest not subject to the PST, though chum salmon harvests have been increasing over the past 20 years. The focus of this section is on direct economic impacts of the

55 Taken from scoping comment letter from ALFA 2023

commercial troll fishery measured primarily as the ex-vessel value of Chinook and coho salmon. For more information on the management of the troll fishery, please see Section 4.

The troll fishery is the smallest salmon fishery by volume in SEAK, but the ex-vessel value of the troll fishery is on average the second highest value commercial fishery in SEAK. The harvest is primarily higher-valued Chinook and coho salmon and fishermen receive premium prices on the high-quality product. Chinook salmon are either frozen at sea or bled and delivered on ice to shoreside processors by small-boat fishermen. Troll-caught Chinook are marketed at the highest price relative to salmon harvested in all other SEAK fisheries due to the laborious onboard handling practices and resulting high quality of meat, the large size of their filets, and the high fat content of the meat. Chinook salmon filets are sold at a premium in restaurants around the United States. Chinook accounted for 43 percent of the total troll fishery ex-vessel value for 2022, followed by coho with 29 percent and chum with 27 percent. As shown in Table 6-3, that equates to $14.5 million in ex-vessel value for Chinook, followed by $9.6 million for coho, and $9.0 million for chum. For 2022, the SEAK troll fishery in SEAK was worth $33.3 million in ex-vessel value (Conrad and Thynes, 2023).

Table 6-3 SEAK troll fishery estimated ex-vessel value and harvest, 2022.

Troll Fishery	Chinook	Sockeye	Coho	Pink	Chum	Total
Total Ex-vessel Value	$ 14,464,832	$ 20,457	$ 9,639,583	$ 117,508	$ 9,036,697	**$ 33,279,077**
Total Fish Harvested	196,672	2,214	854,270	79,397	1,045,914	**2,178,467**

Source: Conrad and Thynes, 2023

The ex-vessel value has been lower in recent years, which is reflective of decreases in the SEAK catch limits associated with the 2019 PST Agreement as well as decreases in coastwide Chinook abundance. On average, Chinook salmon harvested in winter and summer fisheries alone comprise over a third ($11.3 million), and in some years close to half, of the overall ex-vessel value of all salmon in the troll fishery (Table 6-3). In 2022, the range in income per troll permit holder was from $4,248 to $57,335 (Strong 2023).

The troll fishery has landings in more communities than the other salmon fisheries, and the economic impacts are large for those small communities, providing earning potential in an area with otherwise limited opportunities. The SEAK commercial troll fishing fleet is composed of small, family-owned fishing boats that use a hook and line to individually catch every salmon. The largest portion of commercially retained salmon harvested in troll fishery has been delivered directly or by tender to Sitka, with Petersburg, Yakutat, Craig, Pelican, and Hoonah being other primary ports taking deliveries. In addition to being the primary port where deliveries of commercially retained salmon are made, Sitka is also the primary community of residence for troll permit holders. Other main Alaska communities of residence for troll permit holders operating in the fishery, which most fishing activity occurs in the EEZ, include Yakutat, Craig, Wrangell, Juneau, and Petersburg.

There are two types of troll permit issued by CFEC—hand troll (S05B) and power troll (S15B). In 2022, there were 173 hand troll permits and 608 power troll permits fished, for a total of 781 permits fished for the troll fishery. Eighty-five percent of the SEAK troll fleet permits are local to SEAK. Since SEAK's troll fishery has the highest level of local ownership of any major Alaska fishery, its ongoing survival is critical to all of SEAK's communities. Of these issued permits, nearly 120 holders are Alaska Native tribal citizens of the Tlingit & Haida Indian Tribes of Alaska (pers comm Tlingit and Haida, 6/2/23) and nine holders are Alaska Native tribal citizens of the Metlakatla Indian Community Annette Islands Reserve. Alaska residents generally earn 55-86% of the fleet's annual ex-vessel value, which from 2011-2020 ranged from $22 million to $52 million (SeaBank 2022).

6.1.1.2. Commercial Purse Seine Fishery

The purse seine fishery is the largest harvester of salmon (primarily pink and chum salmon) and has the largest ex-vessel value. The purse seine fishery supports larger processors in the SEAK ports of Ketchikan, Craig, Petersburg, and Sitka. These processing plants employ hundreds of people and contribute substantially to the economy of those communities. For more information on the management of the purse seine fishery, please see Section 4. As shown in Table 6-4, that equates to $28.8 million in ex-vessel value for chum, followed by $19.1 million for pink, and $6.6 million for sockeye. For 2022, the SEAK purse seine fishery in SEAK was worth $56.3 million in ex-vessel value (Conrad and Thynes, 2023).

Table 6-4 SEAK purse seine fishery estimated ex-vessel value and harvest, 2022.

Purse Seine Fishery	Chinook	Jacks	Sockeye	Coho	Pink	Chum	Total
Total Ex-vessel Value	$ 1,295,244	$ 1,747	$ 6,572,553	$ 526,920	$ 19,086,029	$ 28,800,669	**$ 56,283,161**
Total Fish Harvested	26,175	1,300	629,374	162,379	14,738,246	3,460,787	**19,018,261**

Source: Conrad and Thynes, 2023

The CFEC-issued permit is S01A. In 2022, a total of 194 permits were fished. In 2022, the average income per purse seine permit holder was $366,102 (Strong 2023).

6.1.1.3. Commercial Drift and Set Gillnet Fisheries

Alaska has two types of gillnet fishing: drift gillnet and set gillnet. Drift gillnets are lowered off a boat and drift in water as salmon swim into them. Set gillnets are used along the shoreline near river mouths. Yakutat has the only commercial set gillnet fishery in SEAK, but drift gillnet fisheries occur throughout SEAK. The SEAK drift gillnet fishery was historically a sockeye and coho salmon fishery that also caught Chinook salmon in relatively small quantities. In recent years, effort has shifted to harvesting hatchery chum salmon as well. For more information on the management of the drift gillnet fishery, please see Section 4. The drift gillnet fishery is typically the second highest harvester by volume but can have lower ex-vessel values than the troll fishery. As shown in Table 6-5, the drift gillnet fishery equates to $20.4 million in ex-vessel value for chum, followed by $5.7 million for sockeye, and $1.3 million for coho. For 2022, the SEAK drift gillnet fishery in SEAK was worth $29.0 million in ex-vessel value (Conrad and Thynes, 2023). The set gillnet fishery equates to $549,201 in ex-vessel value for coho, followed by $454,716 for sockeye, and $22,798 for coho. For 2022, the SEAK set gillnet fishery in SEAK was worth $1.03 million in ex-vessel value (Conrad and Thynes, 2023).

The harvest of Chinook salmon in gillnet fisheries is subject to the PST Agreement and represents between 2 to 6 percent of the ex-vessel value of the fishery. Gillnet harvest of Chinook salmon is minimal beyond the two terminal harvest areas of Districts 108 and 111 and is mostly harvested in Alaska hatchery terminal harvest areas. The drift gillnet average salmon ex-vessel value from 2017-2021 was $20 million and $1 million of that value, or 5 percent, was attributed to Chinook salmon (Thynes et al. 2021).

Table 6-5 SEAK gillnet fishery estimated ex-vessel value and harvest, 2022.

	Chinook	Sockeye	Coho	Pink	Chum	Total
Drift Gillnet Fishery						
Total Ex-vessel Value	$ 849,588	$ 5,722,196	$ 1,333,701	$ 765,177	$ 20,374,523	**$ 29,045,185**
Total Fish Harvested	16,174	479,728	132,522	632,901	2,394,186	**3,655,511**
Setnet Gillnet Fishery						
Total Ex-vessel Value	$ 10,888	$ 454,716	$ 549,201	$ 22,798	$ 170	**$ 1,037,772**
Total Fish Harvested	423	48,374	62,888	22,798	97	**134,580**

Source: Conrad and Thynes, 2023

The CFEC-issued permit is S03A for the drift gillnet fishery and S04D for the set gillnet fishery. In 2022, there were 167 drift gillnet permits and 77 set gillnet permits fished, for a total of 244 permits fished for the gillnet fisheries. In 2022, the average income for a drift gillnet permit holder was $82,761 and the average income for a setnet gillnet permit holder was $14,211 (Strong 2023).

6.1.2. Wholesale Value and Processing Sector

When shoreside processors receive salmon from fishermen, they add value to the catch by fileting, packaging the fish, and freezing it quickly. That additional value-added is called 'first wholesale value,' which processors pass along when they sell the packaged, frozen fillets to buyers in the supply chain.

First wholesale value measures the dollar value of processed seafood products when sold by the processor. This adds the value of the raw fish handled by the fisherman to the value added by the processor. Processing plants in SEAK buy raw fish from fishermen and turn them into seafood products, such as fillets or canned salmon, which buyers can find in fish markets, grocery stores, restaurants, and schools. As shown in Table 6-6, there are 18 processing facilities in SEAK that process salmon from Ketchikan to Yakutat. Many are often the primary source of employment for rural communities.

Table 6-6 Processing Facilities in SEAK, 2023

Processing Facility Name	Location	Nearest Town
Silver Bay Seafoods Craig Plant	Klawock Inlet	Craig
OBI Seafoods, LLC Excursion Inlet Plant	Excursion Inlet	Excursion Inlet
Haines Packing Company	Letnikof Cove	Haines
Alaska Seafood Holdings Hoonah Cold Storage Plant	Port Frederick	Hoonah
Alaska Glacier Seafoods Juneau Plant	Auke Bay	Juneau
Alaska Seafood Holdings SASSCO Juneau Plant	Gastineau Channel	Juneau
Alaska General Seafoods Ketchikan Plant	Tongass Narrows	Ketchikan
EC Phillips & Son Ketchikan Plant	Tongass Narrows	Ketchikan
Trident Seafoods Ketchikan Plant	Tongass Narrows	Ketchikan
OBI Seafoods, LLC Petersburg Plant	Wrangell Narrows	Petersburg
Tonka Seafoods Inc. Petersburg Plant	Wrangell Narrows	Petersburg
Trident Seafoods Petersburg Plant	Frederick Sound	Petersburg
North Pacific Seafoods Sitka Plant	Sitka Channel	Sitka
Seafood Producers Cooperative Sitka Seafood Plant	Sitka Sound	Sitka
Silver Bay Seafoods SMCIP Plant	Silver Bay	Sitka
Pacific Seafoods Wrangell Plant	Zimovia Straits	Wrangell
Trident Seafoods Wrangell Plant	Wrangell Harbor	Wrangell
E&E Foods Yakutat Seafoods Plant	Monti Bay	Yakutat

Source: State of Alaska Department of Conservation, 2023

Processors generate first wholesale value of the harvest delivered by fishermen. As shown in Table 6-7, the 2022 total harvest volume was 193.9 million pounds worth $602.8 in first wholesale value. This number is inflated partially due to the amount of hatchery salmon that is harvested and processed in SEAK. However, hatcheries are closely tied to wild salmon fisheries and both contribute to the volume of harvest fishermen and processors see each year.

Table 6-7 First wholesale volume and value in SEAK attributed to salmon managed under the PST Agreement, 2017-2023.

	First Wholesale Volume					
	2018	2019	2020	2021	2022	5 Yr Average
Chinook	3,648,369.85	4,187,673.12	1,564,414.89	2,157,531.81	2,406,402.70	2,792,878
Chum	72,100,861.90	56,905,734.06	29,748,668.65	39,009,667.93	57,166,321.47	50,986,251
Coho	10,609,266.34	10,818,210.66	5,156,202.72	7,382,646.15	6,509,649.30	8,095,195
Pink	19,066,277.33	57,647,475.91	23,078,500.53	126,088,063.52	109,971,019.44	67,170,267
Sockeye	4,644,534.75	7,516,187.85	3,265,383.49	13,355,343.79	17,819,084.21	9,320,107
Total	**110,069,310**	**137,075,282**	**62,813,170**	**187,993,253**	**193,872,477**	**138,364,698**

	First Wholesale Value					
	2018	2019	2020	2021	2022	5 Yr Average
Chinook	$17,410,253	$11,947,704	$13,786,498	$21,707,171	$21,207,902	$17,211,906
Chum	$199,859,441	$124,721,574	$60,003,313	$133,118,591	$199,764,610	$143,493,506
Coho	$39,961,478	$37,145,805	$24,850,418	$38,183,640	$27,195,469	$33,467,362
Pink	$44,148,535	$111,454,858	$66,591,258	$264,256,595	$277,927,485	$152,875,746
Sockeye	$13,551,248	$21,830,468	$18,470,037	$61,531,669	$76,692,379	$38,415,160
Total	**$314,930,955**	**$307,100,409**	**$183,701,525**	**$518,797,667**	**$602,787,845**	**$385,463,680**

Source: State of Alaska Department of Fish and Game, 2023

6.1.3. Community Importance of the SEAK Salmon Fisheries

Salmon are central to SEAK community identity. Salmon fisheries in SEAK play a pivotal role in sustaining food security, community interconnectedness, and heritage within the region. The annual salmon runs serve as a cornerstone of food security for local communities, offering a critical protein source and essential nutrients that support the health and well-being of residents. The abundance of salmon, both culturally and nutritionally, fosters an interconnectedness between SEAK communities and the natural environment.

The presence of salmon holds significant cultural and heritage value within SEAK communities. The annual salmon runs are deeply entrenched in the cultural fabric of these societies, shaping traditions, practices, and collective identity[56]. The cyclical return and harvest of salmon provides a rhythm around which families are structured, from daily life to seasonal transitions. Even for families that do not actively participate in fishing, their lives are often deeply embedded in it, from providing logistical support to other fishing families to eagerly awaiting fresh salmon on the docks. Many households in SEAK are more likely to describe seasons by what is able to be harvested than by their western names, with “salmon season” often reigning supreme.

Salmon also stand as a focal point for conservation efforts and are integral to the social relationships within Southeast Alaska[57]. Their lifecycle, from freshwater spawning to oceanic migration and return, serves as a model for environmental stewardship and conservation practices. The presence of salmon not only supports the ecosystem's biodiversity but also catalyzes community engagement in conservation efforts, uniting residents in the shared goal of preserving these invaluable natural resources. Moreover, the act of fishing and the communal activities surrounding it reinforce social relationships, fostering a sense of camaraderie, cooperation, and shared experiences among community members. This connection to salmon fisheries and the activities associated with it creates a shared sense of identity and self within these communities.

[56] https://salmonstate.org/salmon-stories/joe-emerson

[57] https://www.youtube.com/watch?v=T3D_0G5VPVo

The inability to harvest salmon would cause irreparable harm to Southeast Alaskan communities. Loss of access to this fishery would compromise the well-being of Southeast Alaskan communities, particularly that of its most rural residents. In Southeast Alaska, salmon fishing is generational and whole communities depend heavily upon healthy returning salmon runs. In modern times, the subsistence, sport, and commercial fisheries remain predominant economic drivers for the region and the State. These fisheries provide a strong sense of identity in coastal communities, with most residents directly and indirectly tied through ownership of fishing permits and boats, work as year-round and seasonal crew members, and by owning and operating support industries including but not limited to boat yards, mechanical and parts shops, seafood processors, grocers, fuel providers, restaurants, lodging, and guide services.

Maintaining access to salmon fisheries is critical for the well-being, identity, and pride of Southeast Alaska communities. Salmon fisheries are a lifeline for rural livelihoods, freezers, and connectedness across the region where families take great pride in being able to harvest and consume salmon.

6.1.3.1. Personal Use and Subsistence Fisheries in SEAK

The availability of salmon contributes significantly to the year-round food supply in rural SEAK communities. The exact economic value has not been estimated but is known to be important, especially as the cost of food in small coastal communities can be significant. It is important to recognize the non-monetary values associated with salmon when attempting to value salmon fisheries in economic terms (Gislason et al. 2017). In the 2022 subsistence/personal use fisheries, 3,028 household permits were issued for fishing in Southeast Alaska and Yakutat; reported 2022 harvest to date is 23,800 salmon (Conrad and Thynes, 2023). Given the challenges of transportation and the high cost of importing fresh produce or protein sources, the local presence of salmon ensures a dependable food source and lessens the reliance on external food sources. Protein sourced from salmon fisheries is central to many SEAK households, providing a nutritionally dense and local food at a low cost as compared to other sources of protein in small rural communities where grocery prices are often inflated due to remoteness. As a region dominated by archipelagos, most food is shipped or flown in as many communities are located on islands or are landlocked, thus contributing to food costs that are 36.3 to 53.3 percent higher than the national average[58]. The ability to harvest, process, and store salmon is a source of pride, is deeply embedded in the cultural and traditional fabric of SEAK communities and is a critical part of food security in the region.

6.1.4. Fishery Taxes and Support Sector in Communities

The economic contribution of commercial fisheries includes the value to individual permit holders and to SEAK coastal communities as a whole. Many of these small coastal communities do not have the alternative employment opportunities that are available in major population centers. Secondary benefits to the SEAK commercial fisheries include vessel crew and deckhand income, the processing sector and associated jobs, earnings spent that support local businesses, increased tourism dollars, and substantial tax revenues to the State and to the communities in which fish are landed which use these revenues to support infrastructure and services. Substantial spillover economic impacts occur not only in SEAK, but on the whole North American economy

[58] https://www.jedc.org/wp-content/uploads/2023/10/2023-Juneau-SEAK-Economic-Indicators-Report.pdf

through the selling of salmon in stores and restaurants across the continent and through the multiplier impacts from regional spending in both commercial and sport sectors.

Table 6-8 Selected demographic indicators in Southeast Alaska communities.

	Total Salmon Permits	Population Estimates	Pct. Of Population Identifying as Alaska Native or American Indian*	Persons Below Poverty	Median Household Income
ANGOON	9	340	61.0%	85	$44,167
CRAIG	125	992	15.0%	130	$61,875
EDNA BAY	4	42	0.0%	26	$38,500
ELFIN COVE	11	38	0.0%	0	$194,063
GUSTAVUS	22	657	3.1%	26	$38,500
HAINES	88	2575	6.7%	347	$63,355
HOONAH	81	917	47.9%	75	$64,432
HYDABURG	12	347	69.0%	85	$45,938
HYDER	1	46	-	-	-
JUNEAU	279	32202	10.1%	2293	$90,126
KAKE	21	530	56.6%	83	$64,000
KASAAN	2	49	-	17	$75,417
KETCHIKAN	258	13762	18.0%	1289	$77,820
KLAWOCK	28	694	41.6%	182	$53,750
METLAKATLA	28	1444	81.0%	-	-
MEYERS CHUCK	8	21	-	-	-
NAUKATI BAY	1	131	-	42	-
PELICAN	25	83	31.6%	4	-
PETERSBURG	327	3357	7.8%	160	$71,696
PORT ALEXANDER	14	57	0.0%	9	$45,625
SITKA	444	8350	10.3%	573	$82,083
SKAGWAY	5	1146	-	64	$75,000
TENAKEE	10	126	0.0%	9	$45,865
THORNE BAY	18	449	2.8%	67	$49,583
WRANGELL	176	2084	22.9%	258	$54,891
YAKUTAT	183	673	31.3%	41	$72,083

Source: CFEC Permits Database 2023, DOLWD Alaska Population Estimates 2023, DCCED DCRA 2023.

There are many small, isolated, rural communities in SEAK where the troll fishery is essential to the economy. Communities such as Craig, Elfin Cove, Hoonah, Meyers Chuck, Pelican, Point Baker, Port Alexander, Tenakee, and Yakutat heavily rely on the troll fishery as a pillar of the local economy as many fishermen stop there weekly to refuel, order groceries, utilize support services, and deliver fish (Table 6-8). For example, in a given fishing season, trollers follow the location of fishing openers set by ADF&G and stop in multiple communities. These communities, in particular, have substantial portions of their populations that rely on trolling as a primary source of income, in many cases, their only source. Shown in Table 6-8, many of these rural communities report median household incomes below the national median household income of $70,784. The larger communities (e.g., Juneau, Petersburg, Ketchikan and Sitka) have more diverse economies and resources; however, the troll fishery still brings in substantial revenue to these communities. For example, only 7% of Sitka residents are directly involved in the troll fishery. Nonetheless, Sitka permit holders brought in $8.2 million in ex-vessel value to their community in 2021 as well as fish landing taxes that support community infrastructure and basic services.

As shown in Table 6-9, there are 2,180 individual SEAK commercial salmon fishing permits held by residents ranging from 1 permit in Hyder to 444 permits in Sitka. Most, but not all, of these communities have harbors and fuel services. Eighteen of these communities have operational processing facilities, which is over half of the communities in SEAK.

Table 6-9 CFEC Permits Held by SEAK Residents, 2023.

City	SEAK Purse Seine S01A	Yakutat Set Gillnet S04D	SEAK Drift Gillnet S03A	Statewide Powertroll S15B	Statewide Handtroll S05B	Total Permits
ANGOON	0	0	0	3	6	9
AUKE BAY	0	0	4	4	8	16
CRAIG	10	0	11	69	35	125
DOUGLAS	1	0	15	14	7	37
EDNA BAY	0	0	0	1	3	4
ELFIN COVE	0	0	0	9	2	11
GUSTAVUS	0	0	0	10	12	22
HAINES	0	0	64	19	5	88
HOONAH	3	0	3	25	50	81
HYDABURG	2	0	0	4	6	12
HYDER	0	0	0	0	1	1
JUNEAU	6	12	62	54	92	226
KAKE	3	0	0	8	10	21
KASAAN	0	0	0	1	1	2
KETCHIKAN	19	0	37	74	91	221
KLAWOCK	4	0	1	9	14	28
METLAKATLA	9	0	11	2	6	28
MEYERS CHUCK	0	0	0	3	5	8
NAUKATI BAY	0	0	0	0	1	1
PELICAN	0	2	0	15	8	25
PETERSBURG	52	1	71	62	141	327
PORT ALEXANDER	0	0	0	8	6	14
SITKA	33	10	27	272	102	444
SKAGWAY	0	0	4	0	1	5
TENAKEE	0	0	0	8	2	10
THORNE BAY	2	0	1	7	8	18
WARD COVE	1	0	5	13	18	37
WRANGELL	9	0	59	46	62	176
YAKUTAT	0	106	3	27	47	183
Total	**154**	**131**	**378**	**767**	**750**	**2180**

Source: CFEC Permit Database, 2023.

Alaska's fisheries taxes, some of which are shared with communities or enhancement operations local to fisheries, are another source of an indirect salmon fishery effect. "Fish" tax receipts shared with a community may be associated with increased community spending on goods and services within the community, smaller community sales tax or property tax assessments, purchases of goods and services outside the community, or some combination of these.

The SEAK salmon fisheries may be subject to different combinations of five separate State fisheries taxes. The State taxes and rates applicable to the salmon fisheries are provided by the Alaska Department of Revenue and shown in Table 6-10. In addition to the taxes discussed here, municipalities may impose their own taxes, and commercial fishing operations contribute a share of the fuel tax revenues collected by Alaska. These are not discussed here.

The two primary taxes on salmon fisheries include the fishery business tax and the fishery resource landing tax. The fisheries business tax is generally paid by the first processor of processed fish, or the exporter of unprocessed fish, based on the ex-vessel price of unprocessed fish. The rates vary depending on the type of processor. The key applicable rates for the species of salmon considered here are those for shore-based processors and direct marketers (3 percent), floating processors (5 percent), or salmon canneries (4.5 percent). Half the tax revenues are shared with communities where the processing takes place. Revenue sharing is based on fishery harvests one year before; thus payments in 2023 are based on taxes collected in 2023, for fishing that took place in 2022.

Trollers may pay a fishery resource landing tax, since they are the only salmon fishermen who process salmon outside the three-mile limit and first landed in Alaska. The tax is levied on the average unprocessed value of the fish. This tax would not be levied on drift gill net vessels or seine vessels, which do not process salmon onboard. The tax rate is 3 percent and would be in place of the fisheries business tax. Half the revenues are shared with communities where the landing occurs.

Table 6-10 Summary of State of Alaska fisheries taxes as they relate to SEAK salmon fisheries.

	Fisheries Business Tax	**Fishery Resource Landing Tax**	**Seafood Marketing Assessment**	**Salmon Enhancement Tax**	**Regional Seafood Development Tax**
SEAK salmon fisheries	3.0%, 4.5%, or 5% depending on processor type	3.0% for trollers freezing their product at sea. A vessel would not pay this and the Fisheries Business Tax.	0.50%	3.00%	0.00%
Revenue sharing	50% to local communities, including cities, villages, and boroughs.	50% to local communities, including cities, villages, and boroughs.	100% to Alaska Seafood Marketing Institute (ASMI)	100% returned to regional hatcheries	100% returned to regional development association
Statute	AS 43.75	AS 43.77	AS 16.51	AS 43.76.001	AS 43.76.350
Regulations	15 AAC 75	15 AAC 77	15 AAC 116	15 AAC 76	Not applicable
Source: Alaska Department of Revenue					

Table 6-11 Shared Fisheries Taxes by SEAK Community, 2023.

SEAK Community	Shared Fisheries Tax
City and Borough of Juneau	$ 4,032
City and Borough of Sitka	$ 25,561
City and Borough of Wrangell	$ 9,541
City and Borough of Yakutat	$ 5,924
City of Angoon	$ -
City of Coffman Cove	$ 4,679
City of Craig	$ 3,604
City of Edna Bay	$ -
City of Gustavus	$ 727
City of Hoonah	$ 753
City of Hydaburg	$ 2,879
City of Kake	$ 5,622
City of Kasaan	$ 2,525
City of Ketchikan	$ 12,383
City of Klawock	$ -
City of Pelican	$ 4,438
City of Port Alexander	$ 4,359
City of Saxman	$ 2,843
City of Tenakee Springs	$ 671
City of Thorne Bay	$ 2,977
City of Whale Pass	$ 4,417
Haines Borough	$ 933
Ketchikan Gateway Borough	$ 9,022
Municipality of Skagway	$ 785
Petersburg Borough	$ 12,780

Source: State of Alaska Department of Revenue Shared Fisheries Taxes Report, 2023.

6.1.5. Sport Fisheries

Sport fishing is an important component of the SEAK economy that generates economic value through private and chartered sport activity, and as a food source. The key species for sport fishing include Chinook and coho salmon, halibut, ling cod, and rockfish. The sport salmon fisheries of SEAK occur in both fresh and saltwater. Chinook salmon are the most preferred salmon species in the SEAK sport fishery, followed by coho. Unlike commercial fisheries where the value of the harvest can be measured directly, the economic contributions of sport fisheries are measured by the number of angler days generated by the fishery and then multiplied by the average sport fish-related spending per day. This method recognizes the economic contributions of the angling activity including those trips when the angler does not have the opportunity or does not choose to retain their catch. Alaskan sport fishermen may keep their catch, meaning they can feed their families.

Previous studies quantifying the economic contribution of SEAK sport fisheries have been commissioned by ADF&G and the PSC. Southwick Associates et al. (2008) in partnership with ADF&G, assessed the economic contributions of the sport fishery for the 2007 calendar year by collecting information on angler spending per day by surveying resident and nonresident anglers who fished in Alaska (as both guided and unguided anglers). These survey results were combined with the total number of licensed anglers in 2007 and the total number of days fished as estimated by the ADF&G Division of Sport Fish Statewide Harvest Survey (SWHS) to produce estimates of economic impact and contribution. The total spending by anglers in 2007 was estimated at $274 million dollars and supports 3,063 jobs while generating $22 million in state and local taxes. These values include the economic benefit of all sport fishing activity in SEAK including salmon, halibut, groundfish, and resident freshwater species.

In 2017, the PSC published a report with estimates on the economic impact of PST fisheries (Gislason et al. 2017) for the years 2012-2015. The PSC report utilized information collected in the 2008 Southwick Associates effort, in combination with additional data produced by NOAA to derive average daily salmon angler expenditures in SEAK and multiplied that by angler days as estimated by the SWHS to generate annual estimates. The findings of this report indicated annual salmon angling expenditures that ranged between $105 million and $132 million while contributing between 845 and 1,055 full time equivalent jobs annually in years 2012-2015 for the SEAK sport salmon fisheries (Table 6-12).

Following the same methodology as published by the PSC, average daily salmon angler expenditures have been multiplied by the most recent estimate of angler days from the SWHS (2021) after conversion factors to adjust total days fished into days fished targeting salmon were applied. In lieu of more recent angler expenditure data, the most recently published angler expenditure data calculated for 2012-2015 by the PSC is presented alongside an inflation adjusted average angler expenditure where the consumer price index has been applied to adjust 2015 angler expenditures into the value of U.S. dollars in 2021.

Economic impacts from the sport fishery result from angler expenditures including trip and durable or major purchases, particularly in the guided sport sector. Gislason et al. (2017) found that the guided sector is relatively more important in the SEAK sport salmon fishery than in the combined sport salmon fisheries in British Columbia, Washington, and Oregon.

Table 6-12 Estimates of Southeast Alaska salmon sport fishery economic impacts for 2021.

	Average daily expenditure (2012-2015)	**Inflation adjusted expenditures for 2021**	**Salmon angler days fished in 2021**	**Inflation adjusted sport fishing expenditures for 2021**
		Freshwater		
Private angler	$160	$179	32,305	$5,782,506
Guided angler	$320	$358	16,565	$5,930,270
		Saltwater		
Private angler	$300	$336	172,388	$57,922,234
Guided angler	$600	$672	67,643	$45,455,995
		Total Freshwater and Saltwater		**$115,091,004**

Source: Gislason et al. 2017

Of the communities surveyed, the largest number of days fished occurs from the communities of Juneau, Craig/Klawock, Ketchikan, and Sitka while the communities of Haines and Skagway account for the smallest portion of regional sport fishing activity. The highest economic value per angler day occurs in the saltwater guided fishery, which increases the relative value of salmon sport fisheries beyond that of the independent or unguided angler. The SEAK communities with the largest amount of saltwater guided activity include Sitka, Juneau, Ketchikan, Craig/Klawock, and Elfin Cove. Significant guided angling activity also occurs in Yakutat, although the majority of this activity occurs in freshwater. Gislason et al. (2017) estimated that angling expenditures for private and guided salmon fishing ranged from $104.6 million to $131.8 million for the 2012-2015 time frame resulting in 845 to 1,055 FTE jobs in the region. Applying that methodology to

2021 data yields $115 million in inflation adjusted salmon sport fishing expenditures. Sport fishing activity for salmon occurs in every community across SEAK.

As mentioned above, in addition to the pure economic value of sport fisheries, salmon sport fishing provides a food resource that many families rely on. Compared to other states, Alaska faces unique food security challenges because of its remoteness, high costs of transportation, limited agricultural production, and high reliance on imported food (Meter and Goldenberg 2014). Also unique to Alaska is the major role that harvesting wild foods through fishing, hunting, and gathering plays in support of food security (Fall 2016a; Walch et al. 2018; ICC 2015). Indeed, as noted in the report "Building Food Security in Alaska" (Meter and Goldenberg 2014), "[t]he main source of local food in the state of Alaska today is subsistence and personal use gathering." Alaskans harvested approximately 46 million pounds of wild resources for food (usable or edible weight) in noncommercial (including sport fishing) fisheries and hunts in 2014 (the most recent year for which a comprehensive estimate is available) (Fall 2016b). These harvests take place in subsistence, personal use, and sport fisheries, and subsistence and general hunts, depending on what is available regionally. The composition of the wild food harvest in Alaska is 31.8% salmon, 21.4% other fish, 22.3% land mammals, 14.2% marine mammals, 2.9% birds, 3.2% shellfish, and 4.2% wild plants (ADF&G 2018).

6.1.6. Estimated Economic Output

Nearly 72,500 people live in Southeast Alaska's 33 communities. Southeast Alaska is an island archipelago with a long, narrow mainland where major economic sectors such as health care and government are concentrated in just a few large communities. The largest scale visitor industry economies are concentrated in five mostly larger communities with deep water ports that accommodate cruise ships. Commercial fishing is the most important economic sector in terms of its overall geographic distribution and contribution to most Southeast Alaska communities.[59]

Southeast Alaska is one of the most important fishing regions in Alaska, with more full-time fishery workers than any region other than the Bering Sea. Within SEAK, seafood is the largest private sector industry in terms of workforce and size and labor income. The industry accounts for 11 percent of regional employment, including multiplier impacts.[60] In any given year, seven of the top 100 fishing ports by value in the *entire country* are likely to be Southeast Alaska ports. There is a high level of resident earnings in these communities—Petersburg (in third place with $49 million in earnings), Sitka (in fourth place with $41 million), Juneau (in eighth place with $20 million) and Ketchikan (in tenth place with $16 million), which are among the top 10 fishing communities in Alaska (Seabank 2022). Salmon is the region's most abundant and valuable harvested seafood species and comprises 60 to 70 percent of the total seafood productivity in any year (McKinley Group 2022). The commercial salmon industry provides a large stimulus to the regional economy beyond wholesale and retail trade activities (Gislason et al. 2017).

Overall, salmon accounted for approximately 60 to 70 percent of SEAK's seafood production value.[61] Using data from the most recent comprehensive economic study produced by ASMI in 2020, the SEAK salmon fishery produced $303 million in output, $165 million in labor income for SEAK, and 7,910 in jobs for the region. Breaking it down, commercial fishing contributed to 4,410 jobs, followed by processing, which contributed to 2,730 jobs, and lastly, management contributed to 770 jobs for salmon-related fisheries. At this time, this is the closest analysts can

[59] Taken from scoping comment letter from ALFA 2023.

[60] https://www.seconference.org/wp-content/uploads/2023/09/SE-by-the-numbers-2023-Final.pdf

[61] This would include all economic activity related to the harvest sector, processing sector, and support sectors.

get to an estimate for 2022 and all salmon-related activity is included in this estimate, not just activity specific to salmon managed under the PST Agreement .

6.2. Tribal Importance of the SEAK Salmon Fisheries

This section and section 6.3.2 were prepared in collaboration with the Central Council of Tlingit and Haida Indian Tribes of Alaska, a cooperating agency for this EIS.

6.2.1. Indigenous Peoples of "Southeast Alaska"

> *"The* Xaadas *people and* Lingít *people have always lived on these sacred and wondrous lands and waters of Southeast Alaska as the original occupants and guardians"*[62]. . .

For thousands of years, the Lingít (Tlingit), Xaadas (Haida), and Ts'msyen (Tsimshian) peoples have been stewards of wild salmon populations that span 43,000 square miles across what is commonly known as SEAK. Today, there are nineteen federally and state recognized SEAK tribes for whom salmon is the foundation of their cultural existence and economic well-being.

The Lingít and the Xaadas peoples have occupied this region since time immemorial, with their history in the region dating back over 10,000 years. The traditional Lingít Aaní (Lingít homelands) stretches from beyond Yakutat in the north, to Prince of Wales Island in the south of SEAK. The Xaadas have occupied Haida Gwai'i (Xaadas homelands), including the southern reaches of SEAK, since time immemorial and their history is documented to extend back at least 12,500 years. Metlakatla was settled by Ts'msyen people who migrated to Annette Island in the 1800s and was established as a reservation by the United States Congress in 1891.

The tribal communities in SEAK include Angoon, Douglas, Craig, Haines, Hoonah, Hydaburg, Juneau, Kake, Kasaan, Ketchikan, Klawock, Klukwan, Metlakatla, Pelican, Petersburg, Saxman, Sitka, Wrangell, and Yakutat. Many tribal citizens who reside in each of these communities participate in SEAK salmon fisheries, especially in the smaller communities, contributing to the regions' annual multi-million-dollar salmon industry.

Salmon are also harvested by Indigenous peoples in both personal use and subsistence fisheries that provide food security for families and are highly valued in traditional and customary activities for communities throughout SEAK, British Columbia, and the Pacific Northwest as a whole.

The participation of tribal citizens throughout commercial, sport, personal use, and subsistence salmon fisheries are vitally important for the social, cultural, and economic resiliency of SEAK coastal communities.

6.2.2. Cultural Importance of Salmon Fisheries

> "Lingít *and* Xaadas *people take great pride in the ability to both cultivate and harvest the resources of the land and sea in a responsible manner.* Lingít *and* Xaadas *people recognize the value of and retain reverence and respect for all life of the land and sea that are harvested for strength and sustenance"*[63]. . .

Salmon fisheries are of critical importance to the Indigenous people throughout all of coastal Alaska, which is shown through the diet, artwork, dances, and other expressions of culture throughout coastal tribes in Alaska. Wild salmon are the lifeblood of Alaska and are an

[62] Central Council of the Tlingit & Haida Indian Tribes of Alaska, "Our History," Central Council of Tlingit & Haida Indian Tribes of Alaska, www.tlingitandhaida.gov (Accessed November 12, 2023).
[63] Id. (Accessed Nov 12, 2023)

irreplaceable resource for the world. Salmon have sustained Indigenous families in SEAK for over 10,000 years and serve as the foundation of Alaska Native culture, commerce, and biodiversity. In comparison, many researchers suggest that Euromerican colonization occurred only in the last 2% of the time period that Indigenous people and salmon have been forming close relationships in the SEAK lands and waters (Carothers et al. 2021). Salmon are and have been the most important resource for Lingít peoples. Lingít relations with salmon combine spiritual understandings with "pragmatic empirical engagement, knowledge acquisition, and practical intervention" (Langdon 2006).

The management of salmon fisheries has developed throughout the course of human history due to social, ecological, and political changes. Traditional knowledge and spiritual beliefs led to practices that sustained salmon runs, informing systems that included allocation and use for clan groups. The governance system of salmon engagement developed by the Lingít was successful in sustaining highly productive systems for thousands of years. As Dr. Steve Langdon writes, the Lingít system can "be characterized by the term 'relational sustainability'—through spiritually inspired prescriptions and actions, Lingít maintained existence, as they knew it" (Langdon 2006).

Langdon writes that special relations with places are memorialized by the Lingít in *at.oow*—objects, stories, dances, crests—that represent the clan history and claims to the location, territory, or resource. Salmon stream ownership was one of the most important forms of property held by clans. Salmon streams were under the control of stream chiefs (*heen saati*) who exercised governance by determining who had access, harvest timing, technology, and location of harvests. In general, other Lingít respected clan claims to streams, but if they were violated, Lingít would use violence to protect their claims.[64] While SEAK salmon fisheries have changed over the course of time, access to these very important fisheries remains of utmost importance to Alaska Native peoples and their families.

Since colonization, Alaska Native peoples have seen reduced access to and decision-making power over the management of fisheries and the privatization of the salmon industry. Moreover, clearcut logging has damaged salmon streams, commercial fisheries can compete for traditional and customary uses, and global hatchery production has created conflict between communities because culturally important species could face resource competition from fish hatcheries (Ohlberger et al. 2021). Exacerbated by anthropogenic causes, climate change factors are adding additional stressors on natural systems, and these changes in ocean conditions are reducing salmon size and availability, resulting in the relational changes between Alaska Native peoples and salmon fishing practices.

6.2.3. Economic Importance of Salmon Fisheries

Salmon are a culturally important food source and economically critical for tribal citizens; each community in SEAK is supported by salmon fisheries (Hosmer 2004; Sisk 2007; Walch et al. 2018; Carothers et al. 2021) where the five species of Pacific salmon accounted for 70% of SEAK seafood production value in 2019.[65] Maintaining continuity, access to salmon and subsistence fishing provides food security and supports food sovereignty in SEAK communities. Protein sourced from salmon fisheries is culturally and nutritionally significant to many tribal citizens and can be a lower cost alternative compared to other sources of protein in small rural communities in SEAK, where grocery prices are often inflated due to shipping expenses. The seafood industry provides economies of scale and economic activity that lowers the cost of utilities, shipping, fuel, and local taxes for residents in many Alaska communities. Fishing

[64] "History of salmon governance", State of Alaska's salmon and people, (Accessed Nov 30, 2023).
[65] ASMI: The Economic Value of Alaska's Seafood Economy, (Accessed December 11, 2023).

communities also benefit from marine infrastructure and support services, which are more developed due to the presence of the commercial seafood industry.[66]

In addition, it is often difficult to quantify the economic importance of subsistence activities across cost benefit or economic analyses. For instance, the sharing and providing of salmon is not only a social practice, but has economic value. Many families in SEAK communities are interconnected and rely on the subsistence economy; however, commodification and marketization of salmon fisheries have disposed tribal communities from sustaining or gaining access to fishing and place-based livelihoods. Inequities are deeply embedded among the legal and economic institutions of salmon science and the management of personal, sport, and commercial fisheries. Cumulative impacts and limited access obstruct a healthy succession of fishing as an economic and cultural mainstay in SEAK for Alaska Natives (Carothers et al. 2021). Consequently, changes in the management of salmon fisheries that would result in further limiting access for Alaska Natives to harvest all species of salmon would have devastating consequences for SEAK - and those consequences would reverberate markets throughout the Pacific Northwest and beyond.

While all SEAK salmon fisheries are important to Alaska Native communities, the commercial troll fishery has an outsized impact on SEAK tribal participants and their families, and their communities. The commercial troll fishery is important for Alaska Native communities in several key ways. Lingít and Xaadas peoples have called SEAK home since time immemorial, and salmon has been the foundation of culture the entirety of that time. Tribal citizens of the Central Council of Tlingit & Haida Indian Tribes of Alaska (Tlingit & Haida) have fished the waters of SEAK for more than 10,000 years, and continue to do so, including as commercial troll fisherman. The tradition of "trolling" pre-dates western contact: Lingít, Xaadas, and Ts'msyen people used a hook-and-line (bone hooks) from their canoes when fishing for Chinook salmon. In some cases, four generations of one family have supported their household and the Southeast economy through a hook-and-line fishery.[67] Now, many citizens of the tribe depend on the commercial troll fishery for their livelihood,[68] with some Alaska Natives earning 60% to 70% of their income from the commercial troll fishery.[69] Additionally, nine troll permits are held by residents of the Metlakatla Indian Community of Annette Islands Reserve. Of the 1,820-hand troll and power troll permits issued in Alaska, 85% are held by SEAK residents, 14% of which are held in the most rural communities with the highest percentages of Alaska Natives. Access to other livelihoods, and even different gear types for fishing, is cost prohibitive, requires years of specialized training or is simply unavailable for Alaska Native peoples who reside in SEAK's small and remote communities.

Fishing remains deeply tied to a traditional way of life for Alaska Natives in SEAK, and fishermen largely rely on the commercial and sport fishery to secure salmon for personal use to feed their families. In addition, fishing has other impacts across communities, for example, revenues from fishery taxes help to keep schools operating and basic infrastructure up to date. Every fisherman matters in a small community. Moreover, the stewardship of traditional lands

[66] The Economic Value of Alaska's Seafood (Accessed December 11, 2023).

[67] Brief for the Alaska Congressional Delegation as Amicus Curiae Supporting Defendants and Intervenor-Defendants, Peterson Decl. ¶3, DktEntry 22-3, page 103, *Wild Fish Conservancy v. Quan*, Nos. 23-35322, 23-35323, 23-35324, 23-35354 (June 2, 2023).

[68] Brief for the Southeast Alaska Tribal Coalition as Amicus Curiae Supporting Defendants, Peterson Decl. ¶6, DktEntry 42-3, page 33, *Wild Fish Conservancy v. Quan*, Nos. 23-35322, 23-35323, 23-35324, 23-35354 (June 16, 2023).

[69] Brief for the Southeast Alaska Tribal Coalition as Amicus Curiae Supporting Defendants, Dybdahl Decl. ¶6, DktEntry 42-3, page 18, *Wild Fish Conservancy v. Quan*, Nos. 23-35322, 23-35323, 23-35324, 23-35354 (June 16, 2023).

and waters is crucial to maintaining Alaska Native ways of life and is an expression of their sovereignty.

6.2.3.1. Tribal Citizen Participation

In the first half of the 20th century, SEAK salmon fisheries' cannery-owned fish traps were used to harvest salmon. The pursuit of Alaska statehood was driven by the territorial citizens' desires to control and benefit from their resources. Following statehood in 1959, fish traps were banned. Ensuing struggles over access to salmon continued with the introduction of limited entry permits in the 1970s.[70]

When 2022 permit data from the Alaska Commercial Fisheries Entry Commission (CFEC) is analyzed with Tlingit & Haida's tribal enrollment database, the prominence of Tlingit and Haida families who depend upon SEAK salmon fisheries is very clear. 2022 CFEC data with current (2023) T&H data indicates that nearly 20% of the SEAK permits for both the purse seine and drift gillnet salmon fisheries are registered to tribal citizens of Tlingit & Haida.

This is even more evident in the SEAK salmon commercial troll fishery. As an example, approximately 61% of the communities directly supported by the SEAK salmon troll fishery are recognized communities of Tlingit & Haida, and approximately 31% of SEAK trollers are Tlingit & Haida tribal citizens[71].

Currently, SEAK's troll fishery has the highest level of local ownership of any major Alaska fishery, making its survival critical to nearly all of SEAK's communities. The economic and community impacts of the SEAK troll fishery, for example, are far reaching to the region, where nearly every community is home to trollers. Trollers comprise the region's largest fishing fleet, and eighty-five percent of the SEAK troll fleet is local to SEAK (Stern et al. 2022). From 2011-2020, an average of 971 and 961 hand and power troll permits were issued, with an average of 295 and 715 permits actively fished, respectively (Conrad and Thynes 2022).

For other, non-troll fisheries, nearly 120 permit holders are Tlingit & Haida tribal citizens and nine holders are Alaska Native tribal citizens of the Metlakatla Indian Community Annette Islands Reserve. Alaska residents generally earn 55-86% of the fleet's annual ex-vessel value, which from 2011-2020 ranged from $22 million to $52 million[72].

Tlingit & Haida's tribal citizens who are "permit holders provide food, employment, and income for many people beyond themselves in [tribal] communities."[73] Trolling is one of the few industries that offers well-paying jobs in remote SEAK, jobs which enable tribal citizens "to continue to live on [their] traditional homelands . . . and to practice [their] traditional way[s] of life[74]".

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[70] State of Alaska's Salmon People, (Accessed December 11, 2023)

[71] Brief for the Southeast Alaska Tribal Coalition as Amicus Curiae Supporting Defendants, Peterson Decl. ¶8, Dkt Entry 42-3, *Wild Fish Conservancy v. Quan*, Nos. 23-35322, 23-35323, 23-35324, 23-35354 (June 16, 2023).

[72] SeaBank 2022, (Accessed November 13, 2023)

[73] Brief for the Southeast Alaska Tribal Coalition as Amicus Curiae Supporting Defendants, Peterson Decl. ¶8, Dkt Entry 42-3, page 34, *Wild Fish Conservancy v. Quan*, Nos. 23-35322, 23-35323, 23-35324, 23-35354 (June 16, 2023).

[74] Brief for the Southeast Alaska Tribal Coalition as Amicus Curiae Supporting Defendants, Ware Decl. ¶3, Dkt Entry 42-3, page 41, *Wild Fish Conservancy v. Quan*, Nos. 23-35322, 23-35323, 23-35324, 23-35354 (June 16, 2023). ; see generally 16 U.S.C. § 3111(1) ("the continuation of the opportunity for subsistence uses . . . is essential to Native physical, economic, traditional, and cultural existence").

6.2.3.2. Reliance on Salmon Fisheries

> *"*Lingít *and* Xaadas *history shows that prior to contact this land that is occupied by* Lingít *and* Xaadas *people remained in balance, maintained that way by our active stewardship, hard work, wise laws, and respect"*[75]*...*

Alaska Native villages are in isolated locations on the coast of the Pacific and the shores of the SEAK archipelago. Few villages have road access; fishing and harvesting from the ocean and beaches is a major food source. "[Troll] fishing keeps our culture and traditions alive and gives young people an opportunity to make a living and support their families"…[76]

Fishing, as it is practiced by Alaska Native people, comprises three major interrelated components: economic, social, and cultural. It operates as a cohesive, adaptive and functioning system. As an example, closing of salmon fisheries for even one season can cause irreparable breaks in this intergenerational knowledge. "Our young people will lose out on critical learning opportunities or may move out of the region entirely if the troll fishery is no longer a viable source of income to support their Families[77]".

Furthermore, connection to culture through salmon is an integral component in youth suicide prevention efforts. For Alaska Natives, "Indigenous suicide is associated with cultural and community disruptions, namely, social disorganization, culture loss, and a collective suffering" (Wexler and Gone 2012). For Alaska Native youth, "resilience" refers to a set of qualities that help to ensure that, despite generational traumas, stress, and other challenges, youth can succeed in school, avoid substance misuse, manage mental health, and remain connected to culture and family, etc.[78]

As a result of the plethora of challenges that have been put upon Alaska Native peoples because of colonization (past and present), many communities have begun cultural revitalization, decolonization, and healing efforts as a way to prevent suicide. Many of these efforts incorporate the harvest of wild salmon to strengthen connection to land and water, and thus, traditional and customary culture.

6.3. Human Dimension Impacts of the Alternatives

This section uses information from the previous sections to describe the economic, tribal and community impacts of the fishery resulting from each alternative. Information parsing out impacts specific to salmon managed under the PST Agreement is limited and the analysts made assumptions about all salmon fishing activity in SEAK, the majority of which is connected to, and reliant on, the issuance of an ITS for the take of listed species incidental to the operation of the PST fisheries as well as grants to the State of Alaska to implement the PST Agreement and manage the fisheries in conformity with the Treaty.

6.3.1. Economic Impacts of the Alternatives

Alternative 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2), and

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[75] Our History, Cent. Council of Tlingit & Haida Indian Tribes of Alaska, (Accessed Nov 30, 2023).
[76] Brief for the Southeast Alaska Tribal Coalition as Amicus Curiae Supporting Defendants, Peterson Decl. ¶¶ 4-7, Dkt Entry 42-3, page 32-33, *Wild Fish Conservancy v. Quan*, Nos. 23-35322, 23-35323, 23-35324, 23-35354 (June 16, 2023).
[77] Brief for the Southeast Alaska Tribal Coalition as Amicus Curiae Supporting Defendants, Peterson Decl. ¶7, Dkt Entry 42-3, page 33, *Wild Fish Conservancy v. Quan*, Nos. 23-35322, 23-35323, 23-35324, 23-35354 (June 16, 2023)..
[78] Suicide Prevention in Alaska: SAMHSA

continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA-listed species. In addition, expected effects flow from the operation of the commercial troll and sport fisheries in the SEAK EEZ, and these effects are similar whether pursuant to the existing delegation of management of those fisheries to the State or from sole federal management.

Under Alternatives 1 and 2, fishermen in communities would continue to participate in salmon fisheries and local communities would continue to benefit from the SEAK salmon fisheries. For example, processors would receive deliveries and provide jobs within communities that would not otherwise have economic opportunities. Costs of living in remote areas with more limited economic diversification would continue to be supported by fisheries suppliers. The description of the existing economic conditions in Section 6.1 would remain status quo.

Alternative 3. Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

The resultant effect of a closure to the SEAK salmon fisheries would be detrimental to fishermen and have a cascading effect on processors, sport fishermen, tribes, and communities throughout SEAK. Current participants in salmon fisheries in rural communities in SEAK do not have the ability to easily pivot to other economic opportunities to mitigate any impacts from a decline in fishery stocks or closures of existing salmon fisheries. Most vessels are smaller and specialized, and may not be easily convertible to other fisheries that generally require larger boats or different gear types such as large pot gear. In addition, the required limited entry permit held by every participant would lose its value. Limited entry permits can have significant market value as long as there is a salmon fishery the buyer can enter. The cascading effect would directly impact the processing sector, since processing plants rely heavily on the salmon fisheries and many would not remain open without the influx of salmon each year. This would reduce fishery taxes and contributions to SEAK communities.

This section focuses on economic impacts of Alternative 3, compared to status quo, using existing economic conditions.

Harvest Sector

If the salmon fisheries closed under Alternative 3, then no harvesting vessels would fish for salmon. Fishermen would have the option of pausing their fishing activities, getting out of the fishing industry, or maintaining or increasing their activity in other fisheries. The loss of revenue from salmon fishing would make reduced economic activity a nearly inevitable exit for most salmon fishermen. The value of salmon permits and vessels would decline, resulting in a lack of buyers interested in the market, making it challenging for fishermen to sell out and pursue other economic activities. Any ex-vessel value received would be reduced to the extent each fisherman relies on salmon in their annual fishing activity. Some fishermen do fish for crab or groundfish outside the salmon season, but access to those fisheries is not universal or easy if fishermen have not already made an investment in the gear.

Under Alternative 3, salmon permit holders and crew would not earn income from salmon fisheries. For some of these fishermen, fishing is their primary or only source of income. In addition, commercial fishing for salmon requires different gear and gear configuration to fish, as well as a vessel that often requires vessel modifications or additional gear depending on the fishery. Similarly, the ability to locate and successfully target specific salmon species is a learned skill set. Icing requirements for Chinook and chum salmon also differ, as an example of a required investment not all small boat fishermen have. Thus, commercial trollers who have historically targeted only Chinook salmon, may face many obstacles and financial burdens in order to pivot to fishing for chum salmon (assuming that the chum fishery could be prosecuted without incidental take of Chinook salmon in the absence of an ITS for listed Chinook) (pers comm commercial troll fishermen, 6/7/23).

The ex-vessel value of all SEAK salmon fisheries (all gear types, all salmon species) was approximately $119 million in 2022 (Conrad and Thynes 2023). The $119 million for all commercial salmon fisheries would likely be reduced to zero, since it is unclear the extent to which the SEAK commercial fisheries could continue to operate in the absence of an ITS for listed salmon (and other listed species) if those commercial fisheries target or incidentally catch listed salmon.

Processing Sector

If salmon fisheries closed under Alternative 3, the processing sector that is heavily reliant on salmon fisheries likely would not remain open, despite receiving deliveries of crab and groundfish throughout the year. The processing plants in SEAK have processing schedules that follow the seasonality of species in the area and the bulk of summer operations are focused on salmon deliveries. While winter remains the slowest in terms of deliveries, winter troll landings of Chinook make up a significant percent of those landings, lending vital income to processors in the winter months. If these deliveries ceased to exist under Alternative 3, this would force processing plant managers to reconsider if they can remain open. A key variable to processing plant operations is a consistent supply of seafood and if salmon fisheries are closed under Alternative 3, more closures would occur within the SEAK region. This is especially worrisome in an economic climate where one of the main processing companies in Alaska is selling off/closing processing plants, two of which are located in SEAK.[79]

Due to commercial salmon comprising approximately 60 to 70 percent of the SEAK region's seafood value, the cessation of salmon fishing would be a huge loss for the processing sector. The first wholesale value of salmon in 2022 was $602.8 million.[80]

Sport Fishing Sector

Under Alternative 3, the economic impact on the sport fishing sector would be reduced to the extent each sport fisherman or sport fishing business relies on salmon fishing throughout the season. Most charter fishing businesses rely heavily on Chinook salmon to draw in customers, and depending on location and marketing, they may try to shift to targeting halibut and groundfish, which has its own daily limits. However, declines in the halibut stock have limited both halibut bag limits and days when halibut fishing is permitted. Salmon fishing can provide an important opportunity on days of the week when halibut fishing is closed to guided anglers. Sport fishing lodges or guiding companies may be forced to close their businesses due to the salmon fishery closures under Alternative 3. Many of these companies contribute to the local economies for most of the year and the impact would be felt throughout the communities. In addition, a

[79] https://www.ktoo.org/2023/12/13/trident-seafoods-to-sell-petersburg-and-ketchikan-processing-plants/

[80] As a reminder this number is inflated partially due to the amount of hatchery salmon that is processed in SEAK.

percentage of visitors to SEAK come to sport fish at least a single day, which in turn contributes to the region's tourism revenue.

The best available data at this time is reliant on a study by Gislason et al. (2017). The findings of this report indicated annual salmon angling expenditures that ranged between $105 million and $132 million annually for both the guided and unguided SEAK sport salmon fisheries. It is anticipated that under Alternative 3, the majority of these expenditures would be lost.

Community and Estimates of Economic Output

Community impacts under Alternative 3 are highly variable for a variety of factors. Most communities who receive fishery taxes would lose that revenue, which could result in a loss between $671 and $25,561 per year depending on the community, based on rates in 2023. Many communities would need to scale back city budgets for community services.

The smaller communities with a large number of commercial salmon permits and less economic diversification would experience a greater negative economic impact if Alternative 3 was selected. For context, the communities of Port Alexander, Elfin Cove, Pelican, and Yakutat show that nearly a third of their population holds salmon permits. If Alternative 3 was selected, communities heavily reliant on salmon fisheries would have a difficult time shifting to a different industry.

Overall, salmon accounted for approximately 70 percent of SEAK's seafood production value. Using data from the most recent comprehensive economic study produced by ASMI in 2020, the SEAK salmon fishery produced $303 million in output, $165 million in labor income for SEAK, and 7,910 in jobs for the region. Breaking it down, commercial fishing contributed to 4,410 jobs, followed by processing that contributed to 2,730 jobs, and lastly, management contributed to 770 jobs for salmon-related fisheries. At this time, this is the closest analysts can get to an estimate for 2022 and all salmon-related activity is included in this estimate, not just salmon managed under the PST Agreement .

Ultimately, any closures to the SEAK commercial fisheries under Alternative 3 would lead to significant, adverse economic impacts. Approximately 11 percent of the total earnings for SEAK residents comes from the seafood industry and the majority of that comes from salmon fishing.[81] We can assume that the majority of this $303 million in output and $165 million in labor income for SEAK would be reduced substantially if Alternative 3 was selected. The most recent estimate for the SEAK gross domestic product (GDP) was around $4.2 billion overall for all industries (Southeast Conference 2023). GDP measures all of the output generated for a region and losing any portion of the estimated $303 million in output would have a significant, adverse impact on the rural communities of SEAK.

6.3.2. Tribal Impacts of the Alternatives

SEAK Indigenous cultures are grounded in the values of respect for all living creatures and their environment, and of maintaining balance between the two. Salmon continue to be central to the ways of life of Alaska Natives, contributing to physical, social, economic, cultural, spiritual, and emotional well-being. Without productive and well-managed salmon fisheries, SEAK's Indigenous peoples and communities dependent upon them will face irreparable damage.

The PST expressly states that it does not affect or modify rights established in existing Indian treaties and other existing federal laws (Article XI). Federal laws, such as the Magnuson-Stevens Act and the National Standards guidelines (4, 7, and 8), foster long-term biological and economic

[81] https://www.seconference.org/wp-content/uploads/2023/09/SE-by-the-numbers-2023-Final.pdf

sustainability of marine fisheries. In addition, the U.S. federal trust responsibility to Alaska Natives and American Indians is an obligation under which the United States "has charged itself with moral obligations of the highest responsibility and trust" to American Indian and Alaska Native tribes;[82] the general trust relationship is considered a distinctive obligation of trust incumbent upon the United States in its dealings with Alaska Natives and American Indians. In addition, statutes, regulations, and other federal policies may create a specific trust responsibility, which mandates a legally-enforceable fiduciary obligation for the United States government when dealing with Indian lands and resources to protect and enhance tribal lands, resources, and self-government.[83] Equity demands continued access to SEAK salmon fisheries subject to the PST, which would occur through Alternatives 1 and 2, with proposed issuance of an ITS, proposed funding under the PST Agreement, and the prosecution of the SEAK salmon fisheries, in contrast to Alternative 3.

While all the salmon fisheries are of great importance and value to Tribal communities, the loss of Chinook salmon fishing opportunities—up to half a business owner's income in any given year—will eliminate most of the participants in SEAK's troll fishery in the near-term and perhaps all of them over time. The harms to individual fishers will extend beyond loss of annual income due to the devaluation of permits and vessels. The troll fishery is widely distributed among SEAK communities to a greater extent than any other regional fishery. Other important SEAK fisheries have high value but even when combined together are second to salmon fisheries in terms of regional earnings and will not mitigate the economic impacts caused by eliminating the Chinook troll fishery or other salmon fisheries. For example, the potential closure of the Chinook fisheries would immediately reduce the troll fleet by an unknown but significant amount and reduce incomes and economic outputs from the remaining fleet depending on fluctuations in remaining target species, coho and chum.

The troll fishery also has landings in more communities than the other fisheries and, although the processing plants may be small, the economic impact is large for those small communities. Many SEAK coastal communities do not have the alternative employment opportunities that major population centers have. Secondary benefits include vessel crew and deckhand income, the processing sector and associated jobs, earnings spent to support local businesses, increased tourism dollars, and substantial tax revenues to the State and to the communities in which fish are landed, which use these revenues to support community infrastructure and services.

Under Alternatives 1 and 2, tribal communities of SEAK would continue more than 10,000 years of salmon stewardship and cultural connections to salmon. Community resilience would be maintained as economic opportunities for rural communities would be preserved. In addition, subsistence harvest, a crucial activity in reducing the high cost of living in Alaska, would be maintained. Intergenerational relationships and teaching would continue, and the health and well-being of tribal youth in SEAK rural communities would continue to be bolstered by access to cultural salmon opportunities.

In contrast to Alternatives 1 and 2, Alternative 3 would halt more than 10,000 years of salmon stewardship and cultural identity associated with salmon harvest. Cessation of access to SEAK commercial salmon fisheries would result in the loss of cultural ties to an industry that is often multi-generational, family run and a pillar of the economy for many SEAK communities where there often are not many other economic opportunities. In addition to direct loss of revenue from

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[82] https://www.noaa.gov/sites/default/files/2023-07/NOAA_Tribal_Consultation_Handbook_2023_FINAL.pdf (citing *Seminole Nation v. United States*, 316 U.S. 286, 296-97 (1942)).

[83] *United States v. Mitchell*, 463 U.S. 206, 225-27 (1983); *Parravano v. Babbitt*, 70 F.3d 539, 546 (9th Cir. 1995).

SEAK commercial salmon fisheries, downstream dollars from revenue earned by commercial fisheries (ex. fuel and grocery purchases, mechanical repairs, restaurant and pub visits) would cease to flow into rural communities. Aside from economic impacts, cultural and health well-being would decrease as cultural, family and recreational outlets would no longer exist, and access to a critical protein source—salmon—would be undermined, which could exacerbate food insecurity across rural and remote SEAK. This could, in turn, fray the cultural, health, well-being, and connectedness of Alaska Native peoples who have been stewards of Southeast Alaska for at least 10,000 years.

6.3.3. Community Impacts of the Alternatives

Local leaders, Alaska state legislators, and Alaska Native tribes and leaders have all noted the impacts from the district court's vacatur of the ITS if it resulted in closure of SEAK's salmon commercial troll fishery in the summer and winter seasons. While the Ninth Circuit stayed the vacatur in June 2023, the impacts of Alternative 3 would be larger than the vacatur, had it gone into effect starting in the summer 2023 season. This section uses community information from before the vacatur was stayed as the best available information from communities on adverse impacts from the closure of a SEAK salmon fishery. These impacts are expanded to include closure of all SEAK salmon fisheries under the 2019 PST Agreement under Alternative 3.

The troll fishery in particular has landings in more communities than the other fisheries and, although the processing plants may be small, the economic impact is large for those small communities. Many SEAK coastal communities do not have the alternative employment opportunities that major population centers have. Secondary benefits include vessel crew and deckhand income, the processing sector and associated jobs, earnings spent to support local businesses, increased tourism dollars, and substantial tax revenues to the State and to the communities in which fish are landed, which use these revenues to support community infrastructure and services. Substantial spillover economic impacts occur not only in SEAK, but on the whole North American economy through the selling of salmon in stores and restaurants across the continent and through the multiplier impacts from regional spending in both commercial and sport sectors.

Rural SEAK communities, including Alaska Native communities and tribal citizens, would experience negative impact from the loss of the commercial salmon fishery for even one season or year. The Central Council of Tlingit & Haida Indian Tribes of Alaska have reported that the closure of the summer and winter Chinook salmon troll fishery would have a devastating cultural and economic impact on their tribal citizens and their communities that rely on the commercial salmon fishery for their livelihood and their cultural well-being. Several tribes have passed resolutions addressing potential closure of the commercial troll fishery, including the Executive Council of the Central Council of the Tlingit & Haida Indian Tribes of Alaska,[84] the Yakutat Tlingit Tribal Council of the Yakutat Tlingit Tribe, the Organized Village of Kake, the Council of the Klawock Cooperative Association, and the Council of the Sitka Tribe of Alaska.[85] The resolutions noted that closure of the commercial troll fishery has the potential to impact a number of Tribal households that rely on commercial trolling for a living, as well the communities across SEAK that will suffer severe economic hardship; that trolling is a year-round contributor to the economy and sustains year-round employment across SEAK; and that the large troll fleet is supported in significant part by Chinook harvest.

[84] https://www.ccthita.org/government/council/resolutions/2023ECResolutions/ECRes.23-14.pdf, Accessed on June 5, 2023.
[85] Attachments in support of Amici Curiae Brief of the Alaska Congressional Delegation in Support of Intervenor-Defendant State of Alaska's Motion for a Stay Pending Appeal.

Local leaders, Alaska state legislators, and Alaska Native tribes have all expressed concern for the economic impacts on communities, livelihoods and culture. In Juneau, the city assembly unanimously approved a resolution supporting SEAK salmon troll fisheries in February 2023. This resolution echoed similar resolutions already passed by other communities such as Ketchikan, Sitka, Petersburg, Wrangell, City of Port Alexander, Yakutat, Hoonah, Craig, and Pelican.[86]

In addition to local communities, the Alaska State House passed a resolution on, March 1, 2023.[87] The Alaska House resolution noted that, when accounting for multiplier effects of the fishing, seafood processing, and fisheries-related industries, commercial trolling is one of the three most valuable commercial fisheries in SEAK with a total economic impact of approximately $85 million as measured in terms of total output.[88] In addition, when compared to the costs of entry to other state fisheries, the affordability of the troll fishery provides an entry level opportunity for new commercial fishers, and, as a result, there are troll fishery permit holders in nearly all communities in SEAK, all of which will suffer if the SEAK Chinook troll fishery is closed.[89] The resolution passed 35-1 with both of Juneau's House members voting in favor. Under Alternative 3, all the SEAK salmon fisheries under the PST would be closed, having even larger adverse economic impacts on communities than just the closure of the troll fishery.

Where commercial troll fishery has landings in more communities than any other fishery, it accounted for approximately 27% of the ex-vessel value in 2022 (Conrad and Thynes, 2023). When all PST salmon fisheries are combined, the community impacts are magnified. Across all seafood sectors, salmon accounted for approximately 60 to70 % of SEAK's seafood production value. Using data from the most recent comprehensive economic study produced by ASMI in 2020, the SEAK salmon fishery produced $303 million in output, $165 million in labor income for SEAK, and 7,910 in jobs for the region. Under Alternative 3, the economic output, labor income, and jobs in the region would be substantially reduced and would have significant, adverse impacts on the rural communities of coastal SEAK.

Ultimately, any closures to the SEAK commercial fisheries under Alternative 3 would lead to significant, adverse economic impacts. Approximately 11 % of the total earnings for SEAK residents comes from the seafood industry and the majority of that comes from salmon fishing.[90] We can assume that the majority of this $303 million in output and $165 million in labor income for SEAK would be reduced substantially if Alternative 3 was selected.

Washington State benefits more from out-of-state salmon fisheries activity than from in-state salmon fisheries, primarily due to Seattle being a major supply center to Alaskan businesses and being a major distribution point for out-of-state caught salmon. A third or more of commercial salmon fishing jobs and salmon processing jobs in SEAK go to out-of-state workers, mainly workers from Washington State. This use of seasonal, out-of-state workers is a particular feature of the Alaska industry (Gislason et al. 2017).

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[86] https://www.juneauempire.com/news/challenges-spawning-rapidly-in-salmon-lawsuit/. Accessed on 05/08/2023.

[87] https://www.savingseafood.org/news/state-and-local/alaska-challenges-spawning-rapidly-in-salmon-lawsuit/. Accessed on 05/07/2023.

[88] https://alaska-native-news.com/alaska-house-coalition-responds-to-ruling-shutting-down-southeast-alaska-troll-fishery/67641/, Accessed on 06/07/2023.

[89] Id.

[90] https://www.seconference.org/wp-content/uploads/2023/09/SE-by-the-numbers-2023-Final.pdf

7. Management Considerations

7.1. Effects of Alternatives on Federal Grants to the State of Alaska under the PST

The Pacific Salmon Treaty Act authorizes Congress to make appropriations to support research, enhancement and other activities as necessary to carry out the purposes of the Treaty and the Act (16 U.S.C. 3641(c)). U.S. obligations under the PST are fundamentally a federal commitment, and the State has the responsibility for the preponderance of the U.S. fishery and stock assessments in Alaska. Additional information on the Federal grants to the State of Alaska under the PST is in section 3.5.

Federal funding is essential to implement the fishery and stock assessments required for state management, to implement and evaluate the international obligations of the PST, and to provide for the participation of ADF&G in the committee, panel, and commission implementation meetings. In 2017, ADF&G completed a detailed assessment of the costs to ADF&G to fulfill the international obligations. This was accomplished through a position-by-position accounting of salaries, benefits, and goods and services for activities that are necessary to fulfill PST obligations (Fair et al. 2017). The total cost of these activities at that time exceeded $9.0 million and, after consideration of inflation, costs now exceed $10.3 million annually.

Alternatives 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2) and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species.

Under Alternative 1 and 2, NMFS may disburse grants to the State of Alaska to monitor and manage salmon fisheries in State and Federal waters related to the obligations of the PST Agreement through 2028. Some of this information is required for domestic fishery management as well. NMFS has already approved and disbursed funds in consecutive multi-year awards to the State of Alaska under the 2019 PST Agreement through the State's current fiscal year. NMFS expects that the proposed funding initiatives necessary for the State to implement the 2019 PST Agreement will remain for the duration of the agreement or will be similar to the funding initiatives currently implemented.

In disbursing funds related to the implementation of the 2019 PST Agreement, NMFS will consider whether to approve grants to the State annually through 2028. Generally, NMFS approves the scope of work for three to five years and then disburses funds annually for that award period, spanning one fiscal year (i.e., July 1 of the current year, to June 30 of the following year). Consistent with Federal law and regulations, NMFS reviews actions taken by the State of Alaska consistent with the proposed grants. The funding initiative has four elements and follows the funding process utilized under the 2009 PST Agreement. The components of the individual grants may change as the result of a recent re-organization within ADF&G; however, the individual projects and objectives will remain the same. The current grant structure is as follows:

1) <u>PST Transboundary River Salmon Enhancement initiative</u> is a 5-year, multi-disciplinary award to the ADF&G funded through individual one-year grants that range from $415K to $460K per year. Although this initiative began under the 2009 PST Agreement, it continued under the 2019

PST Agreement. This initiative supplements the number of sockeye available to fishermen by increasing fry production from several transboundary lakes through hatchery incubation in the U.S. The goal of the enhancement efforts is to produce 100,000 additional adult sockeye, worth approximately $900,000, returning to each of the Taku and Stikine river drainages. The U.S. and Canada agreed to joint enhancement projects on the Stikine and Taku rivers according to Understandings signed in 1999. At that time, it was determined that Parties would share the cost of joint enhancement. The Transboundary River Salmon Enhancement program provides funding to cover the costs that will be incurred by the U.S. in the course of meeting obligations specified in the PST Agreement. These obligations include: 1) operation and improvements of the portion of the Port Snettisham Central Incubation Facility (CIF) for the incubation and rearing of sockeye eggs received from Canadian lakes on the Stikine and Taku River drainage; 2) pathology screening of eggs and fry and otolith marking of fry reared at the CIF; 3) transport of fry back to enhancement sites; and 4) sampling and analysis necessary to determine the contribution of transboundary river sockeye to U.S. fisheries.

The sampling and analysis component entails the use of otolith mass marks to identify enhanced fish and the establishment of a monitoring program to recover marks in mixed stock fisheries targeting adults returning to the transboundary rivers. Information from the monitoring program is used in management models to ensure optimal harvest and adequate wild stock escapement. The estimates of enhanced contribution provide the means for determining if the U.S. and Canada meet their allocation and enhancement goals as specified in the Transboundary Rivers chapter of the PST.

2) PST Wild Chinook Stock Assessment and Sport Harvest Monitoring is a 3-year award funded through individual one-year grants to ADF&G that totals approximately $1.7 million per year. This grant funds permanent staff responsible for analytical, supervisory and coordination duties associated with long-term wild Chinook salmon stock assessment. Chinook salmon spawning abundance and age and length compositions are estimated for 9 indicator (Chilkat, Taku, King Salmon, Stikine, Unuk, Chickamin, Blossom and Keta rivers and Andrew Creek) stocks in SEAK. Spawning abundance is estimated using a combination of weirs, aerial and foot surveys, and mark–recapture experiments. In addition, marking and coded-wire-tagging of Chinook salmon juveniles in the Chilkat, Taku, Stikine and Unuk rivers for use in smolt abundance, marine harvest, exploitation, and marine survival estimates.

This grant also funds permanent staff responsible for analytical, supervisory and coordination duties associated with marine sport harvest monitoring programs in SEAK, including the SEAK Marine Harvest Studies (Marine Creel) and Charter Logbook. This project supports key activities for both of these sport harvest monitoring programs strategically focusing on Chinook salmon. This includes necessary coordination to estimate harvest of Chinook by port in SEAK and to increase sampling rates for coded wire tags in marine sport fisheries to maintain or surpass an inspection rate of 20% of all Chinook caught. Results are used in support of multiple PSC Chinook Technical Committee analyses and in abundance-based management as directed by the 2019 PST Agreement. Goals and objectives for this element include:

a. Estimate the escapement of large (≥660 mm mideye to fork of tail length (MEF)) Chinook salmon in the Chilkat, Taku, King Salmon, Stikine, Unuk, Chickamin, Blossom and Keta rivers and Andrew Creek, such that estimates are within 25% of the true value 90% of the time.

b. Estimate the age and sex composition of large Chinook salmon spawning in the Chilkat, Taku, King Salmon, Stikine, Unuk, Chickamin, Blossom and Keta rivers and

Andrew Creek, such that all estimated proportions are within 10% of the true values 90% of the time.

c. Estimate the marine sport and commercial harvests of wild Chinook from the Chilkat, Taku, Stikine and Unuk rivers such that the estimate is within 35% of the true value 90% of the time.

d. Estimate the Chinook smolt abundance emigrating from the Chilkat, Taku, Stikine, and Unuk rivers each spring such that the estimate is within 35% of the true value 90% of the time.

e. Estimate the preliminary yearly values of the following characteristics of the Chinook harvest such that the relative precision is within 20% of the true value 90% of the time for each port.

f. Estimate the early season (late April to mid-July) harvest of Chinook in District 108 (Petersburg/-Wrangell areas) and District 111 (Juneau area).

g. Maintain or increase CWT sampling rates of 20% or more for Chinook caught in marine sport fisheries in SEAK.

Other tasks/objectives associated with the wild Chinook stock assessment component of this project include: 1) estimating mean length-at-age of Chinook; 2) estimating the escapement and age-sex composition of small and medium Chinook; 3) sampling all Chinook salmon inspected for adipose fin clips; 4) counting all large fish observed during age-sex-length sampling trips; and 5) estimating the exploitation rate (expected CV = 20% or less), total adult production, and the marine survival rate (smolt to adult). Other tasks/objectives associated with the sport harvest monitoring component of this project include: 1) increasing CWT recovery efficiency by using handheld tag detection wands for identification of "No Tags" (Chinook salmon with adipose fin clips but not having a CWT); 2) collecting matched scales and tissues; 3) estimating the proportion of the catch of Chinook salmon that were released; and 4) providing inseason census of Chinook salmon harvest and release for small and large fish by charter/guided anglers.

3) <u>PST Implementation Program Support</u> is a 3-year, multi-disciplinary initiative award to ADF&G funded through individual one-year grants at approximately $4.7 million per year. The PST Implementation grant funds several programs including administrative, management, research, and information technology services related to implementation of the PST in SEAK as well as participation in the various PST panels and technical committees according to PST terms agreed to by the United States and Canada. PST provisions are overseen and implemented by the PSC. Along with domestic obligations, numerous abundance-based PST provisions directly influence the harvest of salmon from Yakutat to Ketchikan in 5 gillnet, one purse seine, and 3 seasonal troll fisheries. These provisions indirectly influence salmon harvesting in many other fisheries. Compliance with PST as well as domestic obligations include management and research programs which provide accurate and timely forecasting, catch, effort, escapement, stock identification, and run timing data. Because current harvest sharing agreements are based on annual abundance, total return (catch in all significant fisheries plus escapement) of treaty stocks must be reconstructed on an annual basis.

Programs that operate under this grant are organized under 5 Project Titles: 1) Program Support; 2) Regional Treaty Support, 3) Transboundary Annex; 4) Northern Boundary Annex; and 5) Chinook Annex. Program Support provides clerical and administrative support, travel, training, supplies and contractual items for administrative personnel and PST related projects operating out of the ADF&G PSC Regional Office in Douglas, Region I Headquarters in Juneau, and field offices in Ketchikan, Craig, Petersburg, Sitka, and Yakutat. Regional Treaty Support covers personnel involved in the design, development, maintenance, and analytical capabilities of the regional catch and effort database. Programs under the Transboundary Annex (Alsek, Taku, and Stikine rivers) support PST-related: 1) management, research, sampling and stock identification of treaty stocks in directed Transboundary fisheries; 2) in-river stock assessment efforts and; 3) enhancement of shared Transboundary stocks. Adherence with abundance-based harvest sharing agreements for U.S. and Canadian fisheries requires inseason management and stock assessment efforts in Alaskan fisheries near the mouths of rivers to pass sufficient fish to meet bilaterally agreed-to spawning objectives and for Canadian in-river fisheries. Implementation of the Transboundary Rivers chapter of the PST requires extensive bilateral cooperation and coordination. Successful enhancement programs currently return large numbers of sockeye salmon to both the Taku and Stikine rivers. Inseason programs which identify the enhanced component of the run are needed to facilitate appropriate harvest levels on commingled enhanced and wild stocks. Programs grouped under the Northern Boundary Area Annex will support the 2019 revision of the PST which places specific, abundance-based harvest constraints on Canadian-origin sockeye salmon in U.S. fisheries and on U.S.-origin pink salmon in Canadian fisheries in the Northern Boundary Area. These programs support basic stock assessment and management, sockeye salmon tissue sampling for genetic analysis, and inseason catch and effort monitoring programs required by the PST and consistent with domestic obligations. They also support bilateral cooperation and coordination to reconstruct total returns, evaluate compliance with agreed harvest shares, and develop run forecasts. Programs grouped under the Chinook Annex fund personnel, supplies, travel and contractual items used in Chinook management, stock assessment, run forecasting, and inseason catch and effort monitoring programs required by the Chinook chapter of the PST, as well as participation on the Chinook Technical Committee.

4) PST Genetics Program Support is a 3-year award funded through individual one-year grants at approximately $585K per year. This grant funds genetic mixed stock analysis required to implement the PST in SEAK. Numerous abundance-based PST provisions directly influence the harvest levels of salmon in SEAK fisheries. Domestic and PST obligations rely on the collection and analysis of catch, escapement, and stock composition information to forecast indices of abundance in PST fisheries. Stock contribution estimates are critical to assess compliance with the harvest sharing agreements, reconstruct runs of wild stocks, estimate the production of enhanced fish, forecast upcoming returns, and support sustainable fisheries management. This program provides information necessary to the successful implementation of the intentions of the PST as it relates to the Transboundary rivers, the Northern Boundary Area, and SEAK Chinook salmon, through strategic integration related to projects and funding identified in 1-3 above.

Alternative 3: Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA's prohibition of such take. Under Alternative 3, NMFS also would not continue to disburse grants to the State.

Under Alternative 3, no ITS coverage for Treaty salmon fisheries and no Federal funding will be provided to the State of Alaska to implement the PST and actively participate in the various PSC panels and technical committees. The PST commits the U.S. and Canada to prevent overfishing; provide for optimum production; and provide for each party to receive benefits equivalent to the production of salmon originating in its waters. Treaty principles also state that in fulfilling their obligations pursuant to the above principle, the Parties shall cooperate in management, research, and enhancement. Treaty principles also recognize the desirability, in most cases, of avoiding undue disruption of existing fisheries.

Alternative 3 directly conflicts with the underlying Treaty principles. First and foremost, Alternative 3 violates the principle of "fair sharing" or "equity principle." Alaska will not reap the benefits equivalent to the production of salmon originating in its waters. Without access to equitable sharing, there is little incentive for Alaska to participate in the Treaty. For example, while Alaska is prevented from prosecuting Treaty salmon fisheries under Alternative 3, Canada may keep harvesting Alaska salmon stocks. Secondly, under Alternative 3, no Treaty salmon fisheries would occur, which directly violates the Treaty principle of "avoiding undue disruption of fisheries." Thirdly, Alternative 3 severely hinders the ability of the State of Alaska from cooperating in management, research, and salmon enhancement activities which undermines Treaty conservation commitments. Salmon in the Treaty area are a shared resource, a lack of coordination and cooperation among the Parties undermines the Treaty itself and impacts conservation of salmon stocks coast-wide. Prior to the Treaty, management of salmon fisheries of the two countries was not coordinated and was often competitive, leading to overfishing and the loss of production to both Parties. Fourth, Alternative 3 runs counter to congressional intent under the Pacific Salmon Treaty Act and congressional intent in funding annual Department of Commerce Treaty appropriations. Fifth, this alternative would likely increase the uncertainty in overall stock assessment and fisheries management necessitating more conservative management actions and accompanying economic losses to fishery participants. Finally, disruptions to agreements reached under the Treaty may increase the possibility of litigation.

The U.S. Congress authorized the implementation of the provisions of the Treaty with the Pacific Salmon Treaty Act of 1985 (16 U.S.C. 3631-3645). The Act carefully balanced U.S. decision-making authority among federal, state, Indian treaty tribes, and commercial interests. This balance was intended to give each party a voice in Treaty decisions. The Act also set forth the principles and rules of engagement in fishery management activities corresponding to the bilateral panels and committees of the Treaty. Alternative 3 significantly compromises Alaska's ability to fully engage in Treaty processes for conservation and management and is therefore contrary to congressional intent.

The U.S. has committed to an international treaty to maintain and improve science, resource monitoring, and management activities. The Treaty establishes a process through which the Parties interact to establish, implement, and monitor science-based fishery management regimes applicable to their respective jurisdictions. U.S. obligations under the Pacific Salmon Treaty are fundamentally a federal commitment, and the State of Alaska has the responsibility for the majority of the U.S. fishery and stock assessments in Alaska. Federal funding is critical to implement the fishery and stock assessments required to implement the international obligations of the PST, and to provide for the participation of ADF&G in the committee, panel, and commission implementation meetings.

Management of Pacific salmon is a scientifically intensive undertaking that requires a great deal of scientific cooperation and management coordination. A vast amount of data routinely must be gathered and analyzed to effectuate the fishing regimes and sustain the resource. Stocks of greatly varying conservation status intermingle in the ocean and major rivers, and are subject to many jurisdictions that can affect their numbers. Some salmon stocks are very productive and can support substantial fisheries, whereas others are imperiled and may be listed under the U.S. Endangered Species Act or the Canadian Species at Risk Act. The Commission and panels carry out their responsibilities aided by scientific advice provided by a number of bilateral technical committees. These committees are comprised of fishery biologists, statisticians, modelers, and other scientific specialists employed specifically for Treaty implementation by the various governmental agencies, and tribes and First Nations who participate in the process.

In the event that no funding is provided for these activities, the basic required elements of this salmon management regime, absent the identification of new funding, the U.S. will default on its Treaty obligations. These elements include: counting, enumerating, or indexing annual salmon escapement by species and stock; harvest accounting (numbers caught by species by area and time); harvest apportionment (either via coded wire tag recovery, otolith recovery, or genetic stock identification) or ascribing the harvest to a particular stock or population (Taku for example), age composition, or size at age; and finally run reconstruction and brood table development or ascribing the harvest and escapement (using the age of the fish) to the year of parental spawning. Furthermore, empirical data from Alaska fisheries provide early observations of the magnitude, stock composition, and migratory timing of Chinook abundance annually, information that is used by both Canada and the Southern U.S. fishery managers. Other losses include the ability to maintain and support databases housing data collections spanning over 50 years, data collection and reporting applications, and network maintenance. These various activities are the data necessary for the salmon management system under the Treaty. The State of Alaska does not have the fiscal resources to continue most of these projects should Federal funding not be provided, and their loss would constitute a major disruption to the PST process.

In the case of bilateral projects, such as occurs on the transboundary rivers, Alaska will not be able to participate in the U.S. components of the stock assessment projects on the Taku, Alsek, and Stikine rivers, which includes marking and tagging fish in U.S. waters for event 1 of the 2-event mark-recapture program. As such, the U.S. may default on Treaty obligations if replacement funding is not identified. Canada will not have quality escapement data on which to base its in-river fisheries, and Canadian First Nations, commercial, and sport fisheries may be reduced.

Additionally, Chinook salmon escapement, catch, stock composition, and age information are used as inputs to a coast-wide Chinook model that sets catch limits, among other important metrics, for Canadian fisheries. Under Alternative 3, the quality, availability, and timeliness of these model inputs will be severely impacted, affecting not only Alaska fisheries, but Canadian fisheries as well.

The existence of an overarching international treaty has paid huge conservation dividends to both the U.S. and Canada and the respective salmon stocks spawning in each country. To fully realize the conservation and management regimes envisioned under the Treaty requires continued commitment and participation by the State of Alaska. Alternative 3 undermines these conservation tenets in multiple ways. For example, Alaska stocks will continue to be harvested in Canadian fisheries and the State will not have the resources to implement programs to adequately evaluate impacts on Alaska stocks.

The PSC provides a forum for bilateral communication, collaboration, and coordination for our shared resource. Without Federal funding, Alaska will have to dramatically scale back its participation in PST Panels and Technical Committees. This will result in a decreased ability to communicate and collaborate on data and information on the status of stocks and fisheries.

The Treaty Base Implementation grants support 50 permanent full time and over 60 seasonal biologists, biometricians, geneticists, scientists, analyst programmers, administrative staff, and fishery technicians across 10 communities. If no Federal funding is awarded, nearly all these employees would lose their jobs. This will have obvious and direct impacts on Alaskan families and coastal communities.

7.2. Effects of the Alternatives on Monitoring and Enforcement Compliance with the ITS

NMFS issues an ITS in cases where NMFS concludes an action and the resultant incidental take of listed species will not violate ESA section 7. An ITS is based on the analysis in the BiOp that the amount or extent of anticipated take, coupled with other effects of the proposed action(s), is not likely to jeopardize the continued existence of the listed species. The ITS specifies, among other requirements: the impact (the amount or extent) of such incidental taking on the listed species; reasonable and prudent measures considered necessary or appropriate to minimize the impact of such take; terms and conditions (including reporting requirements) that implement the specified measures; and for marine mammals, measures necessary to comply with the issuance of incidental take authorization under section 1371(a)(5) of the MMPA. The issuance of the ITS exempts any incidental take and provides protection from liability for any incidental takes, should they occur in compliance with the terms and conditions of the ITS.

Here, the purpose of issuing the ITS would be to exempt incidental take of ESA-listed species associated with the SEAK salmon fisheries subject to provisions of the 2019 PST Agreement. Under the proposed action, NMFS would develop a 2024 BiOp and ITS and include in the ITS the reasonable and prudent measures considered necessary or appropriate to minimize the impact of such take and the terms and conditions (including reporting requirements) that implement the specified measures. The issuance of the ITS would be predicated on the understanding that such incidental takes are reasonably certain to occur.

Alternative 1 and 2. Functionally, Alternatives 1 and 2 have the same outcome: issuance of an ITS under the 2019 BiOp (Alternative 1) and under the proposed 2024 BiOp (Alternative 2) and continued funding of grants to the State under both Alternatives. While none of these actions directly authorize the fisheries, NMFS expects effects to occur from the operation of the salmon fisheries in SEAK that are prosecuted pursuant to the 2019 PST Agreement, facilitated by proposed Federal funding of grants under the 2019 PST Agreement, and proposed to be exempted from liability for incidental takes of ESA listed species.

Under Alternatives 1 and 2, NMFS would prepare a BiOp and ITS for the take that is reasonably certain to occur incidental to the SEAK salmon fisheries. NMFS has preliminarily determined that this would include ESA-listed Chinook salmon, SRKW, Mexico DPS of humpback whales, and Western DPS of Steller sea lions.

The incidental take of ESA-listed Chinook salmon from four ESA-listed ESUs (LCR Chinook, UWR Chinook, Snake River Fall Run Chinook, and Puget Sound Chinook salmon) in the SEAK fisheries would vary from year to year depending on the stock abundances, annual variation in migratory patterns, and fishery management measures used to set and implement fishing levels consistent with the 2019 PST Agreement. The incidental take of ESA-listed Chinook salmon in SEAK fisheries would be limited on an annual basis by the provisions of Chapter 3, Annex IV of the PST Agreement that define the limits of Chinook catch and total mortality or exploitation rate for each fishery (see Table 4-2, Table 4-3, and Table 4-4 in Section 4 of this analysis). Post season measures of total Chinook salmon catch, total mortality and exploitation rate could be used as surrogates for the incidental take of ESA-listed Chinook salmon because they can be monitored directly and readily assessed for compliance.

Under Alternatives 1 and 2, NMFS would also monitor the percent reduction of Chinook salmon prey attributed to the SEAK salmon fisheries as a surrogate for incidental take of SRKW. This “prey reduction” value would include only the amount of Chinook salmon catch expected to overlap in time and space with SRKW (i.e., available prey after natural and fisheries mortality). NMFS can quantify and monitor this value, and it directly relates to the extent of effects on prey availability. The extent of take NMFS expects for SRKW in future years is expected to vary, but be within the range of prey reductions analyzed that would have occurred during the most recent decade (2009 to 2018) had the 2019 PST Agreement been in effect.

Regarding the Mexico DPS of humpback whales and the Western DPS of Steller sea lions, NMFS would be able to describe an amount of take that is expected to occur, based on stranding data, self-reports, and observer data that contributes to monitoring of ESA listed humpback and Steller sea lion interactions in the SEAK salmon fisheries; however, NMFS acknowledges that these data are limited. Fishery observers are not required for most of these fisheries, and much of the existing data regarding interactions is opportunistic. Further, ESA listed and non-listed humpbacks and Steller sea lions co-occur in the action area and are not readily distinguishable. NMFS is generally not able to identify their DPS of origin. In the absence of precise DPS identification for each take, NMFS employs the best available science to allocate those takes relative to the proportion of occurrence of listed versus non-listed humpback whales and Steller sea lions in SEAK. Furthermore, NMFS notes that the recovery of these DPSs continues despite past rates of take that are essentially identical to what we expect to occur in the future.

Reasonable and Prudent Measures

“Reasonable and prudent measures” are non-discretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

When issuing our ITS, NMFS would include a set of reasonable and prudent measures (RPMs) that would be necessary and appropriate to minimize the impacts to listed species from the SEAK salmon fisheries.

Terms and Conditions

The terms and conditions issued in an ITS are non-discretionary. Associated with the issuance of the terms and conditions, the action agency would have a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified the ITS (50 CFR 402.14, NMFS 2023). If the entity to whom a term and condition is directed does not comply with the terms and conditions, protective coverage for the proposed action would likely lapse. A point of contact would be identified to ensure reports and notifications required by the BiOp and the ITS are annually submitted and available for public dissemination upon request. Given the actions analyzed are being proposed by NMFS, under this scenario that would require NMFS to comply with them in order to implement the associated RPMs (50 CFR 402.14).

Alternative 3: Under Alternative 3, NMFS would not develop a new BiOp and any incidental taking of listed species by the SEAK salmon fisheries would not be exempt from the ESA’s prohibition of such take. This EIS therefore assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted under this Alternative. Under Alternative 3, NMFS also would not continue to disburse grants to the State; because these grants facilitate management of the SEAK salmon fisheries in compliance with the 2019 PST Agreement, this EIS also assumes that the SEAK salmon fisheries subject to the 2019 PST Agreement would not be prosecuted if funding were discontinued.

If NMFS did not issue a BiOp and ITS for the incidental take of listed species, and if the SEAK salmon fisheries did not open, NMFS would not need to develop reasonable and prudent measures and terms and conditions for the ITS. NMFS would not develop additional measures to monitor the harvest of Chinook salmon in the SEAK fisheries.

8. Preparers and Persons Consulted

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