Final Environmental Assessment

United States Bureau of Indian Affairs

Northwest Region Office

Portland, Oregon

2021-2022 Puget Sound Salmon and Steelhead Fisheries Plan

Puget Sound Region, Washington

May 2021

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Cooperating Agency: Washington Department of Fish and Wildlife

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List of Acronyms and Abbreviations

BIA	Bureau of Indian Affairs
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
DAO	Departmental Administrative Order
DDT	dichloro-diphenyl-trichloroethanes
DIP	demographically independent population
DOI	Department of the Interior
DPS	Distinct Population Segment
EA	Environmental assessment
Ecology	Washington Department of Ecology
EFH	Essential fish habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
Fed. Reg.	Federal Register
FRAM	Fishery Regulation Assessment Model
LAT	Low abundance threshold
LOAF	List of Agreed Fisheries between Washington State and Puget Sound Treaty Tribes for the 2020-2021 fishing in the Project Area
MMPA	Marine Mammal Protection Act
MPG	Major population group
NEPA	National Environmental Policy Act
NIOSH	National Institute for Occupational Safety and Health
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWIFC	Northwest Indian Fisheries Commission
PAH	polycyclic aromatic hydrocarbon
PDBE	polybrominated diphenyl ether
PFMC	Pacific Fishery Management Council
PCB	polychlorinated biphenyl

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PNPTT	Point No Point Treaty Tribes
RCW	Revised Code of Washington
SUS	Southern U.S. Fisheries
U.S.	United States
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife

Cover Sheet

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2021-2022 Puget Sound Salmon and Steelhead Fisheries Plan

Puget Sound, Washington

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Abstract: Puget Sound Treaty Tribes and Washington State (as fishery co-managers) propose to harvest salmon and steelhead during the 2021-2022 Puget Sound fishery season. The Proposed Action is assistance with the development and implementation of the co-managers agreed-upon salmon and steelhead fishing season, specifically commercial and recreational fishing seasons with pre-set fishery impact limits in the Puget Sound region (Washington Department of Fish and Wildlife [WDFW] and Puget Sound Treaty Tribes 2021). These pre-set fishery impact limits reflect best available science as they were developed based upon the most current data and scientific understanding of salmon and steelhead population dynamics within the Puget Sound region.

The purpose of the Proposed Action is multi-fold and relates to the United States' status as plaintiff in *United States v. Washington* in which the court ruled that the Puget Sound Treaty Tribes "shall have" the right to take up to 50% of the harvestable number of fish that may be taken by all fishers at usual and accustomed grounds and stations in the state and that non-treaty fisherman would also have the right to take up to 50%. *United States v. Washington,* 384 F. Supp. 312, 343 (W.D. WA 1974). As a co-manager, the Puget Sound Treaty Tribes with support from BIA have annually engaged with its co-manager, the State of Washington, to "co-allocate" the Puget Sound fisheries harvest pursuant to *U.S. v. Washington.* The co-allocation agreement is a multi-step process that ultimately is intended to meet any applicable legal requirements, including international and Tribal treaty obligations, the Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation Act (MSFCA), and the National Environmental Policy Act (NEPA). The Proposed Action thus includes BIA's support of salmon and steelhead sustainability, managing risk, meeting Endangered Species Act requirements, optimizing harvest, providing equitable sharing of harvest opportunity between treaty and non-treaty fishers, protecting treaty Indian fishing rights and federal treaty trust responsibility. The Proposed Action is also intended to ensure consistency with the Puget Sound Salmon Management Plan (including the Chinook Harvest Management Component), Hood Canal Salmon Management Plan, Pacific Salmon Treaty, other Puget Sound and Pacific Fisheries Management Council fisheries restrictions, and other applicable laws and regulations to meet overall conservation and harvest management objectives for Chinook salmon, steelhead, coho salmon, and chum salmon.

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The Puget Sound Treaty Tribes have been stewards of the salmon resource and its associated habitat since time immemorial. Salmon, as all Indian trust resources, are managed based on a holistic approach where all things are connected. It's gravel-to-gravel management where resource impacts are accounted for at all life stages and throughout the migratory range of these stocks. The expected harvest under the Proposed Action reflects the best professional judgment on how to sustain this resource and ensure its perpetuation for future generations to come. For Indian people, this means fostering their communities' economic well-being, preserving their cultural heritage and traditional practices, as well as sustaining a significant element of their diet. More importantly, it's honoring the wishes of their elders to sustain this resource for their children's children.

The Bureau of Indian Affairs (BIA) mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve trust assets of American Indians, Indian tribes, and Alaskan Natives. This is accomplished through the delivery of quality services, while maintaining government-to-government relationships within the spirit of self-determination. The BIA has supported the Northwest Treaty Tribes to protect, restore, and enhance their treaty fishing rights in *United States v. Washington* for over forty years. Pursuant to tribal requests, the BIA is consulting with other federal agencies for fishery-related impacts associated with the proposed LOAF for 2021-2022 in Puget Sound pursuant to *United States v. Washington* and other related cases.

The BIA is the lead agency representing the Puget Sound Treaty Tribes for this environmental assessment. BIA receives funding annually to support the implementation of *U.S. v. Washington.* Further, and in keeping with the annual funding received from Congress, the BIA's action is also consistent with the federal government's trust responsibilities and various Secretarial Orders.[1] This document will help inform BIA's evaluation of federal, state, and local resource impacts associated with the Proposed Action.

[1] See Secretarial Order 3206, American Indian Tribal Rights, Federal Trust Responsibilities, and the Endangered Species Act (June 5, 1997), Secretarial Order 3335, Reaffirmation of the Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries (August 20, 2014).

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Executive Summary

This Final environmental assessment (EA) has been prepared by the Bureau of Indian Affairs (BIA) and its contractor, the Northwest Indian Fisheries Commission (NWIFC) and its subcontractor, to describe and analyze the environmental effects of the 2021-2022 Puget Sound Salmon and Steelhead Fisheries Plan, which is intended to implement the co-managers (Washington State and Puget Sound Treaty Tribes) list of agreed salmon and steelhead fishing (LOAF) season, specifically commercial and recreational fishing seasons with pre-set fishery impact limits in the Puget Sound region (Washington Department of Fish and Wildlife [WDFW] and Puget Sound Treaty Tribes 2021). The BIA is the lead agency on the basis of the United States' status as plaintiff in *United States v. Washington,* its role as a party to the Tribes' treaties, which includes BIA's authority to evaluate the environmental effects of its actions on the development and implementation of the co-managers' List of Agreed Fisheries for 2021-2022 (LOAF).

The project is located where Puget Sound salmon and steelhead fisheries occur, which includes all marine and freshwater fishing areas in Puget Sound, encompassing all marine and freshwater areas east of the Bonilla-Tatoosh Line north of the tip of Cape Flattery on the northwest coast of Washington.

NEPA Process

This EA has been prepared in accordance with NEPA (42 United States Code et seq.) and the Council on Environmental Quality NEPA regulations contained in Code of Federal Regulations Parts 1500-1508. The analysis presented in the Final EA will help provide the basis for the BIA's determination to implement the Proposed Action, as well as form the basis for determining that the Proposed Action would not constitute a major federal action significantly affecting the quality of the human environment.

Proposed Action

The BIA's Proposed Action is to assist with the development and implementation of the 2021-2022 co-managers agreed upon salmon and steelhead fishing seasons, specifically tribal subsistence, ceremonial, and commercial fisheries and non-tribal recreational and commercial fisheries with pre-set fishery impact limits in Puget Sound and its tributaries (WDFW and Puget Sound Treaty Tribes 2021). These efforts result in a List of Agreed Fisheries for 2021-2022 (LOAF) in the project area.

Purpose and Need

The need for the Proposed Action is to examine BIA's actions supporting the Puget Sound Treaty Tribes' development and implementation of the 2021-2022 LOAF, and due to the

inextricably intertwined nature of WDFW's action as a co-manager, the State of Washington's development and implementation of the 2021-2022 LOAF, and to ensure that BIA's actions:

- Provide for the meaningful exercise of federally protected tribal treaty fishing rights
- Provide for 2021-2022 tribal and non-tribal salmon and steelhead fishing harvest co-managed under the jurisdiction of the 1974 court case *United States v. Washington* (also known as the Boldt decision)
- Protect and improve fishery trust assets of Puget Sound Treaty Tribes
- Meet Endangered Species Act (ESA) requirements to not appreciably reduce the likelihood of survival and recovery of listed Puget Sound Chinook salmon, Hood Canal summer-run chum salmon, and Puget Sound steelhead and other listed species impacted by the planned fisheries
- Are consistent with:
    - Puget Sound Salmon Management Plan (implementation plan as directed under *U.S. v Washington*)
    - Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component
    - Hood Canal Salmon Management Plan
    - Pacific Salmon Treaty
    - Pacific Fishery Management Council Salmon Fishery Management Plan.

As lead agency, the BIA's purpose for the action is to assist the Puget Sound Treat Tribes' efforts as co-managers to:

- Ensure and enhance the sustainability of listed salmon and steelhead by conserving the productivity, abundance, and diversity of the salmon and steelhead populations within listed evolutionarily significant units and distinct population segments of the project area
- Manage risk associated with abundance estimation, population dynamics, and management implementation of salmon and steelhead
- Meet established ESA criteria for salmon and steelhead and other listed species impacted by the planned fisheries
- Optimize harvest of abundant Puget Sound salmon (Chinook salmon, coho salmon, chum salmon, and sockeye salmon) and steelhead while protecting weaker comingled listed salmon and steelhead stocks
- Account for all sources of fishery-related mortality
- Provide equitable sharing of salmon and steelhead harvest opportunity among tribes, and among tribal and non-tribal fishers pursuant to *United States v. Washington*
- Protect treaty Indian fishing rights and meet federal treaty trust responsibility
- Meet legal requirements under applicable salmon and steelhead plans and treaties.

Project Description

Puget Sound Treaty Tribes and Washington State (as fishery co-managers) propose to harvest salmon and steelhead during the 2021-2022 Washington State fisheries season.

This Final EA evaluates the No Action, Proposed Action, and No Puget Sound Fishing alternatives. No Action represents implementation of the 2020-2021 LOAF (WDFW and Puget Sound Treaty Tribes 2020) for the 2021-2022 fishing season such that the co-managers would continue with the previous year's fisheries management regime for Puget Sound salmon fisheries. The Proposed Action represents agreement on a new LOAF that would be implemented for the 2021-2022 fishing season (WDFW and Puget Sound Treaty Tribes 2021). In either case, the LOAF is intended to be consistent with the information and commitments of the 2010 Puget Sound Chinook Harvest Management Plan as amended by the Summary of Modifications to Management Objectives (Parker and Susewind 2021). The primary differences between the No Action and Proposed Action include differences in the number of fish harvested for each salmon and steelhead species, area closures, seasonal and timing restrictions, and other restrictions in use of fishing gear. The No Fishing Alternative represents co-managers lack of ESA authorization and therefore no salmon or steelhead fishing would occur within the action area as a result, although harvest would still occur on Puget Sound stocks in ocean fisheries under PFMC control. The No Fishing Action, while evaluated in this EA, does not meet the project purpose and need, which is to provide for the meaningful exercise of federally protected tribal treaty fishing rights on harvestable hatchery-origin and natural-origin salmon and steelhead management units among other objectives. These treaties secured the rights of tribes for taking fish at usual and accustomed grounds and stations in common with all citizens of the United States.

Summary of Potential Effects

A summary of the potential effects associated with each of the alternatives evaluated in the Final EA is presented in the table below using the following terms to describe the relative impact:

- No Effect – The alternative would have no effect on the resource.
- Undetectable – The impact would not be detectable.
- Negligible – The impact would be at the lower levels of detection.
- Low – The impact would be slight, but detectable.
- Medium – The impact would be readily apparent.
- High – The impact would be severe.

These resource areas are also described as the effect either being positive (beneficial), neutral, or negative (detrimental).

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Table 0-1. Summary of potential effects of implementation of the No Action, the Proposed Action, and the No fishing Action.

Resource Area	No Action	Proposed Action	No Fishing Action
Water Quality	Negligible negative effect	Same as No Action	Negligible positive effect
Air, Greenhouse Gases, Pollutants	Negligible negative	Same as No action	Negligible positive effect
Wildlife – Predator/Prey Relationships	Negligible for most wildlife species, and low negative effect for species dependent on salmon and steelhead	Same as No Action	Same as No Action, but low positive effect for species dependent on salmon and steelhead
Wildlife – SRKW	Low, negative effect	Low, positive effect	Low, positive effect
Wildlife – Salmon Carcass Nutrient Benefits	Low, positive effect	Low, negative effect	Low positive effect
Wildlife- Transfer of Toxins from Salmon to Wildlife	No effect	Same as No Action	Same as No Action
Wildlife – Wildlife Habitat Disturbance	Negligible negative effect	Same as No Action	Negligible positive effect
Wildlife - Bycatch	Low negative effect	Same as No Action	Low positive effect
Wildlife – Derelict Fishing Gear	Low negative effect	Same as No Action	Low positive effect
Fish – Chinook Salmon	Medium negative Effect	Low, positive effect	Same as Proposed Action
Fish – Summer-run Chum Salmon	Negligible negative effect	Same as No Action	Negligible positive effect
Fish - Steelhead	Negligible negative effect	Same as No Action	Negligible positive effect
Fish – Coho Salmon	Negligible positive effect	Negligible positive effect	Low, positive effect
Fish – Chum Salmon	Moderate, negative effect	Low, negative effect	Low, positive effect
Fish – Pink Salmon	Low, Positive effect	Negligible, negative effect	Same as No Action
Fish – Sockeye Salmon	High, negative effect	Low, negative effect	Low, positive effect
Fish – Bull Trout	Negligible, negative effect	Same as No Action	Negligible, positive effect
Fish – Other Fish	Negligible negative effect	Same as No Action	Negligible effect
Fish – Fish Habitat	Low negative effect	Same as No Action	Low positive effect
Fish – Marine-derived Nutrients	Low, positive effect	Low, negative effect	Low, positive effect
Fish – Harvest of Hatchery-origin Fish	Low, negative effect	Same as No Action	Medium negative effect
Fish - Treaty Indian Ceremonial and Subsistence Salmon Uses	Moderate, negative effect	Same as No Action	High, negative effect
Invertebrates	No Effect	Same as No Action	Same as No Action

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Resource Area	No Action	Proposed Action	No Fishing Action
Socioeconomics	Moderate negative effect	Same as No Action	High Negative effect
Environmental Justice	Low, negative effect	Moderate, negative effect	High, negative effect
Recreation and Recreational Fishing	Moderate, positive effect	Same as No Action	High, negative effect
Marine Protected Areas	Negligible effect	Same as No Action	Same as No Action
Noise and Light	Negligible, negative effect	Same as No Action	Negligible positive effect
Public Health and Safety	Low, negative effect	Same as No Action	Low, positive effect
Indian Trust Assets	High, negative effect	Moderate, positive effect	Same as No Action

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1.0 Purpose and Need for the Proposed Action

1.1 Introduction

Each year, the Puget Sound Treaty Indian Tribes and Washington State (through the Department of Fish and Wildlife [WDFW]), as co-managers of the Puget Sound salmon fisheries resources, develop a cooperative management plan, known as the List of Agreed Fisheries (LOAF or "annual fisheries agreement"), for salmon and steelhead fisheries in Puget Sound and its tributaries. These fisheries provide for non-tribal commercial and recreational salmon and steelhead harvest and tribal salmon and steelhead ceremonial, subsistence, and commercial harvest in the Project Area. WDFW and the Puget Sound Treaty Indian Tribes jointly manage the salmon and steelhead harvest to avoid jeopardizing the survival or recovery of species listed under the Endangered Species Act (ESA) including meeting the terms of applicable salmon and steelhead management plans and the Pacific Salmon Treaty. These annual fisheries agreements typically occur during spring of each year through a series of public meetings involving federal, state, tribal, public, and industry representatives and other concerned citizens, known as the North of Falcon planning process, in conjunction with the annual salmon process of the Pacific Fishery Management Council (PFMC), the federal authority responsible for managing ocean fisheries. The North of Falcon process initiates the establishment of fishing seasons for commercial and recreational salmon fisheries in Puget Sound, Willapa Bay, Grays Harbor, and Washington State rivers. This environmental assessment (EA) evaluates the co-managers' agreement for the 2021-2022 salmon and steelhead fishing season in Puget Sound and its tributaries.

The Bureau of Indian Affairs (BIA) is the lead agency for this EA to ensure that the co-managers' agreement for the 2021-2022 salmon and steelhead fishing season meets its agency guidelines and obligations under the National Environmental Policy Act (NEPA) and other applicable laws, regulations, and guidelines.

1.2 Location

Puget Sound salmon and steelhead fisheries include all marine and freshwater fishing areas in Puget Sound, which encompasses the marine and freshwater areas east of the Bonilla-Tatoosh Line north of the tip of Cape Flattery on the northwest coast of Washington (Figure 1-1), which is considered the project area for this EA. The area consists of marine management areas 4B through 13 as identified by WDFW:

- Neah Bay (Area 4B, from October through April)
- Sekiu and Pillar Point (Area 5)
- East Juan de Fuca Strait (Area 6)
- San Juan Islands (Area 7)
- Deception Pass, Hope Island, and Skagit Bay (Area 8-1)
- Ports Susan and Gardner (Area 8-2)
- Admiralty Inlet (Area 9)

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- Seattle-Bremerton (Area 10)
- Tacoma-Vashon Island (Area 11)
- Hood Canal (Area 12)
- South Puget Sound (Area 13) (Figure 1-1).

Figure 1-1. Marine Catch areas of the Project Area. The Project Area also includes freshwater rivers flowing into the noted marine areas.

In addition, fisheries are further subdivided by major freshwater management areas as shown below:

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- Nooksack River
- Skagit River
- Stillaguamish River
- Snohomish River
- Lake Washington/Cedar River
- Green River
- Puyallup River, White River
- Nisqually River
- Skokomish River
- Mid-Hood Canal Tributaries
- Dungeness River
- Elwha River
- Hoko River.

1.3 Purpose and Need

The need for the Proposed Action is to analyze BIA's actions in support of the negotiation and implementation of the 2021-2022 annual fisheries agreement to determine whether they:

- Provide for the meaningful exercise of federally protected tribal treaty fishing rights
- Protect and improve fishery trust assets of Puget Sound Treaty Tribes
- Meet ESA requirements to not appreciably reduce the likelihood of survival and recovery of listed Puget Sound Chinook salmon, Hood Canal summer-run chum salmon, Puget Sound steelhead, and other listed speices impacted by the planned fisheries.
- And Are consistent with:
    - Puget Sound Salmon Management Plan (implementation plan as directed under *U.S. v. Washington*)
    - Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component
    - Hood Canal Salmon Management Plan
    - Pacific Salmon Treaty
    - PFMC Salmon Fishery Management Plan.

As lead agency, the BIA's purpose for the action is to assist the Puget Sound Treaty Tribes' efforts as co-managers to:

- Ensure and enhance the sustainability of listed salmon and steelhead by conserving the productivity, abundance and diversity of the salmon and steelhead populations within listed evolutionarily significant units (ESUs) and distinct population segments (DPSs) of the project area
- Manage risk associated with abundance estimation, population dynamics, and management implementation of salmon and steelhead

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- Meet established ESA criteria for listed salmon and steelhead and other listed species impacted by the planned fisheries
- Optimize harvest of abundant Puget Sound salmon (Chinook salmon, coho salmon, chum salmon, pink salmon, and sockeye salmon) and steelhead while protecting weaker comingled listed salmon and steelhead stocks
- Account for all sources of fishery-related mortality
- Provide equitable sharing of salmon and steelhead harvest opportunity among tribes, and among treaty and non-treaty fishers pursuant to *United States v. Washington*
- Protect treaty Indian fishing rights and meet federal treaty trust responsibility
- Meet legal requirements under applicable salmon and steelhead plans and treaties.

1.4 Proposed Action

The Proposed Action is BIA's assistance of the negotiation and implementation of the co-managers' agreed-upon 2021-2022 salmon and steelhead fishing seasons, specifically tribal subsistence, ceremonial, and commercial fisheries and non-tribal recreational and commercial fisheries with pre-set fishery impact limits in Puget Sound and its tributaries (WDFW and Puget Sound Treaty Tribes 2021). These efforts result in a List of Agreed Fisheries for 2021-2022 (LOAF) in the project area.

Five salmon species and steelhead covered for the 2021-2022 salmon and steelhead harvest are:

- Chinook salmon (*Oncorhynchus tshawytscha)*
- Steelhead (*O. mykiss*)
- Coho salmon (*O. kisutch)*
- Chum salmon (*O. keta*)
- Sockeye salmon (*O. nerka)*
- Pink salmon (*O. gorbuscha*)

The fishery plan includes:

- Recreational fishing in
    - Inland marine areas (Puget Sound, Strait of Juan de Fuca, San Juan Islands, and Hood Canal)
    - Puget Sound rivers and bays
- Commercial fishing as
    - Tribal Indian troll, seine, reef net, gill net and tangle net
    - Non-tribal seine, reef net, and gill net
- Tribal ceremonial and subsistence (seine, reef net, gill net, tangle net, dip net, and hook and line) fishing in
    - Inland marine (Puget Sound, Strait of Juan de Fuca, San Juan Islands and Hood Canal)
    - Puget Sound rivers and bays

1.5 Background

1.5.1 ESA

The National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) are responsible for administering the Endangered Species Act (ESA). For this project area, multiple fish species, a marine mammal, and an avian species are listed under the ESA by NMFS or USFWS (Table 1-1). ESA section 7(a)(2) provides that any action authorized, funded, or carried out by a federal agency shall not jeopardize the continued existence of any endangered or threatened species or result in the adverse modification or destruction of designated critical habitat and requires that federal agencies make this provision in consultation with NMFS or FWS (the Services) for listed species within their respective jurisdiction. 16 USC § 1536(a)(2). A biological opinion concluding such consultation sets forth reasonable and prudent measures, terms and conditions for implementing such measures, and compliance with which exempts the resulting take from the section 9 prohibition (16 USC § 1536(o)).

Table 1-1. ESA status of species regulated by the National Marine Fisheries Service (NMFS) and the United States Fish and Wildlife Service likely to be adversely affected by the proposed action in the Puget Sound region.

Agency and Species	ESU/DPS	Current Endangered Species Act Listing Status
NMFS		
Chinook salmon (*O. tshawytscha*)	Puget Sound	Threatened 6/28/05 (70 Federal Register [Fed. Reg.] 37160)
Chum salmon *(O. keta)*	Hood Canal summer-run (includes Strait of Juan de Fuca summer-run)	Threatened 6/28/05 (70 FR 37160)
Steelhead (*O. mykiss*)	Puget Sound	Threatened 8/15/11 (76 Fed Red. 50448)
Bocaccio (*Sebastes paucispinis*)	Puget Sound/Georgia Basin	Endangered
Yelloweye Rockfish (*S. ruberrimus*)	Puget Sound/Georgia Basin	Threatened
Killer whale (*Orcinus orca)*	Southern Resident	Endangered
USFWS		
Marbled Murrelet (*Braycyramphus marmoratus*)	Washington, Oregon, and California DPS	Threatened
Bull Trout (*Salvelinus confluentus*)	Coterminus U.S. DPS	Threatened

The Proposed Action is a federal action, and BIA is requesting consultation on this action with NMFS under section 7(a)(2). The results of previous consultations regarding similar actions are documented in biological opinions developed by NMFS (2020) for the species under their jurisdiction as shown in Table 1-1. Biological opinions provide NMFS' conclusions regarding

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the likelihood that the proposed harvest actions will jeopardize the continued existence of any listed species or adversely modify designated critical habitat for any listed species. In the biological opinion described in NMFS' May 8, 2020 update, NMFS determined that the proposed harvest for the 2020-2021 fishing season would not jeopardize the survival or recovery of species listed under the ESA, including Puget Sound Chinook salmon, Puget Sound steelhead, two species of listed Puget Sound rockfish, and Southern Resident killer whales (NMFS 2020).

In 2015, the BIA and NMFS, along with co-applicants WDFW and PSTIT, initiated consulation with the USFWS for harvest actions impacting Marbled Murrelets and Bull Trout. That consultation resulted with the USFWS issuing a 20-year Biological Opinion (USFWS 2017) providing Incidental Take coverage of Marbled Murrelets and acknowledging incidental take of Bull Trout in accordance with State, National Park Service, or Native American Tribal permitted fishing activities is not prohibited consistent with their 4(d) Rule (64 FR 58929-58930). The Proposed Action is consistent with the effects assessed under that Biological Opinion.

In addition to the biological requirements for conservation under the ESA, NMFS and the USFWS (the Services), have a federal trust responsibility to treaty Indian tribes. In recognition of its treaty rights stewardship obligation and consistent with Secretarial Order 3206, the Services, as a matter of policy, will make every effort to harmonize the protection of listed species and the treaty right to harvest fish. The Services recognize that the treaty tribes have a right to conduct their fisheries within the limits of conservation constraints. Because of the federal government's trust responsibility to the tribes, the Services are committed to considering the tribal co-managers' judgment and expertise regarding conservation of trust resources. However, the opinion of tribal co-managers and their immediate interest in fishing must be considered in context with the Services' responsibilities under the ESA.

1.5.2 Fisheries Co-Management

Washington's salmon and steelhead fisheries are managed cooperatively in a unique government-to-government relationship between Washington State and Treaty Tribes. In the treaties signed between the United States and tribal governments beginning in the 1850s, the tribes agreed to allow the peaceful settlement of much of western Washington, and provided the land to do so, in exchange for their continued right to fish, gather shellfish, hunt and exercise other sovereign rights. A 1974 federal court case (*United States v. Washington*) decided by U.S. District Court Judge George Boldt re-affirmed the tribes' rights to harvest salmon and steelhead, established the tribes as co-managers of Washington fisheries, and entitled them to 50 percent of the allowed salmon and steelhead harvest. As a result, each year Washington State and tribal representatives participate in key fish management processes. The Pacific Fishery Management Council (PFMC) process sets annual fisheries in federal waters from 3 to 200 miles off the coasts of Washington, Oregon, and California. State and tribal representatives are members of the PFMC and its technical committees.

Parallel to the PFMC planning effort is the annual North of Falcon process, which sets salmon fishing seasons for Indians and non-Indians in inland waters, such as Puget Sound, Willapa Bay, Grays Harbor, and state rivers. This process consists of a series of meetings that occur at and between the March and April meetings of the PFMC. The process represents government-to-

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government negotiation between the state of Washington and 24 northwest Indian tribes with federally recognized treaty fishing rights. Coordination among the 25 independent sovereigns is essential to ensure resource conservation and sustainable fisheries, as each co-manager regulates and controls their fisheries within their jurisdictions.

The objective of the North of Falcon process is to develop a comprehensive and coordinated fisheries plan that provides for resource conservation, sustainable fisheries, and assures all parties are afforded harvest opportunity. This forum allows the co-managers to collectively evaluate the biological consequences of options for outside (ocean) and inside (Puget Sound and in-river) fisheries collectively and with their respective constituencies. The option evaluation process is highly re-iterative as the co-managers continue to shape fisheries until all conservation objectives are met and consensus can be reached on a final fisheries plan. For the Puget Sound planning region, the final *List of Agreed Fisheries* must account for all salmon fishery (tribal/non-tribal; recreational/commercial) related impacts – incidental and directed – from ocean to in-river to ensure that ESA obligations as well as Pacific Salmom Treaty obligations are met for listed Chinook salmon, summer-run Chum salmon stocks, and Steelhead stocks and non-listed Chinook salmon, Chum salmon, Steelhead, Coho salmon, and Sockeye salmon stocks.

1.5.3 NEPA Compliance

The NEPA of 1969 (Public Law 90-190; 42 United States Code [USC] § 4371 et seq.) established a national policy to promote the protection and enhancement of the environment. This policy was in response to the growing concerns about the ecological balance and preservation of natural resources in the United States while meeting the demands of a growing population. This national policy encourages productive harmony between human beings and their environment, promotes efforts to prevent or eliminate damage to the environment, stimulates the health and welfare of human beings, and enriches the understanding of ecological systems. NEPA is the basic national charter for protection of the environment. It establishes policy, sets goals, and provides the means for carrying out the policy. NEPA requirements apply to any federal project that might have a significant impact on the quality of the human environment. Thus, NEPA requires evaluation and public disclosure of the effects of proposed federal actions on the natural and human environment as described in this EA.

1.6 Relationship to Other Plans and Policies

In addition to NEPA and ESA, other plans, regulations, agreements, treaties, laws, and Secretarial and Executive Orders also affect salmon and steelhead harvest in Puget Sound and its tributaries including:

- Puget Sound Salmon Management Plan (implementation plan as directed under *U.S. v. Washington*)
- Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component
- Hood Canal Salmon Management Plan
- Pacific Salmon Treaty
- PFMC Salmon Fisheries Management Plan

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1.6.1 Puget Sound Salmon Management Plan

The Puget Sound Salmon Management Plan, adopted by WDFW and Puget Sound Treaty Tribes in 1985, establishes guidelines for management of salmon resources originating in or passing through Washington waters from the mouth of the Strait of Juan de Fuca eastward (Puget Sound) only. The plan is intended to ensure that tribal fishers and non-tribal fishers shall be afforded the opportunity to harvest their share as determined in *U.S. v. Washington*. The parties developed the plan with the objectives of promoting the stability and vitality of tribal and non-tribal fisheries of Puget Sound and steadily improving the practical and technical basis for management of each of the Puget Sound fisheries.

A component of the Puget Sound Salmon Management Plan is the Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component. This supplementary plan was developed to address the region's reduced stock abundance and productivity. The 2010 Harvest Management Component established conservation objectives (i.e., exploitation rate ceilings and/or spawning escapement goals) for each natural management unit that are intended to assist in the overall recovery efforts for Puget Sound Chinook salmon (PSIT and WDFW 2010). The annual harvest regimes are then structured to achieve these identified stock specific conservation objectives as part of this recovery effort. The plan guides the implementation of fisheries in Washington, under co-managers' (WDFW and Puget Sound Treaty Tribes) jurisdiction but also accounts for harvest impacts of other fisheries that affect Puget Sound Chinook salmon, including those in Alaska and British Columbia, to assure that conservation objectives for Puget Sound management units are achieved. Accounting for total fishery-related mortality includes incidental harvest in fisheries directed at other salmon species and non-landed mortality. The fundamental intent of the plan is to enable harvest of strong, productive stocks of Chinook salmon and other salmon species and to minimize harvest of weak or critically depressed Chinook salmon stocks.

1.6.2 Hood Canal Salmon Management Plan

The Hood Canal Salmon Management Plan is a regional plan and stipulated order related to the Puget Sound Salmon and Steelhead Management Plan. The state, tribal, and federal parties to the plan establish management objectives for stocks originating in Hood Canal, including listed Chinook salmon and summer-run chum salmon stocks. Any change in management objectives under the Hood Canal Salmon Management Plan requires authorization by the U.S. Fish and Wildlife Service (USFWS). Management for this plan affects those fisheries where Hood Canal salmon stocks are harvested.

1.6.3 Pacific Salmon Treaty

The Pacific Salmon Treaty, signed in 1985, commits the United States and Canada to work together on research, conservation, and management of Pacific salmon (Pacific Salmon Commission and Fisheries and Oceans Canada 2016a). Annex 4 of the January 1, 2019 agreement stipulates management goals and measures for important Chinook salmon and coho salmon stocks that are harvested in Washington among other areas. Annex 4 establishes an abundance-based Chinook salmon management regime for the populations and fisheries subject to the Pacific Salmon Treaty. It includes increased specificity of the management of all fisheries affecting Chinook salmon and seeks to address the conservation requirements of a larger number

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of depressed stocks, including those listed under the ESA. The agreement establishes exploitation rate guidelines or quotas for fisheries subject to the Pacific Salmon Treaty based on the forecast abundance of key Chinook salmon stocks. The Pacific Salmon Commission is responsible for implementation of the treaty. The commission is a bilateral, multi-level organization composed of delegates from Canada and the United States representing federal, state, and provincial fisheries agencies, tribal and First Nation governments, the commercial, recreational, and processing sectors, and environmental organizations with an interest in salmon conservation.

The Fraser Panel controls sockeye and pink fisheries in the Strait of Juan de Fuca and San Juan Island regions in the United States, the southern Georgia Strait in the United States and Canada, the Fraser River in Canada, and other nearby areas. The U.S. Fraser Panel fisheries are managed in-season to meet the objectives of the Pacific Salmon Treaty. The season structure and catches are modified in-season in response to changes in projected salmon abundance, fishing effort, or environmental conditions, to assure achievement of the management objectives and in consideration of safety concerns. United States Fraser Panel fisheries are also managed together with the suite of other Puget Sound fisheries to meet conservation and harvest management objectives for Chinook salmon, coho salmon, and chum salmon.

1.6.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) is the primary law governing marine fisheries management in United States federal waters to conserve fishery resources, support enforcement of international fishing agreements, promote fishing in line with conservation policies, provide for implementation of fishery management plans, establish regional fishery management councils, develop underutilized fisheries, and protect essential fish habitats (EFH).

The Act established eight fishery management councils, including the Pacific Fishery Management Council, and requires these councils to adopt, with NMFS' approval, Fishery Management Plans (FMPs) and implementing regulations for each fishery they manage. The Pacific Fishery Management Council's Pacific Salmon Fishery Management Plan (see 1.6.6 below) governs salmon fisheries in federal waters off the U.S. West Coast pursuant to the Magnuson Act.

1.6.5 Sustainable Fisheries Act

The Sustainable Fisheries Act of 1996 (Public Law 104-297) is an amendment to the Magnuson-Stevens Conservation and Management Act. There were two major changes to the purpose of the law: adding the promotion of catch and release programs to conservation and management principles, and adding the promotion of EFH protection. The Sustainable Fisheries Act establishes requirements for EFH descriptions in Federal Fishery Management Plans (50 CFR 600). EFH was designated for groundfish, coastal pelagic species, highly migratory species, and salmon. NMFS subsequently issued an interim final rule (62 Fed. Reg. 66531, December 19, 1997) to implement the EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act. This rule established guidelines to assist the Regional Fishery Management Councils and the Secretary of Commerce in the description and identification of EFH in fishery

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management plans, including identification of adverse impacts from both fishing and non-fishing activities on EFH, and identification of actions required to conserve and enhance EFH. The intended effect of the rule is to promote the protection, conservation, and enhancement of EFH. The interim rule was finalized in 2002 (67 Fed. Reg. 2343, January 17, 2002).

1.6.6 The Pacific Coast Salmon Fishery Management Plan

The Pacific Coast Salmon Fishery Management Plan (PFMC 2014) guides management of salmon fisheries in federal waters (3 to 200 nautical miles) off the coast of Washington, Oregon, and California. The fishery management plan covers the coastwide aggregate of natural-origin and hatchery-origin salmon encountered in ocean salmon fisheries, but only has management objectives and allocation provisions for Chinook salmon, coho salmon, and pink salmon; other salmon species are rarely encountered in ocean salmon fisheries. The fishery management plan also includes identification of EFH as required under the Magnuson-Stevens Fishery and Conservation Act for Chinook salmon, coho salmon, and pink salmon in ocean, estuary, and fresh water, and contains recommendations for measures to avoid or mitigate for impacts to salmon EFH.

The fishery management plan includes conservation objectives and status determination criteria for major salmon stocks that ensure salmon populations are able to produce maximum sustained yield on a continuing basis and support fishing community's coastwide. The plan contains allocation provisions to ensure that salmon resources are shared fairly among various user groups and regions. The fishery management plan also contains a management framework that allows fishing seasons to be set and managed in a fair and efficient manner.

1.6.7 Recovery Plans for Puget Sound Salmon and Steelhead

Federal recovery plans are in place for the ESA-listed Puget Sound Chinook salmon (72 Fed. Reg. 2493, January 19, 2007), Hood Canal summer chum salmon ESU (72 Fed. Reg. 29121, May 24, 2007), and Puget Sound steelhead (84 Fed. Reg. 71379, December 27, 2019). Broad partnerships of federal, state, local, and tribal governments and community organizations collaborated in the development of the recovery plans under Washington's Salmon Recovery Act. The comprehensive recovery plans include conservation goals and proposed habitat, hatchery, and harvest actions needed to achieve the conservation goals for each Puget Sound watershed within the geographic boundaries of the two listed ESUs for Chinook salmon and chum salmon as well as the Puget Sound Steelhead DPS.

1.6.8 American Indian Treaties

Beginning in the mid-1850s, the United States entered into a series of treaties with tribes in Puget Sound. The treaties were completed to secure the rights of the tribes to land and use natural resources in their historically inhabited areas, in exchange for ceding land to the United States for settlement by its citizens. The first treaty was the Treaty of Medicine Creek (signed in 1854), followed by three treaties signed in 1855 – Neah Bay Treaty, Point Elliott Treaty, and Point No Point Treaty. These treaties secured the rights of tribes for taking fish at usual and accustomed grounds and stations in common with all citizens of the United States. Marine and freshwater areas of Puget Sound were affirmed as the usual and accustomed fishing areas for treaty tribes under *United States v. Washington* (1974).

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1.6.9 Secretarial Order 3206

Secretarial Order 3206 (*American Indian Tribal Rights, Federal–Tribal Trust Responsibilities and the ESA* at http://www.nmfs.noaa.gov/sfa/reg_svcs/Councils/Webinar/secretarial_order.pdf) issued by the secretaries of the Departments of Interior and Commerce, clarifies the responsibilities of the agencies, bureaus, and offices of the departments when actions taken under the ESA and its implementing regulations affect, or may affect, Indian lands, tribal trust resources, or the exercise of American Indian tribal rights as they are defined in the Order. The Secretarial Order acknowledges the trust responsibility and treaty obligations of the United States toward tribes and tribal members, as well as its government-to-government relationship when corresponding with tribes. Under the Order, NMFS and the USFWS (Services) "will carry out their responsibilities under the [ESA] in a manner that harmonizes the federal trust responsibility to tribes, tribal sovereignty, and statutory missions of the [Services], and that strives to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species, so as to avoid or minimize the potential for conflict and confrontation."

In the event that the Services determine that conservation restrictions directed at a tribal activity are necessary to protect listed species, specifically where the activity could result in incidental take under the ESA, the Services shall provide the affected tribe(s) written notice, including an analysis and determination that (i) the restriction is reasonable and necessary for conservation of the species; (ii) the conservation purpose of the restriction cannot be achieved by reasonable regulation of non-Indian activities; (iii) the measure is the least restrictive alternative available to achieve the required conservation purpose; (iv) the restriction does not discriminate against Indian activities, either as stated or applied; and (v) voluntary tribal measures are not adequate to achieve the necessary conservation purpose.

More specifically, the Services shall, among other things, do the following:

- Work directly with Indian tribes on a government-to-government basis to promote healthy ecosystems (Section 5, Principle 1)
    - Recognize that Indian lands are not subject to the same controls as federal public lands (Section 5, Principle 2)
    - Assist Indian tribes in developing and expanding tribal programs so that healthy ecosystems are promoted and conservation restrictions are unnecessary (Section 5, Principle 3)
    - Be sensitive to Indian culture, religion, and spirituality (Section 5, Principle 4).

Additionally, the U.S. Department of Commerce has issued a Departmental Administrative Order (DAO) addressing Consultation and Coordination with Indian Tribal Governments (DAO 218-8, April 26, 2012; http://www.osec.doc.gov/opog/dmp/daos/dao218_8.html), which implements relevant Executive Orders, Presidential Memoranda, and Office of Management and Budget Guidance. The DAO describes actions to be "followed by all Department of Commerce operating units . . . and outlines the principles governing Departmental interactions with Indian tribal governments." The DAO affirms that the "Department works with Tribes on a government-to-government basis to address issues concerning . . . tribal trust resources, tribal treaty, and other rights."

1.6.10 Secretarial Order 3336

Secretarial Order 3335 (*Reaffirmation of the Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries*) issued by the Department of Interior (DOI) sets forth guiding principles that bureaus and offices will follow to ensure that the DOI fulfills its trust responsibility. The DOI secretarial order establishes guidelines pursuant to the long-standing trust relationship between the United States, Indian tribes, and individual Indian beneficiaries. In furtherance of the United States' obligation to fulfill the trust responsibility, all bureaus and offices of the Department are directed to abide by the following guiding principles consistent with all applicable laws. Bureaus and offices shall:

- Principle 1: Respect tribal sovereignty and self-determination, which includes the right of Indian tribes to make important decisions about their own best interests.
- Principle 2: Ensure to the maximum extent possible that trust and restricted fee lands, trust resources, and treaty and similarly recognized rights are protected.
- Principle 3: Be responsive and informative in all communications and interactions with Indian tribes and individual Indian beneficiaries.
- Principle 4: Work in partnership with Indian tribes on mutually beneficial projects.
- Principle 5: Work with Indian tribes and individual Indian beneficiaries to avoid or resolve conflicts to the maximum extent possible in a manner that accommodates and protects trust and restricted fee lands, trust resources, and treaty and similarly recognized rights.
- Principle 6: Work collaboratively and in a timely fashion with Indian tribes and individual Indian beneficiaries when evaluating requests to take affirmative action to protect trust and restricted fee lands, trust resources, and treaty and similarly recognized rights.
- Principle 7: When circumstances warrant, seek advice from the Office of the Solicitor to ensure that decisions impacting Indian tribes and/or individual Indian beneficiaries are consistent with the trust responsibility.

1.6.11 The Federal Trust Responsibility and Executive Order 13175

The United States government has a trust or special relationship with Indian tribes. The unique and distinctive political relationship between the United States and Indian tribes is defined by statutes, executive orders, judicial decisions, and agreements, and differentiates tribes from other entities that deal with, or are affected by the federal government. Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments,* states that the United States has recognized Indian tribes as domestic dependent nations under its protection. The federal

government has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian tribes.

1.6.12 Executive Order 12898

In 1994, the President issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-income Populations*. The objectives of the Executive Order include developing federal agency implementation strategies, identifying minority and low-income populations where proposed federal actions could have disproportionately high and adverse human health and environmental effects, and encouraging the participation of minority and low-income populations in the NEPA process. Salmon and steelhead harvest has the potential to affect the extent of harvest available for minority and low-income populations.

1.6.13 Clean Water Act

The Clean Water Act (33 USC 1251, 1977, as amended in 1987), administered by the U.S. Environmental Protection Agency (USEPA) and state water quality agencies, is the principal federal legislation directed at protecting water quality. Washington State implements and carries forth federal provisions, as well as approves and reviews National Pollutant Discharge Elimination System applications, and establishes total maximum daily loads for rivers, lakes, and streams. The states are responsible for setting the water quality standards needed to support all beneficial uses, including protection of public health, recreational activities, aquatic life, and water supplies.

The Washington State Water Pollution Control Act, codified as Revised Code of Washington Chapter 90.48, designates the Washington Department of Ecology (Ecology) as the agency responsible for carrying out the provisions of the federal Clean Water Act within Washington State. The agency is responsible for establishing water quality standards, making and enforcing water quality rules, and operating waste discharge permit programs. These regulations are described in Washington Administrative Code (WAC) 173. Salmon and steelhead harvest is required to comply with the Clean Water Act.

1.6.14 Washington State Endangered, Threatened, and Sensitive Species Act

The state of Washington has species of concern listings (WAC Chapters 232-12-014 and 232-12-011) that include all state endangered, threatened, sensitive, and candidate species. These species are managed by WDFW, as needed, to prevent them from becoming endangered, threatened, or sensitive. The state-listed species are identified on WDFW's website at (https://wdfw.wa.gov/species-habitats/at-risk/listed); the most recent update occurred in June 2019. The criteria for listing and de-listing, and the requirements for recovery and management plans for these species are provided in WAC Chapter 232-12-297. The state list is separate from the federal ESA list; the state list includes species status relative to Washington State jurisdiction only. Critical wildlife habitats associated with state or federally listed species are identified in WAC Chapter 222-16-080. Species listed under the state endangered, threatened, and sensitive species list are reviewed in this EA if actions could affect these species.

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1.6.15 Bald Eagle and Golden Eagle Protection Act

The Bald Eagle and Golden Eagle Protection Act (16 USC 668-668c), enacted in 1940, and amended several times since then, prohibits the taking of bald eagles, including their parts, nests, or eggs. The act defines “take” as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The USFWS, which is responsible for carrying out provisions of this act, defines “disturb” to include “injury to an eagle; a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.” Salmon and steelhead harvest is required to comply with the Bald Eagle and Golden Eagle Protection Act.

1.6.16 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) of 1972 (16 USC 1361) as amended, establishes a national policy designated to protect and conserve wild marine mammals and their habitats. This policy was established so as not to diminish such species or populations beyond the point at which they cease to be a significant functioning element in the ecosystem, nor to diminish such species below their optimum sustainable population. All marine mammals are protected under the MMPA.

The MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States. The term “take,” as defined by the MMPA, means to “harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.” The MMPA further defines harassment as “any act of pursuit, torment, or annoyance, which (i) has the potential to injure a marine mammal or marine mammal stock in the wild; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.” Salmon and steelhead harvest could result in the harassment of marine mammals and could impact availability of marine mammal prey.

1.6.17 Migratory Bird Treaty Act and Executive Order 13186

The Migratory Bird Treaty Act (16 USC 703-712), administered by the USFWS, protects migratory birds and forbids the taking, killing, or possessing of migratory birds. Specific provisions in the statute include a federal prohibition to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 USC 703-712). The responsibilities of federal agencies to protect migratory birds are set forth in Executive Order 13186. The birds protected under this statute are many of the most common species in Puget Sound, as well as birds listed as threatened or endangered.

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1.6.18 Marine Protected Areas

There are 127 Marine Protected Areas in Washington that are managed by 11 federal, state, and local agencies. Each protected area has specific management requirements that may restrict or prohibit harvest based on its management plan, which varies from detailed, site specific plans to general, programmatic plans intended to cover a large number of Marine Protected Areas managed by a single agency. Marine protected areas are reviewed in this EA if actions could affect these areas.

1.7 Organization of this Final EA

This EA has been prepared in accordance with NEPA (40 CFR 1500 to 1508) and with NEPA implementing regulations adopted by BIA (2012). The EA should be reviewed in conjunction with the co-managers' List of Agreed Fisheries (**Error! Reference source not found.** and **Error! Reference source not found.**). Links to online sources of information used in the EA are active at the time of publication; however, BIA cannot guarantee that they will remain active over time. The contents of this Final EA are described briefly below:

- **Introductory Materials**. Prior to Chapter 1 are a cover sheet, list of acronyms, and table of contents.
- **Chapter 1**. **Purpose and Need for the Proposed Action**. This chapter provides the background and context leading to the development of the Proposed Action. It describes the purpose and need for the action; background and decisions to be made; and the relationship of this action to other plans, regulations, and laws.
- **Chapter 2**. **Alternatives**. This chapter describes the No Action and the Proposed Action alternatives, along with alternatives considered but not analyzed in detail.
- **Chapter 3**. **Affected Environment**. This chapter describes the existing environmental setting (i.e., existing conditions) that would be affected by the alternatives, and includes subsections on topography, water quality, air, living resources, cultural resources, socioeconomics, resource use patterns, and other values.
- **Chapter 4**. **Environmental Consequences**. This chapter contains a description and analyses of the potential direct and indirect effects of each alternative on the resources identified in Chapter 3.
- **Chapter 5**. **Cumulative Effects**. This chapter addresses cumulative impacts, which are the incremental effects of an action when added to other past, present, and reasonably foreseeable actions, regardless of what agency or person undertakes such actions. Climate change is addressed in this chapter.

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- **Chapter 6. List of Contributors.** This chapter identifies contributors to this EA.
- **Chapter 7. Literature Cited.** References cited in the EA are provided in this chapter.
- **Appendices.** This material includes background information as referenced in the EA.

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2.0 Alternatives

2.1 Introduction

This chapter describes the three alternatives evaluated in this EA. The alternatives are fully described in this chapter, and their environmental effects are presented in Chapter 4, Environmental Consequences. Specifically, this chapter describes the following:

- Alternatives that were analyzed in detail
- Alternatives that were considered but eliminated from detailed analysis.

2.2 Background

Puget Sound commercial, recreational, and tribal salmon harvest seasons for each year are based on expected salmon and steelhead returns and state/tribal objectives. Once agreed between WDFW and treaty tribes, each respective entity works within their own governance structure and processes to develop their specific fishery regulations and proposals. WDFW publishes proposed commercial and recreational season regulations, allows for public comment, and then publishes final regulations. Prior to publication of the draft rule proposal, WDFW and tribal co-managers have technical and policy level discussions to develop agreement on conservation objectives, runsize forecasts, and estimates of allowable tribal and non-tribal catch share for various salmon runs considered in defining fishing levels. WDFW and tribes also meet for agreement on coordinating fishing schedules. As a result, the salmon fishing seasons are products of government-to-government consultations, inter- and intra-tribal discussions, tribal-state negotiations, and open public processes, which are all components of the North of Falcon process as described in WDFW (2015). Finally, the agreement must meet applicable regulations, standards, and guidelines.

WDFW objectives for establishing the annual fishing seasons include the following (WDFW 2015):

- Conserve the wildlife and food fish, game fish, and shellfish resources in such a manner that does not impair the resource by achieving conservation objectives for all species and stocks.
    - Ensure primary stocks meet escapement goals and/or management objectives.
    - Manage fisheries to minimize mortalities on non-target species and stocks (including salmonids, non-salmonids, birds, and marine mammals) consistent with Fish and Wildlife Commission Policy POL-C3608. This includes management strategies to limit seabird mortalities consistent with the federal Migratory Bird Treaty Act.
    - Monitor fisheries.
    - Harvest the non-tribal share of salmon.
    - Maintain the economic well-being and stability of the fishing industry (Revised Code of Washington [RCW] 77.04.012); allow a sustainable level of harvest sufficient to provide opportunity for each gear type (RCW 77.50.120).

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WDFW's action in developing alternatives developed for each upcoming fishing season are thus based on these rules.

Initially, previous year's species specific spawning estimates and catch, along with biologically relevant stock information (age, mark status, and stock origin etc.) from State and tribal biologists are used to develop forecasts of the number of salmon returning each year to assess allowable harvest impacts and ensure sustainable escapment (WDFW 2016). WDFW and treaty tribes also work to avoid impacts to listed salmon and other fish and wildlife species, including impacts from bycatch (accidental loss of non-target fish, bird, and marine mammals), and the potential impact from lost and derelict fishing gear. Monitoring is used to verify catch and bycatch for target and non-target fish and wildlife species.

The alternatives described below (No Action [2.3.1], Proposed Action [2.3.2], and No Fishing [2.3.3]) were developed based on the process described above.

2.3 Alternatives Analyzed in Detail

2.3.1 No Action

No Action assumes that the co-managers would continue with the previous year's harvest management regime to achieve the co-managers' conservation objectives for Puget Sound Chinook salmon and coho salmon management units presented at the 2021 March meeting of the PFMC (see Section 3.5.1 - Listed Salmon and Steelhead), as well as NOAA's guidance for consultation standards and identified conservation needs for ESA-listed species (NOAA 2021). The co-managers would independently manage their 2021-2022 fisheries by continuing with the same fishery harvest structure that was in place from the previous season (e.g. 2020-2021 LOAF fisheries).

The pre-season planning meetings are intended to ensure that WDFW and tribal co-managers coordinate both on the technical and policy level on a variety of issues, such as species forecasts, management objectives, and model inputs for the Coho salmon and Chinook salmon Fishery Regulation Assessment Model (FRAM), which is a model used by the PFMC annually to estimate impacts of proposed ocean and terminal fisheries on Chinook salmon and Coho salmon stocks in Puget Sound and other areas (PFMC 2008). The co-managers attend the pre-season meetings during the North of Falcon and PFMC salmon planning process to collectively develop the suite of salmon and steelhead fisheries that constitute the annual List of Agreed Fisheries for Puget Sound. It is this fishing plan that is annually negotiated each year to achieve the specified management objectives for each salmon and steelhead management unit within Puget Sound.

Under this alternative, coordination and pre-season planning meetings would not occur, fisheries harvest for salmon and steelhead would be the same as the fisheries plan approved and implemented during the 2020-2021 fishing season for a total of 1,117,640 fish to be harvested (Table 2-1) with focused conservation concerns for natural-origin Coho salmon, Chum salmon, and ESA-listed Puget Sound Chinook salmon. This alternative represents no change from the most recent (2020-2021) management practice for fisheries harvest by WDFW and treaty tribes. A detailed description of this Puget Sound season structure is provided in Appendix A**Error!**

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Table 2-1. Total salmon and steelhead target fisheries harvest.

Species	No Action	Proposed Action	No Fishing Action
Chinook salmon			
Hatchery-origin	197,529	141,806	0
Natural-origin	27,568	21,820	0
Summer-run chum salmon	93	88	0
Steelhead	5,540	3,305	0
Coho salmon			
Hatchery-origin	201,619	200,263	0
Natural-origin	69,364	76,344	0
Chum salmon	613,326	333,670	0
Pink salmon	0	1,879,222	0
Sockeye salmon	2,601	2,253	0
Total	**1,117,640**	**2,658,711**	**0**

The 2020-2021 LOAF was developed using the co-managers' conservation objectives for Puget Sound Chinook salmon and coho salmon management units presented in the 2020 March meeting of the PFMC (NOAA 2020). In addition to maximum harvest allocated among species, the fisheries plan includes restrictions for timing of harvest, harvest location and type, fish size and origin (natural-origin or hatchery-origin), fish gear used for harvesting fish, daily limits, and whether fish retention is allowed or if it must be released. Some fisheries would be closed for specific species and locations, and in some areas, regulations prohibiting retention of species of concern are in effect (Table 2-4).

2.3.1.1 Harvest by Species

Harvest by salmon species as shown in Table 2-1, with assessment of the total fishery impacts associated with these harvest levels for natural-origin Puget Sound Chinook salmon in Table 2-2 and natural-origin coho salmon in Table 2-3. Results are summarized below by species.

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Table 2-2. Natural-origin Chinook salmon harvest by management unit and estimated escapements for No Action based on FRAM results.

Stock	Total Exploitation Rate (%)	Southern United States Exploitation Rate (%)	Southern United States Pre-terminal Exploitation Rate (%)	Natural Escapement (number of fish)
Spring/Early:				
Nooksack (n) - Total	33.9	**9.2**	4.1	450
North Fork				149
South Fork				301
Skagit (n) - Total	23.5	**10.2**	4.1	1,434
Upper Sauk				872
Upper Cascade				130
Suiattle				431
White	22.9	**15.8**	4.0	2,250
Dungeness	16.2	**3.7**	3.3	695
Summer/Fall:				
Skagit - Total	53.5	**28.6**	4.2	6,773
Upper Skagit				4,993
Sauk				328
Lower Skagit				1,126
Stillaguamish (n) - Total				997 (Terminal Forecast)
Unmarked	**20.5**	**8.3**	4.3	316
Marked	25.7	**11.9**	8.2	565
Snohomish (n) - Total	18.0	**6.3**	5.0	2,878
Skykomish				1,839
Snoqualmie				1,039
Lake Washington (Cedar River)	36.1	24.3	**11.5**	750
Green	54.8	42.9	**11.5**	3,689
Puyallup	47.2	35.4	**11.5**	2,576
Nisqually FW Selective Gear Evaluation	**48.8** **2.3**	40.8	15.6	7,540 [1]
Western Strait Juan de Fuca - Hoko	20.6	**2.0**	2.0	1,065
Elwha	15.6	**3.5**	3.5	4,062
Mid-Hood Canal tributaries (n)	23.3	12.8	**12.6**	17
Skokomish	**48.7**	38.2	12.9	3,863

Notes:

[1] Nisqually escapement is comprised of all adults escaping fisheries and returning to either of the hatchery facilities and to spawning grounds, regardless of mark status.

Total Exploitation Rate: Total mortality in a fishery or aggregate of fisheries divided by the sum of total fishing and natural mortality plus escapement.

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Southern United States Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in the waters of the states of Washington and Oregon, this includes adjacent federal waters.

Southern United States Pre-Terminal Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in pre-terminal management areas/waters of the states of Washington and Oregon, this includes adjacent federal waters. These fisheries occur inside marine entry areas for major river basins, and typically target fish that are maturing on return migrations to their rivers of origin but can include some mixture of immature fish not destined to spawn that year.

Bolded Exploitation Rates: Represent the annual harvest control in effect for the year based on projected escapement and/or total exploitation.

Blue highlighted cells: Represent the projected exploitation rate that exceeds the annual harvest control in effect for the management unit. Table 3-2 contains management unit objectives.

Red highlighted cells: Represent projected escapement levels that are below the identified Low Abundance Threshold for the management unit. This threshold is a spawning escapement level, set above the point of biological instability, which triggers extraordinary fisheries management measures to minimize fishery related impacts and increase spawning escapement. For these stocks, the annual harvest control limit is referred to as the Critical Exploitation Rate ceiling that further constrains fishery impacts to increase escapement.

Table 2-3. Natural-origin coho salmon harvest by management unit for the No Action Alternative based on FRAM results.

Stock	Total Exploitation Rate (%)	Southern United States Exploitation Rate (%)	2021 Ceiling Exploitation Rate (%)	Predicted Escapement (number of fish)
Skagit	**28.5**	25.0	35 Total	41,954
Stillaguamish	**24.8**	22.0	50 Total	20,226
Snohomish	**19.6**	17.1	40 Total	48,331
Hood Canal	**40.0**	36.0	45 Total	17,346
Juan de Fuca	7.5	**4.4**	10 SUS ER	6,193

Note:

Total Exploitation Rate: Total mortality in a fishery or aggregate of fisheries divided by the sum of total fishing and natural mortality plus escapement.

Southern United States Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in the waters of the states of Washington and Oregon, this includes adjacent federal waters.

Ceiling Exploitation Rate: This is the pre-set annual harvest control limit as determined by the projected abundance status for the management unit. Table 3-37 contains management unit objectives.

Bolded Exploitation Rates: Represent the annual harvest control in effect for the year based on projected escapement.

Blue highlighted cells: Represent projected exploitation rate that exceeds the annual harvest control in effect for the management unit.

Red highlighted cells: Represent projected escapement levels that are below the identified Low Abundance Threshold for the management unit. This threshold is a spawning escapement level, set above the point of biological instability, which triggers extraordinary fisheries management measures to minimize fishery related impacts and increase spawning escapement.

Negative Escapement values: The FRAM is a deterministic model that calculates impacts based on fishery structure that can led to projected fishery impacts on management units that exceed its annual projected abundance (e.g., Stillaguamish natural coho).

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Table 2-4. Salmon area openings, closures, and restrictions by area.

Restrictions	No Action	Proposed Action	No Fishing Action
Area closures	Yes, and with additional restrictions	Yes, and with additional restrictions	N/A
Impact limits or harvest quotas	Yes, and with additional restrictions	Yes, and with additional restrictions	N/A
Mark-selective restrictions	Yes, and with additional restrictions	Yes, and with additional restrictions	N/A
Seasonal and timing restrictions	Yes, and with additional restrictions	Yes, and with additional restrictions	N/A
Restrictions by fishing gear	Yes, and with additional restrictions	Yes, and with additional restrictions	N/A
Restrictions by fishery type	Yes, and with additional restrictions	Yes, and with additional restrictions	N/A

2.3.1.1.1 Chinook Salmon

Under No Action, Puget Sound fisheries would be expected to take 197,529 hatchery-origin Chinook salmon and 27,568 natural-origin Chinook salmon (Table 2-1). Six management units, or component populations, would not meet their Low Abundance Thresholds (Table 2-2) and would be managed to their Critical Exploitation Rate Ceiling (Table 3-2). Based on estimated exploitation rates, four natural-origin management units (Skagit River summer/fall-run Chinook, Stillaguamish summer/fall-run, Nisqually fall-run, and Mid-Hood Canal fall-run Chinook salmon) would exceed their designated exploitation rate management objectives (Table 2-2). By management plan requirements (i.e., Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component), the exploitation rates for these four management units must be lowered to achieve their designated exploitation rate management objectives for the year (Table 3-2). Attainment of these designated management objectives is also required for compliance with NOAA's 2021-22 guidance for consultation standards for Puget Sound Chinook.

2.3.1.1.2 Summer-run Chum Salmon

Harvest impacts on listed Puget Sound summer-run chum salmon are constrained by the established Base Conservation Regime. Recent harvest has been consistently around 1 percent exploitation rate in United States fisheries on Hood Canal summer-run chum salmon and 0.2 percent exploitation rate on Strait of Juan de Fuca stocks in United States fisheries. As a result, a harvest of 93 listed Puget Sound summer-run chum salmon is expected (Table 2-1).

The Base Conservation Regime is an annual fishing regime designed to minimize incidental impacts to summer-run chum salmon. The intent is to initiate rebuilding of the summer chum runs, from the critical or near critical levels of the late 1990s, by establishing ceiling exploitation rate, to provide incremental increases in escapement over time while allowing a limited opportunity to harvest other species.

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2.3.1.1.3 Steelhead

Under No Action, a total of 5,504 steelhead including ESA-listed natural origin and non-listed natural and hatchery-origin returns would be expected to be harvested under the 2021-2022 season structure (Table 2-1), with approximately 70 percent as recreational harvest of summer and winter-run hatchery origin fish in the Snohomish River.

2.3.1.1.4 Coho Salmon

Under No Action, total Puget Sound harvest would be expected to be 201,619 hatchery-origin and 69,365 natural-origin coho salmon (Table 2-1). Total exploitation rates for Puget Sound coho salmon primary natural-origin management units would range from 7.5 percent for the Strait of Juan de Fuca stock to 40 percent for the Hood Canal stock (Table 2-3) with escapements ranging from 6,193 for the Strait of Juan de Fuca stock to 20,226 for the Stillaguamish stock (Table 2-3). All natural-origin management units are estimated to meet their designated annual Ceiling Exploitation Rate (Table 2-3). Further, escapement for the Snohomish stock would be below the co-managers agreed to escapement of 55,000 for initial rebuilding.

2.3.1.1.5 Fall-run and Winter-run Chum Salmon

Under No Action, a total of 613,326 fall and winter-run chum salmon would be harvested under the 2020 season structure (Table 2-1). Four fall-run stock's (Skagit River, Stillaguamish River, Snohomish River, and the Strait of Juan de Fuca) as well as the Puyallup Diru Hatchery late-run broodstocks forecasted escapement would be below the level needed to provide harvest opportunity (Table 3-41 provides management objectives for chum salmon). As a result, Chum salmon fisheries would need to be restricted to meet expectations for Chum management.

2.3.1.1.6 Pink Salmon

Although pink salmon are expected to return in 2021/2022 as Puget Sound pink salmon exhibit an odd-year return life-history, no pink salmon fisheries were promulgated in 2020/2021. As a result, for the No Action alternative no pink salmon would be harvested as fisheries were not developed to target pink Salmon in 2020/2021(Table 2-1).

2.3.1.1.7 Sockeye Salmon

With no harvestable abundance forecast for Lake Washington sockeye salmon or Fraser River sockeye salmon, harvest is expected to occur exclusively in southern United States fisheries targeting Baker River sockeye salmon in terminal area fisheries of the Skagit River. Under No Action, 2,601 sockeye salmon would be expected to be harvested under the 2020 season structure (Table 2-1). Terminal harvest of 2,601 Baker River sockeye salmon under the No Action alternative, would result in an escapement of 9,652 natural spawners and hatchery broodstock needs; below the co-managers target of 10,000 (P. Kairis, pers comm). As a result, Sockeye fisheries would need to be restructured to ensure compliance with the co-manager objectives for the Baker River sockeye salmon stock.

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2.3.2 Proposed Action

Under the Proposed Action alternative, the co-managers would negotiate and implement the LOAF for 2021-2022 (Appendix B) with support from the BIA, to achieve the co-managers' conservation objectives for Puget Sound Chinook salmon and coho salmon management units presented at the 2021 March meeting of the PFMC, as well as NOAA's guidance for consultation standards and identified conservation needs for ESA-listed species (NOAA 2021). Primary reductions in fisheries in the 2021-2022 LOAF include (but are not limited to) the following:

- Closure of fishing areas altogether (i.e., tribal commercial Chinook salmon fisheries in Dungeness River, Snohomish River, Stillaguamish River, and Lake Washington, and winter, non-tribal sport fisheries in 6, 7, 8-1, 8-2 and 9, etc.)
- Restrictions by total fish harvested (harvest controls on encounters and landed catch in mark-selective fisheries and harvest quota for Puget Sound winter Troll)
- Restrictions for visual mark – mark-selective fisheries targeting hatchery-origin fish
- Seasonal and timing restrictions for fisheries (fishing dates and trip limits) (i.e., treaty and non-treaty commercial Marine Area 7/7A chum fishery)
- Restrictions by fishing gear (i.e., tribal subsistence spring Chinook salmon fishery in Nooksack River tangle net)
- Restrictions by fishery type (treaty, non-treaty, recreational, commercial, tribal ceremonial and subsistence) (i.e., tribal commercial, subsistence and ceremonial coho salmon fisheries on the Skagit River) (Table 2-3).
- Consideration for harvest impacts from non-tribal fisheries to SRKWs (i.e., seasonal closures of marine catch areas, voluntary 'No Go'zones for non-tribal fishing fleets, increased enforcement visibility)

The total increase in salmon and steelhead harvested under the Proposed Action compared to the No Action is 1,541,071 fish, including 1,879,222 pink salmon. Excluding pink salmon harvest, there is a 30 percent decrease in harvest of other salmon and steelhead relative to the No Action alternative with a slight decrease in sockeye salmon (-348) harvest and substantial decreases in Chum salmon (-279,656) harvest (Table 2-1). Associated FRAM model impacts for natural-origin Chinook salmon management units for the 2021-2022 harvest season are provided in Table 2-5 and FRAM model impacts for natural-origin coho salmon management units for the 2021-2022 harvest season are provided in Table 2-6.

2.3.2.1 Harvest by Species

2.3.2.1.1 Chinook

Under the Proposed Action, fisheries would be expected to harvest 141,806 hatchery-origin Chinook salmon and 21,820 natural-origin Chinook salmon (Table 2-1). Six management units or populations within a management unit would remain below their Low Asbundance Threshold under the Proposed Action and would be managed at their Critical Exploitation Rate Ceiling levels. However, no management units would exceed their designated exploitation rate objective under the Proposed Action (Table 2-5). The suite of fisheries that constitute the Proposed Action

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would meet or exceed the co-managers harvest objectives for 2021-2022 as well as NOAA's 2021-2022 consultation standards for Puget Sound Chinook.

2.3.2.1.2 Summer-run Chum Salmon

Under the Proposed Action, the expected incidental harvest of listed Puget Sound summer-run chum salmon would be 88 fish (Table 2-1) and an estimated escapement of 10,092 fish.

2.3.2.1.3 Steelhead

Under the Proposed Action, a total of 3,305 steelhead (Table 2-1), including ESA-listed and non-listed natural-origin fish and hatchery-origin, 58 percent of which are hatchery-origin fish harvested in the Snohomish River, would be expected to be harvested by the Proposed Action.

2.3.2.1.4 Coho Salmon

Under the Proposed Action, total exploitation rates for natural-origin coho salmon primary management units would range from 9.2 percent for the Strait of Juan de Fuca stock to 43.1 percent for the Hood Canal stock (Table 2-6). Natural-origin escapements for these management units would range from 6,089 coho salmon for the Strait of Juan de Fuca stock to 43,076 coho salmon for the Snohomish River stock (Table 2-6). The Strait of Juan de Fuca stock and the Snohmish River stock would remain below their Low Abundance Breakpoints (Table 2-6). However, all five natural-origin management units would achieve their designated exploitation rate objectives under the Proposed Action (Table 2-6).

2.3.2.1.5 Fall-run and Winter-run Chum Salmon

Under the Proposed Action, a total of 333,670 fall-run chum salmon (Table 2-1) are expected to be harvested with four fall-run stocks below their even-year escapement objectives (Skagit River, Snohomish River, Stillaguamish River, and the Strait of Juan de Fuca stocks) . Additionally, tribal concerns for conservation of South Sound fall-run chum salmon and Nisqually late-run chum salmon, catch sharing equity and the burden of conservation are addressed through an agreed management approach.

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Table 2-5. Natural-origin Chinook salmon harvest by management unit and estimated escapements for the Proposed Action based on FRAM results.

Stock	Total Exploitation Rate (%)	Southern United States Exploitation Rate (%)	Southern United States Pre-terminal Exploitation Rate (%)	Natural Escapement (number of fish)
Spring/Early:				
Nooksack (n) - Total	32.5	**10.5**	4.4	464
North Fork				154
South Fork				310
Skagit (n) - Total	22.5	**10.3**	4.1	1,442
Upper Sauk				871
Upper Cascade				141
Suiattle				431
White	21.3	**16.6**	4.5	2,281
Dungeness	14.4	**3.6**	3.6	699
Summer/Fall:				
Skagit - Total	**38.9**	17.0	4.0	8,837
Upper Skagit				6,587
Sauk				400
Lower Skagit				1,420
Stillaguamish (n) - Total				990 (Terminal Forecast)
Unmarked	**18.1**	**7.4**	4.3	323
Marked	23.1	**11.0**	8.0	583
Snohomish (n) - Total	16.7	**6.3**	4.9	2,936
Skykomish				1,876
Snoqualmie				1,060
Lake Washington. (Cedar River)	34.1	23.6	**11.5**	778
Green	54.7	44.4	**11.5**	3,741
Puyallup	47.3	36.8	**11.5**	2,536
Nisqually [1] FW Selective Gear Evaluation	**46.9** **0.8**	36.8	11.5	8,047
Western Strait of Juan de Fuca - Hoko	21.6	**2.0**	2.0	1,054
Elwha	14.3	**2.8**	2.8	4,089
Mid-Hood Canal tributaries (n)	22.6	14.4	**12.1**	18
Skokomish	**49.2**	41.0	12.7	3,787

Note:

[1] Nisqually escapement is comprised of all adults escaping fisheries and returning to either of the hatchery facilities and to spawning grounds, regardless of mark status.

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Total Exploitation Rate: Total mortality in a fishery or aggregate of fisheries divided by the sum of total fishing and natural mortality plus escapement.

Southern United States Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in the waters of the states of Washington and Oregon, this includes adjacent federal waters.

Southern United States Pre-Terminal Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in pre-terminal management areas/waters of the states of Washington and Oregon, this includes adjacent federal waters. These fisheries occur inside marine entry areas for major river basins, and typically target fish that are maturing on return migrations to their rivers of origin but can include some mixture of immature fish not destined to spawn that year.

Bolded Exploitation Rates: Represent the annual harvest control in effect for the year based on projected escapement and/or total exploitation. Table 3-2 contains management unit objectives.

Red highlighted cells: Represent projected escapement levels that fall below the identified Low Abundance Threshold for the management unit. This threshold is a spawning escapement level, set above the point of biological instability, which triggers extraordinary fisheries management measures to minimize fishery related impacts and increase spawning escapement. For these stocks, the annual harvest control limit is referred to as the Critical Exploitation Rate ceiling that further constrains fishery impacts to increase escapement.

Table 2-6. Natural-origin coho salmon harvest by management unit for the Proposed Action based on FRAM results.

Stock	Total Exploitation Rate (%)	Southern United States Exploitation Rate (%)	2021 Ceiling Exploitation Rate (%)	Predicted Escapement (number of fish)
Skagit	**34.9**	30.0	35 Total	38,271
Stillaguamish	**28.6**	25.0	50 Total	19,242
Snohomish	**28.5**	25.1	40 Total	43,076
Hood Canal	**43.1**	38.0	45 Total	16,461
Juan de Fuca	9.2	**5.7**	10 SUS	6,089

Note:

Total Exploitation Rate: Total mortality in a fishery or aggregate of fisheries divided by the sum of total fishing and natural mortality plus escapement.

Southern United States Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in the waters of the states of Washington and Oregon, this includes adjacent federal waters.

Ceiling Exploitation Rate: This is the pre-set annual harvest control limit as determined by the projected abundance status for the management unit. Table 3-37 contains management unit objectives.

Bolded Exploitation Rates: Represent the annual harvest control in effect for the year based on projected escapement. Attachment

Red highlighted cells: Represent projected escapement levels that fall below the identified Low Abundance Threshold for the management unit. This threshold is a spawning escapement level, set above the point of biological instability, which triggers extraordinary fisheries management measures to minimize fishery related impacts and increase spawning escapement.

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2.3.2.1.6 Pink Salmon

Under the Proposed Action, approximately 1,879,222 pink salmon are anticipated to be harvested throughout Puget Sound marine and freshwater fisheries during 2021-2022 (Table 2-1).

2.3.2.1.7 Sockeye Salmon

With no harvestable abundance forecast for Lake Washington sockeye salmon or in southern U.S. fisheries targeting Fraser River sockeye salmon in marine waters, Baker River sockeye salmon in terminal area fisheries of the Skagit River are the only sockeye fisheries proposed in 2021-2022. Under the Proposed Action, 2,253 sockeye salmon (Table 2-1), all of which would be Baker River sockeye salmon, would be expected to be harvested, with an escapement estimate of 10,000 fish meeting the co-managers goal.

2.3.3 No Salmon or Steelhead Harvest (No Fishing Action)

The No Salmon and Steelhead Harvest alternative assumes that non-tribal and tribal fisheries would not occur within the Puget Sound action area for salmon or steelhead during the 2021-2022 fishing season due to lack of ESA authorization. All market and non-market economic benefits associated with steelhead and salmon harvest within Puget Sound would be forgone. While this alternative would result in no salmon or steelhead harvest occurring within Puget Sound, the alternative would not preclude these same stocks from being harvested by fisheries outside of Puget Sound. Interceptions by Canadian fisheries of Puget Sound origin stocks would continue as would interceptions by U.S. ocean fisheries in Alaska, Washington, and Oregon, which are covered under separate ESA authorizations.

Under this alternative, the percentage of the total runsize of Puget Sound salmon and steelhead taken by U.S. and Canadian fisheries outside of Puget Sound could, and mostly likely would, increase. These prior intercepting Canadian and U.S. fisheries would have additional allowable harvest available to them in terms of Puget Sound stock abundance given the absence of planned Puget Sound fisheries. This is especially true for U.S. ocean fisheries in Alaska, Oregon, and Washington as the constraints presented by impacts upon ESA-listed Puget Sound Chinook salmon would be considerably lessened with the absence of salmon and steelhead fishing occurring within Puget Sound. The entire amount of the allowable impacts identified by NMFS regarding ESA-listed Puget Sound salmon and steelhead would be available for harvest by these U.S. ocean fisheries, although other constraining salmon stocks along the west coast would likely limit overall harvest opportunity.

Although this alternative would provide some degree of additional protection for ESA-listed fish species within Puget Sound, it does not meet the project purpose and need, which is to provide for the meaningful exercise of federally protected tribal treaty fishing rights on harvestable hatchery-origin and natural-origin salmon and steelhead management units among other objectives. These treaties secured the rights of tribes for taking fish at usual and accustomed grounds and stations in common with all citizens of the United States. Marine and freshwater areas of Puget Sound were affirmed as the usual and accustomed fishing areas for treaty tribes under *United States v. Washington* (1974). This alternative would virtually close all marine and

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freshwater areas of Puget Sound because of potential salmon and/or steelhead fishery related mortality and represents a defacto re-allocation of all the production from this treaty resource and its associated benefits to fisheries and fishing communities outside of Puget Sound. This action would render the federally secured treaty fishing rights meaningless for treaty Tribes whose fishing occurs exclusively in the action area.

Under this alternative, fisheries harvest for salmon and steelhead would be foregone within Puget Sound because of the lack of ESA authorization. Associated FRAM model impacts for natural-origin Chinook salmon and coho salmon management units for the 2021-2022 harvest season are summarized in Table 2-7 and Table 2-8.

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Table 2-7. Natural-origin Chinook salmon harvest by management unit and estimated escapements for the No Fishing Action based on FRAM results.

Stock	Total Exploitation Rate (%)	Southern United States Exploitation Rate (%)	Southern United States Pre-terminal Exploitation Rate (%)	Natural Escapement (number of fish)
Spring/Early:				
Nooksack (n) - Total	25.5	**3.2**	3.2	506
North Fork				169
South Fork				337
Skagit (n) - Total	13.7	**1.2**	1.2	1,572
Upper Sauk				941
Upper Cascade				166
Suiattle				465
White	6.6	**1.8**	1.8	2,646
Dungeness	12.2	**1.2**	1.2	702
Summer/Fall:				
Skagit - Total	**23.5**	1.3	1.3	10,930
Upper Skagit				8,168
Sauk				498
Lower Skagit				1,711
Stillaguamish (n) - Total				990 (Forecast runsize)
Unmarked	**12.0**	**1.1**	1.1	336
Marked	14.1	**1.2**	1.2	613
Snohomish (n) - Total	**12.5**	**1.9**	1.9	3,009
Skykomish				1,923
Snoqualmie				1,086
Lake Washington. (Cedar River)	16.7	5.7	**5.7**	967
Green	16.7	5.7	**5.7**	6,816
Puyallup	16.7	5.7	**5.7**	4,480
Nisqually	**14.1**	7.3	7.3	16,894 [1]
Western Strait of Juan de Fuca - Hoko	21.1	**1.6**	1.6	1,057
Elwha	11.8	**1.1**	1.1	4,106
Mid-Hood Canal tributaries (n)	15.7	7.2	**7.2**	19
Skokomish	**16.2**	7.8	7.8	6,462

Note:

[1] Nisqually escapement is comprised of all adults escaping fisheries and returning to either of the hatchery facilities and to spawning grounds, regardless of mark status.

Total Exploitation Rate: Total mortality in a fishery or aggregate of fisheries divided by the sum of total fishing and natural mortality plus escapement.

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Southern United States Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in the waters of the states of Washington and Oregon, this includes adjacent federal waters.

Southern United States Pre-Terminal Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in pre-terminal management areas/waters of the states of Washington and Oregon, this includes adjacent federal waters. These fisheries occur inside marine entry areas for major river basins, and typically target fish that are maturing on return migrations to their rivers of origin but can include some mixture of immature fish not destined to spawn that year.

Bolded Exploitation Rates: Represent the annual harvest control in effect for the year based on projected escapement and/or total exploitation. Table 3-2 contains management unit objectives.

Red highlighted cells: Represent projected escapement levels that fall below the identified Low Abundance Threshold for the management unit. This threshold is a spawning escapement level, set above the point of biological instability, which triggers extraordinary fisheries management measures to minimize fishery related impacts and increase spawning escapement. For these stocks, the annual harvest control limit is referred to as the Critical Exploitation Rate ceiling that further constrains fishery impacts to increase escapement.

Table 2-8. Natural-origin coho salmon harvest by management unit for the No Fishing Action based on FRAM results.

Stock	Total Exploitation Rate (%)	Southern United States Exploitation Rate (%)	2021 Ceiling Exploitation Rate (%)	Predicted Escapement (number of fish)
Skagit	**7.5**	2.0	35 Total	54,250
Stillaguamish	**4.8**	1.0	50 Total	25,587
Snohomish	**4.8**	1.4	40 Total	57,227
Hood Canal	**7.9**	2.0	45 Total	26,661
Juan de Fuca	5.5	**2.0**	10 SUS	6,335

Note:

Total Exploitation Rate: Total mortality in a fishery or aggregate of fisheries divided by the sum of total fishing and natural mortality plus escapement.

Southern United States Exploitation Rate: Total exploitation rate exerted by the aggregate of fisheries located in the waters of the states of Washington and Oregon, this includes adjacent federal waters.

Ceiling Exploitation Rate: This is the pre-set annual harvest control limit as determined by the projected abundance status for the management unit. Table 3-37 contains management unit objectives.

Bolded Exploitation Rates: Represent the annual harvest control in effect for the year based on projected escapement. Attachment

Red highlighted cells: Represent projected escapement levels that fall below the identified Low Abundance Threshold for the management unit. This threshold is a spawning escapement level, set above the point of biological instability, which triggers extraordinary fisheries management measures to minimize fishery related impacts and increase spawning escapement.

2.3.3.1 Harvest by Species

Under this alternative, fisheries harvest for salmon and steelhead would be foregone within Puget Sound because of the lack of ESA authorization (Table 2-1). However, as previously noted, 2.3.3 No Salmon or Steelhead Harvest (No Fishing Action), Puget Sound salmon would still be harvested in ocean fisheries under PFMC management as well as in northern fisheries in Canada and Alaska. Associated No Fishing FRAM model impacts for natural-origin Chinook salmon and coho salmon management units for the 2021-2022 harvest season are summarized in Table 2-7 and Table 2-8, respecitively. These FRAM model runs incorporated final ocean fishing quotas presented at PFMC April meeting for tribal and non-tribal coho salmon ocean fisheries

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and for tribal and non-tribal Chinook salmon ocean fisheries (PFMC 2020). At the conclusion of PFMC March meeting, there were six unique options for both Chinook and Coho and were too broad to select one for the Zero Puget Sound Alternative. As a result, the Zero Option alternatives were selected based on considerations of the Final Action at PFMC April. For Chinook salmon, the final action was a total allowable catch of 58,000 Non-tribal and 40,000 Tribal. This final Chinook option from PFMC was the highest option and still met harvest consideration for stocks outside of Puget Sound (i.e. Columbia River Chinook salmon) and was selected for the Chinook salmon component for the Zero PS alternative. For Coho salmon, final Council action at PFMC April was a total allowable catch of 75,000 for non-tribal fisheries and 26,500 for tribal fisheries. The final Zero PS alternative for Coho salmon total allowable catch was selected using catch final option quotas adopted by the PFMC council. For tribal ocean fisheries, the total allowable catch considered in the Zero PS fishing models were 40,000 Chinook salmon and 26,500 coho salmon. For non-tribal ocean fisheries, the total allowable catch considered in the Zero PS fishing models were 58,000 Chinook salmon and 75,000 coho.

2.3.3.1.1 Chinook

While no Puget Sound Chinook salmon would be harvested in the Action Area under the No Fishing Alternative within the action area (Table 2-1), five management units would still be below their Low Abundance Thresholds (Table 2-7). However, all Puget Sound Chinook salmon management units would meet their targeted exploitation rate management objectives.

2.3.3.1.2 Summer-run Chum Salmon

No summer-run Chum salmon would be harvested in the Action Area under No Fishing (Table 2-1).

2.3.3.1.3 Steelhead

No Puget Sound steelhead would be harvested in the Action Area under the No Fishing Alternative (Table 2-1).

2.3.3.1.4 Coho Salmon

While no Puget Sound coho salmon would be harvested in the Action Area under No Fishing (Table 2-1), the Strait of Juan de Fuca natural-origin primary management unit would still be below its critical abundance thresholds (Table 2-8). Primary natural-origin coho salmon management units would all meet their required exploitation rate management objectives, while the Snohomish River primary management unit would meet its targeted escapement for rebuilding (Table 2-8).

2.3.3.1.5 Fall-run and Winter-run Chum Salmon

No fall-run or winter-run chum salmon would be harvested in the action area under the No Fishing Alternative (Table 2-1).

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2.3.3.1.6 Pink Salmon

No pink salmon would be harvested in the Action Area under the No Fishing Alternative (Table 2-1).

2.3.3.1.7 Sockeye Salmon

No sockeye salmon would be harvested in the Action Area under the No Fishing Alternative (Table 2-1). The entirety of the sockeye salmon harvest targeted under the Proposed Action would be expected to return as escapement in the Baker River system.

2.4 Alternatives Considered but not Analyzed in Detail

Several alternatives were considered for analysis, but dropped because the alternatives did not meet the project purpose and need (Section 1.3, *Purpose and Need*) as described below.

2.4.1 Variations on the Proposed Action

During 2021 co-manager negotiations for the 2021-2022 Fisheries Plan, there were numerous variations for salmon and steelhead harvest discussed specific to fish species for harvest, number of fish allocated for harvest as either hatchery-origin or natural-origin, timing and location of harvest, trip limits, fishing gear restrictions, and fishery type (treaty, non-treaty, recreational, commercial, tribal ceremonial and subsistence). These negotiations represented a number of variations among the harvest areas. Generally, the primary intent was to conserve declining stocks of Chinook salmon and coho salmon and ensure an equitable sharing of the fisheries resource between tribal and non-tribal fishers. The variations discussed during negotiations were dismissed by either one and/or the other co-manager (treaty tribes or WDFW) as not meeting one or both of the co-managers' objectives. As a result, the final negotiated and agreed upon 2021-2022 fisheries is that shown under the Proposed Action, thus resulting in no need to further evaluate any other harvesting option prior to this final agreement that represents the Proposed Action.

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3.0 Affected Environment

3.1 Introduction

Chapter 3 describes the physical, biological, and social components within the project area that would be affected by salmon and steelhead harvest in Puget Sound for the 2021-2022 fishing season. Resource areas discussed are those topics required to be considered under NEPA and have the potential to be impacted from implementation of the Proposed Action.

3.1.1 Scoping

Resource areas to be considered are based on BIA's NEPA guidelines (BIA 2012). Through internal scoping, each resource area was reviewed to determine if the resource area had the potential to be impacted by the Proposed Action (Table 3-1). If not applicable, or if the impact is considered negligible, the resource area is not considered for further analysis in this EA. If the resource area has the potential to be impacted by the Proposed Action, then the resource is described in Chapter 3, Affected Environment, and analyzed in Chapter 4, Environmental Consequences of this EA.

Table 3-1. Resources considered for evaluation in this EA.

Resource Area[1]	Potential Impact by Proposed Action	Conclusion for Chapters 3 and 4
Topography	Would not change but added for context	Place under Environmental setting in Chapter 3, do not discuss in Chapter 4
Soils	Proposed Action would not affect this resource	Do not include in either Chapter 3 or Chapter 4
Geology, Mineral, and Paleontological Resources	Proposed Action would not affect these resources	Do not include in either Chapter 3 or Chapter 4
Water Resources	Proposed Action would not affect the water resource (water type, quantity, and rights); however, salmon and steelhead are impacted by poor water quality	Analyze water quality in Chapter 3 and 4
Air	Fishing boat exhaust would affect air quality and greenhouse gases	Analyze in Chapters 3 and 4
Living Resources – Wildlife, Fish, and Invertebrates	Harvest would affect predators and competitors of salmon and fish, as well as prey of salmon and fish	Analyze in Chapters 3 and 4
Living Resources – Vegetation	Harvest would not affect vegetation on land and would have negligible impacts to aquatic vegetation	Do not include in either Chapter 3 or Chapter 4
Living Resources – Ecosystems and Biological Communities	Harvest would affect ecosystems and biological communities	Do not include as a separate topic titled Living Resources, since this topic will be analyzed under Wildlife, Fish, Invertebrates, and Marine Protected Areas

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Resource Area[1]	Potential Impact by Proposed Action	Conclusion for Chapters 3 and 4
Agriculture – Livestock, Crops, Prime and Unique Farmland	Harvest would not affect agriculture	Do not include in either Chapter 3 or Chapter 4
Cultural Resources – Resources and Properties	Harvest would not affect cultural resources as physical components but would affect cultural resource values	Do not include as a separate resource but analyze under Environmental Justice and Indian Trust Assets
Socioeconomics	Income derived from harvest would affect socioeconomic conditions	Analyze in Chapters 3 and 4
Environmental Justice	Harvest would affect minority, low income, and tribal communities	Analyze in Chapters 3 and 4
Resource Use Patterns – Hunting, Fishing, and Gathering	Harvest would not affect hunting and gathering but would affect fishing	Do not include hunting and gathering in either Chapter 3 or Chapter 4. Include fishing under Fish, Recreation and Recreational Fishing Environmental Justice, and Indian Trust Assets
Resource Use Patterns – Timber Harvesting	Harvest would not affect timber harvesting	Do not include in either Chapter 3 or Chapter 4
Resource Use Patterns – Agriculture – other	Harvest would not affect agriculture	Do not include in either Chapter 3 or Chapter 4
Resource Use Patterns – Mineral Extraction	Harvest would not affect mineral extraction	Do not include in either Chapter 3 or Chapter 4
Resource Use Patterns – Recreation	Harvest would affect recreation, specifically recreational fishing	Analyze in Chapters 3 and 4
Resource Use Patterns – Transportation Networks	Harvest would not affect transportation networks	Do not include in either Chapter 3 or Chapter 4
Resource Use Patterns – Land Use Plans	Harvest would not affect land use plans but could affect Marine Protected Areas	Include Marine Protected Areas in Chapter 3 and 4
Resource Use Patterns – Energy (alternative energy, energy infrastructure)	Harvest would not affect alternative energy or energy infrastructure	Do not include in either Chapter 3 or Chapter 4
Other Values – Wilderness	Harvest would not affect wilderness	Do not include in either Chapter 3 or Chapter 4
Other Values – Noise and Light	Harvest would affect noise and light in fishing areas	Analyze in Chapters 3 and 4
Other Values – Visual	Harvest would not affect visual resources	Do not include in either Chapter 3 or Chapter 4
Other Values – Public Health and Safety	Harvest has the potential to affect public health and safety	Analyze in Chapters 3 and 4
Other Values – Climate Change (greenhouse gases)	Climate change would have cumulative long-term effects on salmon harvest	Do not include as a separate resource in either Chapter 3 or Chapter 4. Include climate change

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Resource Area[1]	Potential Impact by Proposed Action	Conclusion for Chapters 3 and 4
		under Air, Greenhouse Gases, and Pollutants, and Cumulative Effects
Other Values – Indian Trust Assets	Harvest affects fishing rights as an Indian Trust Asset	Analyze in Chapters 3 and 4
Other Values – Hazardous Materials	Harvest would not affect hazardous materials and does not require the use of hazardous materials. However, boat emissions can contribute pollutants in water	Do not include in either Chapter 3 or Chapter 4. Discuss boat emissions under Air
Other Values – Construction	Harvest would not affect construction	Do not include in either Chapter 3 or Chapter 4

[1] Source: BIA (2012)

As a result of the review above, the resource areas evaluated in this EA include:

- Environmental Setting (incudes topography)
- Water Quality
- Air, Greenhouse Gases, Pollutants
- Wildlife
- Fish
- Invertebrates
- Socioeconomics
- Environmental Justice
- Recreation and Recreational Fishing
- Marine Protected Areas
- Noise and Light
- Public Health and Safety
- Indian Trust Assets - Fishing

Federally listed species are discussed within each resource area. The resources are discussed relative to how salmon and steelhead harvest affects the resource. Where applicable, background information is taken from the *Puget Sound Chinook Harvest Resource Management Plan Final Environmental Impact Statement* (NMFS 2004) along with other more recently published information. Chapter 3 also begins with a description of the environmental setting considered for the resource analysis.

3.1.2 Environmental Setting - Topography and Description of Project Area

The project area consists of approximately 13,600 square miles with 20 percent of the total land surface mass within Washington (66,582 square miles). Freshwater inflow into the project area is approximately 900 million gallons per day. The major sources of fresh water are the Skagit and Snohomish Rivers, although the majority of the fresh water entering the northern portion of Puget Sound is from the Fraser River drainage that enters the Strait of Georgia approximately 10

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miles north of the United States border. The marine surface area of the project area is approximately 900 square miles with 2,000 miles of coastline (Gustafson et al. 2000).

Puget Sound is a series of interconnected, glacially scoured channels with an entrance to the Pacific Ocean. Each of the basins of Puget Sound forms a depression on the seafloor whereby a shallower sill separates relatively deep water from adjacent basins. The deepest point in Puget Sound is more than 920 feet. About 43 percent of the Puget Sound's tideland is located in the Whidbey Island Basin due to the strong influence of the Skagit River. The waters of Puget Sound function as a partially mixed, two-layer system with relatively fresh water flowing seaward at the surface and saline oceanic water returning landward at depth (Battelle Marine Sciences Laboratory et al. 2001).

Due to the abrupt gradient in topography and bathymetry in Puget Sound, only a narrow fringe of vegetated shoreline habitat exists where light can penetrate the water and reach the bottom sediments (Sound Science 2007). This nearshore zone represents one of the highest areas of primary productivity in the region and supports valuable shellfish, fisheries, and recreation industries (Gelfenbaum et al. 2006). The Puget Sound nearshore ecosystem is expected to perform critical functions by providing substrate for eelgrass and kelp, and supporting shellfish production, rearing and migration for juvenile salmon, and spawning habitat for forage fish (Fresh 2006; Dethier 2006; Penttila 2007; Mumford 2007). Despite the importance of nearshore habitat for recovery of listed Puget Sound Chinook salmon (Shared Stregey Plan 2007) in performing critical ecosystem functions, from 2008 to 2016, more than twice as much shoreline armoring was added than was removed in Puget Sound with an estimated 40 percent of Puget Sound shoreline was considered degraded through shoreline modifications with 27 percent armormed (NWIFC 2016).

Twelve counties occur within the project area of Puget Sound (Figure 3-1) with an estimated 2020 population of 5,191,130 residents, which represents 68 percent of the state population (7,656,200) (Washington Office of Financial Management 2021a). Native Americans and Alaska Natives represent 80,116 residents from the 12 counties, which is 57 percent of the state Native American and Alaska Natives population of 140,345 residents (Washington Office of Financial Management 2021).

There are four major subareas within Puget Sound where the Proposed Action would occur (Strait of Juan de Fuca, North Puget Sound, Hood Canal, and South Puget Sound) as described below.

Strait of Juan de Fuca. The Strait of Juan de Fuca is a 90-mile long waterway between British Columbia (Canada) and Washington State, with an average width of 13 miles (Figure 3-1). The Strait of Juan de Fuca extends from the Pacific Ocean at Cape Flattery to the vicinity of Port Townsend, Washington, and Victoria, British Columbia. For analysis purposes, only waters of the United States are evaluated. The Strait of Juan de Fuca subarea includes the city of Port Angeles, and Clallam and Jefferson Counties. Major river systems draining into the strait include the Elwha and Dungeness Rivers. The Strait of Juan de Fuca subarea includes the marine areas

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of Neah Bay (Marine Area 4B), Sekiu and Pillar Point (Marine Area 5), and East Juan de Fuca Strait (Marine Area 6).

North Puget Sound. This area encompasses northwestern Washington and the San Juan Islands (Figure 3-1). The area begins south of the United States/Canadian border and includes the San Juan Islands and Whidbey Island south past Everett to the Snohomish River. The North Puget Sound subarea includes the cities of Bellingham, Friday Harbor, Oak Harbor, and Everett. Counties within the North Puget Sound subarea include Whatcom, Skagit, Snohomish, Island, and San Juan counties. Major rivers include Nooksack, Samish, Skagit, Stillaguamish, and Snohomish Rivers. The North Puget Sound subarea includes the marine areas of San Juan Islands (Marine Area 7); Deception Pass, Hope Island, Skagit Bay (Marine Area 8-1); and Port Susan and Port Gardner (Marine Area 8-2).

South Puget Sound. This subarea is the inland, saltwater sound that extends from Point Wilson near Port Townsend in western Washington south to Olympia. The South Puget Sound subarea includes the cities of Seattle, Tacoma, and Olympia, and portions of King, Pierce, Thurston, and Mason Counties. Major rivers include Lake Washington (Cedar River), Green/Duwamish, Puyallup/White, and Nisqually Rivers. The South Puget Sound subarea consists of marine areas of Admiralty Inlet (Marine Area 9), Seattle-Bremerton (Marine Area 10), Tacoma-Vashon Island (Marine Area 11), and South Puget Sound (Marine Area 13).

Hood Canal. This saltwater channel extends southwest from the vicinity of Port Ludlow to Great Bend at Union, then northeast to Belfair (Figure 3-1). Major rivers include Skokomish, Hamma Hamma, Dosewallips, Duckabush, Big Quilcene, and Little Quilcene Rivers. The Hood Canal subarea includes portions of Jefferson, Kitsap, and Mason Counties. Hood Canal (Marine Area 12) is the only marine area of this subarea.

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Figure 3-1. Figure depicting counties within the action area.

3.2 Water Quality

Puget Sound water quality improvement is identified as a common objective within the Puget Sound Salmon Recovery Plan (Shared Strategy Development Committee 2007), and is also mentioned as a common action for most watershed salmon recovery plans (NWIFC 2016). Clean water is also mentioned as essential to the recovery of the Southern Resident killer whale (to support its growth and development) where portions of its residency occurs in Puget Sound (NMFS 2008). Although water quality improvements are important contributors for Puget Sound salmon recovery and watershed improvement plans, the increasing population of Puget Sound and the continued interest in development results in increased impervious surfaces, shoreline modifications, loss of riparian forests and forest cover, and increased pollution flowing into rivers and marine areas that result in overall diminished water quality (NWIFC 2016). These impacts to water quality are either from point or nonpoint sources.

Point sources occur from development, industrial discharges, sewage treatment, and drainage system discharges at a single location. Point source pollution is controlled through implementation of the Clean Water Act that authorizes point source emissions through its

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National Pollutant Discharge Elimination System permit program. Permits are issued for discharge from industrial and municipal wastewater facilities and include limitations for allowed discharges based on water quality standards.

Nonpoint sources are from agriculture, forestry, and surface water runoff from paved roads at non-specified areas. Nonpoint source pollution is the primary cause of water pollution in Puget Sound (Shared Strategy for Puget Sound 2007), and can include fecal coliform bacteria, pesticides, sediments, and excess nutrients. Nonpoint pollution is more difficult to control and results from the cumulative effect of small discharges over time and space.

Overall for Puget Sound, marine water quality conditions have declined over time from 1999 to 2008 (Puget Sound Partnership 2015) with Bellingham Bay having the largest decreases in water quality within Puget Sound. Water quality parameters evaluated in marine water and considered important to water quality include temperature, salinity, nutrient balance, algae biomass, and dissolved oxygen (Puget Sound Partnership 2015). The cause of decreased water quality conditions is generally attributed to human activities, such as human sources of nutrients from wastewater treatment plants, failed septic systems, and fertilizers which can be from point and nonpoint sources that reach Puget Sound through freshwater drainage (Puget Sound Partnership 2015).

Freshwater quality has remained relatively unchanged over the past 10 years with five river systems having some improvements – Deschutes, Nisqually, Green, Cedar and Samish Rivers (Puget Sound Partnership 2015). However, more streams are on the Washington State water quality assessment 303(d) list than those that are no longer impaired or remain non-impaired (greater than 1,200 streams are on the 303(d) list versus fewer than 800 streams on the non-impaired list). There were 392 streams that were placed on the 303(d) list from 2004 to 2014, although placement on the list for most of these streams was due to improved characterization of water quality conditions (Puget Sound Partnership 2015).

For salmon and steelhead, low dissolved oxygen levels and high nutrient levels can result in fish kills (Washington Department of Ecology 2014). High levels of fine sediment and high water temperature are two major water quality issues affecting freshwater salmon habitat. Fine sediments can cover salmon spawning grounds or embed in the interstitial spaces of larger sediments impacting spawning gravel suitability and egg survival. Decreased riparian shading and reservoir development can increase stream temperatures that impact salmon because they require streams with cool water temperatures for foraging and spawning. In addition, pollutants in water can lead to fish impacts including immunosuppression, reduced metabolism, and damage to gills and epithelia in fish. Increased incidences of fish diseases can also be attributed to poor water quality conditions (Austin 1998). Poor water quality can impact the ability of fish to reproduce, find a steady food supply, and survive the stress of life in the marine environment. Poor water quality can also lead to increased populations of invasive fish species and vegetation that can outcompete native species.

Asplund (2000) provides a summary of how boat operations affect water quality, which includes turbidity, bank erosion, fuel and waste discharges, increase in invasive fish and plant species, and

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overall disturbance. Boat operations in shallow areas can stir up bottom sediments and cause short-term increases in turbidity. Boat wakes have the potential to contribute to bank erosion.

Fishing operations can result in accidental releases of fuel that can also impact water quality and enter marine and river sediments as contaminants, although these effects are expected to be minimal because Washington law states that boat operators are responsible for cleaning up accidental spills (RCW 90.56.320). The use of boats with copper boat paint can also impact water quality, although since 2018 sales of copper boat paint is no longer be allowed (RCW 70.300.020). Boats can also carry aquatic invasive species on their hulls, rudders, and props, thereby transporting these species to new areas. Finally, boats can discharge sewage or waste into waters while conducting fish operations. All of these boat discharges are considered nonpoint sources of pollution. Most of these impacts to water quality from boat use occurs from large boats, barges, and tankers (NMFS 2008). Although recreational and treaty fishing operations can affect water quality, the affect is considered minimal and has not been cited as a significant contributor to poor water quality conditions in Puget Sound. Further, on April 9, 2018 the Washington State Department of Ecology (2018) adopted a No Discharge Zone rule for Puget Sound (WAC 173-228), which prohibits discharge of sewage, whether treated or not with in Puget Sound. This rule is effective beginning May 10, 2018 (WAC 173-228), effectively elimimating effects to water quality from vessels in Puget Sound, including vessels engaged in fishing activities, although commercial fishing vessels have a five-year delayed implementation (WAC 173-228-050).

3.3 Air, Greenhouse Gases, Pollutants

Air quality in Puget Sound region is affected by its geography, climate, and emissions from a variety of natural and manmade sources. Most of the air pollution in the region comes from urban areas and transportation corridors. For Puget Sound, 50 percent of its emissions is attributable to transportation sources, including motor vehicles, aircraft, construction equipment, and boats (Puget Sound Regional Council 2008). In addition, the primary source of greenhouse gases that contribute to global warming is the burning of fossil fuels to generate electricity and power engines.

Marine gasoline and diesel engines are a major contributor of hydrocarbons. Nitrogen oxide emissions are considered pollutants to air quality and contributors to greenhouse gas emissions. Fuel from outboard motors and accidental gas spills can also be the primary cause of impaired water body designations. Engine emissions can produce ground-level ozone and smog that contribute to impairment of air quality. Products of marine engine combustion include carbon dioxide and carbon monoxide, whereby carbon dioxide is seen as a major contributor to global warming. Use of boats for fisheries harvest results in the contribution of air emissions and greenhouse gases that impact air quality. For example, driving a motorboat with an outboard engine for 1 hour releases as much air pollution as driving a car for 800 miles (Stevens Institute of Technology 2016). Because of these air quality impacts, the U.S. Environmental Protection Agency is phasing in tighter emission standards for marine engines that would result in burning less fuel and at lower pollution levels.

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3.4 Wildlife

Cederholm et al. (2000) compiled a detailed synopsis of the relationships between salmon and wildlife, and focused on predator/prey relationships between salmon and wildlife currently and historically common throughout Washington and Oregon. Other indirect relationships between salmon and wildlife include wildlife nutrient benefits from salmon carcasses in fresh water, the transfer of toxins in salmon to wildlife predators, the disturbance of wildlife habitat during fishing, the potential bycatch of wildlife during fish harvest, and the impact of derelict fishing gear to wildlife. These effects to wildlife are discussed below.

3.4.1 Predator/Prey Relationships

Numerous wildlife species prey on hatchery-origin and natural-origin salmon and steelhead. Other species, such as marine and freshwater invertebrates, are prey of salmon and steelhead. Of the wildlife that currently occur or were historically common in Washington and Oregon, over 100 vertebrate wildlife species have a relationship with salmon and steelhead (Cederholm 2000). Nine of these wildlife species were found to have a *Strong, Consistent* relationship with salmon and steelhead, 58 species have a *Recurrent* relationship with salmon, 25 species were found to have an *Indirect* relationship with salmon, and 65 species were found to have a *Rare* relationship with salmon (Cederholm 2000). The nine species of currently and/or historically common wildlife throughout Washington and Oregon with strong consistent links to salmon (bald eagle, American black bear, Caspian tern, common merganser, grizzly bear, harlequin duck, killer whale, osprey, and river otter) constitute a functional group of salmon-eaters with close affinities to salmon distribution.

Listed Species. Threatened and endangered species that have a S*trong, Consistent* relationship with salmon include the grizzly bear (state endangered and federally threatened) and Southern Resident killer whale (state and federally endangered), although the grizzly bear is not known to occur in Puget Sound waters or adjacent shoreline.

Southern Resident killer whale

The Southern Resident killer whale (*Orcinus orca*; SRKW) clan comprises 74 individuals from three component pods (J, K, and L pods) with critical habitat identified as occurring in Puget Sound (71 Fed. Reg. 69054, November 29, 2006). The species is present in Puget Sound/Salish Sea on a regular year-round basis, although distinct pods have varying winter distributions, with K and L pods spending a substantial amount of time on the outer coast during winter months (Hanson et al 2013). Individual pod sizes range from 33 individuals in the L pod to 17 in the K pod (Center for Whale Research 2021). Declines of almost 50 percent in the L pod, from 59 animals in 1993 to 33 as of December 31, 2020, account for the majority of mortalities in the DPS over the past 30 years. The J pod grew over the same time frame, but recent declines from 2016-2019 has reduced its abundance to levels observed in the mid to late 1990s, although still greater than abundances observed in the 1970's to 1980's (Center for Whale Research 2021). The SRKW recovery plan, developed by NOAA in 2008, identified five factors for decline: prey availability, pollution/contamination, vessel effects (physical disturbance), oil spills, and acoustical effects (NMFS 2008).

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SRKW primary prey in inland marine waters during the summer months is Chinook salmon, particularly Chinook salmon originating from the Fraser River in British Columbia (Hanson et al. 2010). Southern Resident killer whales are believed to prefer older (i.e., larger) than average Chinook salmon (Ford and Ellis 2006). There is no evidence, however, that Southern Resident killer whales distinguish between hatchery-origin and natural-origin salmon. Coho salmon and Chum salmon increase in presence in SRKW diet in inland marine waters during the fall and early winter (Hanson 2011, Hempelmann et al. 2012, Ford et al. 2016). In October, Coho salmon become more prevalent (~50 percent of the diet) in SRKW diet samples while Chum salmon are present in nearly 60 percent of the diet samples from November through February (Hanson et al. 2021). During the winter, salmon stocks across the west coast including stocks from the Columbia River to Central Valley California Chinook, as well as steelhead are important prey for K and L pods when present on the outer coast (Hanson et. al. 2021).

Adult salmon from hatchery releases have partially compensated for declines in natural-origin salmon and may have benefited Southern Resident killer whales (Myers 2011). In its most recent review of the status of the Southern Resident killer whale, Wiles (2016) states that the population is threatened from the reduced availability of Chinook salmon, interactions with whale-watching vessels, marine sound (noise), and its small population size. Ward et al (2009 and 2013) found correlations between killer whale demographic rates and aggregated abundance indices of west coast Chinook salmon. However, those relationships have decoupled during the last 5-10 years and no longer appear relevant (Trites and Rosen 2018, PFMC SKRW Workgroup 2020). Additionally, Vélez-Espino et al. (2014) concluded that any reductions in Chinook harvest would not necessarily result in equivalent increases in prey availability for whales or their population growth.

For Western Washington Treaty Tribes the SRKW are a revered species, and like salmon, share a special cultural and spiritual connection with them. Like salmon, marine mammals such as SRKW are a tribal treaty trust resource as they are part of the natural resources within the tribes' usual and accustomed areas[2]. An assessment of the potential interaction and impact of Puget Sound tribal fishing activities from 2010-2019, indicates minimal overlap in time and space of the tribal fishing fleet with observed SRKW sightings, minimizing the acoustic and vessel disturbance to SRKW (Loomis 2021). Most (77 percent) tribal fishing occurs in terminal/freshwater areas, and the pre-terminal tribal fishing fleet presence dwarfs in comparison to that of commercial whale watching fleet and commercial cargo and passenger vessels (Loomis 2021). Pre-terminal (marine) harvest of Chinook salmon in the action area has resulted in an average of 70,860 adult Chinook salmon harvested from numerous stocks, with tribal harvest accounting for 30,169 fish (43 percent) or approximately 12.6 days of food for SRKW (Loomis 2019). This estimate makes an assumption that all Chinook harvested pre-terminally by tribes in the action area are 1) preferred prey stocks for SRKW in space and time and would be consumed and 2) all caught fish would be available to SRKW in space and time. As noted though, the tribal preterminal fishing fleet footprint, has minimal overlap in space and time with SRKWs in the action area, minimizing the likelihood that preterminal tribal harvest would be available to

[2] United States v. Washington, 129 F. Supp. 3d 1069 (W.D. Wash. 2015) ("Quileute I"), aff'd in part, rev'd in part sub nom. Makah v. Quileute et al., 873 F.3d 1157 (9th Cir. 2017) ("Quileute II"), reh'g denied, No. 15-35824, Dkt. 99, 2018 WL 3964238 (9th Cir. Jan. 19, 2018), petition for cert. filed, No. 17-1592 (U.S. May 21, 2018).

SRKW. In comparison, pinnipeds in the Salish Sea are estimated to have eaten almost twice as many Chinook salmon in 2015 as SRKWs (Chasco et al. 2017).

From 2010 through 2018, pre-terminal tribal harvest accounted for approximately 155,594 coho harvested from an estimated average of 2,410,719 entering Puget Sound. Tribal pre-terimanl harvest, excluding tribal harvest in Hood Canal and deep South Sound (Marine catch area 13), of Chum salmon from 2010-2018 averaged 163,341 fish, including Fraser River chum salmon as well as fall and winter-run Chum salmon from Puget Sound. Assuming all harvested Chum salmon are Puget Sound stocks results in an average 10 percent decrease of the 1,621,344 fall and winter-run Chum salmon entering the action area.

In 2021, WDFW is implementing actions within their harvest regulations expected to benefit SRKW status (Cunningham 2021). Those actions included likely increase in prey abundance and availability and reduced vessel noise and interactions through area closures and additional outreach and education efforts. Area closures include a "No-Go" whale protection zone along the western side of San Juan Islan for all recreational boat – both fishing and non-fishing – and non-tribal commercial boats. Other closures include restrictions on salmon harvest, particularly Chinook retention although still open for coho mark-selective fishing, in marine catch area 7 during early August (August 1st – 15th) and all of September 2020, as well as complete winter sport fishery closures in marine catch areas 6, 7, 8, and 9 which are expected to also reduce recreational fishing boat presence during those times (Cunningham 2020).

Other Wildlife

Offshore and transient killer whales are occasionally observed in Puget Sound (Wiles 2004). Transient killer whales feed on marine mammals (Wiles 2004), whereas offshore killer whales feed on shark and fish (including Chinook salmon) (Fisheries and Oceans Canada 2014). Both of these killer whale species could be disturbed during fishing activities.

Other state and/or federally listed wildlife species that do not have a predator/prey relationship with salmon and steelhead but could be disturbed during fisheries harvest include whales and marbled murrelet. Six species of whales occur in Washington waters that are federally or state listed (sperm whale, humpback whale, blue whale, fin whale, sei whale, and North Pacific right whale); however, these species (other than the humpback whale) either are rare or do not occur within Puget Sound inland waters (WDFW 2013). Thus, salmon and steelhead harvest does not affect these species. Although extremely rare, interactions of marbled murrelets with commercial and recreational fishing gear are a potential for the proposed action. The USFWS has evaluated this risk in recent Biological Opinions (USFWS 2017), exempting the incidental take of marbled murrelets in the proposed action. The short-tailed albatross is known to be impacted from derelict fishing gear and hooking and drowning on commercial longline gear; however, its distribution is limited to sightings along the outer coast of Washington (USFWS 2001). The green sea turtle and loggerhead sea turtle (both state and federally listed) have only been recorded off the coast of Washington and do not feed on salmon (WDFW 2013). Similarly, the snowy plover occurs only along the southern Washington coast (Paulson 1993). The

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humpback whale and marbled murrelet could be disturbed during fishing activities but do not feed on salmon and steelhead.

Marine Mammals. Puget Sound marine mammals are protected under the Marine Mammal Protection Act. Other than the listed marine mammal species, additional marine mammals that occur in Puget Sound are the Pacific harbor seal, California sea lion, Steller sea lion, northern elephant seal, harbor porpoise, gray whale, and minke whale. Three of these species (Steller sea lion, California sea lion, and harbor seals) have a *Recurrent* relationship with salmon because salmon are prey of these species (Cederholm 2000). The other marine mammal species either do not have a relationship with salmon and steelhead or do not occur in Puget Sound waters (NMFS 2014). Steller sea lions, California sea lions, and harbor seals often occur in areas where salmon and steelhead concentrate. These marine mammal species are not known to be exclusively dependent on salmon and steelhead; rather these species are opportunistic feeders and will predate on a variety of fish species, including salmon and steelhead, dependent on local abundance and distribution (summary in NMFS 2014). However, recent analyses suggests large increases in Chinook salmon predation by marine pinnipeds in Puget Sound over the last 40 years (ninefold in terms of numbers and doubled in terms of biomass) as a result of rapid pinniped population growth (Chasco et al. 2016). Chasco et al. (2016) concluded that harbor seal predation impacts are possibly larger than either current commercial and recreational fishery impacts or predation by endangered Southern Resident killer whales. Additionally, these marine mammals are known to prey on Coho and Chum salmon (Lance and Jefferies 2009, Lance et al. 2012, Trites and Rosen 2019) further interacting with southern-resident killer whales.

Bald Eagles and Golden Eagles. The bald eagle and golden eagle are protected under the Bald Eagle and Golden Eagle Protection Act (16 USC 668-668c). Bald eagles are considered to have a *Strong Consistent* relationship with salmon, while golden eagles have a *Recurrent* relationship with salmon (Cederholm 2000). The strong, consistent relationship that bald eagles have with salmon occurs in salt water when the species can feed on live adult salmon and in fresh water when bald eagles feed on spawning adult salmon. Golden eagles predate on salmon similarly but to a lesser degree. Fisheries harvest does not directly impact eagles; however, harvest has potential to affect their food supply. Both species are considered opportunistic feeders and can feed on live and dead animals including fish, waterfowl, small mammals, and other birds (Puget Sound Institute 2016).

Migratory Birds. The Migratory Bird Treaty Act (16 USC 703), originally passed in 1918, makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid Federal Permit. The term "take" is not defined in the Migratory Bird Treaty Act, but the USFWS has defined it under the ESA to mean to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" or to attempt those activities (USFWS and NMFS 1998). Under the provisions of the Migratory Bird Treaty Act, the unauthorized take of migratory birds is a criminal offense, even if it is unintentional.

There are numerous water birds that are migratory and protected under the Migratory Bird Treaty Act. These species include gulls, kingfishers, loons, murres, oystercatchers, shorebirds,

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cormorants, and many species of ducks (USFWS 2016). As described by Cederholm et al. (2000), migratory bird species include the harlequin duck which has a *Strong, Consistent* relationship with salmon eggs and alevin; grebes, loons, pelican, cormorants, gulls, and other migratory bird species that have a recurrent relationship with juvenile salmon; and other migratory bird species that have an indirect relationship with juvenile salmon. The relationship is primarily as bird predators that consume salmon as prey. Generally, the birds prey on salmon juveniles. Harvest of adults would not affect the food supply of migratory birds. However, while the birds are foraging in open water, there is potential for the birds to be caught from bycatch, as described under Section 3.4.5, Fisheries Bycatch. Fishing boats may also disturb foraging migratory birds over open water; however, this impact is considered negligible since the birds have ample space over open water to forage for prey. Finally, migratory birds benefit from salmon carcasses that provide marine-derived nutrients in fresh water.

3.4.2 Salmon Carcass Nutrient Benefits

Research in Pacific Northwest streams indicates the importance of anadromous salmon and steelhead to freshwater and terrestrial food webs and ecosystem function (Kline et al. 1990; Cederholm et al. 2000; Hilderbrand et al. 2004). In addition to live salmon and steelhead consumed by wildlife predators, salmon carcasses provide a carrion food source to wildlife and a source of nutrients to other aquatic and terrestrial species through the decomposition of carcasses. The carcasses in streams result from natural-origin and hatchery-origin spawners and from hatchery-origin fish that return to hatchery facilities to spawn and then are placed out into streams by hatchery operators.

Birds (such as wintering bald eagles), mammals, and aquatic invertebrates feed directly on salmon and steelhead carcasses, and the decomposer communities (i.e., organisms including bacteria, fungi, and invertebrates that decompose organic material) that develop on carcasses are, in turn, consumed by other aquatic invertebrate species (Willson et al. 1998). The input of marine-derived nutrients, such as phosphorus and nitrogen, into streams is thought to substantially enhance productivity of many nutrient-poor coastal streams (reviewed by Willson et al. 1998) and riparian vegetation communities (reviewed by Hilderbrand et al. 2004).

3.4.3 Transfer of Toxins from Salmon to Wildlife

Wildlife species that consume salmon and steelhead are susceptible to toxic contaminants and/or pathogens that may be within the fish they consume. There is evidence of bioaccumulation in fish-eating birds and mammals of persistent organic pollutants, including polychlorinated biphenyls (PCBs), dichloro-diphenyl-trichloroethanes (DDTs) and other pesticides, polycyclic aromatic hydrocarbons (PAHs), fire retardants (such as polybrominated diphenyl ethers [PDBEs]) and other compounds that may cause a range of deleterious health effects (Anthony et al. 1983; Ross et al. 2000; Tabuchi et al. 2006; review in Puget Sound Action Team 2007; Cullon et al. 2009; O'Neill and West 2009). One study noted that adult Puget Sound Chinook salmon had nearly three to five times the PCB levels compared to Chinook salmon from the Georgia Basin, Alaska, British Columbia, and Oregon (Puget Sound Action Team 2007). Salmon and steelhead may pass contaminants onto wildlife that prey on them. It has been hypothesized, but not verified, that the PCB concentrations in Chinook salmon has contributed to the decline in Southern Resident killer whales whose preferred prey is Chinook salmon (Wiles 2016).

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3.4.4 Harvest Habitat Disturbance

Fisheries harvest results in use of wildlife habitat specific to the aquatic environment and adjacent riparian and shoreline habitat and the impact is primarily related to disturbance from the presence of boats, people, and noise (Kelly et al. 2004). The disturbance results in wildlife expending energy to move away from the fishing activity and search for another location to forage, although some gulls are attracted to fishing vessels and the discarded bycatch that is thrown overboard. Generally, the impact has not resulted in loss or injury to wildlife, but when fishing activity is significant and localized to a specific area, the effects from human presence could result in increased stress to marine and freshwater wildlife while these animals pursue other places to forage and seek cover.

3.4.5 Fisheries Bycatch

Bycatch is the incidental capture of non-target fish, including that brought to ports or discarded at sea. Wildlife species most likely caught in fisheries bycatch are seabirds that dive underwater, sea turtles, dolphins, and whales. NMFS (2011) estimated that 17 percent of catch is regarded as bycatch and discarded during targeted fisheries operations. The type of fishing gear used has different bycatch levels with trawls, which are not part of the proposed action, considered to have the highest bycatch at 78 percent, longlines, also not part of the proposed action, having the next highest bycatch at 13 percent, gill nets resulted in 1 percent bycatch, and other fishing methods combined accounting for up to 8 percent of bycatch (Kelekjian et al. 2014). Although the vast majority of bycatch are fish species, bycatch also impacts wildlife. For salmon fisheries, most bycatch are non-targeted salmon species (Alverson et al. 1994). NMFS (2003) reported that serious injuries or mortalities of marine mammals from bycatch is remote, direct impacts on seabirds are also minimal to non-existent, and bycatch of sea turtles was not significant (PFMC 2000; NMFS 2003). However, WDFW (2015) reported conservation concerns over the non-salmon species encountered during Puget Sound commercial salmon fisheries.

Outside of the bycatch of fish species, bycatch of wildlife species of concern in Puget Sound are Steller sea lions, marbled murrelets, and common murres. Marbled murrelets (*Brachyramphus marmoratus*) are listed as a threatened species by the USFWS under the ESA and incidental take, although rare, in Puget Sound salmon and steelhead fisheries has been assessed in the recent USFWS Biop (USFWS 2017). As a result of bycatch impacts to fish and wildlife, there has been an effort to reduce bycatch in Pacific Northwest fisheries. These efforts include restrictions on bottom trawling and a focus on mark-selective fisheries and single-species fisheries. The recent regulations for Puget Sound commercial salmon seasons include restrictions specific to purse seine and gill-net gear that are expected to reduce seabird bycatch in non-treaty commercial fisheries (WDFW 2015; NOAA Fisheries 2016).

3.4.6 Derelict Fishing Gear

Also referred to as ghost fishing, derelict fishing gear is known to trap, wound, and/or kill seabirds, sea turtles, and marine mammals (Gilardi et al. 2009). WDFW estimated that hundreds of tons of derelict fishing gear have collected over time in Puget Sound, including the Strait of Juan de Fuca up to the Canadian border (WDFW 2016a). Derelict fishing gear includes terminal tackle from recreational salmon gear, salmon fishing nets, recreational and commercial shellfish pots and traps, longlines, and trawls. The cause of derelict fishing gear may include weather

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conditions (e.g., storms), gear entanglement with other vessels including recreational boaters and commercial freighters, entanglement on bottom topography (such as rocky reefs), and old age or overused fishing gear.

From a gill-net study in Europe, less than 1 percent of all nets deployed resulted in fishing gear loss, although the relationship was found to be dependent on water depth such that fishing in waters greater than 1,640-foot depth was most likely to result in more loss due to excessive net length, increased soak times, and gear stress (Hareide et al. 2005). Other studies have found varied results dependent on study location. As summarized by Gilardi (2010), derelict fishing gear has been identified as a major cause of morbidity and mortality in some fish, coral, and wildlife populations. From a study in Puget Sound, mortality from 870 derelict gill nets was associated with 31,278 invertebrates (76 species), 1,036 fishes (22 species), 514 marine birds (15 species), and 23 marine mammals (4 species) (Good et al. 2010).

Derelict fishing gear made of synthetic materials may take many years to decompose in water, although fouling of derelict gear from moss and algae accumulation reduces its effect over time. In addition to wildlife becoming entangled in derelict fishing gear, the gear can also damage underwater habitats and cause economic impacts (e.g., the cost of replacing the lost gear). In Puget Sound, there are multiple programs to promote onshore collection, disposal, and recycling of used gear. In addition, Northwest Straits Commission works directly with WDFW and tribes to find and remove derelict fishing gear.

Gilardi et al. (2010) summarized that in Washington State, over 85 tons of derelict gear (primarily crab pots and gill nets) were removed from Puget Sound since 2002. In correspondence with Natural Resource Consultants, Gilardi et al. (2010) stated that Natural Resource Consultants predicted that 16 to 42 nets were lost annually in the Puget Sound from drift gill-net fisheries along with purse seines and set gill nets. Gibson and NWIFC (2013) stated that over 4,000 derelict fishing nets were removed from the Puget Sound over the past decade at a cost of several million dollars. This latter study focused on recommendations to prevent future derelict fishing gear. The gill nets become snagged on rocky outcroppings and on rocky ledges (Northwest Straits Commission 2015) although interactions with marine boat traffic is a known cause of lost fishing gear also.

3.5 Fish

Puget Sound salmon and steelhead harvestable abundance is determined based on pre-season forecasted adult abundance (Puget Sound Indian Tribes and WDFW 2010). For species and stocks with depressed returns, a directed fishery is not appropriate and harvest is limited to incidental impacts from fisheries directed at more abundant species or stocks. For Puget Sound Chinook salmon and coho salmon, expected pre-season harvest impacts are modeled using Fishery Regulation and Assessment Models (FRAM) (Pacific Fishery Management Council 2008). These models use pre-season forecasted abundance and fishery inputs to model expected fishery distribution by stock, area, and time in relation to specified management objectives. For other salmon (chum salmon, pink salmon, and sockeye salmon) harvestable abundance is based

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on pre-season forecasted abundance in excess of specified natural-origin and/or hatchery-origin escapement goals (Puget Sound Indian Tribes and WDFW 2010).

Salmon fisheries occur in both pre-terminal and terminal areas. Pre-terminal areas are defined as mixed stock areas where more than one management unit/population of a species co-occurs at a given time. Terminal area fisheries target a single stock. Fisheries are managed for weak stock management, indicating that harvest is constrained to protect weaker, less abundant stocks, and to forgo additional harvest on more abundant stocks where they co-occur in mixed stock areas to minimize harvest (bycatch) of the weaker stocks (Puget Sound Indian Tribes and WDFW 2010).

While salmon and steelhead harvest has been modified and decreased over time to minimize impacts to the abundance, occurrence, and diversity of salmon and steelhead in Puget Sound (Puget Sound Indian Tribes and WDFW 2010), harvest is only one of many factors affecting the present status of salmon and steelhead (WDFW 2015a). In addition to harvest, there are several past and current factors that also impact salmon survival in fresh and marine waters. Known factors (in addition to harvest) that affect salmon survival in fresh water include habitat loss and degradation; decreased water quality and quantity (including contaminant releases); dams, diversions, and culverts blocking fish access; shoreline modifications impacting migration, refugia, and cover; predation; hatchery management actions; and climate change (such as increasing temperatures and changes in stream flow) (summarized in NMFS 2014). Impacts to salmon and steelhead diversity, occurrence, and abundance in the marine environment include degraded and converted estuarine and nearshore habitat, water quality degradation and contaminant releases, climate change affecting ocean temperature and salinity, and changes in salmon and steelhead predator and prey abundance and diversity (Northwest Fisheries Science Center 2015; US Salish Sea Technical Team 2014; Chasco et al. 2017).

In reference to salmon and steelhead habitat, NWIFC (2016) states that aquatic habitat within the Puget Sound has degraded over time due to the following principal findings:

- Degradation of habitat outpaces estuary restoration
- Degraded nearshore habitat is unable to support forage fish
- Freshwater shoreline armoring continues unabated
- Forest cover is disappearing
- Streams lack large woody debris
- Riparian forests not recovering
- Alarming number of stream crossings, high road densities
- Impervious surface area impacts water quality, runoff timing, and salmonid habitat
- Fish migration barriers cut off vast amounts of habitat
- Agricultural lands remain degraded
- Sensitive flood plains being overdeveloped
- Rapidly increasing permit-exempt wells threaten water for fish

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3.5.1 Listed Salmon and Steelhead

Endangered species act (ESA) federally listed salmon and steelhead species include Puget Sound Chinook salmon, Hood Canal summer-run chum salmon, and Puget Sound steelhead. Annually, NOAA Fisheries provides guidance regarding conservation needs for ESA-listed salmon species during the pre-season harvest planning process at PFMC (NOAA 2021). For the Puget Sound Chinook and Hood Canal Summer-run Chum salmon, this involves specified conservation objectives for fishery-related impacts.

The Puget Sound Chinook salmon ESU includes 21 populations from 14 different management units (Table 3-2). Harvest management objectives are specified for each management unit and populations where more than one population exists in a single management unit (PSIT and WDFW 2010). Co-manager exploitation rate harvest objectives for 2021-2022 are specified for each management unit, dependent on FRAM modeled pre-season estimated escapements or in the case of Stillaguamish River Chinook the pre-seaon forecasted terminal runsize (Table 3-2), and are expressed as either total, southern United States (SUS), or pre-terminal SUS rates. Total exploitation rates include impacts from all fisheries including Alaskan, Canadian, and U.S. fisheries. SUS exploitation rates include impacts from fisheries occurring in Puget Sound and its freshwater tributaries, as well as in state and federal waters off the Pacific coast of Washington, Oregon, and California, although migration patterns of Puget Sound Chinook salmon constrain impacts primarily to Puget Sound and to a minimal extent off the Pacific coast of Washington. Pre-terminal SUS exploitation rates include impacts from fisheries in Puget Sound pre-terminal marine catch areas and off the Pacific coast of Washington.

If the estimated Chinook escapement or in the case of Stillaguamish River Chinook the pre-seaon forecasted terminal runsize, is predicted to be above the low abundance threshold, harvest is managed to limit incidental impacts below the stated Exploitation Rate Ceiling. When estimated escapement or in the case of Stillaguamish River Chinook the pre-seaon forecasted terminal runsize is predicted to be below the low abundance threshold, incidental impacts are constrained to meet the Critical Exploitation Rate Ceiling to provide further protection from population demographic risk. Table 3-2 provides the co-managers harvest management objectives and abundance thresholds for the Puget Sound Chinook management units for the 2021-2022 season.

In review of the most recent pre-season forecasts of spring-run, summer-run, and fall-run Puget Sound Chinook salmon, the 2021 forecast is for 231,268 hatchery-origin and natural-origin Chinook salmon (WDFW 2021a). This represents 26,918 natural-origin fish, which is 12 percent of the total pre-season forecast. For 2020, the pre-season forecast was for 250,692 Chinook salmon with 11 percent as natural-origin fish (28,869 fish) (WDFW 2020a). These totals represent a decrease of 8 percent in 2021 compared to 2020, and a 7 percent decrease in forecasted natural-origin Chinook salmon.

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Table 3-2. Puget Sound Chinook salmon ESU co-manager management objectives for the 2021-2022 fishing season.

Management Unit	Exploitation Rate Ceiling (%)	Low Abundance Threshold (escapement in number of fish)	Critical Exploitation Rate Ceiling (%)
Nooksack North Fork South Fork		 400 [1] 200 [1]	10.5 SUS
Skagit summer/fall Upper Skagit summer-run Sauk summer-run Lower Skagit fall-run	48 Total	9,100 [1] 2,200 [1] 400 [1] 900 [1]	15 SUS even-years
Skagit spring Upper Sauk Upper Cascade Suiattle	37.5 Total	823 [1] 130 [1] 170 [1] 170 [1]	10.3 SUS
Stillaguamish Unmarked Marked	 22 Total max/ 13 SUS max	1,200 [2]	 22 Total max/ 8 SUS max 12% SUS
Snohomish Skykomish Snoqualmie	10 SUS	3,250 [1] 2,015 [1] 1,132 [1]	9 SUS
Lake Washington [3] Cedar River	 500 Escapment (13 PT SUS) [4]	 200	 12 SUS
Green [3]	2,003 Escapement (13 PT SUS) [4]	802	12 SUS
White River spring-run	22 SUS	400	15 SUS
Puyallup fall-run	1,170 Escapement (13 PT SUS) [4]	468	15 SUS
Nisqually	47 Total plus 150 fish [5]	6,300 [5]	Up to 50 reduction of SUS ER
Skokomish	50 Total	1,300 [6]	12 PT SUS
Mid-Hood Canal	15 PT SUS	400	12.4 PT SUS
Dungeness	10 SUS	500	6 SUS
Elwha	10 SUS	1,500	6 SUS
Western Strait of Juan de Fuca – Hoko [7]	10 SUS	500	6 SUS

[1] Natural-origin spawners.

[2] Stillaguamish MU LAT is based on the pre-season Terminal runsize forecast and not on estimated escapement.

[3] Hatchery rack escapement needs are also considered for these management units.

[4] Based on the pre-season forecasts for Lake Washington, Green River, and Puyallup River, the ER ceiling for the pre-terminal fisheries will be 13% PT SUS.

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[5] ERC is 47 percent Total ER plus no more than 150 adult encounters (<2% ER) fish for experimental selective gear fishery. Nisqually River LAT is comprised of all adults escaping fisheries and returning to either of the hatchery facilities and to spawning grounds, regardless of mark status.

[6] Skokomish LAT is escapement of 800 natural spawners and 500 escapement to the hatchery.

[7] Co-managers provide management considerations for Hoko River Chinook salmon although they are not part of the Puget Sound Chinook ESU.

3.5.1.1 Chinook Salmon

3.5.1.1.1 Nooksack Early (Spring-run) Chinook Salmon

The Nooksack early spring-run Chinook salmon management unit comprises two populations: North Fork Nooksack and South Fork Nooksack. Recent harvest distribution data indicates that the majority of harvested Nooksack early spring-run Chinook salmon are caught in northern pre-terminal fisheries, primarily in Canada (Table 3-3). Harvest in U.S. fisheries occurs almost equally in net and sport fisheries but also in some troll fisheries (Table 3-3). Escapement estimates for both populations have been well below the low abundance thresholds for natural-origin escapement (Table 3-4). As a result, SUS fisheries have been managed to the Critical Exploitation Rate (Table 3-2).

Table 3-3. Nooksack early spring-run Chinook salmon harvest distribution, 2008-2019.

	Harvest Distribution (%)				
Year	**Alaska**	**Canada**	**U.S. Troll**	**U.S. Net**	**U.S. Sport**
2008	3.2	76.9	2.1	4.9	12.8
2009	8.6	77.9	1.8	3.2	8.6
2010	7.7	77.4	5.2	1.5	8.2
2011	6.7	77.0	2.1	5.4	8.8
2012	10.4	57.8	6.2	6.2	19.4
2013	6.9	64.9	3.4	12.2	12.6
2014	8.8	70.2	1.1	8.0	11.9
2015	16.1	59.1	8.4	4.1	12.3
2016	14.8	67.6	1.3	11.7	4.5
2017	3.5	82.9	3.0	5.8	4.9
2018	6.6	58.5	2.0	27.8	5.2
2019	7.3	44.0	0.0	35.9	12.8
Average	**8.4**	**67.8**	**3.0**	**10.6**	**10.2**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on Nooksack spring-run fingerling data)

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Table 3-4. Spawning escapements for Nooksack early spring-run Chinook salmon populations, 2004-2018.

Year	North Fork Natural-origin Returns (LAT=400)	South Fork Natural-origin Returns (LAT=200)
2004	**347**	**29**
2005	**266**	**19**
2006	**377**	**61**
2007	**372**	**26**
2008	412	**80**
2009	**327**	**45**
2010	**247**	**21**
2011	**160**	**90**
2012	453	**116**
2013	**139**	**10**
2014	**147**	**22**
2015	440	**7**
2016	**366**	319
2017	**131**	**186**
2018	**102**	408

Note: Numbers in bold highlight escapements below low abundance thresholds.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast for 14,787 hatchery-origin and natural-origin early spring-run Nooksack Chinook salmon with 3 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast for 7,864 early spring-run Nooksack Chinook salmon with 5 percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there is an 88 percent increase in the projected total pre-season forecast with a 26 percent increase in natural-origin early spring-run Nooksack Chinook salmon compared to 2020.

3.5.1.1.2 Skagit Summer/Fall-run Chinook Salmon

The Skagit River summer/fall-run Chinook salmon management unit comprises three populations: Upper Skagit River summer-run, Lower Sauk River summer-run, and Lower Skagit River fall-run. Recent harvest distribution data indicates that Skagit River summer/fall-run Chinook salmon are primarily caught in northern pre-terminal fisheries in Canada and Alaska (Table 3-5). However, harvest in U.S. net fisheries accounts for 20 percent of the observed harvest (Table 3-5). Since 2003, escapements for Upper Skagit River summer-run Chinook salmon have consistently exceeded its low abundance threshold as has the Lower Skagit River fall-run population except for 2011 (Table 3-6). Prior to 2007, the Lower Sauk summer-run population consistently was above its low abundance threshold but has fallen below it six times since 2007 and as recently as 2018 and 2019 (Table 3-6).

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Table 3-5. Skagit River fall-run Chinook salmon harvest distribution, 2008-2019.

Year	Harvest Distribution (%)				
	Alaska	Canada	U.S. Troll	U.S. Net	U.S. Sport
2008	13.6	38.4	0.0	44.3	3.7
2009	14.3	29.5	0.4	51.1	4.7
2010	22.9	46.3	1.3	18.5	11.0
2011	10.7	36.8	2.4	36.8	13.4
2012	42.3	40.8	0.0	11.5	5.4
2013	13.6	44.8	1.9	31.2	8.4
2014	31.8	47.4	1.4	10.9	8.5
2015	32.7	48.2	3.9	6.5	8.7
2016	17.4	63.3	1.6	6.4	11.2
2017	11.4	73.3	0.6	6.9	7.7
2018	12.0	59.8	2.4	4.8	21.0
2019	4.7	50.6	1.6	16.7	26.4
Average	**18.9**	**48.3**	**1.5**	**20.5**	**10.9**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on Skagit summer-run fingerling data)

Table 3-6. Spawning escapements of Skagit River summer/fall-run Chinook salmon populations, 2003-2019.

Year	Lower Skagit Fall (LAT=900) (number of fish)	Lower Sauk Summer (LAT=400) (number of fish)	Upper Skagit Summer (LAT=2,200) (number of fish)
2003	1,161	1,493	7,123
2004	3,070	443	20,040
2005	3,320	875	16,608
2006	3,508	1,095	16,165
2007	1,053	**383**	9,845
2008	2,685	538	8,441
2009	1,439	**250**	5,290
2010	1,017	**356**	6,644
2011	**820**	**210**	4,480
2012	3,295	715	9,808
2013	1,551	530	8,801
2014	1,785	**364**	8,308
2015	2,203	406	10,705
2016	2,921	1,044	15,423
2017	3,638	1,001	7,792
2018	1,923	**378**	8,602
2019	1,336	**319**	10,155

Numbers in bold highlight escapements below low abundance thresholds.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 10,986 hatchery-origin and natural-origin summer/fall-run Skagit Chinook salmon with 95 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 13,676 summer/fall-run Skagit Chinook salmon with 96 percent as natural-origin fish (WDFW 2020a). In 2021, there is an 18

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percent decrease in the total projected pre-season forecast of Skagit summer-fall-run Chinook salmon with a 19 percent decrease in natural-origin fish compared to 2020.

3.5.1.1.3 Skagit Spring-run Chinook Salmon

The Skagit River spring-run Chinook salmon management unit comprises three populations: Upper Sauk River, Suiattle River, and Upper Cascade River. Recent harvest distribution data indicates that Skagit River spring-run Chinook salmon are primarily caught in northern pre-terminal fisheries in Canada and in U.S. net fisheries (Table 3-7). Populations in the Skagit River spring-run Chinook salmon management unit have exceeded their low abundance threshold every year since 2003 except for the Suiattle River in 2007 and recently the Cascade River spring-run in 2018 (Table 3-8).

Table 3-7. Skagit River spring-run Chinook salmon harvest distribution, 2008-2019.

	Harvest Distribution (%)				
Year	**Alaska**	**Canada**	**U.S. Troll**	**U.S. Net**	**U.S. Sport**
2008	0.9	41.0	1.9	34.4	21.9
2009	1.3	34.8	2.9	41.8	19.1
2010	0.4	36.2	0.8	54.8	7.8
2011	1.3	31.1	0.0	52.7	14.9
2012	0.0	39.7	0.6	40.5	19.3
2013	2.6	31.1	0.9	54.5	10.8
2014	4.2	32.6	0.0	48.0	15.2
2015	2.4	28.2	1.4	39.9	28.2
2016	4.0	40.4	1.5	33.0	21.1
2017	2.5	42.5	0.1	43.3	11.6
2018	1.5	39.8	1.8	46.9	10.0
2019	2.6	15.5	0.0	59.0	22.9
Average	**2.0**	**34.4**	**1.0**	**45.7**	**16.9**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on Skagit River spring fingerling data)

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Table 3-8. Spawning escapements for Skagit River spring-run Chinook salmon populations, 2003-2019.

Year	Suiattle River (LAT=170) (number of fish)	Upper Sauk (LAT=130) (number of fish)	Upper Cascade (LAT=170) (number of fish)
2003	353	193	298
2004	495	700	380
2005	518	308	420
2006	375	1,043	478
2007	**108**	282	223
2008	203	983	284
2009	273	367	338
2010	263	768	330
2011	215	345	265
2012	460	1,826	488
2013	620	1,080	310
2014	460	923	225
2015	478	743	188
2016	648	1,486	295
2017	898	1,630	323
2018	645	1,603	**128**
2019	400	551	180

Note: Numbers in bold highlight escapement below low abundance thresholds.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 5,169 hatchery-origin and natural-origin Skagit spring-run Chinook salmon with 30 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 5,698 Skagit spring-run Chinook salmon with 28 percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there is a 10 percent decrease in total forecasted returns and 3 percent decrease in the natural-origin Skagit spring-run Chinook salmon pre-season forecast compared to 2020.

3.5.1.1.4 Stillaguamish Summer/Fall-run Chinook Salmon

The Stillaguamish River summer/fall-run Chinook salmon management unit comprises two populations: Stillaguamish River summer-run Chinook salmon and Stillaguamish River fall-run Chinook salmon. Recent harvest distribution data indicates more than three-quarters of the harvest of Stillaguamish River summer/fall-run Chinook salmon are harvested in Canadian fisheries and U.S. sport fisheries combmined (Table 3-9). Stillaguamish River summer/fall Chinook salmon escapement estimates have been below the revised low abundance threshold for eight of the last 17 years (Table 3-10).

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Table 3-9. Stillaguamish River summer/fall-run Chinook salmon harvest distribution, 2008-2019.

Year	Harvest Distribution (%)				
	Alaska	Canada	U.S. Troll	U.S. Net	U.S. Sport
2008	7.5	45.4	0.2	11.0	35.9
2009	4.7	43.9	0.6	14.2	36.5
2010	2.4	59.0	5.6	11.4	21.5
2011	4.9	69.1	2.0	7.2	16.8
2012	8.4	63.0	1.3	6.3	21.0
2013	6.7	47.4	7.8	7.4	30.7
2014	6.4	55.9	2.1	3.7	32.0
2015	7.7	57.2	1.9	8.2	25.0
2016	2.8	56.4	1.8	16.0	23.0
2017	4.9	57.4	3.6	8.3	25.8
2018	4.7	55.8	1.9	16.9	20.7
2019	9.9	46.1	0.4	18.9	24.7
Average	**5.9**	**54.7**	**2.4**	**10.8**	**26.1**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on Stillaguamish fall-run fingerling data)

Table 3-10. Spawning escapements for Stillaguamish River summer/fall-run Chinook salmon populations, 2003-2019.

Year	Stillaguamish Escapement [1] (LAT=1,200) (number of fish)
2003	1,346
2004	2,045
2005	1,427
2006	1,709
2007	**887**
2008	1,840
2009	1,388
2010	**977**
2011	1,810
2012	1,966
2013	**1,129**
2014	**563**
2015	**838**
2016	**1,194**
2017	1,212
2018	**1,118**
2019	**634**

Note: Numbers in bold highlight escapements below low abundance thresholds.

[1] Escapement is based on recent Genetic Mark Recapture (GMR) estimate and includes broodstock collection.

LAT=low abundance threshold.

In 2021, there is a pre-season terminal run-size forecast of 912 hatchery-origin and natural-origin Stillaguamish River summer/fall-run Chinook salmon with 36 percent of these fish as natural-

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origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season terminal runsize forecast of 901 Stillaguamish River summer/fall-run salmon with 40 percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there is a one percent increase in total returns and a 9 percent decrease in natural-origin Stillaguamish River summer/fall-run Chinook salmon pre-season forecast compared to 2020.

3.5.1.1.5 Snohomish Summer/Fall-run Chinook Salmon

The Snohomish River summer/fall-run Chinook salmon management unit comprises two populations: Skykomish River summer-run Chinook salmon and Snoqualmie River fall-run Chinook salmon. Recent harvest distribution data indicates more than 90 percent of the harvest of Snohomish River summer/fall-run Chinook salmon are harvested in Canadian fisheries and U.S. sport fisheries (Table 3-11). Natural-origin escapement of Snoqualmie River fall-run Chinook salmon fell below the low abundance threshold nine times since 2007 (Table 3-12). The Skykomish River summer-run population has fallen below its low abundance threshold eight times since 2007 (Table 3-12).

Table 3-11. Snohomish summer/fall-run Chinook salmon harvest distribution, 2008-2019.

	Harvest Distribution (%)				
Year	**Alaska**	**Canada**	**U.S. Troll**	**U.S. Net (%)**	**U.S. Sport**
2008	1.1	59.7	0.0	5.4	33.9
2009	0.0	38.6	4.0	0.0	57.4
2010	1.1	36.8	3.2	7.4	51.6
2011	1.4	26.7	3.7	1.8	66.4
2012	0.7	58.3	7.4	2.7	30.9
2013	1.7	65.4	4.6	1.7	26.6
2014	3.8	52.8	0.0	0.0	43.4
2015	4.8	30.0	9.6	5.2	50.4
2016	6.7	57.0	4.3	1.6	30.4
2017	4.9	61.0	1.9	1.1	31.2
2018	1.4	59.4	3.7	1.4	34.1
2019	4.5	47.7	0.0	1.3	46.5
Average	**2.7**	**49.5**	**3.5**	**2.5**	**41.9**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on Skykomish fall-run fingerling data)

AR004448

Table 3-12. Spawning escapements for Snohomish summer/fall-run Chinook salmon populations, 2007-2019.

Year	Skykomish (LAT=2,015 NOR) (number of NORs)	Snoqualmie (LAT=1,132 NOR) (number of NORs)
2007	**1,510**	1,174
2008	4,780	2,190
2009	**1,146**	**649**
2010	**1,836**	1,585
2011	**881**	**479**
2012	2,462	**898**
2013	**1,860**	**770**
2014	**1,654**	**698**
2015	**1,585**	**694**
2016	2,363	**1,013**
2017	2,783	1,401
2018	2,259	**823**
2019	**569**	**445**

Note: Numbers in bold highlight escapements below low abundance thresholds.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 8,973 hatchery-origin and natural-origin Snohomish River summer/fall-run Chinook salmon escapement without fishing, with 33 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 9,732 Snohomish River summer/fall-run Chinook salmon extreme terminal runsize without fishing, with 31 percent as natural-origin fish (WDFW 2020a). In 2021 there is an 8 percent decrease in total forecast and a two percent derease in natural-origin fish compared to 2020.

3.5.1.1.6 Lake Washington Fall-run Chinook Salmon

The Lake Washington fall-run Chinook salmon management unit is comprised of the Cedar River fall-run Chinook salmon. Recent harvest distribution data indicates that almost three-quarters of Lake Washington fall-run Chinook salmon are caught in Canadian fisheries and U.S. sport fisheries at almost equal proportions (

AR004449

Table 3-13). Harvest in U.S. troll and net fisheries account for 25 percent of total harvest (

AR004450

Table 3-13). Escapement in Lake Washington/Cedar River has exceeded the low abundance threshold of 200 natural spawners every year since 2003 (Table 3-14).

AR004451

Table 3-13. Lake Washington fall-run Chinook salmon harvest distribution, 2008-2019.

Year	Harvest Distribution (%)				
	Alaska	**Canada**	**U.S. Troll**	**U.S. Net**	**U.S. Sport**
2008	0.1	28.9	6.7	32.1	32.2
2009	0.3	37.6	5.8	28.0	28.3
2010	0.2	44.1	9.3	6.4	39.9
2011	0.9	32.4	8.1	19.0	39.6
2012	0.0	32.9	13.8	6.3	47.0
2013	1.8	32.3	11.7	8.8	45.5
2014	4.2	40.5	11.1	3.7	40.4
2015	1.0	35.6	20.1	5.1	38.2
2016	0.5	38.0	7.1	4.9	49.6
2017	0.7	37.7	13.2	15.7	32.6
2018	1.3	31.1	10.7	19.3	37.6
2019	1.5	25.6	7.5	11.2	54.2
Average	**1.0**	**34.7**	**10.4**	**13.4**	**40.4**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on South Puget Sound fall-run fingerling data)

Table 3-14. Spawning escapements for Lake Washington fall-run Chinook salmon, 2003-2019.

Year	Lake Washington/Cedar River (LAT=200) (number of fish)
2003	798
2004	1,225
2005	828
2006	1,468
2007	2,148
2008	1,498
2009	713
2010	665
2011	810
2012	1,083
2013	1,850
2014	580
2015	1,808
2016	1,045
2017	2,048
2018	813
2019	855

Note: Numbers in bold highlight escapements below low abundance thresholds.
LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 4,410 hatchery-origin and natural-origin Lake Washington fall-run Chinook salmon with 17 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 4,594 Lake Washington fall-run Chinook salmon with 18 percent as natural-origin fish (WDFW 2020a). Thus, in 2021 there

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is a 4 percent decrease in the total pre-season forecast with an 8 percent decrease in natural-origin Lake Washington fall-run Chinook salmon compared to 2020.

3.5.1.1.7 Green River Fall-run Chinook Salmon

The Green River fall-run Chinook salmon management unit comprises a single population. Recent harvest distribution data indicates that about two-thirds of Green River fall-run Chinook salmon are primarily caught in Canadian and U.S. sport fisheries at almost equal proportions (Table 3-15). Harvest in U.S. troll and net fisheries combined account for less than one-third (~30 percent) of total harvest mortality (Table 3-15). Escapement in Green River has exceeded the low abundance threshold every year since 2003, except in 2009 (

AR004453

Table 3-16).

Table 3-15. Green River fall-run Chinook salmon harvest distribution, 2008-2019.

Year	Harvest Distribution (%)				
	Alaska	**Canada**	**U.S. Troll**	**U.S. Net**	**U.S. Sport**
2008	0.0	25.7	7.2	45.0	22.1
2009	0.1	26.9	3.1	49.1	20.8
2010	0.0	50.7	7.0	8.3	34.0
2011	0.7	30.4	3.1	31.6	34.2
2012	0.0	36.4	10.9	9.7	43.1
2013	2.0	33.9	13.5	12.4	38.2
2014	7.4	31.1	14.1	17.0	30.4
2015	0.0	35.7	19.1	5.0	40.1
2016	0.0	48.3	7.4	4.6	39.6
2017	1.3	33.9	12.5	23.4	28.9
2018	0.9	28.5	10.2	32.5	27.9
2019	0.0	30.7	5.7	0.0	63.6
Average	**1.0**	**34.3**	**9.5**	**19.9**	**35.2**

Source: G.Johnson, personal communication (CWT derived total mortality distribution based on Green River fall-run fingerling data)

AR004454

Table 3-16. Spawning escapements for Green River fall-run Chinook salmon, 2003-2019.

Year	Total Natural Escapement (LAT=802) (number of fish)
2003	5,864
2004	7,947
2005	2,523
2006	5,790
2007	4,301
2008	5,971
2009	**688**
2010	2,092
2011	993
2012	3,090
2013	2,041
2014	2,730
2015	4,087
2016	10,063
2017	8,357
2018	6,891
2019	2,976

Source: Numbers in bold highlight escapements below low abundance thresholds.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 24,368 hatchery-origin and natural-origin Green River fall-run Chinook salmon with 16 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 25,179 Green River fall-run Chinook salmon with 9 percent as natural-origin fish (WDFW 2020a). Thus, in 2021 there is a 3 percent decrease in the total pre-season forecast and a 65 percent increase in natural-origin Green River fall-run Chinook salmon compared to 2020.

3.5.1.1.8 White River Spring-run Chinook Salmon

The White River spring-run Chinook salmon management unit comprises a single population. Over 90 percent of the harvest of White River Chinook salmon is caught in U.S. net and sport fisheries, combined, with U.S. net fisheries accounting for the majority of harvest (

Table 3-17). Since 2003, White River spring-run Chinook salmon has exceeded its low abundance threshold of 400 spawners (Table 3-18).

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Table 3-17. White River spring-run Chinook salmon harvest distribution, 2008-2019.

Year	Harvest Distribution (%)				
	Alaska	Canada	U.S. Troll	U.S. Net	U.S. Sport
2008	0.0	16.7	0.0	46.7	36.7
2009	0.0	0.0	0.0	9.4	90.6
2010	0.0	16.0	0.0	64.0	20.0
2011	0.0	0.0	0.0	100.0	0.0
2012	0.0	7.4	7.4	59.3	25.9
2013	0.0	0.0	0.0	100.0	0.0
2014	0.0	0.0	0.0	56.3	43.8
2015	0.0	15.0	0.0	67.5	17.5
2016	0.0	0.0	0.0	85.0	15.0
2017	0.0	0.0	0.0	100.0	0.0
2018	0.0	8.3	0.0	91.7	0.0
2019	0.0	0.0	0.0	100.0	0.0
Average	**0.0**	**5.3**	**0.6**	**73.3**	**20.8**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on White River spring-run yearling data).

Table 3-18. Spawning escapements for White River spring-run Chinook salmon, 2003-2019.

Year	Adults above Mud Mountain Dam (LAT=400) (number of fish)
2003	1,444
2004	1,479
2005	1,776
2006	2,144
2007	4,985
2008	2,188
2009	907
2010	1,007
2011	3,091
2012	2,394
2013	5,913
2014	882
2015	4,074
2016	3,626
2017	3,624
2018	3,677
2019	2,943

Note: Numbers in bold highlight escapements below the low abundance threshold.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 3,925 hatchery-origin and natural-origin White River spring-run Chinook salmon with 67 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 4,000 White River spring-run Chinook salmon with 61 percent as natural-origin fish (WDFW 2020a). Thus, in 2021 there is a

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two percent decrease in the total pre-season forecast with a 7 percent increase in natural-origin White River spring-run Chinook compared to 2020.

3.5.1.1.9 Puyallup River Fall-run Chinook Salmon

The Puyallup River fall-run Chinook salmon management unit comprises a single population. Recent harvest distribution data indicates that almost three-quarters of Puyallup River fall-run Chinook salmon are primarily caught in Canadian and U.S. sport fisheries at almost equal proportions (Table 3-19). Harvest in U.S. troll and net fisheries account for slightly less than 25 percent of total harvest mortality (Table 3-19). Since 2003, Puyallup River fall-run Chinook salmon has exceeded the low abundance threshold of 468 spawners (Table 3-20).

Table 3-19. Puyallup River fall-run Chinook salmon harvest distribution, 2008-2019.

	Harvest Distribution (%)				
Year	**Alaska**	**Canada**	**U.S. Troll**	**U.S. Net**	**U.S. Sport**
2008	0.1	28.9	6.7	32.1	32.2
2009	0.3	37.6	5.8	28.0	28.3
2010	0.2	44.1	9.3	6.4	39.9
2011	0.9	32.4	8.1	19.0	39.6
2012	0.0	32.9	13.8	6.3	47.0
2013	1.8	32.3	11.7	8.8	45.5
2014	4.2	40.5	11.1	3.7	40.4
2015	1.0	35.6	20.1	5.1	38.2
2016	0.5	38.0	7.1	4.9	49.6
2017	0.7	37.7	13.2	15.7	32.6
2018	1.3	31.1	10.7	19.3	37.6
2019	1.5	25.6	7.5	11.2	54.2
Average	**1.0**	**34.7**	**10.4**	**13.4**	**40.4**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on South Puget Sound fall-run fingerling data).

AR004458

Table 3-20. Spawning escapements for Puyallup River fall-run Chinook salmon, 2003-2019.

Year	Total Spawners (LAT=468) (number of fish)
2003	1,547
2004	1,843
2005	1,182
2006	2,400
2007	3,077
2008	3,068
2009	1,558
2010	1,619
2011	1,503
2012	993
2013	1,202
2014	1,470
2015	2,124
2016	2,700
2017	1,919
2018	2,805
2019	1,688

Note: Numbers in bold highlight escapements below the low abundance threshold.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 17,835 hatchery-origin and natural-origin Puyallup River fall-run Chinook salmon with 8 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 13,139 Puyallup River fall-run Chinook salmon with 13 percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there was a 36 percent decrease in the total pre-season forecast with a 16 percent decrease in natural-origin Puyallup River fall-run Chinook salmon compared to 2020.

3.5.1.1.10 Nisqually River Fall-run Chinook Salmon

The Nisqually River fall-run Chinook salmon management unit comprises a single population. Recent harvest distribution data indicates that just under half of Nisqually River fall-run Chinook salmon harvested are caught in U.S. net fisheries (Table 3-21). Since 2004, Nisqually River fall-run Chinook salmon have exceeded the low abundance threshold of 6,300 natural and hatchery escapement (Table 3-22) established in 2017 (Nisqually Chinook Workgroup 2017).

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Table 3-21. Nisqually River fall-run Chinook salmon harvest distribution, 2008-2019.

Year	Harvest Distribution (%)				
	Alaska	Canada	U.S. Troll	U.S. Net	U.S. Sport
2008	0.0	17.5	2.2	58.1	22.2
2009	0.0	11.3	3.7	59.1	25.9
2010	0.3	15.9	7.8	54.0	22.0
2011	0.0	14.7	8.1	38.7	38.5
2012	0.0	10.2	10.8	28.7	50.4
2013	0.0	15.1	7.2	45.1	32.5
2014	0.5	19.0	9.3	38.5	32.6
2015	0.2	13.0	13.0	38.4	35.5
2016	0.0	19.0	5.4	31.3	44.3
2017	0.0	20.2	7.8	47.6	24.5
2018	0.0	18.2	9.7	35.7	36.4
2019	0.0	9.8	5.5	47.6	37.1
Average	**0.1**	**15.3**	**7.5**	**43.6**	**33.5**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on Nisqually fall-run fingerling data)

Table 3-22. Total escapements (hatchery rack returns plus natural escapement) for Nisqually River fall-run Chinook salmon, 2004-2019.

Year	Total Escapement (LAT=6,300 total hatchery and natural escapement) (number of fish)
2004	11,013
2005	14,635
2006	12,714
2007	15,806
2008	7,684
2009	7,133
2010	19,810
2011	15,641
2012	15,575
2013	20,938
2014	8,154
2015	9,177
2016	15,774
2017	20,326
2018	10,373
2019	8,654

Note: Numbers in bold highlight escapements below the low abundance threshold.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 14,798 hatchery-origin and natural-origin Nisqually River fall-run Chinook salmon with 6 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 17,498 Nisqually River fall-run Chinook salmon with 5 percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there

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was a 15 percent decrease in the total pre-season forecast with a one percent increase in natural-origin Nisqually River fall-run Chinook salmon compared to 2020.

3.5.1.1.11 Skokomish River Fall-run Chinook Salmon

The Skokomish River fall-run Chinook salmon management unit comprises a single population. Recent harvest distribution data indicates that Skokomish River fall-run Chinook salmon are primarily taken during U.S. net and U.S. sport fisheries (Table 3-23). Escapement in the Skokomish River of fall-run Chinook salmon since 2001, fell below the low abundance threshold of 800 natural spawners in 2007 and 2015 (Table 3-24), although returns to George Adams Hatchery well exceeded its portion of the low abundance threshold of 500 fish.

Table 3-23. Skokomish River fall Chinook salmon harvest distribution, 2008-2019.

	Harvest Distribution (%)				
Year	**Alaska**	**Canada**	**U.S. Troll**	**U.S. Net**	**U.S. Sport**
2008	0.0	26.0	3.4	40.4	30.2
2009	0.0	40.7	5.4	12.5	41.4
2010	0.4	28.8	8.4	30.9	31.6
2011	0.0	15.1	5.0	30.9	49.1
2012	0.4	14.6	9.2	36.7	39.1
2013	1.1	27.7	11.9	21.0	38.2
2014	0.9	21.0	2.2	47.3	28.6
2015	0.0	9.7	10.6	48.9	30.8
2016	0.2	25.4	4.3	35.3	34.8
2017	0.1	26.1	5.4	47.2	21.1
2018	0.2	16.9	7.6	52.5	22.7
2019	0.0	10.4	3.1	55.7	30.9
Average	**0.3**	**21.9**	**6.4**	**38.3**	**33.2**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on George Adams fall fingerling harvest data).

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Table 3-24. Spawning escapements for Skokomish River fall Chinook salmon, 2003-2019.

Year	Total Natural Spawners (LAT=800 Natural spawners plus 500 hatchery returns) (number of fish)
2003	1,129
2004	2,398
2005	2,032
2006	1,209
2007	**531**
2008	1,134
2009	1,066
2010	1,214
2011	1,321
2012	1,533
2013	1,722
2014	849
2015	**432**
2016	1,342
2017	8,058
2018	2,459
2019	2,265

Note: Numbers in bold highlight escapements below the low abundance threshold.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 33,264 hatchery-origin and natural-origin Skokomish River fall-run Chinook salmon with one percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 38,378 Skokomish River fall-run Chinook salmon with one percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there is a 13 percent decrease in the total pre-season forecast with a 14 percent decrease in natural-origin Skokomish River fall-run Chinook salmon compared to 2020.

3.5.1.1.12 Mid-Hood Canal Fall-run Chinook Salmon

The Mid-Hood Canal fall-run Chinook salmon management unit comprises a single population spawning in the Hamma Hamma River, Duckabush River, and the Dosewallips River. Recent harvest distribution data indicates that Mid-Hood Canal fall-run Chinook salmon are primarily taken during U.S. sport and net fisheries (

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Table 3-25). The Mid-Hood Canal fall-run Chinook salmon population has only exceeded its low abundance threshold of 400 total natural spawners two times since 2003 (Table 3-26).

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Table 3-25. Mid-Hood Canal fall-run Chinook salmon harvest distribution, 2008-2019.

Year	Harvest Distribution (%)				
	Alaska	Canada	U.S. Troll	U.S. Net	U.S. Sport
2008	0.0	26.0	3.4	40.4	30.2
2009	0.0	40.7	5.4	12.5	41.4
2010	0.4	28.8	8.4	30.9	31.6
2011	0.0	15.1	5.0	30.9	49.1
2012	0.4	14.6	9.2	36.7	39.1
2013	1.1	27.7	11.9	21.0	38.2
2014	0.9	21.0	2.2	47.3	28.6
2015	0.0	9.7	10.6	48.9	30.8
2016	0.2	25.4	4.3	35.3	34.8
2017	0.1	26.1	5.4	47.2	21.1
2018	0.2	16.9	7.6	52.5	22.7
2019	0.0	10.4	3.1	55.7	30.9
Average	**0.3**	**21.9**	**6.4**	**38.3**	**33.2**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on George Adams fall fingerling preterminal only data).

Table 3-26. Spawning escapements for Mid-Hood Canal fall-run Chinook salmon, 2003-2019.

Year	Total Spawners (LAT=400) (number of fish)
2003	**194**
2004	**129**
2005	**45**
2006	**30**
2007	**73**
2008	**273**
2009	**130**
2010	**82**
2011	**289**
2012	429
2013	672
2014	**141**
2015	**259**
2016	**291**
2017	**374**
2018	**63**
2019	**21**

Note: Numbers in bold highlight escapements below low abundance thresholds.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 18 natural-origin Mid-Hood Canal fall-run Chinook salmon (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 39 Mid-Hood Canal fall-run Chinook natural-origin fish (WDFW 2020a). Thus, in 2021, there was a 53 percent decrease in natural-origin Mid-Hood Canal fall-run Chinook salmon compared to 2020.

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3.5.1.1.13 Dungeness River Spring-run Chinook Salmon

The Dungeness River spring-run Chinook salmon management unit comprises a single population. Recent harvest distribution data is unavailable for Dungeness River spring-run Chinook salmon population. Escapement of Dungeness River spring-run Chinook salmon has fallen below the low abundance threshold of 500 fish seven times since 2007 (Table 3-27). As a result, this population is often a constraining stock for fisheries harvest management. Terminal and pre-terminal U.S. fisheries are structured to minimize or avoid impacts upon this stock via restrictions on location, season timing, and/or harvest limits.

Table 3-27. Spawning escapements for Dungeness River spring-run Chinook salmon, 2003-2019.

Year	Total Escapement (includes natural-origin broodstock collected) (LAT=500) (number of fish)
2003	640
2004	1,014
2005	1,077
2006	1,543
2007	**403**
2008	**229**
2009	**220**
2010	**457**
2011	665
2012	614
2013	**277**
2014	**204**
2015	**407**
2016	523
2017	705
2018	905
2019	936

Note: Numbers in bold highlight escapements below the low abundance threshold.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 704 hatchery-origin and natural-origin Dungeness River Chinook salmon with 51 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 792 Dungeness River Chinook salmon with 36 percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there was an 11 percent decrease in the total pre-season forecast with a 24 percent increase in natural-origin Dungeness River Chinook salmon compared to 2020.

3.5.1.1.14 Elwha River Summer-run Chinook Salmon

The Elwha River summer-run Chinook salmon management unit comprises a single population. Recent harvest distribution data for return years 2015 through 2019 indicate that over 50 percent of the harvest of Elwha River summer-run Chinook salmon population occurs in Alaska and Canadian fisheries with approximately 40 percent harvested in U.S. sport fisheries (Table 3-28). Escapement of Elwha River summer-run Chinook salmon was below the low abundance threshold of 1,500 three times since 2003 (Table 3-29).

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Table 3-28. Elwha River summer-run Chinook salmon harvest distribution, 2015-2019.

Year	Harvest Distribution (%)				
	Alaska	Canada	U.S. Troll	U.S. Net	U.S. Sport
2015	13.6	25.0	0.0	0.0	61.4
2016	20.2	55.3	1.1	0.0	23.4
2017	15.7	51.8	0.0	0.0	32.5
2018	4.7	64.3	3.1	0.0	27.9
2019	15.6	21.1	5.6	1.7	56.1
Average	**13.9**	**43.5**	**1.9**	**0.3**	**40.3**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on Elwha River fingerling data).

Table 3-29. Spawning escapements for Elwha River summer-run Chinook salmon, 2003-2019.

Year	Escapement (LAT=1,500) (number of fish)
2003	2,305
2004	3,439
2005	2,238
2006	1,933
2007	**1,146**
2008	**1,153**
2009	2,192
2010	**1,278**
2011	1,863
2012	2,136
2013	5,510
2014	4,360
2015	4,112
2016	2,628
2017	3,100
2018	7,107
2019	7,500

Note: Numbers in bold highlight escapements below low abundance thresholds.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 4,800 hatchery-origin and natural-origin Elwha River summer-run Chinook salmon with 4 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 4,160 Elwha River summer-run Chinook salmon with 4 percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there is a 15 percent increase in the total pre-season forecast with a 16 percent increase in natural-origin Elwha River summer-run Chinook salmon compared to 2020.

3.5.1.1.15 Western Strait of Juan de Fuca Chinook Salmon

The Western Strait of Juan de Fuca Chinook salmon management unit comprises the Hoko River fall-run Chinook salmon population. However, NOAA did not include this population in the Puget Sound Chinook salmon ESU, which includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Strait of Juan

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de Fuca from the Elwha River eastward (50 Fed. Reg. 37160, June 28, 2005). Regardless, WDFW and the Puget Sound Treaty Tribes manage it under the Puget Sound Chinook Salmon Harvest Management Plan, and the fish are considered part of the Puget Sound region. Nearly 90 percent of the harvest of Hoko River fall-run Chinook salmon are caught in northern fisheries in Canada and Alaska, with relatively little harvest in U.S. fisheries (Table 3-30). Escapement of Hoko River fall-run Chinook salmon fell below the low abundance threshold in 2005, 2008, and 2009 but has seen stronger escapements in the last six years (Table 3-31).

Table 3-30. Hoko River fall-run Chinook salmon harvest distribution, 2008-2019.

	Harvest Distribution (%)				
Year	**Alaska**	**Canada**	**U.S. Troll**	**U.S. Net**	**U.S. Sport**
2008	46.4	53.6	0.0	0.0	0.0
2009	41.9	49.5	0.0	0.0	8.6
2010	39.0	52.4	6.7	0.0	1.9
2011	63.2	29.6	0.0	0.0	7.2
2012	36.7	49.7	6.5	0.0	7.0
2013	23.4	45.3	6.0	0.0	25.4
2014	41.6	47.0	2.0	0.9	8.5
2015	28.1	41.1	13.1	0.0	17.7
2016	27.3	54.9	0.4	1.1	16.3
2017	36.7	61.0	1.0	0.0	1.3
2018	21.7	66.8	0.8	0.0	10.7
2019	20.5	51.9	2.1	0.0	25.5
Average	**35.5**	**50.2**	**3.2**	**0.2**	**10.8**

Source: G. Johnson, personal communication (CWT derived total mortality distribution based on Hoko fall-run fingerling data).

Table 3-31. Spawning escapements for Hoko River fall-run Chinook salmon, 2003-2019.

Year	Escapement (LAT=500) (number of fish)
2003	1,098
2004	1,086
2005	**284**
2006	895
2007	568
2008	**483**
2009	**385**
2010	793
2011	1,504
2012	663
2013	1,406
2014	1,534
2015	2,888
2016	1,324
2017	1,188

2018	1,943
2019	1,815

Note: Numbers in bold highlight escapements below low abundance thresholds.

LAT=low abundance threshold.

In 2021, there is a pre-season forecast of 1,044 hatchery-origin and natural-origin Hoko River fall-run Chinook salmon with 61 percent of these fish as natural-origin fish (WDFW 2021a). In comparison, in 2020, there was a pre-season forecast of 2,240 Hoko River fall-run Chinook salmon with 63 percent as natural-origin fish (WDFW 2020a). Thus, in 2021, there is a 53 percent decrease in the total pre-season forecast with a 55 percent decrease in natural-origin Hoko River fall-run Chinook salmon compared to 2020.

3.5.1.1.16 Other Hatchery-origin Chinook Salmon Stocks

In addition to Chinook salmon natural-origin and hatchery-origin mixed stocks as described above, there are 10 Puget Sound hatchery-origin only summer/fall-run Chinook salmon stocks (these stocks are not listed) with 2021 pre-season forecasts resulting in a total of 85,275 hatchery-origin fish as shown below (WDFW 2021a):

- Glenwood Springs – 612 fish
- Nooksack/Samish – 19,412 fish
- Tulalip – 5,760 fish
- Grovers – 2,166 fish
- East Kitsap (Gorst, Dogfish) – 7,652 fish
- Carr Inlet – 7,580 fish
- McCalister – 371
- Deschutes – 5,951 fish
- Chambers – 685 fish
- Hoodsport – 35,086.

In comparison, the combined pre-season forecast total for these hatchery-origin fish in 2020 was 103,027 (WDFW 2020a). Comparing the total 2021 pre-season forecast with the total 2020 pre-season forecast results in a decrease of 17 percent in 2021.

3.5.1.2 Hood Canal Summer-run Chum Salmon

The ESA-listed Hood Canal summer-run chum salmon ESU comprises six distinct management units: Sequim Bay, Discovery Bay, Port Townsend, Quilcene/Dabob Bays, Mainstem Hood Canal, and Southeast Hood Canal. WDFW considers summer-run chum salmon as a species of concern. All management units are supported by a single stock except for the Mainstem Hood Canal management unit, which is made up of five existing populations, and the Southeast Hood Canal management unit, which consists of two stocks. Escapement thresholds are defined under the Base Conservation Regime (WDFW and Point No Point Treaty Tribes [PNPTT] 2000) for the Hood Canal summer-run chum salmon management unit (Table 3-32). Spawning escapements in all management units have exceeded the critical escapement thresholds each year since 2005 (Table 3-32).

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Harvest management of Hood Canal summer-run chum salmon is under the Base Conservation Regime (WDFW and PNPTT 2000). This regime restricts directed harvest of summer-run chum salmon and creates time and area closures, or the release of summer-run chum salmon during fisheries directed at other species. The Base Conservation Regime is anticipated to result in an average total exploitation rate of 10.9 percent (Range: 3.3 to 15.3 percent) for Hood Canal Region management units and 8.8 percent (range: 2.8 to 11.8 percent) for Strait of Juan de Fuca Region management units. Exploitation rate impacts from U.S. pre-terminal fisheries are expected to be 2.5 percent (range: 0.5 to 3.5 percent) in the Strait of Juan de Fuca while exploitation rates in terminal Hood Canal fisheries are expected to be 2.1 percent (range: 0.5 to 3.5 percent; WDFW and PNPTT 2000). Under the Base Conservation Regime, management objectives were met for Hood Canal summer-run chum salmon since 2005, except for the Quilcene extreme terminal escapement, which fell below its escapement management objective by 10 fish in 2009 (Table 3-33).

For 2021, forecasts for Hood Canal summer-run chum salmon are 10,180 fish with all fish as natural-origin fish (WDFW 2021b). In comparison, the 2020 runsize forecasts was for 10,752 summer-run chum salmon (WDFW 2020b), which represents a decrease of 5 percent for 2021.

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Table 3-32. Critical escapement thresholds and spawning escapement estimates (2005-2015) for Hood Canal summer-run chum salmon management units.

Management Unit	Critical Escapement Threshold (number of fish)	Return Year (number of fish)										
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Strait of Juan de Fuca (total)	**920**	**9,682**	**8,246**	**3,295**	**3,525**	**5,115**	**9,261**	**5,675**	**6,304**	**14,727**	**7,811**	**15,535**
Sequim Bay	200	1,310	725	654	1,058	2,628	4,027	2,411	2,590	8,341	3,400	6,532
Discovery Bay	720	6,974	5,492	1,713	1,740	1,466	3,264	2,621	2,814	3,320	2,955	7,688
Port Townsend (Chimacum)	NA	1,396	2,026	926	727	1,020	1,968	640	894	3,066	1,454	1,311
Hood Canal (total)	**4,070**	**15,751**	**26,753**	**10,781**	**15,403**	**7,423**	**12,742**	**6,972**	**30,057**	**22,807**	**27,585**	**32,752**
Quilcene/Dabob Bay	1,110	6,672	11,876	2,526	3,861	1,490	2,073	2,580	11,739	7,950	9,685	17,366
Mainstem Hood Canal	2,660	7,083	11,284	5,643	9,689	4,909	8,492	3,664	14,143	11,069	16,150	11,801
Southeast Hood Canal	300	1,991	3,585	2,590	1,830	991	2,116	621	3,651	2,811	999	2,028
Total for ESU	**4,990**	**25,433**	**34,999**	**14,076**	**18,928**	**12,538**	**22,003**	**12,647**	**36,361**	**37,534**	**35,396**	**42,287**

Source: PNPTT and WDFW (2014), Johnson T., (personal communication).

NA= Not available.

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Table 3-33. Base conservation exploitation rate limits and observed exploitation rates for Hood Canal summer-run chum salmon.

Fishery	BCR Limit (%)	Return Year (%)										
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Canada	6.3	0.2	0.1	0.5	0.6	0.5	0.2	0.3	0.3	0.1	0.2	0.2
U.S Pre-Terminal Fisheries	2.5	0.3	0.3	0.5	0.8	0.2	0.6	0.2	0.3	0.4	0.1	0.2
Hood Canal Terminal	2.1	0.2	0.9	4.0	0.1	0.2	0.7	0.4	0.7	1.6	0.5	0.5
Quilcene Extreme Terminal	1,500[1]	6,672	11,876	2,526	3,861	**1,490**	2,073	2,580	11,739	7,950	9,685	17,366
Regional Totals												
Juan De Fuca	8.8	0.5	0.4	0.9	1.4	0.6	0.7	0.5	0.5	0.5	0.3	0.4
Hood Canal[2]	10.9	0.7	1.3	4.9	1.5	0.8	1.4	0.9	1.2	2.1	0.8	0.9

[1] Quilcene Extreme Terminal fishery managed for a minimum escapement of 1,500.

Source: Point No Point Treaty Tribes and WDFW (2014), Johnson T. (personal communication).

Note: Values in bold indicate when management objectives were not met

BCR=base conservation exploitation rate

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3.5.1.3 Puget Sound Steelhead

The Puget Sound steelhead DPS comprises 32 demographically independent populations (DIPs) from three major population groups. Of the 32 DIPs, 23 populations are winter-run, 5 populations are summer-run, and 4 populations are summer/winter-runs (Table 3-34). Recent available escapement estimates for Puget Sound DIPs are provided in Table 3-35.

Table 3-34. ESA listed Puget Sound Steelhead Demographically Independent Populations (DIPs) within major population groups (MPG).

Major Population Group (MPG)	Winter-run DIPs	Summer/Winter Run DIPs	Summer Run DIPs
Northern Cascades MPG			
	Drayton Harbor Tributaries	Mainstem Skagit River	South Fork Nooksack River
	Nooksack River	Baker River	Deer Creek
	Samish River	Sauk River	Canyon Creek
	Nookachamps Creek Stillaguamish River		North Fork Skykomish River Tolt River
	Snohomish/Skykomish		
	Pilchuck River		
	Snoqualmie River		
Central and South Sound MPG			
	Cedar River		
	North Lake Washington and Lake Sammamish		
	Green River		
	Puyallup River/Carbon River		
	White River		
	Nisqually River		
	South Sound		
	East Kitsap		
Hood Canal and Strait of Juan de Fuca MPG			
	East Hood Canal	Dungeness River	
	South Hood Canal		
	Skokomish River		
	West Hood Canal		
	Sequim/Discovery Bay Independent Tributaries		
	Strait of Juan de Fuca Independent Tributaries		
	Elwha River		

Source: Puget Sound Steelhead Technical Recovery Team (2013).

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Table 3-35. Puget Sound steelhead spawning escapements, 2012-2020. Note some management units may constitute multiple DIPs (see Table 3-34).

Management Unit	Spawning year Escapement (Number of Fish)								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Nooksack River winter-run	1,747	1,805	1,521	2,081	1,842	1,714	2,006	N/A	N/A
Samish River winter-run	524	916	680	1,876	1,456	862	N/A	1,341	N/A
Skagit River summer/winter-run	6,185	8,727	9,084	8,644	7,918	6,380	6,084	4,314	N/A
Stillaguamish River winter-run[1]	338	514	362	566	684	428	422	422	504
Snohomish River winter-run	2,642	2,784	2,684	2,914	3,120	1,992	1,252	965	1,598
Green River winter-run	392	656	997	1,622	2,145	1,002	970	972	1,103
Puyallup River winter-run	233	447	531	926	1,563	672	974	847	688
White River winter-run	617	610	617	556	805	432	774	719	520
Lk. Washington/Cedar River winter-run	0	11	0	4	10	0	4	0	0
Nisqually River winter-run	269	699	593	1,126	2,035	616	1,738	1,950	1,411
Skokomish River winter-run	564	1,161	694	1,338	1,126	619	902	864	526
East Hood Canal winter-run	149	271	71	160	66	77	93	16	34
West Hood Canal winter-run	242	220	210	219	170	38	110	236	120
Dungeness River winter-run	NA	564	NA	618	NA	NA	306	467	N/A
Elwha River winter-run	NA	230-385	400	1,450	890	1,130	1,625	N/A	N/A
Sequim Port Townsend-Snow Creek winter-run	21	50	8	24	13	39	29	42	42
Port Angeles McDonald Creek winter-run	147	177	N/A	99	74	32	45	150	44
Total Escapement	**14,070**	**19,842 - 19,997**	**18,452**	**24,223**	**23,197**	**16,033**	**17,334**	**13,305**	**6,590**

[1] Stillaguamish estimate represents un-expanded index reach survey data.

Source: Northwest Fisheries Science Center (2015), WDFW and PSIT (2017a, 2018, 2019, 2020a, 2021a).

NA=Not available.

Listed Puget Sound steelhead are indirectly harvested in fisheries throughout the project area in marine and freshwater areas. Most harvest occurs in freshwater areas where hatchery produced steelhead are released from production facilities, particularly in the Snohomish River. Catch of listed steelhead is minimized due to earlier return timing for targeted hatchery-origin steelhead. In marine areas, steelhead harvest is minimal and of mixed origin (hatchery origin and natural

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origin) and, if outside the steelhead DPS area, harvest could be of unlisted natural-origin or hatchery-origin steelhead. Where releases of hatchery-origin steelhead are still allowed, hatchery-origin steelhead-directed fisheries are anticipated to continue. Incidental harvest is minimal in marine waters and freshwater fisheries targeting more abundant salmon stocks (e.g., spring-run Chinook salmon in the Skagit River and winter-run chum salmon in Nisqually and Puyallup River) or for ceremonial and subsistence purposes (WDFW and the Puget Sound Indian Tribes 2017, 2018, 2019, 2020a, and 2021a). Terminal harvest rate estimates for populations where sufficient escapement and harvest data are available indicate harvest impacts to Puget Sound steelhead are minimal with 2013-2020 average annual harvest rates below 2.0 percent per year (Table 3-36).

Table 3-36. Terminal natural-origin harvest rates on Skagit River summer/winter-run, Snohomish River winter-run, Green River winter-run, Puyallup River winter-run, and Nisqually River winter-run steelhead, 2013-2020.

		Terminal Harvest Rate (%)							
Management Unit	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Avg.**
Skagit River summer/winter-run	2.9	2.3	2.6	1.2	1.7	1.87	N/A	N/A	**2.1**
Snohomish River winter-run	0.9	1.1	0.9	1.0	1.0	1.2	1.1	0.9	**1.0**
Green River winter-run	2.0	2.4	1.1	1.0	0.9	0.5	0.3	0.4	**1.1**
Puyallup River winter-run	0.4	0.7	0.6	0.5	0.1	0.1	0.0	0.4	**0.3**
Nisqually River winter-run	2.5	1.1	1.3	0.8	0.0	0.1	0.05	0.0	**0.7**
Average	**1.7**	**1.5**	**1.3**	**0.9**	**0.7**	**0.8**	**1.7**	**0.4**	**1.1**

Source: Northwest Fisheries Science Center (2015), WDFW and the Puget Sound Indian Tribes (2017, 2018, 2019a, and 2020a).

Steelhead directed harvest is limited to hatchery-origin fish for commercial, recreational, and tribal harvests because natural-origin steelhead stocks are depressed throughout Puget Sound, and hatchery-origin steelhead have also experienced lower survival in the last 15 years. Limited commercial harvest occurs on the Snohomish River hatchery-origin stocks; elsewhere tribal harvest in Puget Sound is limited to nominal subsistence and ceremonial harvest.

Pre-season forecasts of steelhead abundance are published in January of each year. Thus, pre-season forecasts for the 2021-2022 fishing season are not available. The pre-season forecasts for the 2019-2020 fishing season are provided in Table 3-37 for those populations where sufficient information is available.

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Table 3-37. Steelhead 2019-2020 pre-season forecast, where data are confirmed by co-managers.

Management Unit	Hatchery-origin (Number of Fish)	Natural-origin (Number of Fish)	Total (Number of Fish)
Nooksack River winter-run	N/A	No Forecast	N/A
Whatcom Creek winter-run	0	-	0
Samish River winter-run	0	No Forecast	No Forecast
Skagit River summer/winter-run	N/A	N/A	N/A
Stillaguamish River winter-run	1,814	1,810	3,624
Stillaguamish River summer-run	62	No Forecast	62
Snohomish River winter-run	2,951	1,270	4,221
Snohomish summer-run	1,960	No Forecast	1,960
Green River winter-run	0	996	996
Green River summer-run	344	N/A	344
Puyallup River winter-run (includes White & Carbon River)	-	1,490	1,490
Lk. Washington/Cedar River winter-run	No Forecast		
Nisqually River winter-run	-	N/A	N/A
Skokomish River winter-run	-	887+ [1]	887+ [1]
East Hood Canal winter-run	-	63+ [1]	63+ [1]
West Hood Canal winter-run	-	208+ [1]	208+ [1]
South Hood Canal winter-run	-	87+ [1]	87+ [1]
Dungeness River winter-run	No Forecast	No Forecast	No Forecast
Elwha River winter-run	No Forecast		
Sequim Port Townsend-Snow Creek winter-run	No Forecast		
Port Angeles McDonald Creek winter-run	No Forecast		

Source: WDFW and Puget Sound Treaty Tribes 2019a.

[1] The "+" accounts for steelhead runs into streams in each DIP other than those shown in the table.

In April 2018, the NMFS approved a 4(d) harvest plan for Skagit River terminal steelhead fisheries (NMFS 2018). As a result, terminal Skagit River fishery impacts on steelhead are no longer considered under the Puget Sound Salmon Harvest Plan. Lacking sufficient data to forecast the 2021-2022 wild winter steelhead returns for the remaining primary management units with agreed to forecasts (Snohomish, Green, and Puyallup including White and Carbon River) the 2019-2020 wild winter steelhead forecasted escapements are used as a surrogate resulting in a forecast of 1,252. From 2016-2020 the average escapment for those three primary management units was 1,261 wild winter-run Steelhead, resulting in an estimated one percent reduction in the 2020/2021 surrogate forecast.

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3.5.2 Non-listed Salmon

3.5.2.1 Coho Salmon

The Puget Sound/Strait of Georgia coho salmon ESU includes populations from drainages of Puget Sound and Hood Canal, the Olympic Peninsula east of Salt Creek, the Strait of Georgia from the east side of Vancouver Island (north to and including Campbell River), and the British Columbia mainland (north to and including Powell River), excluding the upper Fraser River above Hope. While the Puget Sound/Strait of Georgia coho salmon ESU has been delineated spatially, the ESU is not listed as either threatened or endangered under the ESA or by Washington State.

Washington Department of Fisheries identified 40 coho salmon populations within the boundaries identified by NMFS for the Puget Sound ESU (Washington Department of Fisheries et al. 1993). While the majority of the populations were sustained by natural-origin spawning, only three of these populations (Sumas/Chilliwack, Skagit, and Deer Creek [Stillaguamish River]) were determined to be of native origin. The rest were classed as being of mixed, non-native, or unknown origin.

For harvest management purposes, co-managers group Puget Sound coho salmon populations into seven management units and further divide these into either natural-origin (five management units) or hatchery-origin (two management units) components. The Coho Salmon Comprehensive Management Plan identifies primary, auxiliary, and secondary management units with specific abundance breakpoints (normal, low, and critical) which control harvest impacts on each management unit (Puget Sound Treaty Tribes and WDFW 1998). In 2009, management break points and exploitation rates were updated for primary natural-origin coho salmon management units (Table 3-38): Skagit River, Stillaguamish River, Snohomish River, Hood Canal, and Strait of Juan de Fuca (Bowhay and Pattillo 2009). In 2018, both the Snohomish River and Strait of Juan de Fuca natural-origin coho salmon management units met criteria for overfished status, where the three-year geometric mean escapement fell below the minimum stock size threshold, pursuant to section 3.1 of the Pacific Coast Salmon Fishery Management Plan (PFMC 2019a). Rebuilding plans have been drafted for each stock and were finalized during the September 2019 Pacific Fisheries Management Council meeting (PFMC 2019b). For 2021, the Strait of Juan de Fuca primary natural-orign Coho management unit will be managed to no more than 10 percent SUS exploitation rates.

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Table 3-38. Management objectives for Puget Sound primary natural-origin coho salmon management units.

	Management Unit				
	Strait of Juan de Fuca	**Hood Canal**	**Skagit**	**Stillaguamish**	**Snohomish**
Critical Exploitation Rate (% Total)	20	20	20	20	20
Critical/Low runsize breakpoint (number of fish)	11,679	19,545	22,857	9,385	51,667
Low exploitation rate (%)	40	45	35	35	40
Low/normal runsize breakpoint (number of fish)	27,445	41,000	62,500	20,000	125,000
Normal exploitation rate (%)	60	65	60	50	60

Source: Bowhay and Pattillo (2009).

Note: Expressed as total exploitation rate ceilings for critical, low, and normal abundance status categories, with runsize breakpoints (abundances expressed as Ocean Age 3).

From 1991 through 2000, the average total (hatchery-origin and natural-origin combined) annual escapement of Puget Sound coho salmon populations was 385,122 coho salmon, of which 55 percent were naturally spawning (Table 3-39). The management units, and the portion of the coho salmon run for which they account, are: Hood Canal (16 percent), Nooksack-Samish (9 percent), Strait of Juan de Fuca (4 percent), Skagit (10 percent), Southern Puget Sound (29 percent) and Stillaguamish-Snohomish (31 percent) (Table 3-39).

Table 3-39. Average Spawning escapements for Puget Sound coho salmon management units, 1991-2000, 2001-2010, and 2011-2019**.**

	1991-2000		**2001-2010**		**2011-2019**	
Management Unit	**Hatchery-origin**	**Natural-origin**	**Hatchery-origin**	**Natural-origin**	**Hatchery-origin**	**Natural-origin**
Hood Canal	19,055	42,605	22,936	62,155	14,212	24,473
Nooksack-Samish[1]	27,357	8,966	22,637	11,804	15,933	8,154
Strait of Juan de Fuca	7,202	8,724	8,742	15,335	4,894	7,735
Skagit River	10,624	27,190	10,559	58,150	9,342	38,030
South Puget Sound[1]	85,344	26,141	80,957	27,292	59,455	30,322
Stillaguamish	71	15,129	66	33,571	50	27,855
Snohomish	22,361	83,356	12,376	134,499	8,468	65,302
Total	**172,013**	**213,109**	**158,273**	**342,804**	**112,353**	**201,831**

1) Primary hatchery management units of Nooksack-Samish and South Puget Sound were included for indication of overall abundance trend for entire the Puget Sound.

Source: Pacific Fisheries Management Council (2021a).

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From 2001 to 2010, the total annual escapement of Puget Sound coho salmon population groups averaged 501,076 fish, with 68 percent as natural origin (Table 3-39). The management units, and the portion of the coho salmon run for which they account, are: Hood Canal (17 percent), Nooksack-Samish (7percent), Strait of Juan de Fuca (5 percent), Skagit (14 percent), Southern Puget Sound (22 percent) and Stillaguamish-Snohomish (36 percent) (Table 3-39).

From 2011-2019, the total annual esapement of Puget Sound coho salmon averaged 314,184 coho salmon, with 64 percent of natural origin (Table 3-39). The management units, and the portion of the coho salmon run for which they account, are: Hood Canal (12 percent), Nooksack-Samish (8 percent), Strait of Juan de Fuca (4 percent), Skagit (15 percent), Southern Puget Sound (29 percent) and Stillaguamish-Snohomish (32 percent) (Table 3-39).

From 2011 through 2019, harvest of primary natural-origin Puget Sound coho salmon stocks in British Columbia averaged less than 10 percent, except for the Strait of Juan de Fuca stock (Table 3-40). Prior to 1997, Canadian fisheries accounted for 50 percent or more of the harvest of Puget Sound coho salmon stocks, before joint U.S. and Canadian conservation objectives were implemented for Puget Sound Fraser River coho salmon (Coho Technical Committee 2013a). Subsequently, Puget Sound fisheries now account for the vast majority of harvest of Puget Sound coho salmon stocks (Table 3-40).

Table 3-40. Percent of harvest distribution of Puget Sound primary natural-origin coho salmon stocks between Canadian (BC) and United States (US) fisheries, 2011-2019.

Return Year	Skagit River (%)		Stillaguamish (%)		Snohomish (%)		Hood Canal (%)		Strait of Juan de Fuca (%)	
	BC	US	BC	US	BC	US	BC	US	BC	US
2011	5.39	94.61	5.37	94.63	5.21	94.79	3.40	96.60	8.28	91.72
2012	2.50	97.50	1.37	98.63	1.27	98.73	1.41	98.59	4.69	95.31
2013	4.79	95.21	3.03	96.97	2.58	97.42	3.41	96.59	11.90	88.10
2014	12.77	87.23	6.98	93.02	6.48	93.52	10.08	89.92	32.70	67.30
2015	7.27	92.73	4.59	95.41	4.14	95.86	8.47	91.53	18.75	81.25
2016	8.14	91.86	2.60	97.40	2.49	97.51	3.55	96.45	34.62	65.38
2017	23.40	76.60	10.17	89.83	5.58	94.42	6.46	93.54	25.00	75.00
2018	7.85	92.15	10.67	89.33	9.60	90.40	6.99	93.01	36.00	64.00
2019	10.79	89.21	16.75	83.25	19.77	80.23	11.96	88.04	26.72	73.28
Average	**8.14**	**91.86**	**5.35**	**94.65**	**4.53**	**95.47**	**4.96**	**95.04**	**19.22**	**80.78**

Source: Coho Technical Committee (2012, 2013, 2014, 2015, 2017, 2018, 2019).

For 2021, Puget Sound forecasts for coho salmon were predicted by production unit and by hatchery-origin versus natural-origin fish (WDFW 2021c). A total of 614,948 coho salmon are forecasted to return with 40 percent as natural-origin fish. For natural management units, the largest forecasted stocks are expected from the Snohomish area, whereas the lowest forecasted natural management unit return are expected from the Strait of Juan de Fuca. In comparison, the 2020 runsize forecast was 504,604 coho salmon, with 32 percent as natural-origin fish (WDFW 2020c). The predicted total forecasts for Puget Sound coho salmon in 2021 represents a 23

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percent increase compared to 2020 forecasted abundance. Predicted forecasts for Strait of Juan de Fuca and Hood Canal in 2021 are lower compared to 2020, with 21 and 32 percent decrease, respectively, and greater for the Skagit, Stillaguamish, and Snohomish hatchery and natural origin abundance ranging from 37 to 64 percent increases.

3.5.2.2 Fall- and Winter-run Chum Salmon

Washington Department of Fisheries et al. (1993) identified 45 fall-run chum salmon populations in Puget Sound, including 9 populations in the northern area (Canada-Washington border to Stillaguamish), 30 populations in the southern area (Snohomish watershed south and Hood Canal), and 6 populations in the Strait of Juan de Fuca. The status was unknown for 13 populations and healthy for all other populations. Winter-run chum salmon occur primarily in south Puget Sound including the Puyallup and Nisqually Rivers. Puyallup River winter-run chum salmon are primarily maintained through hatchery propagation programs.

Total estimated runsize for Puget Sound fall-run chum salmon averaged slightly more than 1.0 million fish from 1968 through 1999, and just fewer than 1.5 million fish from 1991 through 1999. During the former period, runsizes fluctuated from a low of 156,000 fish to more than 2.4 million fish. From 2007 through 2016, the average estimated runsize to Puget Sound, including Strait of Juan de Fuca and Hood Canal, was 1.45 million chum salmon (Chum Technical Committee 2019). Forty-eight percent of the total run originated in Hood Canal, 39 percent in southern Puget Sound, 12 percent in northern Puget Sound, and less than 1 percent in the Strait of Juan de Fuca.

Harvestable abundance of Puget Sound chum salmon is determined based on abundance in excess of pre-defined escapement goals (Table 3-41). From 2007 to 2016, chum salmon harvest in the Puget Sound region has averaged 1.14 million chum salmon, including summer, fall, and winter runs (Chum Technical Committee 2019). For many Puget Sound fall-run chum salmon stocks, escapement goals vary between odd and even years, to accommodate for pink salmon on the spawning grounds (e.g., chum salmon escapement goals are lower during odd years when pink salmon returns are anticipated). Puget Sound chum salmon harvest operates in consideration of the Puget Sound Salmon Management Plan (PSSMP), with harvest defined by aggregate management units. For the South Puget Sound fall-run chum salmon aggregate management unit, this includes multiple individual stocks each with their own escapment goal. While the aggregate South Sound Chum management unit has met its escapement goal, the sum of the individual escapements, some individual components of the aggregate have failed to meet their goals in multiple years. As a result, terminal tribes have forgone harvest to allow more fish to escape to spawn. While the PSSMP allows for aggregate abundance management units, it also provides flexibility to co-managers to adapt management expectations in response to concerns for overall stock health. As a result, co-managers have adopted an interim management agreement for South Sound fall-run chum beginning in 2019 intended to redress tribal concerns for all stocks meeting escapement goals as well as a more equitable share of the burden of conservation, with the expectation that a long-term Comprehensive Chum Management Plan will be developed in the coming year. For 2021, given the continued decline in South Sound fall chum stocks and the historically low pre-season forecast for 2021, as well as concerns for incidental impacts to Nisqually winter chum stocks also forecasted below escapement, the co-

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managers (State and Tribal) have planned to forgo preterminal directed fisheries in Marine Areas 10 and 11 (and the associated impacts on Nisqually winter chum) as well as recreational fisheries directed at any of the South Sound chum stocks for the 2021 fishery (WDFW and Puget Sound Treaty Tribes 2021).

Table 3-41. Odd-year and even-year Puget Sound fall-run chum salmon escapement management objectives.

Management Unit	Odd Year (number of fish)	Even Year (number of fish)
Nooksack/Sammish	20,800	20,800
Skagit	40,000	116,500
Stillaguamish	13,100	33,100
Snohomish	9,000	28,000
Central/South Sound	65,000	85,000
South Sound fall-run NOR[1]	72,275	
Nisqually late-run	18,000	27,000
Hood Canal	39,900	54,250
Strait of San Juan de Fuca	3,600	3,600
Total	**191,400**	**341,250**

[1]For 2020, co-managers agreed to manage South Sound fall-run chum salmon to an average of the odd-year/even-year natural-origin aggregate escapment objective.

Escapement objectives for winter-run chum salmon in south Puget Sound are 32,273 fish during even-years. Winter-run chum salmon escapement estimates to south Puget Sound has averaged just over 42,000 from 2004-2013 with harvest averaging 20,083 over the same period (Chum Technical Committee 2019).

For 2021, runsize forecasts for chum salmon are predicted by run type (fall-run and winter-run) (WDFW 2021b). A total of 550,438 fish are predicted to return in 2021, with 54 percent representing natural-origin chum salmon. In comparison, the 2020 runsize forecast was 906,370 chum salmon with 57 percent representing natural-origin returns (WDFW 2020b). The 2021 pre-season forecast is 39 percent less than in 2020.

3.5.2.3 Pink Salmon

Because all pink salmon mature at 2 years of age, this species lacks variable age structure. Two broodlines (even- and odd-year) result from generations spawning in alternate years. Most Puget Sound pink salmon adults return to spawn in odd-numbered years, although one even-year population occurs in the Snohomish River (Hard et al. 1996; NOAA 1996). The co-manager pink salmon pre-season forecast for 2021 is 2,925,681fish (WDFW 2021b). Compared to the recent 2019 forecast of 608,388 pink salmon (WDFW 2019), the 2021 forecast is a 380 percent increase.

3.5.2.4 Sockeye Salmon

Washington Department of Fisheries et al. (1993) identified four distinct sockeye salmon populations in Puget Sound. The Baker River sockeye salmon (tributary to the Skagit River)

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contains a native population maintained through a hatchery culture program, and is considered an ESU (Gustafson et al. 1997). Three other populations occur within the Lake Washington system, the largest being that returning to the Cedar River. This non-native population originated from fry plants of Baker River sockeye salmon in the 1930s, and is maintained through natural-origin production and spawning throughout the 21 river miles below the Landsburg Diversion Dam. Returns to the Sammamish Slough and other small Lake Washington tributaries constitute the Bear Creek Provisional ESU, a population genetically dissimilar from the introduced Cedar River populations, and one that may be native to the Lake Washington system. Another distinct and possibly native population spawns on Lake Washington beaches.

Baker River sockeye salmon abundance from 1986 through 1995 increased by approximately 32 percent a year after a dismal return of 99 fish to the Baker River trap in 1985 (WDFW 2016e). From 1996 through 2009, returns were fairly stable averaging just over 7,000 adults to the trap with a peak in 2003 of 20,235 adults. In response to improved survival and passage through upgraded smolt collection facilities at Baker Lake and Lake Shannon, recent (2010-2015) returns to the Baker River trap have averaged more than 21,000 adults (WDFW 2016e), and were sufficient to provide some commercial and sport harvest opportunities, primarily in the terminal areas from 2015 through 2020. Because the migration of the Baker River sockeye salmon run occurs well in advance of the more abundant Fraser River and other more northern sockeye salmon runs, commercial net fisheries in the Strait of Juan de Fuca region likely have little impact on this run. Sockeye salmon are taken incidentally in the early weeks of the Bellingham Bay and Samish Bay Chinook commercial salmon-directed fisheries, but the origin of these fish is unknown. Sockeye salmon are rarely taken in marine sport fisheries in Washington, including those directed at Chinook salmon.

Sport and tribal commercial sockeye salmon fisheries in Lake Washington only occur in years where the escapement goal of 350,000 fish is expected to be met, which has not occurred since 2014. The highly popular sport fishery attracts tremendous angler effort when the season does open, and the allowable catch is taken within a few weeks or days. Impacts of marine salmon fisheries on Lake Washington sockeye salmon populations are not well-documented. Because the migration of this run occurs well in advance of the more abundant Fraser River and other more northern sockeye salmon runs, commercial net fisheries, at least in the Strait of Juan de Fuca region, likely have little impact on this run.

The co-managers' runsize forecast for 2020 was 13,242 sockeye salmon for Baker River (includes Baker Lake and Skagit River) and 20,824 sockeye salmon for Lake Washington, for a total of 34,066 sockeye salmon (WDFW 2020b). The 2021 runsize is forecasted for a total of 37,060 fish (12,253 fish to Baker River and 24,807 fish to Lake Washington) (WDFW 2021b) resulting in an overall increase of 9 percent.

3.5.3 Other Fish

Other fish affected by salmon and steelhead harvest include groundfish, forage fish, trout, sturgeon, and northern pikeminnow. Table 3-42 provides a description of how fish, other than salmon and steelhead, are affected by salmon and steelhead fishing in Puget Sound. Common groundfish include sole and flounder, rockfishes, surf perches, halibut, sculpins, spiny dogfish,

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lingcod, and Pacific cod. Rockfish constitute 30 percent of groundfish harvest and include listed species under the ESA. To conserve groundfish in Puget Sound, there are state management plans (WDFW 1998; WDFW 2011), as well as federal regulations and guidelines under the Magnuson-Stevens Fishery Conservation and Management Act. Forage fish are important prey of salmon and steelhead.

Bull Trout (technically a char) in the co-terminus U.S. are a federally listed ESA species (threatened status) representing a single Dinstinct Population Segment (DPS) which prey on salmon and steelhead, although not exclusively (USFWS 2015a). This species generally benefits from releases of juvenile salmon and steelhead but bull trout can also be accidentally caught as bycatch. Bull Trout present in the Action Area belong to the Coastal Recovery Unit of the DPS and are defined by three major geographic regions: Puget Sound, Olympic Peninsula, and Lower Columbia River (USFWS 2015b). The Coastal Recovery Unit is the only unit in the DPS with overlapping distribution with Dolly Varden (*Salvelinus malma*); a native char species that is not ESA listed but which looks nearly identical to the Bull Trout (Haas and McPhail 1991, in USFWS 2015). Data are lacking to sufficiently describe trends in abundance for Bull Trout within the Puget Sound Region, although current conditions in core areas of the region are likely stable overall, with some at depressed abundances (i.e. Puyallup River and Stillaguamish River; USFWS 2015b). Incidental encounters of Bull Trout in the Proposed Action are rare and would likely constitute less than ten Bull Trout a year across all fishery sectors in the Proposed Action (BIA and NMFS 2015). Never the less, fisheries promulgated under the Proposed Action do not target Bull Trout and are authorized by State or Native American Tribal laws and are therefore consistent with the USFWS 4(d) Rule (64 FR 58929, November 1, 1999) exempting take of Bull Trout encountered in fishing activities (NMFS and BIA 2015, USFWS 2017). Additional components of the 4(d) Rule also exempted select Bull Trout retention fisheries, none of which are components of the Proposed Action, to be maintained including in the mainstem Skagit River and several of its tributaries (Cascade, Suiattle, Whitechuck, and Sauk rivers) as well as the Snohomish River and the Skykomish River below the mouth (64 FR 58923, November 1, 1999 and WDFW 2018).

Rainbow trout, coastal cutthroat trout, and northern pikeminnow also benefit during juvenile salmon and steelhead migration from freshwater streams to estuaries and the ocean. Generally, when fish species are impacted from salmon and steelhead fishing, it is due to bycatch and derelict fishing gear. All fish benefit from marine-derived nutrients resulting from salmon spawning, and some fish species that are prey of salmon and steelhead benefit from harvest.

Table 3-42. Interaction and status of other fish species that may be affected by salmon and steelhead harvest in Puget Sound.

Species	Federal/State Listing Status	Interaction with Salmon and Steelhead Fisheries
Groundfish (80 species including rockfish)	Some species in depressed conditions. Two species are federally listed (one as threatened and one endangered) and/or have State	• Some species are predators of juvenile salmon and steelhead • Juveniles are prey for juvenile and adult salmon

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Species	Federal/State Listing Status	Interaction with Salmon and Steelhead Fisheries
	Candidate listing status[1]. The two listed species also have critical habitat in Puget Sound	• May be caught during marine sport salmon fisheries • Maybe impacted by lost/derelict net gear
Forage fish (herring, sandlance, smelt, hake, anchovy, Pollock, surf smelt, and others)	Pacific eulachon is a federally threatened species	• Prey for juvenile and adult salmon and steelhead
Bull trout[2]	Federally listed as threatened, critical habitat in Puget Sound	• Freshwater predator on salmon and steelhead eggs and juveniles • May benefit from additional marine-derived nutrients • May be caught in freshwater salmon sport fisheries, dependent on gear size
Rainbow trout	Not listed	• Predator of salmon and steelhead eggs and fry • May benefit from additional marine-derived nutrients • May be caught during freshwater salmon and steelhead sport fisheries
Coastal cutthroat trout	Not listed	• Predator of salmon and steelhead eggs and fry • May benefit from additional marine-derived nutrients • May be caught during salmon and steelhead sport fisheries
Green sturgeon	Federally threatened, critical habitat in Strait of Juan de Fuca	• May benefit from additional marine-derived nutrients • May be caught in sport and commercial salmon and steelhead fisheries.
Northern pikeminnow	Not listed	• Freshwater predator on salmon and steelhead eggs and juveniles • May be caught during freshwater salmon and sport fisheries if open in Lake Washington

[1] Georgia Basin bocaccio DPS (*Sebastes paucispinis*) – Federally listed as endangered and state candidate species; Georgia Basin yelloweye rockfish DPS (*S. ruberrimus*) – Federally listed as threatened and state candidate species; Black, brown, China, copper, green-striped, quillback, red-stripe, tiger, and widow rockfish are state candidate species.

[2] Bull trout (*Salvinlus confluentus*) Federaly listed as threatened by USFWS. A special 4(d) rule exempts fishery actions consistent with state or tribal fishery regulations from take prohibitions.

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3.5.4 Fish Habitat Affected by Salmon Fishing

Fish habitat affected by salmon and steelhead fishing includes open water, marine/benthic substrates, river sediments and bottoms, and aquatic vegetated areas in fresh and marine water. These habitats are affected by boat use and human disturbance and waste, light, and noise during fishing activities. Seines, reef nets, gill nets, and tangle nets may scour the seabed or river bottom. Fish gear may be lost and left as derelict fishing gear, which may cover fish habitat. A description of the effects of derelict fishing gear to wildlife is provided in Subsection 3.4.6, Derelict Fishing Gear. Stream wading by fishers can also result in trampling of salmon spawning redds.

3.5.5 Marine-derived Nutrients from Salmon and Steelhead Spawners

Salmon and steelhead carcasses, which occur in freshwater streams after spawning, provide a direct food source for juvenile salmonids and other fish, aquatic invertebrates, and terrestrial animals (Cederholm et al. 2000; Merz and Moyle 2006). The decomposition of carcasses supplies nutrients that increase primary and secondary production and benefit the ecosystem. The salmon and steelhead carcass biomass may be from both hatchery-origin and natural-origin fish. Salmon and steelhead carcasses may be placed in streams by hatchery operators in addition to natural spawning of salmon and steelhead. For a description of how salmon and steelhead carcasses benefit wildlife, refer to Section 3.4.2, Salmon Carcass Nutrient Benefits.

3.5.6 Selectivity of Biological Characteristics of Salmon and Steelhead

Selectivity refers to selection of specific fish features when fishing, such as size- or age-selective fisheries or selectivity pertinent to specific stocks or species. For example, the net size in gill-net fisheries could be used to select specific fish sizes. Concerning the effects of selectivity on fish size and maturity, a summary within the Puget Sound Harvest Management Plan (Puget Sound Treaty Tribes and WDFW 2004), concluded that there was no evidence of declining size or age at maturity for Puget Sound Chinook salmon based on existing harvest practices. A recent analysis by Ohlberger et al. (2018) suggests that Chinook salmon populations across the entire Northeast Pacific Ocean have experienced shifts in age structure as well as size at age. Given the large geographic extent from California to Alaska of Ohlberger et al. (2018) analysis, the observed shifts in size-at-age and varying fishery size limits regualtions by state, variation in gear selectivity, and range of estimated harvest impacts across the populations, the authors hypothesize that harvest is unable to explain the overall trend (Ohlberger et al 2018). Thus, selectivity for biological characteristics of salmon and steelhead has not yet been shown to be an effect of harvest and is not discussed further in this EA.

3.5.7 Harvest of Hatchery-origin Fish

Hatcheries provide a substantial portion of salmon and steelhead harvest. Benefits of hatcheries include helping increase salmon and steelhead abundances particularly for fisheries, and helping restore salmon populations when there is use of integrated and conservation hatcheries. Hatchery production for integrated and conservation hatcheries is intended for hatchery-origin salmon to return to spawn in natural areas outside of hatcheries. Hatchery risks include the potential for incidental harvest of natural-origin fish when hatchery-origin fish were intended (bycatch), and potential straying of hatchery fish into natural areas where the intention was not for spawning by hatchery-origin fish due to inappropriate genetic composition of the hatchery-

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origin stock. When hatchery-origin fish of inappropriate genetic composition spawn in natural areas it may result in loss of genetic diversity among natural-origin populations. In addition, when unintended hatchery-origin fish spawn in natural areas, these hatchery-origin fish could displace the natural-origin fish intending to spawn. For an overall summary of the effects on hatchery-origin salmon and steelhead on natural-origin salmon and steelhead, refer to NMFS (2004).

Harvest of hatchery-origin fish is intended to decrease impacts to natural-origin fish while still allowing harvest to occur. The majority of hatcheries in Puget Sound have been isolated hatcheries whereby the intent of producing hatchery-origin fish is for future harvest to compensate for lost natural productivity as a result of anthropogenic actions. Over time, more hatcheries are producing fish for conservation purposes, thereby expecting some hatchery-origin fish to return to spawning grounds while continuing to supplement harvest actions.

3.5.8 Treaty Indian Ceremonial and Subsistence Salmon Uses

Ceremonial and subsistence uses pertain to fish that are caught non-commercially by members of Puget Sound treaty tribes. Salmon and steelhead harvested for ceremonial and subsistence purposes provide basic nutritional benefits to their members and help to maintain the intrinsic and essential cultural values imbued in traditional fishing practices and spiritual links with natural resources (Puget Sound Indian Tribes and WDFW 2004). Thus, ceremonial and subsistence fishing are important to maintaining cultural viability, and provide valuable food resources, among other traditional foods, in tribal ceremonies. Examples of ceremonies that use traditional foods include winter ceremonies, first salmon ceremonies (Amoss 1987), naming ceremonies, giveaways, feasts, and funerals (Meyer Resources 1999). Subsistence refers to ways in which Native Americans use natural resources, such as salmon and steelhead, to meet the nutritional needs of tribal members.

Members of the Puget Sound treaty tribes prioritize their ceremonial and subsistence needs over commercial sales. Tribes may fish for ceremonial and subsistence uses when there are no concurrent commercial fisheries, and may use some of their commercial harvest for ceremonial and subsistence purposes. For an overall summary of treaty Indian ceremonial and subsistence salmon uses, refer to NMFS (2003). From 2014 through 2018, Puget Sound tribes have averaged 21,747 salmon and steelhead a year for ceremonial and subsistence purposes. Coho salmon and sockeye salmon account for almost 50 percent of the harvest for ceremonial and subsistence fisheries.

3.6 Invertebrates

There are over 3,000 species of invertebrates in Puget Sound including crustaceans, mollusks, echinoderms, annelids, arachnids, insects, krill, and zooplankton among others. About 1,200 benthic (bottom dwelling) invertebrates (also known as benthos) live in soft sediments in Puget Sound (Dutch et al. 2014). These invertebrate communities can be impacted through the use of fishing gear that is dragged over the seabed, which can result in displacement and possibly mortality of benthic communities, although gear utilized in the proposed action is not intended to

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be in contact with the substrate. This impact also occurs in other fisheries (groundfish and shellfish) as described in Section 3.4.6, Derelict Fishing Gear.

Many invertebrate species serve as prey for salmon and steelhead or are prey consumed by other fish that are then consumed by salmon and steelhead. As a result, invertebrates can serve as transporters of pollutants through the food chain to fish (Hasan 2016).

Although it was previously thought that PCBs and other pollutants quickly disperse to bottom sediments and then were consumed by benthos, recent research has indicated that the PCBs and other pollutants can also be picked up by bacteria or plankton in the water column before the pollutants reach the surface bottom (Dunagan 2016). The plankton are then consumed by krill and other organisms as the pollutants move up the food chain to higher order predators. One reason that more pollutants may be consumed within open water and prior to descending to sediments within Puget Sound is because of the deeper water depth of the area compared to other larger estuaries within the United States (average depth is 205 feet in Puget Sound and deepest depth is 905 feet).

Benthos have been regularly sampled in Puget Sound since 1997 through the Puget Sound Ecosystem Monitoring Program. The information is used to develop a suite of structural abundance and diversity indices and an overall benthic index. Recent results indicate that the benthic community composition varies between locations, and significant declines in its overall health have been observed. A study conducted by Ecology that compared 2008 to 2009 data with 1998 to 1999 data throughout Puget Sound found that adverse effects to benthos increased from 7 percent of the study area in 1998 to 1999 to 28 percent of the study area in 2008 to 2009 (Partridge et al. 2013). Study summary conclusions were that the declining sediment quality, particularly benthic community health, is of concern because it was observed almost everywhere in Puget Sound. Although 72 percent of the area of Central Puget Sound was recorded to have non-impacted surface sediments, the proportion represents a significant drop from the 93 percent of the area that had un-impacted sediments in 1998 to 1999. It is believed that adversely impacted benthos have spread away from heavily urbanized/industrial portion of Elliott Bay and Commencement Bay into areas which previously had unaffected benthos.

3.7 Socioeconomics

This section describes salmon and steelhead harvest and related economic conditions for the 2020-21 fishing season, based on consideration of salmon and steelhead abundance and fishery management actions taken in 2020 to manage commercial and sport fishing in the Puget Sound region. Modeled estimates of the salmon and steelhead commercial harvest (including that by tribal and non-tribal fishers) are identified, and levels of sport fishing activity targeting salmon and steelhead in marine and fresh waters of Puget Sound are also presented.

The distribution of the commercial salmon and steelhead harvest and sport fishing activity within Puget Sound also is described. Commercial catch and sport fishing trips are presented for five areas within the project area that collectively make up the Puget Sound region: Strait of Juan de Fuca, North Puget Sound, Central Puget Sound, South Sound, and Hood Canal. For context,

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historical information on commercial harvest and sport fishing activity in these areas between 2000 and 2011 is included in Appendix C, *Socioeconomics Methods.* Marine catch areas associated with these five areas are shown in Figure 1-1.

Fishing activities associated with Puget Sound salmon and steelhead fisheries contribute to the regional economy, which for purposes of this assessment, consists of the three multi-county subregions: North Puget Sound subregion (including Whatcom, Skagit, Snohomish, Island and San Juan Counties), South Puget Sound/South Hood Canal subregion (including King, Pierce, Thurston, Mason, and Kitsap Counties), and Strait of Juan de Fuca/North Hood Canal subregion (including Clallam and Jefferson Counties). Estimates of economic activity related to commercial harvest and sport fishing activity are presented by county of origin in Appendix C, *Socioeconomics Methods*. Sectors of the regional economy that are most affected by commercial and sport fishing activity also are identified.

In addition to the value to salmon and steelhead fishers and the regional economy, Puget Sound salmon and steelhead resources are considered to be a source of value to persons who do not directly use or consume these resources. Reducing the likelihood for species extinction, or by providing more certainty that these resources will exist even if no personal use is intended are concepts of economic value that are widely recognized (NOAA 2004). These values are commonly referred to as non-use or passive use values. Although these values are not quantified or analyzed for this assessment, their existence should be acknowledged.

Finally, it should be noted that table values and corresponding values in the sections are not rounded to aid the reader in finding corresponding numbers between tables and text. The use of unrounded numbers, however, should not be interpreted as suggestive of unusually high levels of precision in the estimates. All numbers presented represent a reasonable approximation of the underlying values.

3.7.1 Commercial Salmon and Steelhead Fisheries

The commercial harvest (both tribal and non-tribal) of salmon and steelhead caught in the marine and fresh waters of Puget Sound under modeled 2020 Existing Conditions are presented inTable 3-43. Of the estimated 887,456 fish commercially harvested, the most frequently harvested species of salmon and steelhead expected in 2020-21 commercial fisheries were chum salmon (613,326 fish) and coho salmon (150,831 fish) (Table 3-43). The number of steelhead expected to be caught commercially (tribal fishers only) was estimated at 285 fish.

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Table 3-43. Commercial salmon harvest under modeled 2020 Exisiting Conditions by species and Puget Sound catch area.

SPECIES/CATCH AREA	Modeled 2020 Existing Conditions[1]	
	Number of Fish	% of Species Total
Chinook Salmon		
Strait of Juan de Fuca (Catch Area 5, 6)	3,808	3.1
North Puget Sound (Catch Area 7)	18,135	14.9
Central Puget Sound (Catch Area 8, 9)	8,212	6.7
South Puget Sound (Catch Area 10,11,13)	41,341	34.0
Hood Canal (Catch Area 12)	50,217	41.3
Total	**121,713**	**100.0**
Coho Salmon		
Strait of Juan de Fuca (Catch Area 5, 6)	9,677	6.4
North Puget Sound (Catch Area 7)	30,802	20.4
Central Puget Sound (Catch Area 8, 9)	22,254	14.8
South Puget Sound (Catch Area 10,11,13)	59,130	39.2
Hood Canal (Catch Area 12)	28,968	19.2
Total	**150,831**	**100.0**
Sockeye Salmon		
Strait of Juan de Fuca (Catch Area 5, 6)	0	0
North Puget Sound (Catch Area 7)	0	0
Central Puget Sound (Catch Area 8, 9)	1,300	100
South Puget Sound (Catch Area 10,11,13)	0	0
Hood Canal (Catch Area 12)	0	0
Total	**1,300**	**100.0**
Pink Salmon		
Strait of Juan de Fuca (Catch Area 5, 6)	0	0
North Puget Sound (Catch Area 7)	0	0
Central Puget Sound (Catch Area 8, 9)	0	0
South Puget Sound (Catch Area 10,11,13)	0	0
Hood Canal (Catch Area 12)	0	0
Total	**0**	**0.0**
Chum Salmon		
Strait of Juan de Fuca (Catch Area 5, 6)	322	0.1
North Puget Sound (Catch Area 7)	129,071	21.0
Central Puget Sound (Catch Area 8, 9)	18,512	3.0
South Puget Sound (Catch Area 10,11,13)	96,672	15.8
Hood Canal (Catch Area 12)	368,749	60.1
Total	**613,326**	**100.0**
Steelhead		
Strait of Juan de Fuca (Catch Area 5, 6)	95	33.3
North Puget Sound (Catch Area 7)	105	36.8
Central Puget Sound (Catch Area 8, 9)	85	29.8
South Puget Sound (Catch Area 10,11,13)	0	0.0
Hood Canal (Catch Area 12)	0	0.0
Total	**285**	**100.0**

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SPECIES/CATCH AREA	Modeled 2020 Existing Conditions[1]	
	Number of Fish	% of Species Total
ALL SPECIES		
Strait of Juan de Fuca (Catch Area 5, 6)	13,902	1.6
North Puget Sound (Catch Area 7)	178,113	20.1
Central Puget Sound (Catch Area 8, 9)	50,364	5.7
South Puget Sound (Catch Area 10,11,13)	197,143	22.2
Hood Canal (Catch Area 12)	447,935	50.5
Total	**887,456**	**100.0**

Notes:

[1] Modeled 2020 Existing Conditions = 2020-21 estimated harvest, as predicted by FRAM 2020 model run.

Source: Estimates provided by NWIFC.

In terms of fish commercially harvested by area, the Hood Canal subregion (Catch Area 12) accounted for the largest estimated share of the salmon and steelhead harvest in the modeled 2020 Existing Conditions, constituting about 51 percent of the total salmon and steelhead landed in waters of Puget Sound (Table 3-43). The South Puget Sound subregion accounted for just over 22 percent of the fish commercially harvested, followed by the North Puget Sound subregion (20.1 percent), Central Puget Sound subregion (5.7 percent), and the Strait of Juan de Fuca subregion (1.6 percent). As presented in Appendix C, *Socioeconomics Methods*, the commercial catch of salmon and steelhead throughout Puget Sound varies considerably from year to year.

The economic value of salmon and steelhead commercially harvested in Puget Sound fisheries can be measured in terms of the monetary value of the harvest to fishery participants, including commercial fishers (boat operators and/or permit holders) and crewmembers. As discussed in Section 3.7.3, Contribution of Puget Sound Commercial and Recreational Salmon and Steelhead Fisheries to the Regional Economy, salmon and steelhead fisheries also are a source of economic value for suppliers of goods and services to commercial fishers.

Revenues received by commercial fishers for their harvest are referred to as ex-vessel values (i.e., the dollar value that commercial fishers receive for their product once it leaves the fishing vessel). Under modeled 2020 Existing Conditions, the total ex-vessel value of salmon and steelhead landed at Puget Sound ports is estimated at $11,305,500 (Table 3-44). In addition to salmon and steelhead harvested from marine and fresh waters of Puget Sound, salmon and steelhead harvested by tribal and non-tribal fishers in Alaska, British Columbia, and Coastal Oregon and Washington are landed at Puget Sound ports, but these values are not included in Table 3-44. Based on NOAA analyses (NOAA 2004), an estimated 92 percent of the total value of all salmon and steelhead landings at ports in Puget Sound is from Puget Sound waters. Under modeled 2020 conditions, the ex-vessel value of landings of Puget Sound-caught salmon and steelhead at ports in the North Puget Sound subregion accounted for $4,410,400, salmon caught in South Puget Sound waters accounted for $6,352,700, and catch in the Strait of Juan de Fuca subregion accounted for $542,300 (Table 3-44).

Table 3-44. Commercial salmon landings and associated ex-vessel value under modeled 2020 Existing Conditions, by Puget Sound subregion.

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Region	Value	% of Total for All Regions
North Puget Sound Region		
Non-Tribal		
Harvest (thousand fish)	149.1	58.4
Ex-vessel harvest value ($ thous.)	1,475.6	56.1
Tribal		
Harvest (thousand fish)	265.5	42.0
Ex-vessel harvest value ($ thous.)	2,934.9	33.8
Total		
Harvest (thousand fish)	414.6	46.7
Ex-vessel harvest value ($ thous.)	4,410.4	39.0
South Puget Sound Region		
Non-Tribal		
Harvest (thousand fish)	97.3	38.1
Ex-vessel harvest value ($ thous.)	1,011.7	38.5
Tribal		
Harvest (thousand fish)	344.7	54.5
Ex-vessel harvest value ($ thous.)	5,341.1	61.6
Total		
Harvest (thousand fish)	442.0	49.8
Ex-vessel harvest value ($ thous.)	6,352.7	56.2
Strait of Juan de Fuca Region		
Non-Tribal		
Harvest (thousand fish)	9.1	3.6
Ex-vessel harvest value ($ thous.)	142.9	5.4
Tribal		
Harvest (thousand fish)	21.8	3.4
Ex-vessel harvest value ($ thous.)	399.4	4.6
Total		
Harvest (thousand fish)	30.9	3.5
Ex-vessel harvest value ($ thous.)	542.3	4.8
Total (all regions)		
Non-Tribal		
Harvest (thousand fish)	255.5	100
Ex-vessel harvest value ($ thous.)	2,630.2	100
Tribal		
Harvest (thousand fish)	632.0	100
Ex-vessel harvest value ($ thous.)	8,675.3	100
Total		
Harvest (thousand fish)	887.5	100
Ex-vessel harvest value ($ thous.)	11,305.5	100

Note: All values are expressed in 2020 dollars.

Net economic value is a measure of net revenues (profits) to commercial fishers, and is estimated as the amount of revenues (based on ex-vessel value) received by vessel operators less the costs of production (including wages), operational expenses (e.g., fuel and equipment), and amortized fixed costs (e.g., depreciation). Based on average net economic value factors per fish species

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(refer to Appendix C, *Socioeconomic Methods*), the net economic value of the Puget Sound commercial salmon and steelhead harvest under modeled 2020 Existing Conditions is estimated at $6.6 million.

In summary, under modeled 2020 Existing Conditions, commercial salmon and steelhead fisheries in Puget Sound can be characterized by a total commercial harvest of an estimated 887,500 salmon and steelhead (Table 3-43), with an ex-vessel value of landings at Puget Sound ports of $11,305,500 (Table 3-44). Of the salmon and steelhead caught commercially in the marine and fresh waters of Puget Sound, about 51 percent are caught in the Hood Canal subregion (Catch Area 12) (Table 3-43). Of total commercial harvest, tribal harvest accounts for about 71 percent of commercial catch, and an estimated 77 percent of total ex-vessel value (Table 3-44), largely because tribal fishers harvest a greater proportion of the higher value fish and non-tribal fisheries must balance harvest between commercial and recreational interests (see Section 3.7.2). Approximately 50 percent of the total salmon landed at Puget Sound ports were caught in the Hood Canal subregion (Table 3-43).

Additional information on the economic contribution of the commercial harvest of salmon and steelhead is described in Subsection 3.7.3, Contribution of Puget Sound Commercial and Recreational Salmon and Steelhead Fisheries to the Regional Economy.

3.7.2 Recreational Salmon and Steelhead Fisheries

Sport fishing for salmon and steelhead is a popular recreational activity in Puget Sound. Under the modeled 2020 Existing Conditions, an estimated 477,450 sport fishing trips targeting salmon and steelhead in marine and fresh waters occurred throughout Puget Sound. Of this total, an estimated 143,509 sport fishing trips occurred in marine waters of Puget Sound, and an estimated 333,941 trips occurred targeting salmon and steelhead in fresh waters of the Puget Sound region (Table 3-45). Approximately 50 percent of all sport fishing trips for salmon and steelhead occurred in the South Puget Sound subregion (Table 3-45).

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Table 3-45. Marine and freshwater sport fishing trips and associated trip-related expenditures by Puget Sound catch area.

Type of Recreational Fishery	Modeled 2020 Existing Conditions	
	Value (trips or dollars)	% of Total
Marine		
Strait of Juan de Fuca (Catch Area 5, 6)	35,129	24.5
North Puget Sound (Catch Area 7)	20,382	14.2
Central Puget Sound (Catch Area 8, 9)	15,660	10.9
South Puget Sound (Catch Area 10,11,13)	57,747	40.2
Hood Canal (Catch Area 12)	14,592	10.2
Total Marine Trips	143,509	100.0
Marine Trip-Related Angler Expenditures ($ Thous.)	$ 27,331	37.1
Freshwater		
Strait of Juan de Fuca (Catch Area 5, 6)	3,173	1.0
North Puget Sound (Catch Area 7)	56,917	17.0
Central Puget Sound (Catch Area 8, 9)	77,836	23.3
South Puget Sound (Catch Area 10,11,13)	179,539	53.8
Hood Canal (Catch Area 12)	16,477	4.9
Total	333,941	100.0
Freshwater Trip-Related Angler Expenditures ($ Thous.)	$ 46,420	62.9
All Waters		
Strait of Juan de Fuca (Catch Area 5, 6)	38,301	8.0
North Puget Sound (Catch Area 7)	77,299	16.2
Central Puget Sound (Catch Area 8, 9)	93,496	19.6
South Puget Sound (Catch Area 10,11,13)	237,285	49.7
Hood Canal (Catch Area 12)	31,068	6.5
TOTAL TRIPS	477,450	100.0
TOTAL TRIP-RELATED EXPENDITURES ($ Thous.)	$ 73,751	100.0

Note: All dollar values are expressed in 2020 dollars.

In terms of the distribution of catch by salmon and steelhead species, pink salmon, coho salmon, and Chinook salmon are the primary species caught by sport anglers. Coho salmon and Chinook salmon are predominantly caught in the marine waters of Puget Sound, whereas pink salmon, chum salmon, sockeye salmon, and steelhead are predominantly caught in freshwater areas. Major launching areas and marinas used by anglers are dispersed throughout the Puget Sound region (NOAA 2004).

The economic value of the Puget Sound salmon and steelhead sport fishery can be estimated by approximating the value of salmon and steelhead fishing to anglers. In addition, recreational fisheries contribute value to sport fishing-related businesses (including guides, charter boat operators, and other businesses such as bait and tackle stores, lodging places, food stores and restaurants, and miscellaneous retail stores), as described in Section 3.7.3, Contribution of Puget Sound Commercial and Recreational Salmon and Steelhead Fisheries to the Regional Economy. The value to anglers is measured by their willingness to pay for fishing opportunities, including what anglers actually pay to fish (i.e., angler spending) plus the additional amount that they would be willing to pay to continue to fish. The amount that anglers would be willing to pay over

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and above what they actually pay measures the net economic value (or surplus value received) to anglers.

Based on the estimated number of sport fishing trips (which for purposes of this assessment is assumed to be equivalent to angler days) under modeled 2020 Existing Conditions 477,450 trips, including 143,509 marine trips and 333,941 freshwater trips (Table 3-45) and an estimated $190 per trip for marine fishing and $139 per trip for sport fishing in fresh water (refer to Appendix C, *Socioeconomics Methods* for details), trip-related spending associated with sport fishing for salmon and steelhead in the Puget Sound project area is estimated at $73,751,000. Based on NMFS information (NOAA 2004), anglers who reside in Washington State account for about 93 percent of all sport fishing trips for salmon and steelhead in Puget Sound.

As indicated above, the net economic value of recreational salmon and steelhead fisheries represents the additional (or net) willingness by anglers to pay to fish for salmon and steelhead. Based on an estimated net economic value of $72 per trip, the estimated 477,450 sport fishing trips (Table 3-45) that were estimated to occur under modeled 2020 Existing Conditions generates an estimated $34,588,000 in net economic values (refer to Appendix C, *Socioeconomic Methods* for details).

In summary, recreational salmon and steelhead fisheries in Puget Sound under modeled 2020 Existing Conditions can be characterized by the estimated 477,450 sport fishing trips made for salmon and steelhead in Puget Sound marine and fresh waters, $73,751,000 in trip-related expenditures, and $34,588,000 in net economic values. Note that sport fishing trips in freshwater accounted for about 70 percent of all sport fishing trips for salmon and steelhead. Pink salmon, coho salmon, and Chinook salmon are the primary species sought by sport anglers, with pink salmon predominantly caught in freshwater areas, and coho and Chinook salmon predominantly caught in marine waters of Puget Sound.

3.7.3 Contribution of Puget Sound Commercial and Recreational Salmon and Steelhead Fisheries to the Regional Economy

Commercial and sport fisheries in the Puget Sound region generate economic activity that can be characterized by various economic measures. For this assessment, employment and personal income are used to estimate economic activity generated by commercial and recreational salmon and steelhead fishing activity in the Puget Sound project area. The distributional effects on employment and personal income of the commercial harvest and sport fishing trips targeting salmon and steelhead are characterized by Puget Sound subregion.

Economic activity generated by commercial and sport fishing activity is concentrated within certain sectors of the regional economy. For example, in addition to the fish harvesting sector, commercial fisheries affect seafood product preparation and packing (including the canning and curing of seafood) and prepared fresh or frozen fish or seafood (which affects fish processing, wholesaling, and restaurant sectors). Sectors particularly affected by sport fishing activity include those that provide food services, eating and drinking establishments, lodging, and fuel.

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The number of jobs (as measured in terms of full-time equivalents, or FTEs) and the amount of personal income generated by commercial and recreational salmon and steelhead fisheries in the Puget Sound region under modeled 2020 Existing Conditions are presented in Table 3-46. For both commercial and recreational fisheries, the largest regional impact on jobs and personal income occurs in the South Puget Sound subregion (Table 3-46).

Table 3-46. Regional economic effects of commercial and recreational salmon and steelhead fisheries under modeled 2020 Existing Conditions, by subregion.

Subregion	Value	% of Fishery Total
North Puget Sound		
Commercial Fisheries		
Personal income ($ Thous.)	7,972	39.0
Jobs	140	40.5
Recreational Fisheries		
Personal income ($ Thous.)	19,231	32.3
Jobs	318	35.4
South Puget Sound		
Commercial Fisheries		
Personal income ($ Thous.)	11,483	56.2
Jobs	184	53.2
Recreational Fisheries		
Personal income ($ Thous.)	36,892	61.9
Jobs	504	56.1
Strait of Juan de Fuca		
Commercial Fisheries		
Personal income ($ Thous.)	967	4.7
Jobs	22	6.3
Recreational Fisheries		
Personal income ($ Thous.)	3,461	5.8
Jobs	77	8.5
Puget Sound (all regions)		
Commercial Fisheries		
Personal income ($ Thous.)	20,422	100
Jobs	345	100
Recreational Fisheries		
Personal income ($ Thous.)	59,584	100
Jobs	899	100

Note: All dollar values are expressed in 2020 dollars. Jobs are expressed in full-time equivalents.

Under modeled 2020 Existing Conditions, commercial salmon and steelhead fisheries to the Puget Sound regional economy supported 345 FTEs and generated $20,422,000 in personal income, and sport salmon and steelhead fisheries supported an estimated 899 FTEs and generated $59,584,000 in personal income (Table 3-46).

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3.8 Environmental Justice

This subsection was prepared in compliance with Presidential Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Fed. Reg. 7629, February 16, 1994) and Title VI of the Civil Rights Act of 1964. Executive Order 12898 states that federal agencies shall identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects of [their] programs, policies and activities on minority populations and low-income populations." Through analysis conducted under this Environmental Justice section, the BIA intends to ensure fair treatment, equal protection, and meaningful involvement for minority and low-income populations to meet compliance with Executive Order 12898 and Title VI.

Both Executive Order 12898 and Title VI address persons belonging to the following target populations:

- **Minority** – Includes all people of the following origins: Black/African American, Asian, American Indian and Alaskan Native, Native Hawaiian or Other Pacific Islander, and Hispanic (which is an ethnic and cultural identity and is not the same as race).
- **Low Income** – Includes persons whose household income is at or below the U.S. Department of Health and Human Services poverty guidelines.

Definitions of minority and low income areas were established on the basis of the Council on Environmental Quality's (CEQ's) Environmental Justice Guidance under the NEPA of December 10, 1997. CEQ's guidance states that "minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis." The CEQ further adds that "[t]he selection of the appropriate unit of geographical analysis may be a governing body's jurisdiction, a neighborhood, a census tract, or other similar unit that is chosen so as not to artificially dilute or inflate the affected minority population."

The CEQ guidelines do not specifically state the percentage considered meaningful in the case of low-income and minority populations, and as a result, there is no consistent method for identifying "meaningfully different" used for NEPA documents. As a result of this confusion for determining a "meaningfully different" low income or minority population, the CEQ (2016) recently published a federal agency work group agreement that recommends use of three approaches for determining a meaningful different population including the following:

- **50 Percent Analysis.** This analysis considers 50 percent or more of a population is represented by a minority or low-income population.
- **No Threshold Analysis.** Provide data (number and percent of populations) and maps to identify the minority populations, geographic units, reference community and rationale for selecting the geographic unit of analysis, the reference community, and other methods to identify the minority populations.

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- **Meaningful Greater Analysis.** Similar to the other methods, data is provided on minority populations by selected geographic unit. Minority and low-income populations are determined based on a threshold. As an example, CEQ provides either 10 or 20 percent greater than the reference community.

All three methods as described above are considered as a possibility for use to identify minorities and low-income populations. The unit of measurement for this EA is the county for which 12 counties represent the project area.

- **50 Percent Analysis.** There is no county within the project area that has at least 50 percent minority or low-income populations. In addition, there are no minority populations substantially involved in fisheries harvest other than Native Americans (which are considered as a separate topic under Environmental Justice). Thus, use of a 50 percent analysis would not indicate that a minority population or low-income population could be affected by the Proposed Action; thus not needing an analysis under Environmental Justice.
- **No Threshold Analysis.** Because no other minority, other than Native Americans, are known to have a strong interest in fisheries harvest, this analysis would not result in any minority being considered as a community of concern. There are also no publications regarding economic groups of concern in Puget Sound, other than Native Americans, that are known to be dependent on fisheries harvest and considered a low-income community. However, in its analysis of low-income communities that may be affected by changes in fisheries harvest, NMFS (2014) identified two ports to be considered as environmental justice groups of concern. Using this analysis, which is historical information on fishing by selective groups, ports but not minorities would be considered as populations to evaluate for environmental justice.
- **Meaningful Greater Analysis.** Considering examples in the CEQ guidance (2016) and the meaningful threshold used in the Puget Sound Hatchery EIS (NMFS 2010), a threshold of 10 percent was considered for this evaluation (i.e., the community represents more than 10 percent of the minority or low-income community that resides in the state of Washington).

To be conservative, both the No Threshold Analysis (for ports) and the Meaningful Greater Analysis (for minorities) were used to identify low-income and minority populations, respectively, for the analysis.

3.8.1 Low Income

Using USDA Economic Research Service Data for 2019, the poverty levels for Washington State and counties within the project area were calculated (Table 3-47). The 2019 poverty level (including rural and urban areas) varies by family unit size and number of children under 18 years old and ranges from $12,261 for a single family 65 and older to $56,895 for a family unit of nine with one child under 18 (US Census Bureau 2020). There are five counties (Clallam,

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Jefferson, Mason, Skagit, and Whatcom counties) that have a percent poverty level greater than 10 percent of the state percent poverty level. Thus, these five counties are considered environmental justice communities of concern for this analysis.

Table 3-47. Percent of population below poverty level within the project area.

State/County	Percent Below Poverty Level (2019)[1] (%)	Per Capita Income (2017)[2] ($)
Washington	9.8	69,288
Clallam	**11.2**	47,767
Island	7.3	60,786
Jefferson	**12.6**	54,884
King	7.7	88,466
Kitsap	7.5	70,531
Mason	**12.8**	58,228
Pierce	9.4	65,517
San Juan	8.1	61,268
Skagit	**11.2**	60,175
Snohomish	7.0	81,779
Thurston	9.1	68,765
Whatcom	**12.7**	60,028

Sources: [1]https://data.ers.usda.gov/reports.aspx?ID=17826

[2] https://www.ofm.wa.gov/washington-data-research/economy-and-labor-force/median-household-income-estimates

Note: Numbers in bold represent communities that exceed the threshold criteria.

As described in NMFS (2014) there are two ports to be considered as low-income communities for commercial fishing: Bellingham Bay (Whatcom County) and Shelton (Mason County). Although Neah Bay is also considered a low-income port, the community is outside the analysis area.

3.8.2 Minority

Using Washington State Office of Financial Management data (2020) (which relies on U.S. Census Bureau information) to calculate percent minority for Washington State and each county within the project area, percent minority populations were calculated (Table 3-48) with the following county minorities greater than 10 percent of the state minority population:

- Asian – King and Snohomish Counties
- Black – King and Pierce Counties
- Hispanic – Skagit County
- Native Hawaiin or Other Pacific Islander: King, Kitsap, Pierce, and Thurston Counties

Thus, King, Kitsap, Pierce, Skagit, Snohomish, and Thuston Counties are considered to support minority environmental justice communities of concern.

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Table 3-48. Percent of minority persons by county and race within the project area.

State/County	Total Population (2020)	Hispanic (%)	Black/African American (%)	American Indian/Alaska Native[1] (%)	Asian (%)	Native Hawaiian Pacific Islander (%)
Washington	7,656,200	13.4	4.3	1.8	9.6	0.8
Clallam	76,770	6.5	1.1	**5.6**	2.0	0.2
Island	85,530	7.2	2.7	0.9	5.6	0.6
Jefferson	32,190	3.6	1.0	**2.5**	2.1	0.3
King	2,260,800	10.3	**7.2**	1.0	**19.3**	**0.9**
Kitsap	272,200	7.7	3.3	1.7	6.1	**1.1**
Mason	65,650	10.5	1.3	**4.6**	1.5	0.5
Pierce	900,700	11.2	**7.9**	1.6	7.6	**1.8**
San Juan	17,340	7.0	0.6	0.9	1.6	0.1
Skagit	130,450	**20.3**	1.0	**2.8**	2.5	0.3
Snohomish	830,500	10.9	3.3	1.6	**12.1**	0.6
Thurston	291,000	8.9	3.3	1.6	6.7	**1.0**
Whatcom	228,000	9.7	1.2	**3.2**	4.7	0.3

Source: Washington Office of Financial Management 2021

[1] Puget Sound treaty tribes are considered as user groups of concern separately.

Numbers in bold represent communities that exceed the threshold criteria.

3.8.3 Native American

USEPA guidance regarding environmental justice extends beyond statistical threshold analyses to consider explicit environmental justice effects on Native American tribes (USEPA 1998). Federal duties under Executive Order 12898, the presidential directive on government-to-government relations and the trust responsibility to Indian tribes may merge when the action proposed by another federal agency or the USEPA potentially affects the natural or physical environment of a tribe. The natural or physical environment of a tribe may include resources reserved by treaty or lands held in trust; sites of special cultural, religious, or archaeological importance (e.g., sites protected under the National Historic Preservation Act); and other areas reserved for hunting, fishing, and gathering (i.e., usual and accustomed area), which may include "ceded" lands that are not within reservation boundaries. Potential effects of concern may include ecological, cultural, human health, economic, or social impacts when the impacts are interrelated to impacts on the natural or physical environment (USEPA 1998).

As described in Section 3.3, Socioeconomics, salmon and steelhead fishing has been a focus for tribal economics, cultures, lifestyles and identities for more than 1,000 years. These activities continue to be important today both economically and for subsistence and ceremonial purposes (Stay 2012; Northwest Indian Fisheries Commission 2013). Tribal fishing (including commercial, subsistence, and ceremonial) is considered a very important lifestyle for all Puget Sound tribes. The following tribes are considered federally recognized treaty tribes in the action area for the 2021-2022 Puget Sound fisheries plan: Lummi, Nooksack, Swinomish, Upper Skagit, Sauk-Suiattle, Stillaguamish, Tulalip, Muckleshoot, Puyallup, Nisqually, Squaxin Island,

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Skokomish, Suquamish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Makah.

In summary, the following are identified as environmental justice communities or user groups, which includes the following ports, counties, and target populations:

- Low income – Clallam, Jefferson, Mason, Skagit, and Whatcome Counties and two ports in Puget Sound (Bellingham Bay and Shelton)
- Minority – King, Kitsap, Pierce, Skagit, Snohomish, and Thuston Counties
- Indian Tribes – Federal trust responsibility

3.9 Recreation and Recreational Fishing

Outdoor recreation is an important component of Washington residents' lifestyle, and there are a variety of opportunities to conduct these activities in federal, tribal, state, and local parks and private areas (e.g., golf courses). About 8 of every 10 residents visit a county, city, or state park on an annual basis (Washington State Recreation and Conservation Office 2013).

Washington residents spend an average of 56 days a year recreating outdoors, which results in a total of $21.6 billion dollars in annual expenditures with expenditures highest for recreation associated with public waters (Earth Economics 2015). Local parks have been the most common place for people to visit, as well as the most accessible and least costly destinations (Earth Economics 2015). These local parks often provide docks to offload boats where parks are alongside a water body. Of the 23 million acres available for recreation, public waters (fresh water and marine water) constitute 12 percent of this area (Earth Economics 2015).

In 2006, recreational fishing directly and indirectly supported an estimated 12,850 jobs and generated an estimated $424 million net economic values (over and above expenditures) to the estimated 725,000 residents who live and fish in Washington, suggesting that sport fishing substantially contributes to anglers' quality of life (TCW Economics 2006). An estimated 538,000 anglers participated in freshwater fishing in Washington State in 2006 (TCW Economics 2006). Altogether, during 2006, recreational anglers in Washington spent an estimated $904.8 million on fishing-related equipment and trip-related items such as food, lodging, transportation, and other trip expenses. As shown in Table 3-45. , an estimated 477,450 sport fishing trips occurred in Puget Sound in 2020 with the most popular areas for salmon and steelhead in the South Sound subregion. Primary species caught by anglers were coho salmon and Chinook salmon. As shown in Table 3-45. , trip-related expenditures are $73,751,000.

Fishing is considered a popular activity by Washington State residents, which had an increase in activity from 2006 to 2012 for fishing from a boat (8 percent) and for fishing from a bank, dock, or jetty (12 percent) (Washington State Recreation and Conservation Office 2013). Based on surveys conducted by Washington State, residents have stated that they desire more opportunities to conduct fishing activities (Washington State Recreation and Conservation Office 2013).

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For recreationists who desire to fish, Washington State salmon fishing regulations are complex and vary by season, salmon species, catch allowed, location, and fishing type. The regulations are necessary due to the need to 1) protect weak stocks and fish listed under the ESA, 2) share harvest between treaty tribes and other state residents, 3) meet requirements of the Pacific Salmon Treaty, and 4) address dis-orderly fisheries (WDFW 2016c). These state fishing regulations change on a regular basis due to changes in fish abundance, distribution, and catch quotas. Fishers in Washington State are required to report their catch of salmon and steelhead.

3.10 Marine Protected Areas

There are 127 Marine Protected Areas in Washington, of which 109 areas occur within the project area (Van Cleve et al. 2009). The majority of these areas are in the greater San Juan Islands. The Marine Protected Areas are owned, regulated, and/or managed by 12 federal, state, or local agencies with Washington State agencies responsible for managing the most protected areas with the highest acreage. The Marine Protected Areas may also be termed as aquatic reserves, refuges, marine preserves, conservation areas, parks, research reserves, recreation areas, and/or sanctuaries. The majority of these areas require that harvest of natural resources is restricted within the reserve (97 percent), although a few areas have no harvest restrictions, and some areas completely prohibit harvest (16 percent) (Van Cleve et al. 2009). Fishers are required to adhere to each Marine Protected Area's harvest requirements. The WDFW Sport Fishing Regulation Pamphlet (WDFW 2016d) identifies Marine Protected Areas where salmon and steelhead harvest is not allowed.

3.11 Noise and Light

Fishing, wherever conducted, results in a small amount of noise and light pollution in marine and freshwater areas through boat operations and use of lighting for work, travel, and/or lodging after sunset. Although boat lighting during harvest can be considered a negligible impact in comparison to shoreline lighting that occurs from residents and industry (and which has been cited as an impact to biological organisms), noise caused by fishing boats contributes to the overall noise levels in the aquatic environment. Boat use creates noise from propellers, motors, gears, and waves that are hit by boats (Wozny 2003).

Effects to aquatic organisms from noise include inner ear damage, hemorrhaging, impaired hearing, permanent deafness and disruption of equilibrium (Wozny 2003). In areas of loud noises and use of aquatic devices, fish, birds, and marine mammals move away from the noise source, although damage may have already occurred to the animals. Although there are federal regulations intended to protect aquatic species from loud noises (ESA, Migratory Bird Treaty Act, Marine Mammal Protection Act), it is difficult to regulate operations that, at times, cause loud noises. In addition, noise from separate incidences results in cumulative impacts to aquatic organisms over time. An exemption to the Marine Mammal Protection Act in 1994 by Congress allows the use of acoustic deterrence or harassment devices for fishing even if this could result in take of a marine mammal.

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3.12 Public Health and Safety

3.12.1 Public Health

Since 1989, WDFW collected fish tissue data that Washington Department of Health (DOH) analyzed to determine long-term trends in contaminant levels in Puget Sound fish (DOH 2006). Its results indicate that the contaminants of concern are limited to polychlorinated biphenyls (PCBs) and methylmercury (mercury) based on frequency of detection, contaminant concentrations, and contaminant toxicity. These two contaminants were detected with sufficient frequency and of high enough levels to warrant an assessment of human health risk. PCBs and mercury were frequently observed in aquatic organisms due to their persistence, toxicity, and ability to bio-accumulate and/or bio-magnify. The species sampled by DOH included rockfish, English sole and other flat fish, Chinook salmon, and coho salmon (DOH 2006).

DOH issues yearly fish consumption advice for people consuming Puget Sound marine fish, the latest which occurred in September 2015 (DOH 2015). Based on its findings, DOH recommends that Chinook salmon may be consumed once (eight ounces) per week or four times per month for fish caught in Puget Sound. Resident Chinook salmon (also referred to as blackmouth) should be further limited to two times per month because these fish appear to accumulate more PCBs than Chinook salmon that migrate to the ocean. Although sampled by DOH, the agency did not recommend restrictions for coho salmon. DOH also did not recommend restrictions on sockeye salmon, pink salmon, and chum salmon but stated that data from other sources resulted in these salmon species having very low PCB levels, which was due primarily to their life history and diet (DOH 2006, 2015). DOH did not analyze salmon and steelhead from freshwater rivers and streams.

3.12.2 Safety

According to the National Institute for Occupational Safety and Health (NIOSH), commercial fishing is one of the most hazardous occupations in the United States with a fatality rate 39 times higher than the national average (NIOSH 2016). Since 1991, the NIOSH Western States Division office in Alaska has conducted studies of fishing safety to reduce the incidence of injuries and fatalities among the nation's fishermen. Those studies show that the greatest dangers to fishermen were vessel disasters, falls overboard, and machinery on deck causing on-deck injuries, which accounted for 92 percent of fatalities to commercial fishermen in the United States between 2000 and 2014 (NIOSH 2016). The remaining 8 percent of fatal injuries in that time period can be split into two areas: diving injuries (5 percent) and on-shore injuries (3 percent).

For the West Coast Region, Dungeness crab and tribal salmon fisheries have the highest number of fatalities on the West Coast (NIOSH 2010). An example NIOSH cited was the tribal salmon fishery on the Columbia River, which claimed many lives from 2000 to 2009. These deaths were attributed to a single cause: skiffs capsizing on the river. All but one of the skiffs capsized after being swamped by waves in poor weather conditions. NIOSH (2016) recommends approaches to minimize and decrease boating accidents. Their recommendations to prevent injuries and deaths on fishing skiffs are to (1) wear a PFD in the skiff, especially in bad weather, (2) avoid going out in conditions that exceed the safe operating limits of the skiff, and (3) have emergency communications equipment onboard to call for help. All Puget Sound fishing associated with

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harvest of salmon and steelhead should be considered potentially hazardous and safety procedures and guidelines as required and/or recommended by regulations and NIOSH should be followed to minimize accidents that impact the safety of boat passengers.

3.13 Indian Trust Assets – Fishing

In *United States v. Washington* the United States District Court for the Western District of Washington ruled that the Puget Sound Treaty Tribes "shall have" the right to take up to 50% of the harvestable number of fish that may be taken by all fishermen at usual and accustomed grounds and stations in the state and that non-treaty fisherman would also have the right to take up to 50%. *United States v. Washington,* 384 F. Supp. 312, 343 (W.D. WA 1974). The decision and its progeny resulted in the Tribes and WDFW becoming co-managers of the Project Area fisheries. The United States, acting through the BIA, as the plaintiff in *United States v. Washington,* has supported the Tribes' co-management activities.

To annually confirm an equitable sharing of the anadromous fisheries resource and as explained in Section 1, Introduction, Section 1.5.2, Fisheries Co-Management, and Section 2.2, Background; WDFW and Puget Sound treaty tribes meet during spring of each year to review expected salmon and steelhead returns and agree on sharing of the fisheries resource for the upcoming year's harvest. The annual agreement is then published as the Co-Managers' List of Agreed Fisheries, the most recent of which is described by WDFW and Puget Sound Treaty Tribes (2020) and provided in **Error! Reference source not found.**.

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4.0 Environmental Consequences

4.1 Introduction

The three alternatives being evaluated in this EA are described in Chapter 2, *Alternatives*, and consist of the No Action, the Proposed Action, and the No Fishing Action. No Action represents fishing regulations for the 2020-2021 fishing season applied to the 2021-2022 pre-season forecasts, whereas the Proposed Action represents fishing regulations for the 2021-2022 fishing season applied to the 2021-2022 pre-season forecasts. The No Fishing Action excludes all salmon and steelhead fishing within the Action Area. The baseline conditions for 14 resources (water quality; air, greenhouse gases, pollutants; wildlife; fish; invertebrates; socioeconomics; environmental justice; recreation and recreational fishing; marine protected areas; noise and light; public health and safety; Indian trust assets – fishing) that may be affected by the alternatives described in Chapter 3, *Affected Environment*. This chapter provides an analysis of the direct and indirect environmental effects associated with the three alternatives on these 14 resources for the 2021-2022 fishing season. Cumulative effects of these alternatives are presented in Chapter 5, *Cumulative Effects*.

The analysis area for each resource is the same as that described in Chapter 3.

Where applicable, the relative magnitude of impacts is described using the following terms:

- No Effect –The alternative would have no effect on the resource.
- Undetectable – The impact would not be detectable.
- Negligible – The impact would be at the lower levels of detection.
- Low – The impact would be slight, but detectable.
- Medium – The impact would be readily apparent.
- High – The impact would be severe.

These resource areas are also described as the effect either being positive (beneficial), neutral, or negative (detrimental).

4.2 Water Quality

4.2.1 Point Source and Nonpoint Source Contribution

Under the No Action alternative, point source and nonpoint source water pollution contributions would continue to occur throughout Puget Sound and contribute to water quality degradation. Implementation of salmon recovery plans, enforcement, and continued interest in improving water quality conditions by decreasing known polluting discharges are helping to decrease some water quality degradation, while other unchecked pollution sources (e.g., agricultural runoff, sedimentation, and removal of overstory shading adjacent to streams) and water quality pollution (cars leaking oil, fertilizers and pesticides, failing septic tanks, pet waste, and fuel spills from recreational boaters) continue to occur and impact water quality and fish habitat (Section 3.2 *Water Quality*). Fishing contributes to water quality degradation through use of conventional,

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carbureted two-stroke boat engines that discharge up to 30 percent of their fuel, unburned, into the environment. Use of boats also results in the discharge of sewage and waste into marine and freshwater areas, and the transport of invasive species on boat hulls that impact water quality.

As described in Section 3.2, *Water Quality*, degraded water quality from pollution, low dissolved oxygen levels, high nutrient levels, sediment, and high water temperature can impact salmon and steelhead and their habitat, including their ability to reproduce, forage and successfully find food, and survive in a polluted environment, which is considered a low negative effect.

Under No Action, salmon and steelhead escapement as the fish return to spawning grounds would result in continued exposure of these fish to poor water quality conditions. As summarized in Section 3.2, *Water Quality*, about one-third of Washington's waters are too polluted to meet state water quality standards. This impact is not caused directly by fisheries harvest as an activity but occurs indirectly through boat operations. When considering all contributors to water quality impairment and pollution, the effect from use of motorized boats for fishing both under existing conditions and No Action, would be considered a negligible negative effect that is not readily apparent but detectable.

Under the Proposed Action, degradation of water quality from fishing operations would continue to occur as described under No Action. However, given all other sources affecting Water Qualtiy under existing conditions, the Proposed Action (changes in fisheries harvest by species, location, timing, closures, gear, and type), as an activity, would not result in a detectable change in water quality conditions. In comparison to No Action and Existing Conditions, the Proposed Action would also result in a negligible, negative effect.

Under No Fishing, commercial and recreational salmon and steelhead fishing would not occur in the action area and impacts from fishing operations on water quality would be curtailed resulting in a neglible, positive effect to water quality compared to the Proposed Action.

4.3 Air, Greenhouse Gases, Pollutants

Under existing conditions and No Action, boat use for fishery harvest currently does and would contribute to release of gaseous emissions to the environment during fishing operations, which would impact overall air quality and contribute to greenhouse gases (Section 3.3, *Air, Greenhouse Gases, Pollutants*). Although USEPA is phasing in tighter emission standards for new boats, many operators would continue to repair older boats to extend overall use and minimize costs. Boats are one of several transportation vehicles that degrade air quality but are not the primary source. As a result, under both existing conditions and No Action, the impact would be considered a negligible, negative impact that, over the long term, should decrease assuming new standards would be in place that reduce emissions.

The Proposed Action would similarly result in release of emissions. It is not known if the expected changes in fisheries harvest by species, location, timing, closures, gear, and type under the Proposed Action would result in a change in boat emissions. From a qualitative perspective, the increased harvest levels, primarily for pink salmon, under the Proposed Action would result

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in more fishing trips resulting in a negligible, negative effect from boat air emissions relative to the No Action and Existing Conditions.

Under No Fishing, boating activity directly related to salmon and steelhead harvest would not occur in the action area. As a result, air quailty and greenhouse gases effects would be expected to result in a negligible, positive effect, compared to the Proposed Action.

4.4 Wildlife

Described in this section are predator/prey relationships, salmon carcass nutrient benefits, transfer of toxins from salmon to wildlife, harvest habitat disturbance, fisheries bycatch, and derelict fishing gear.

4.4.1 Predator/Prey Relationships

Listed Species. The listed federal and/or state species that has a *Strong, Recurrent* (Cederholm 2000) relationship with salmon and steelhead is the Southern Resident killer whale, while other listed species either do not forage exclusively on salmon or steelhead or are only occasionally observed within Puget Sound waters (Section 3.4.1, *Predator Prey Relationships*).

Southern Resident killer whale

The Southern Resident killer whale feeds on adult salmon, particularly those returning to spawn. During the summer, Chinook salmon, particularly Fraser River early-run Chinook salmon, are the preferred prey of Southern Resident killer whales while coho and chum salmon become more prevalent in their diet during fall and winter. The pre-season forecast for Puget Sound Chinook salmon, which does not include Fraser Chinook salmon, in 2020 was 250,692 Chinook salmon returning to the Puget Sound (excluding Fraser River Chinook salmon), whereas in 2021, the pre-season forecast is 231,268 Chinook salmon (WDFW 2021a), which represents about an 8 percent dcrease. Under Existing Conditions, harvest of salmon and steelhead results in a low, negative effect to Southern Resident killer whales because the alternative includes marine harvest of both hatchery-origin and natural-origin Chinook salmon, coho salmon, and chum salmon, which would be available as prey for Southern Resident killer whales. These whales have not shown a preference between hatchery-origin and natural-origin Chinook salmon (Section 3.4.1, *Predator/Prey Relationships*).

Chum salmon have also been shown to be an important component of Southern Resident killer whales' diet during the fall and winter months. For 2020, the runsize forecast Puget Sound fall/winter-run chum salmon was 906,370, whereas for 2021, the Puget Sound forecast is 550,438 fall/winter-run chum salmon, resulting in substantially fewer chum salmon available to Southern Resident killer whales in 2021 (Section 3.5.2.2, *Fall- and Winter-run Chum Salmon*).

Actions implemented by WDFW which were anticipated to directly (voluntary "No-Go" zone on western side of San Juan Island) or indirectly (Chinook salmon non-retention in marine catch area 7 during September) benefit SRKW would still be anticipated under the No Action

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alternative. As a result under No Action, harvest of Chinook salmon would result in a low negative effect to Southern Resident killer whales because of the importance of Chinook salmon although during the summer months, Fraser River Chinook salmon would continue to be the preferred prey of Southern Resident killer whales. The anticipated marine harvest of chum salmon in Puget Sound pre-terminal marine areas, except Hood Canal, under the No Action (

Table 4-1) is about 90 percent of the estimated harvestable abundance based on odd-year escapement objectives for chum salmon excluding Hood Canal chum forecast, despite Chum forecasts being 60 percent lower in 2021. Under existing conditions, pre-terminal marine Chum harvest, was substantially reduced relative to harvestable abundance estimates by co-manager agreement, due to concerns over the effect of aggregate stock management on individual Chum salmon stocks not meeting their respective escapement goals. As a result, under the No Action alternative, harvest is expected to have a low, negative effect on Southern Resident Killer Whales relative to existing conditions, primarily because pre-terminal Chinook harvest would not be adjusted despite reduced forecasted abundance (Section 3.5.1) and marine chum salmon harvest would be similar under both alternatives, despite lower forecasts (Section 3.5.2.2).

The Proposed Action, excluding Hood Canal (Marine Catch Area 12) and Deep South Sound (Marine Catch Area 13) harvest since SRKW are not known to utilize those areas, results in decreased Puget Sound marine harvest of 24,178 Chinook salmon compared to the No Action, and a percentage harvest decrease of 29 percent. Chum salmon runsizes are forecasted to be 355,932 fish lower in 2021 compared to 2020, a decrease of 39 percent (Section 3.5.2.2, *Fall-run and Winter-run Chum Salmon*) and therefore fewer chum salmon would be available as prey. Given the adjustments to South Sound marine chum fisheries in 2021, excluding Hood Canal chum fisheries where SRKW have not been observed, results in 84,004 fewer chum harvested, relative to No Action, resulting in additional chum salmon available as prey for Southern Resident killer whales. Actions implemented by WDFW which are anticipated to directly (voluntary "No-Go" zone on western side of San Juan Island and increased enforcement visibility in marine catch area 7) or indirectly (seasonal closures of entire marine catch areas) to benefit SRKW are part of the Proposed Action (Cunningham 2021). Considering harvest of both Chinook salmon and chum salmon and a preference for Fraser River Chinook salmon during the summer, actions taken to address ESA-listed salmon stocks, and actions taken to address concerns over low escapement for South Sound Chum salmon, the Proposed Action would result in a low, positive effect to Southern Resident killer whales relative to the No Action.

The No Fishing alternative would result in no salmon or steelhead being harvested in the action area. Compared to the Propsed Action, no Chinook salmon would be harvested under the No Fishing Action (Table 4-2) and there would be a potential prey increase for Southern Resident killer whales. With no harvest of chum salmon in marine waters, an additional 138,380 chum would be available for prey to Southern Resident killer whales compared to the Proposed Action. Considering harvest of both Chinook salmon and chum salmon, and a preference for Fraser River Chinook salmon durin the summer, the No Fishing action would result in a low, positive effect to Southern Resident killer whales compared to the Proposed Action.

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Table 4-1. Puget Sound marine Chinook salmon harvest excluding Hood Canal (Marine Catch Area 12) and deep South Sound (Marine Catch Area 13) estimates and marine harvest of chum salmon, excluding Hood Canal, for No Action, Proposed Action, and No Fishing Action alternatives.

Species	No Action	Proposed Action	No Fishing Action
Chinook salmon	82,270	58,092	0
Chum salmon	222,384	138,380	0

Marine Mammals. Marine mammals that have a *Recurrent* (Cederholm 2000) relationship with salmon and steelhead are Steller sea lions, California sea lions, and harbor seals, particularly where salmon and steelhead smolts congregate (Section 3.4.1, *Predator/Prey Relationships*). Because these mammals are opportunistic fish feeders, they will seek other foraging locations and search out other prey when salmon and steelhead are not as plentiful or are not present during specific times of the year. Under existing conditions and No Action, harvest would result in a negligible negative effect to marine mammals. This is because, although marine mammals prey on salmon and steelhead, they prefer salmon smolts and given their opportunistic behavior and ability to prey on a variety of fish species allows this species to accommodate to changing foraging conditions.

Under the Proposed Action, 138 percent more salmon and steelhead would be harvested compared to No Action primarily as a result of odd-year pink Salmon returns (1.8 million estimated odd-year pink salmon harvest). However, the harvest of salmon and steelhead under the Proposed Action would result in a negligible negative effect for similar reasons as discussed under No Action, which is the same as existing conditions.

Under No Fishing, no salmon or steelhead would be harvested in the action area and all salmon and steelhead, primarily pink salmon, would be available as possible prey (Table 2-1) for non-listed marine mammals. The result of No Fishing would be a negligible positive effect compared to the Proposed Action for marine mammal, because of their opportunistic feeding behavior to prey on more than just mature salmon and steelhead.

Bald Eagles and Golden Eagles. As described under Section 3.4.1, *Predator/Prey Relationships*, bald eagles have a *Strong, Consistent* (Cederholm 2000) relationship with salmon and steelhead, while golden eagles have a *Recurrent* (Cederholm 2000) relationship with salmon and steelhead. Under existing conditions, bald eagles feed on adult salmon carcasses that result directly from escapement, which would be considered a low positive effect. Under No Action, bald eagles and golden eagles would continue to feed on salmon and steelhead carcasses, which would also be a low positive effect. Under the Proposed Action, bald eagles and golden eagles would continue to feed on salmon and steelhead carcasses in the action area, which would also be a low positive effect.

Under No Fishing, no harvest of salmon and steelhead would occur in the project area, resulting in more carcasses available for bald eagles and golden eagles to feed on. As a result, the No Fihsing Action would result in a low positive effect.

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Migratory Birds. As described under Section 3.4.1, *Predator/Prey Relationships*, migratory birds have a variety of relationships with salmon and steelhead including some species having a *Strong, Consistent* (Cederholm 2000) relationship. The effect of fisheries harvest on migratory birds includes providing a food supply through offal, disturbing seabirds that may be foraging and caught as bycatch, and allocating salmon and steelhead escapement whereby salmon carcasses provide marine-derived nutrients. Under existing conditions, these effects are both beneficial (provision of food supply and nutrients) and detrimental (bycatch). Altogether, effects from harvest under existing conditions would be negligible.

Under No Action, effects would be the same as under existing conditions, which is a negligible effect. Under the Proposed Action, 138 percent more salmon and steelhead would be harvested compared to No Action primarily as a result of odd-year pink Salmon returns (1.8 million estimated odd-year pink salmon harvest) and would be expected to increase the number of boats or boat operations fishing for salmon and steelhead in Puget Sound. As a result, the Proposed Action would also result in a negligible, negative effect, relative to existing conditions and No Action.

Under No Fishing, the number of boats or boat operations directed at fishing for salmon and steelhead would be zero and a negligible positive effect on migratory birds.

4.4.2 Salmon Carcass Nutrient Benefits

Salmon carcasses provide a source of nutrients to all aquatic organisms (Section 3.4.2, *Salmon Carcass Nutrient Benefits*). Under existing conditions, No Action, and Proposed Action, these carcasses are a benefit to wildlife. Harvest decreases the number of spawning carcasses. Under both the No Action and the Proposed Action, harvest would continue to decrease the amount of salmon carcasses. Under the No Action, no harvest of pink salmon would expected and the entire forecasted abundance of 2.9 million pink salmon would be expected to spawn, along with other salmon and steelhead. Overall, the effect would be a low, positive effect under the No Action because pink salmon, along with unharvested portions of other salmon and steelhead would provide nutrient benefits to freshwater systems. Under the Proposed Action, less biomass of spawning carcasses would be expected on the spawning grounds with approximately 1.9 million pink harvested. Relative to No Action, the Proposed Action would result in a low, negative effect as fewer pink salmon are expected to provide nutrients to the spawning grounds. The No Fishing alternative would result in a low, positive effect compared to existing conditions and the Proposed Action, providing greater abundance and biomass of salmon carcasses to the freshwater environments in the action area, primarily pink salmon carcasses, to lower river reaches.

4.4.3 Transfer of Toxins to Salmon and Wildlife

Because Puget Sound has substantial contaminated sediments, salmon and steelhead prey can transfer their pollutant levels to salmon and steelhead, and in turn, salmon and steelhead can transfer their pollutant loadings to their predators. The extent of contamination in the different trophic levels of prey and predators is unknown although hypothesized that salmon and steelhead toxins transferred to Southern Resident killer whales as predators may have impacted their overall health (including reproductive capability) and life span (Section 3.4.3, *Transfer of Toxins*

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from Salmon to Wildlife). Although cleanup of toxins in Puget Sound is ongoing, there is continuing potential to introduce additional pollutants into Puget Sound through increased development and residential populations contributing to pollution sources. However, fisheries harvest as an activity does not contribute to the transfer of toxins among biological organisms.

Under existing conditions, No Action, Proposed Action, and No Fishing Action, changes in fisheries harvest (including harvest by species, location, timing, closures, gear, and type) and pre-season forecasts would not result in an effect regarding the likely or unlikely transfer of toxins to salmon and steelhead since fisheries, by itself, cannot influence this transfer. Harvest would result in no effect under existing conditions, No Action, Proposed Action, and No Fishing Action.

4.4.4 Harvest Wildlife Habitat Disturbance

As described in Section 3.4.4, *Harvest Habitat Disturbance*, fisheries harvest can result in impacts to wildlife habitat through disturbance from the presence of boats, people, and noise. These activities often cause wildlife to temporarily depart areas of active fishing where boating activity occurs. Under existing conditions, this boating activity is considered a negligible negative effect that is temporary while fishing occurs. Wildlife would be expected to return to use habitat during times that boat activity is not occurring. Under No Action, a similar level of boating activity is expected compared to existing conditions, resulting in a negligible negative effect, which is temporary while fishing occurs.

Under the Proposed Action, there is 138 percent increase in total fisheries harvest, primarily of odd-year pink salmon, relative to the No Action alternative. As a result, an increased level of fishing activity and operations is expected under the Proposed Action but this activity is expected to temporary. Thus, the Proposed Action would have a negligible, negative effect on wildlife habit disturbance, relative to existing conditions and No Action.

Under No Fishing, disturbance of wildlife and wildlife habitat by salmon and steelhead activities would not occur and would result in a negligible positive effect on the wildlife habitat resource compared to the Proposed Action.

4.4.5 Fisheries Bycatch

As described in Section 3.3.4, Fisheries Bycatch, the reduction of bycatch is an important objective of co-managers and NOAA Fisheries. Programs and guidelines have been developed to continue to reduce bycatch (WDFW 2015; NOAA Fisheries 2016). Under existing conditions, bycatch from fishing is considered a low, negative effect. Although there is continuing intent to reduce bycatch in all types of salmon and steelhead fisheries and there are also recent fishing restrictions by WDFW for specific fishing methods that cause bycatch, the No Action would be expected to result in only a slightly reduced bycatch and continue to have a low, negative effect, similar to existing conditions.

Under the Proposed Action, there is 138 percent increase in total fisheries harvest, primarily odd-year pink salmon harvest. As a result, an increaseed level of fishing activity and therefore

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fisheries bycatch is expected under the Proposed Action resulting in a low, negative effect, relative to that which occurs under existing conditions and No Action.

Under No Fishing Action, no salmon or steelhead fishing would occur in the action area and there would be no by-catch associated without salmon or steelhead fishing, which would be expected to result in a low, positive effect compared to the Proposed Action.

4.4.6 Derelict Fishing Gear

Derelict fishing gear occurs from harvest of fish and shellfish, and is predominantly from crab pots and gill nets (Section 3.4.6, *Derelict Fishing Gear*). Under existing conditions, fishing operations are expected to result in a low, negative effect for the potential of derelict fishing gear occurring in Puget Sound. The 2021-2022 fishing season for the No Action and the Proposed Action would likely continue to result in the loss of fishing equipment and deposit of derelict fishing gear in Puget Sound. Although there are harvest differences between the No Action and Proposed Action, commercial boat and fishing operations are expected to be fairly similar between No Action and the Proposed Action. Thus, both alternatives would result in a low, negative effect, which is the same as existing conditions. No additional lost or derlict salmon and steelhead fishing gear would be expected to accrue under the No Fishing Action. As a result, the No Fishing Action would have a low, positive effect compared to the Proposed Action.

4.5 Fish

For the fish analysis, FRAM model results are used to estimate impacts for Chinook salmon and coho salmon for the No Action, Proposed Action, and No Fishing Action. The FRAM model is a single-season modeling tool for determining compliance with management objectives, allocation arrangements, ESA compliance and domestic and international legal obligations. Refer to Pacific Fishery Management Council (2008) for assumptions used in developing the Chinook salmon and coho salmon FRAM models.

Other salmon and steelhead species are managed based on pre-season abundance forecasts and/or in-season run-size updates. The quantitative changes in pre-season expectations for harvest are compared between the No Action and Propoased Action alternatives as well as the Proposed Action and No Fishing Action alternatives and discussed relative to escapement goals and management objectives, where applicable. For chum salmon and sockeye salmon under No Action, the analysis assumes that fisheries harvest is structured to harvest the full pre-season harvestable abundance for 2020/21 return year even though inseason data are used to adjust runsizes and therefore harvestable abundances. For pink salmon, which predominately return on odd years, the No Action alternative assumes no pink salmon would be harvested as there were no pink salmon fisheries promulgated in 2020/21. Additionally, co-managers have adopted an interim management agreement for South Sound fall-run chum in 2021 and intended to redress tribal concerns for all stocks meeting escapement goals, with the expectation that a long-term Comprehensive Chum Management Plan will be developed. For 2021, the co-managers have agreed to forgo preterminal Chum salmon directed fisheries on South Sound Fall chum pending

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agreement on an in-season runsize update trigger is established (WDFW and Puget Sound Treaty Tribes 2021b).

4.5.1 Listed Salmon and Steelhead

This section describes results for harvest of Chinook salmon based on FRAM modeling, Hood Canal summer-run chum salmon, and steelhead.

4.5.1.1 Puget Sound Chinook Salmon

Described in this section are alternative effects on the 14 management units of Chinook salmon.

4.5.1.1.1 Nooksack Early (Spring-run) Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Nooksack early spring-run Chinook salmon management unit has a low abundance threshold for each component population and a critical exploitation rate ceiling of 10.5 percent for SUS (Table 3-2.) Prior to 2016, harvest distribution within the United States occurred mostly in sport fisheries but also in some troll and net fisheries (Table 3-3). Spawning escapements have rarely met the low abundance thresholds for the entire time series since listing of the Puget Sound Chinook salmon ESU in 1999 particularly for the South Fork River population (Table 3-4). In 2021, there is an 88 percent increase in the projected total pre-season forecast with a 26 percent increase in natural-origin early spring-run Nooksack Chinook salmon compared to 2020, but still with a forecasted North Fork/Middle Fork natural-origin population escapement below the low abundance thresholds.

Under No Action, FRAM model results predict a spawning escapement for Nooksack Early Chinook salmon of 450 natural origin fish (149 to the North Fork Nooksack River and 301 to the South Fork Nooksack River; Table 4-2), with the North Fork population below the Low Abundance Thresholds of 400 natural-origin spawners (Table 3-2). As a result, the critical exploitation rate ceiling of 10.5 percent SUS is the implemented management objective (Table 3-2). Under No Action, SUS exploitation rate for Nooksack Early Chinook salmon is estimated at 9.2 percent SUS ER (Table 4-3) and meets the specified Critical Exploitation Rate (Table 4-4).

Under the Proposed Action, FRAM model results indicate a projected SUS exploitation rate for Nooksack Early Chinook salmon of 10.5 percent (Table 4-3), which meets the critical exploitation rate (Table 3-2). This fishery impact level translates to a total projected escapement of 464 natural-origin fish, 154 to the North Fork Nooksack River and 310 to the South Fok Nooksack River (Table 4-2), with the North Fork population below the low abundance threshold of 400 natural-origin spawners (Table 3-2). The forecasted total SUS rate achieves the designated critical exploitation rate ceiling of 10.5 percent SUS (Table 4-4).

Under No Fishing, FRAM model results predict a spawning escapement for Nooksack Early Chinook salmon of 506 natural-origin fish (169 to the North Fork Nooksack River and 337 to the South Fork Nooksack River; Table 4-2), which for the North Fork population is below the Low Abundance Threshod of 400 natural-origin spawners (Table 3-2). As a result, the critical exploitation rate ceiling of 10.5 percent SUS is the implemented management objective (Table 3-2). Under No Fishing, SUS exploitation rate for Nooksack Early Chinook salmon is estimated

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at 3.2 percent SUS ER (Table 4-3) and complies with the implemented Critical Exploitation Rate management objective (Table 4-4).

In summary, all proposed actions result in projected escapements below the LAT for the North Fork population, requiring fisheries be structured to the meet the critical exploitation rate of 10.5 percent SUS. All the action alternatives would meet the critical exploitation rate management objective, which is the required harvest control for Nooksack early Chinook salmon (Table 4-4). Natural-origin escapement would be slightly greater (42 fish) under No Fishing (Table 4-2) compared to the Proposed Action.

Table 4-2. Predicted Chinook salmon natural spawning escapement for No Action, Proposed Action, and No Fishing Action. NOR= Natural-origin fish only

Management Unit	Predicted Escapement (# of natural fish)		
	No Action	**Proposed Action**	**No Fishing Action**
Nooksack –(NOR)	450	464	506
North Fork – NOR	149	154	169
South Fork – NOR	301	310	337
Skagit summer/fall-run	6,773	8,837	10,930
Upper Skagit summer-run – NOR	4,993	6,587	8,168
Sauk summer-run – NOR	328	400	498
Lower Skagit fall-run – NOR	1,126	1,420	1,711
Skagit spring-run	1,434	1,442	1,572
Upper Sauk – NOR	872	871	941
Upper Cascade – NOR	130	141	166
Suiattle -NOR	431	431	465
Stillaguamish	881	906	949
Snohomish – NOR	2,878	2,936	3,009
Skykomish – NOR	1,839	1,876	1,923
Snoqualmie – NOR	1,039	1,060	1,086
Lake Washington			
Cedar River	750	778	967
Green	3,689	3,741	6,816
White River spring-run	2,250	2,281	2,646
Puyallup fall-run	2,576	2,536	4,480
Nisqually [1]	7,540	8,047	16,894
Skokomish	3,863	3,787	6,462
Mid-Hood Canal	17	18	19
Dungeness	695	699	702
Elwha	4,062	4,089	4,106
Western Strait of Juan de Fuca	1,065	1,054	1,057
Total Escapement	**35,060**	**41,617**	**62,686**

[1] Nisqually escapement estimate includes natural escapement plus hatchery rack escapement.

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Table 4-3. Predicted Chinook salmon exploitation rates (Total, Southern U.S. [S.U.S], and Pre-terminal SUS) for No Action, Proposed Action, and No Fishing.

Management Unit	Predicted Total Mortality Impact								
	Total Exploitation Rate (%)			S.U.S. Exploitation Rate (%)			SUS/Pre-Terminal Exploitation Rate (%)		
	No Action	Proposed Action	No Fishing Action	No Action	Proposed Action	No Fishing Action	No Action	Proposed Action	No Fishing Action
Nooksack North Fork South Fork	33.9	32.5	25.5	9.2	10.5	3.2	4.1	4.4	3.2
Skagit summer/fall-run Upper Skagit summer-run Sauk summer-run Lower Skagit fall-run	53.5	38.9	23.5	28.6	17.0	1.3	4.2	4.0	1.3
Skagit spring-run Upper Sauk Upper Cascade Suiattle	23.5	22.5	13.7	10.2	10.3	1.2	4.1	4.1	1.2
Stillaguamish Unmarked component Marked componenet	 20.5 25.6	 18.1 23.1	 12.0 14.1	 8.3 11.9	 7.4 11.0	 1.1 1.2	 4.3 8.2	 4.3 8.0	 1.1 1.2
Snohomish Skykomish Snoqualmie	18.0	16.7	12.5	6.3	6.3	1.9	5.0	4.9	1.9
Lake Washington Cedar River	36.1	54.7	16.7	24.3	44.1	5.7	11.5	11.5	5.7
Green	54.8	54.7	16.7	42.9	44.1	5.7	11.5	11.5	5.7
White River spring-run	22.9	21.3	6.6	15.8	16.6	1.8	4.1	4.5	1.8
Puyallup fall-run	47.2	47.3	16.7	35.4	36.8	5.7	11.5	11.5	5.7
Nisqually	51.1	47.7	14.1	43.1	41.4	7.3	15.6	16.0	7.3
Skokomish	48.7	49.2	16.2	38.2	41.0	7.8	12.9	12.7	7.8
Mid-Hood Canal	23.3	22.6	15.7	12.8	14.4	7.2	12.6	12.1	7.2
Dungeness	16.2	14.4	12.2	3.7	3.6	1.2	3.3	3.6	1.2
Elwha	15.6	14.3	11.8	3.5	3.8	1.1	3.5	3.8	1.1
Western Strait of Juan de Fuca	20.6	21.6	21.2	2.0	2.0	1.6	2.0	2.0	1.6

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Table 4-4. Predicted Chinook salmon performance relative to the Chinook Salmon Harvest Management Plan management objectives under No Action, Proposed Action, and No Fishing Action.

Management Unit	Performance Relative to Meeting the Critical Exploitation Rate			Performance Relative to Meeting the Low Abundance Threshold			Performance Relative to Meeting Exploitation Rate Ceiling		
	No Action	Proposed Action	No Fishing Action	No Action	Proposed Action	No Fishing Action	No Action	Proposed Action	No Fishing Action
Nooksack	Y	Y	Y	N	N	N	N/A	N/A	N/A
Skagit summer/fall-run	N	Y	N/A	N	N	Y	N/A	N/A	Y
Skagit spring-run	Y	Y	Y	N	N	N	N/A	N/A	N/A
Stillaguamish				N	N	N			
Unmarked component	N	Y	Y				N/A	N/A	N/A
Marked component	Y	Y	Y				N/A	N/A	N/A
Snohomish	Y	Y	Y	N	N	N	N/A	N/A	N/A
Lake Washington Cedar River	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y
Green	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y
White River spring-run	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y
Puyallup fall-run	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y
Nisqually	N/A	N/A	N/A	Y	Y	Y	N	Y	Y
Skokomish	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y
Mid-Hood Canal	N	Y	Y	N	N	N	N/A	N/A	N/A
Dungeness	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y
Elwha	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y
Western Strait Juan de Fuca - Hoko	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y

Y=Meets or exceeds goal.
N = Does not meet goal.
NA= Standard not applicable.

AR004514

4.5.1.1.2 Skagit Summer/Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Skagit summer/fall-run Chinook salmon management unit has a total exploitation rate ceiling (48 percent), a low abundance threshold (9,100 fish), and an odd-year critical exploitation rate ceiling (17 percent SUS) as shown in Table 3-2. Nearly half of the harvest of Skagit River summer/fall-chinook occurs in Canadian fisheries (Table 3-5). Since 2003, escapements for Upper Skagit River summer-run Chinook salmon have consistently exceeded its low abundance threshold as has the Lower Skagit River fall-run population except for 2011 (Table 3-6). Prior to 2007, the Lower Sauk summer-run population consistently was above its low abundance threshold but has only exceeded it six times since then (Table 3-6). In 2021, there is an 18 percent decrease in the total projected pre-season forecast of Skagit summer/fall-run Chinook salmon with a 19 percent decrease in natural-origin fish compared to 2020.

Under No Action, FRAM model results predict an escapement of 6,773 Skagit River summer/fall-run Chinook salmon (Table 4-2). This escapement fails to meet the Low Abundance Threshold of 9,100 spawners for the management unit, triggering implementation of the odd-year critical exploitation rate ceiling of 17 percent SUS (Table 3-2). The predicted escapement by population is 4,993 fish for Upper Skagit summer-run Chinook salmon and 1,126 fish for Lower Skagit fall-run Chinook salmon which are above their respective low abundance thresholds and 328 fish for Sauk summer-run Chinook salmon which is below its low abundance threshold (Table 3-2 and Table 4-2). The No Action alternative is expected to result in a SUS exploitation rate of 28.6 percent (Table 4-3), exceeding the 17 percent SUS criterical ER objective (Table 4-4).

Under the Proposed Action, FRAM model predict an escapement of 8,837 Skagit summer/fall run Chinook salmon (Table 4-2). This escapement fails to meet the Low Abundance Threshold of 9,100 spawners for the management unit, triggering implementation of the Southern UX critical exploitation rate ceiling of 17 percent (Table 3-2). The predicted escapement by population is 6,587 fish for Upper Skagit summer-run Chinook salmon, 400 fish for Sauk summer-run Chinook salmon, and 1,420 fish for Lower Skagit fall-run Chinook salmon, all of which are above the low abundance threshold specified for each population (Table 3-2 and Table 4-2). The Proposed Action is expected to result in a Southern US exploitation rate of 17 percent (Table 4-3), sastisfying the 17 percent SUS critical ER objective (Table 4-4).

Under No Fishing, FRAM model results predict an escapement of 10,930 Skagit River summer/fall-run Chinook salmon (Table 4-2). This escapement exceeds the Low Abundance Threshold of 9,100 spawners triggering implementation of the exploitation rate ceiling of 48 percent (Table 3-2). The predicted escapement by population is 8,168 fish for Upper Skagit summer-run Chinook salmon, 498 fish for Sauk summer-run Chinook salmon, and 1,711 fish for Lower Skagit fall-run Chinook salmon, all of which are above the low abundance threshold specified for each population (Table 3-2 and Table 4-2). The No Fishing alternative is expected to result in a total exploitation rate of 23.5 percent total ER (Table 4-3), satisying the 48 percent total ER objective (Table 4-4).

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In summary, only the no fishing alternatives results in escapements exceeding the low abundance threshold (Table 4-4). Of the No Action and Proposed Action alternatives, neither results in escapements above the requisite LAT, but only the Proposed Action meets the targeted SUS critical exploitation rate (Table 4-4). Escapement would be greatest under the No Fishing Action alternative, while escapement under the Proposed Action exceeds that under the No Action (Table 4-2).

4.5.1.1.3 Skagit Spring-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Skagit spring-run Chinook salmon management unit has a total exploitation rate ceiling (37.5 percent), a low abundance threshold (823 fish), and a critical exploitation ceiling (10.3 percent SUS) as shown in Table 3-2. Recent harvest distribution data indicate that Skagit River spring-run Chinook salmon are primarily caught in northern pre-terminal fisheries in Canada and in U.S. net fisheries (Table 3-7). Populations in the Skagit River spring-run Chinook salmon management unit have exceeded their low abundance threshold every year except for the Suiattle River in 2007 and the Upper Cascade River population in 2018 (Table 3-8). In 2021, there is a 10 percent decrease in forecasted total returns and a 3 percent decrease in the natural-origin Skagit spring-run Chinook salmon pre-season forecast compared to 2020.

Under No Action, FRAM model results predict an escapement of Skagit spring-run Chinook salmon of 1,434 (Table 4-2), which is above the Low Abundance Threshold of 823 fish (Table 3-2). The predicted escapement by population is 872 fish for upper Sauk spring-run Chinook salmon, 130 fish for upper Cascade spring-run Chinook salmon, and 431 fish for Suiattle spring-run Chinook salmon (Table 4-2), with the upper Cascade spring-run below the low abundance threshold triggering the critical exploitation rate of 10.3 percent southern U.S. ER for the management unit. The No Action alternative results in a southern U.S. exploitation rate of 10.2 percent (Table 4-3) and meets the exploitation rate ceiling of 10.3 percent SUS ER (Table 4-4).

Under the Proposed Action, FRAM model results predict an escapement of Skagit spring-run Chinook salmon of 1,442 (Table 4-2), which is above the Low Abundance Threshold of 823 fish (Table 3-2). The predicted escapement by population is 871 fish for upper Sauk spring-run Chinook salmon, 141 fish for upper Cascade spring-run Chinook salmon, and 431 fish for Suiattle spring-run Chinook salmon (Table 4-2), with Upper Cascade spring-run Chinook salmon below its low abundance threshold triggering the critical exploitation rate ceiling for the management unit. The Proposed Action alternative results in a SUS exploitation rate of 10.3 percent (Table 4-3) and meets the critical exploitation rate ceiling of 10.3 percent SUS ER (Table 4-4).

Under No Fishing, FRAM model results predict an escapement of Skagit spring-run Chinook salmon of 1,572 (Table 4-2), which is above the Low Abundance Threshold of 823 (Table 3-2). The predicted escapement by population is 942 fish for upper Sauk spring-run Chinook salmon, 166 fish for upper Cascade spring-run Chinook salmon, and 465 fish for Suiattle spring-run Chinook salmon (Table 4-2), which, except for the Upper Cascade spring-run Chinook population, are above the low abundance threshold specified for each population. As a result the critical exploitation rate ceiling of 10.3% SUS ER would be triggered. Under the No Fishing

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Action alternative, the SUS exploitation rate is projected to be 1.2 percent (Table 4-3) and meets the exploitation rate ceiling of 10.3 percent SUS ER (Table 4-4).

In summary, none of the alternatives results in escapements exceeding the LAT but they all result in SUS fisheries meeting the critical exploitation rate ceiling for Skagit spring-run Chinook salmon (Table 4-4). Escapement would be greatest under No Fishing Action while the Proposed Action would result in an escapement of 8 more fish compared to the No Action alternative for Skagit River spring-run Chinook salmon (Table 4-2).

4.5.1.1.4 Stillaguamish Summer/Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Stillaguamish summer/fall-run Chinook salmon management unit unmarked-component has a total exploitation rate ceiling (22 percent total with 13 percent maximum SUS) and a critical exploitation ceiling (8 percent SUS maximum with total not to exceed 22 percent) as shown in Table 3-2. The marked hatchery-origin component has a SUS exploitation rate ceiling of 17.6 percent and a critical exploitation rate ceiling of 12.0 percent SUS. The low abundance threshold (1,200 terminal run-size forecast) is based on pre-season terminal runsize forecast estimate. Recent harvest distribution data indicate more than three-quarters of the harvest of Stillaguamish River summer/fall-run Chinook salmon are harvested in Canadian fisheries and U.S. sport fisheries (Table 3-9). Stillaguamish River summer/fall Chinook salmon escapement estimates have been below the revised low abundance threshold for eight of the last 17 years (Table 3-10). In 2021, there is a one percent increase in total returns and a 9 percent decrease in natural-origin Stillaguamish River summer/fall-run Chinook salmon pre-season forecast compared to 2020.

Under the No Action, FRAM model results predicts an escapement of 881 fish for the Stillaguamish River summer/fall-run Chinook salmon management unit (Table 4-2). The pre-season terminal runsize forecast is 997 fish and below the low abundance threshold of 1,200 terminal runsize (Table 3-2). Therefore the critical exploitation rate ceiling management objective of 8 percent SUS maximum with no more than 22 percent total ER on the unmarked component is triggered while for the marked component the SUS exploitation rate of 12 percent is triggered (Table 3-2). Under the No Action, the unmarked exploitation rate is 20.5 percent Total with 8.3 percent in SUS fisheries (Table 4-3), which exceeds the critical exploitation rate ceiling management objectives on the unmarked component (Table 4-4). However, the projected SUS exploitation rate on the marked component is 11.9 percent, and meets the marked SUS critical expoitation rate of 12 percent.

Under the Proposed Action, FRAM model results predict an escapement of 906 fish for the Stillaguamish River summer/fall-run Chinook salmon management unit (Table 4-2). The pre-season terminal runsize forecast is for 990 fish and below the low abundance threshold of 1,200 terminal runsize (Table 3-2). Therefore the critical exploitation rate ceiling management objective of 8 percent SUS maximum with no more than 22 percent total ER on the unmarked component is triggered while for the marked component the SUS exploitation rate of 12 percent is triggered (Table 3-2). Under the Proposed Action, the unmarked total exploitation rate is 18.1 percent with 7.4 percent in SUS fisheries (Table 4-3), which satisfies the critical exploitation rate ceiling management objectives on the unmarked component (Table 4-4). The projected SUS

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exploitation rate on the marked component is 11 percent (Table 4-4), meeting the marked SUS critical expoitation rate objective.

Under No Fishing, FRAM model results predict an escapement of 949 fish for the Stillaguamish River summer/fall-run Chinook salmon management unit (Table 4-2). The pre-season terminal runsize forecast is for 990 fish and below the low abundance threshold of 1,200 terminal runsize (Table 3-2). Therefore the critical exploitation rate ceiling management objective of 8 percent SUS maximum with no more than 22 percent total ER on the unmarked component is triggered while for the marked component the SUS exploitation rate of 12 percent is triggered (Table 3-2). Under the No Fishing alternative, the unmarked total exploitation rate is 12.0 percent with 1.1 percent in SUS fisheries (Table 4-3), which satisfies the critical exploitation rate ceiling management objectives on the unmarked component (Table 4-4). The projected SUS exploitation rate on the marked component is 1.2 percent (Table 4-4), meeting the marked SUS critical expoitation rate objective.

In summary, none of the alternatives would meet the low abundance threshold of a terminal runsize of 1,200 natural spawners for Stillaguamish River summer/fall-run Chinook salmon resulting in the critical exploitation rate ceiling being the targeted harvest objective. All three alternatives meet the marked fish critical exploitation rate objectives, but only the Proposed Action and No Fishing Action meet the SUS component of the critical exploitation rate objectives for unmarked fish (Table 4-4). Under the Proposed Action alternative, 25 more fish are expected to return to escapement for Stillaguamish River summer/fall-run Chinook salmon compared to the No Action, while 43 additional fish are predicted to escape under the No Fishing alternative compared to the Proposed Action alternative (Table 4-2).

4.5.1.1.5 Snohomish Summer/Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Snohomish summer/fall-run Chinook salmon management unit has a SUS exploitation rate ceiling (9 percent), a low abundance threshold (3,250 fish), and a critical exploitation ceiling (8 percent SUS) as shown in Table 3-2. Recent harvest distribution data indicates more than three-quarters of the harvest of Snohomish River summer/fall-run Chinook salmon are harvested in Canadian fisheries and U.S. sport fisheries (Table 3-11). Natural-origin escapement of Snoqualmie River fall-run Chinook salmon fell below the low abundance threshold eight times since 2007 (Table 3-12). The Skykomish River summer-run population has fallen below its low abundance threshold eight times since 2007 (Table 3-12). The 2021 forecast is an 8 percent decrease in total forecast and a two percent derease in natural-origin fish compared to 2020.

Under No Action, FRAM model results predict an escapement of 2,878 natural-origin fish (Table 4-2) for the Snohomish summer/fall-run Chinook salmon management unit which is less than the low abundance threshold of 3,250 natural origin spawners triggering the critical exploitation rate ceiling management objective of 8 percent SUS ER (Table 3-2). Under No Action, the expected SUS exploitation rate is 6.3 percent (Table 4-3), which meets the critical exploitation rate of 8 percent SUS (Table 4-4).

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Under the Proposed Action, FRAM model results predict an escapement of 2,936 natural-origin fish (Table 4-2) for the Snohomish summer/fall-run Chinook salmon management unit which is below the low abundance threshold of 3,250 natural origin spawners, triggering critical exploitation rate ceiling management objective of 8 percent SUS ER (Table 3-2). Under the Proposed Action, the expected SUS exploitation rate is 6.3 percent (Table 4-3), which is below the allowable fishery impact levels (Table 4-4).

Under No Fishing, FRAM model results predict an escapement of 3,009 fish (Table 4-2) for the Snohomish summer/fall-run Chinook salmon management unit and below low abundance threshold of 3,250 natural origin spawners (Table 3-2), therefore triggering the critical exploitation rate ceiling (Table 3-2). Under No Fishing, the expected SUS exploitation rate is 1.9 percent (Table 4-3), which is below the allowable SUS fishery impact level (Table 4-4).

In summary, none of the alternatives evaluated meet the Snohomish River summer/fall-run Chinook salmon low abundance threshold, althouth all three alternatives would meet critical exploitation rate ceiling management objective of 8 percent SUS ER for Snohomish River summer/fall-run Chinook salmon.

4.5.1.1.6 Lake Washington Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Lake Washington fall-run Chinook salmon management unit has an escapement goal of 500 adults and a pre-terminal SUS exploitation rate ceiling (13 percent preterminal SUS), a low abundance threshold (200 fish), and a critical exploitation ceiling (12 SUS) as shown in Table 3-2. Recent harvest distribution data indicates that Lake Washington fall-run Chinook salmon are primarily caught in Canadian fisheries and U.S. sport fisheries at almost equal proportions (

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Table 3-13). Harvest in U.S. troll and net fisheries account for almost 25 percent of total harvest mortality (

AR004520

Table 3-13). Escapement in Lake Washington/Cedar River has exceeded the low abundance threshold of 200 natural spawners every year since 2003 (Table 3-14). In 2021, there is a 4 percent decrease in the total pre-season forecast with an 8 percent decrease in natural-origin Lake Washington fall-run Chinook salmon compared to 2020.

Under No Action, FRAM model results predict an escapement for Lake Washington fall-run Chinook salmon of 750 fish (Table 4-2), which exceeds the low abundance threshold of 200 fish (Table 3-2). As a result the exploitation rate ceiling of 13 percent preterminal SUS ER and an escapment goal of 500 fish is the triggered management objective. Under No Action, the expected exploitation rate would be 11.5 percent pre-terminal SUS (Table 4-3) with escapement estimated to be 750 fish, which meets the target management objective (Table 4-4).

Under the Proposed Action, FRAM model results predict an escapement for Lake Washington fall-run Chinook salmon of 778 fish (Table 4-2), which exceeds the low abundance threshold of 200 fish (Table 3-2). As a result, the exploitation rate ceiling of 13 percent preterminal SUS ER and an escapment goal of 500 fish is the triggered management objective. Under the Proposed Action, the expected exploitation rate would be 11.5 percent perterminal SUS (Table 4-3) with estimated escapment of 778 fish, which satisfies the target management objective (Table 4-4).

Under No Fishing, FRAM model results predict an escapement for Lake Washington fall-run Chinook salmon of 967 fish (Table 4-2), which exceeds the low abundance threshold of 200 fish (Table 3-2). As a result the exploitation rate ceiling of 13 percent pre-terminal SUS ER and an escapment goal of 500 fish is the triggered management objective (Table 3-2). Under No Fishing, the expected exploitation rate would be 5.7 percent pre-terminal SUS with an estimated escapement of 967 fish (Table 4-3), which satisifes the target management objective (Table 4-4).

In summary, all three alternatives would exceed the low abundance threshold of 200 spawners for Lake Washington fall-run Chinook salmon (Table 4-4). Further, all alternatives would meet the escapement goal and pre-terminal ER management objectives. Under the No Fishing Action, approximately 189 and 217 more fish are predicted to escape relative to the Proposed Action and No Action alternatives, respectively (Table 4-2).

4.5.1.1.7 Green River Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Green River fall-run Chinook salmon management unit has a preterminal SUS exploitation rate ceiling (13 percent pre-terminal SUS), a low abundance threshold (802 fish), and a critical exploitation ceiling (12 percent SUS) as shown in Table 3-2. Recent harvest distribution data indicates that Lake Washington fall-run Chinook salmon are primarily caught in Canadian fisheries and U.S. sport fisheries at almost equal proportions (Table 3-15). Harvest in U.S. troll and net fisheries accounted for about one-third of the total harvest mortality (Table 3-15). Escapement in Green River has exceeded the low abundance threshold every year since 2007, except in 2009 (

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Table 3-16). In 2021, there is a 3 percent decrease in the total pre-season forecast and a 65 percent increase in natural-origin Green River fall-run Chinook salmon compared to 2020.

Under the No Action, FRAM model results predict an escapement for Green River fall-run Chinook salmon of 3,689 fish (Table 4-2), which exceeds the low abundance threshold of 805 (Table 3-2). As a result, the triggered exploitation rate objective for Green River fall-run Chinook salmon is 13 percent pre-terminal SUS ER with an escapment goal of 2,003 fish. Under No Action, the expected exploitation rate would be 11.5 percent pre-terminal SUS exploitation rate (Table 4-3) which meets the management objective of 13 percent pre-terminal SUS ER (Table 4-4) with an estimated escapement of 3,689.

Under the Proposed Action, FRAM model results predict an escapement for Green River fall-run Chinook salmon of 3,741 fish (Table 4-2), which exceeds the low abundance threshold of 805 (Table 3-2). As a result, the triggered exploitation rate objective for Green River fall-run Chinook salmon is 13 percent pre-terminal SUS ER with an escapment goal of 2,003 fish. Under the Proposed Action, the expected exploitation rate would be 11.5 percent pre-terminal SUS exploitation rate (Table 4-3) which satisfies the management objective of 13 percent pre-terminal SUS ER (Table 4-4) with an estimated escapement of 3,741.

Under No Fishing, FRAM model results predict an escapement for Green River fall-run Chinook salmon of 6,816 fish (Table 4-2), which exceeds the low abundance threshold of 805 (Table 3-2). As a result, the triggered exploitation rate objective for Green River fall-run Chinook salmon is 13 percent pre-terminal SUS ER with an escapment goal of 2,003 fish. Under No Fishing, the expected exploitation rate would be 5.7 percent pre-terminal SUS (Table 4-3) which satisfies the management objective of 13 percent pre-terminal SUS ER (Table 4-4) with an estimated escapement of 6,816.

In summary, all three alternatives would exceed the low abundance threshold of 805 spawners and escapement goal of 2,003 fish for Green River fall-run Chinook salmon while also meeting the targeted exploitation rate objective of 13 percent pre-terminal SUS (Table 4-4). Escapement would be greatest under the No Fishing Action and lowest under the No Action, although still well above the LAT (Table 4-4).

4.5.1.1.8 White River Spring-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the White River spring-run Chinook salmon management unit has an exploitation rate ceiling (22 percent SUS), a low abundance threshold (400 fish), and a critical exploitation ceiling (15 percent SUS) as shown in Table 3-2. More than 90 percent of the harvest of White River Chinook salmon are caught in U.S. net and sport fisheries, combined (

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Table 3-17). Since 2007, White River spring-run Chinook salmon has exceeded its low abundance threshold of 400 spawners (Table 3-18). In 2021, there is a two percent decrease in the total pre-season forecast with a 7 percent increase in natural-origin White River spring-run Chinook compared to 2020.

Under No Action, FRAM model results predict an escapement for White River spring-run Chinook salmon of 2,250 fish (Table 4-2), which exceeds the low abundance threshold of 400 fish and triggers the exploitation rate ceiling of 22 percent SUS ER (Table 3-2). The projected exploitation rate under the No Action alternative of 15.8 percent SUS ER (Table 4-3) and satisfies the objective of 22 percent SUS exploitation rate (Table 4-4).

Under the Proposed Action, FRAM model results predict an escapement for White River spring-run Chinook salmon of 2,281 fish (Table 4-2), which exceeds the low abundance threshold of 400 fish and triggers the exploitation rate ceiling of 22 percent SUS ER (Table 3-2). The projected exploitation rate under the Proposed Action alternative is 16.6 percent SUS (Table 4-3) and satisfies the objective of 22 percent SUS exploitation rate (Table 4-4).

Under No Fishing, FRAM model results predicted an escapement for White River spring-run Chinook salmon of 2,646 fish (Table 4-2), which exceeds the low abundance threshold of 400 fish and triggers the exploitation rate ceiling of 22 percent SUS ER (Table 3-2). The projected exploitation rate under the No Fishing alternative is 1.8 percent SUS (Table 4-3) and satisfies the objective of 22 percent SUS exploitation rate (Table 4-4).

In summary, all three alternatives would exceed the low abundance threshold while achieving the exploitation rate ceiling of 22 percent SUS ER for White River spring-run Chinook salmon (Table 4-4). Escapement would be slightly greatest under the No Fishing Action, but comparable between the No Action and Proposed Action (Table 4-2).

4.5.1.1.9 Puyallup River Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Puyallup River fall-run Chinook salmon management unit has a pre-terminal SUS exploitation rate ceiling (13 percent), a low abundance threshold (468 fish), and a critical exploitation ceiling (13 percent pre-terminal SUS) as shown in Table 3-2. Recent harvest distribution data indicate that Puyallup River fall-run Chinook salmon are primarily caught in Canadian fisheries and U.S. sport fisheries at almost equal proportions (Table 3-19). Harvest in U.S. troll and net fisheries account for almost 25 percent of total harvest mortality (Table 3-19). Since 2003, Puyallup River fall-run Chinook salmon has exceeded the low abundance threshold of 468 spawners (Table 3-20). In 2021, there is a 36 percent decrease in the total pre-season forecast with a 16 percent decrease in natural-origin Puyallup River fall-run Chinook salmon compared to 2020.

Under No Action, FRAM model results predict an escapement for Puyallup River fall-run Chinook salmon of 2,576 fish (Table 4-2), which exceeds the low abundance threshold of 468 fish (Table 3-2). This projected escapement triggers the exploitation rate ceiling of 13 percent pre-terminal SUS ER with an escapement goal of 1,170 fish (Table 3-2). The estimated

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exploitation rate under No Action of 11.5 percent pre-terminal SUS ER (Table 4-2) meets the exploitation rate ceiling of 13 percent (Table 4-4) with an estimated escapement of 2,576 fish.

Under the Proposed Action, FRAM model results predict an escapement for Puyallup River fall-run Chinook salmon of 2,536 fish (Table 4-2), which exceeds the low abundance threshold of 468 fish (Table 3-2). This projected escapement triggers the exploitation rate ceiling of 13 percent perterminal SUS ER with an escapement goal of 1,170 fish (Table 3-2). The estimated exploitation rate under the Proposed Action of 11.5 percent preterminal SUS ER (Table 4-2) satisfies the exploitation rate ceiling of 13 percent perterminal SUS ER (Table 4-4) with an estimated escapement of 2,536.

Under No Fishing, FRAM model results predict an escapement for Puyallup River fall-run Chinook salmon of 4,480 fish (Table 4-2), which exceeds the low abundance threshold of 468 fish (Table 3-2). This projected escapement triggers the exploitation rate ceiling of 13 percent pre-terminal SUS ER with an escapement goal of 1,170 fish (Table 3-2). The estimated exploitation rate under No Fishing of 5.7 percent pre-terminal SUS ER (Table 4-2) satisfies the preterminal SUS exploitation rate ceiling of 13 percent (Table 4-4) with an estimated escapementof 4,480 fish.

In summary, escapement under all three alternatives would exceed the low abundance threshold of 468 spawners for Puyallup River fall-run Chinook salmon while also meeting the targeted harvest objective of 13 percent preterminal SUS ER and escapement goal of 1,170 (Table 4-4). Escapement would be greatest under the No Fishing Action and comparable uner the No Action, and Proposed Action (Table 4-2).

4.5.1.1.10 Nisqually River Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Nisqually River fall-run Chinook salmon management unit has a total exploitation rate ceiling of 47 percent with an additional 150 fish encounters (<2 percent exploitation rate) for selective gear evaluation research, a low abundance threshold (6,300 fish escaping to the hatcheries or spawning grounds), and a critical exploitation rate ceiling (up to 50 percent reduction in SUS exploitation rate) as shown in Table 3-2. Recent harvest distribution data indicate that just under half of Nisqually River fall-run Chinook salmon harvested are caught in U.S. net fisheries (Table 3-21). Since 2004, Nisqually River fall-run Chinook salmon have exceeded the low abundance threshold of 6,300 spawners established in 2017 (Table 3-22). In 2021, there is a 16 percent decrease in the total pre-season forecast with a one percent increase in natural-origin Nisqually River fall-run Chinook salmon compared to 2020.

Under No Action, FRAM model results predict a natural and hatchery escapement for Nisqually River fall-run Chinook salmon of 7,540 fish (Table 4-2), which exceeds the low abundance threshold of 6,300 fish (Table 3-2). The estimated escapement triggers the exploitation rate ceiling of 47 percent total ER plus 150 fish (≤2 percent ER) identified for the selective gear evaluation study (Table 3-2). Under No Action, the expected exploitation rate is 48.8 percent total ER with an additional 450 fish (2.3 percent exploitation rate) for the selective gear

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evaluation study (Table 4-3) and exceeds the implemented management objective exploitation rate and targeted gear evaluation impacts (Table 4-4).

Under the Proposed Action, FRAM model results predict a natural and hatchery escapement for Nisqually River fall-run Chinook salmon of 8,047 fish (Table 4-2), which exceeds the low abundance threshold of 6,300 fish (Table 3-2). The estimated escapement triggers the exploitation rate ceiling of 47 percent total ER plus no more than 150 fish for selective gear evaluation study (Table 3-2). Under the Proposed Action, the expected exploitation rate is 46.9 percent total ER from harvest actions plus 150 fish (0.8 percent ER) for selective gear evaluation resulting in a total stock ER of 47.7 percent (Table 4-3) and would meet the implemented management objective exploitation rate (Table 4-4).

Under No Fishing, FRAM model results predicts a natural and hatchery escapement for Nisqually River fall-run Chinook salmon of 16,894 fish (Table 4-2), which exceeds the low abundance threshold of 6,300 fish (Table 3-2). The estimated escapement triggers the exploitation rate ceiling of 47 percent total ER plus no more than 150 fish (≤2 percent ER) for selective gear evaluation study (Table 3-2). Under No Action, the expected exploitation rate is 14.1 percent total ER and zero fish for selective gear evaluaytion (Table 4-3) and satisfies the implemented management objective exploitation rate (Table 4-4).

In summary, all three alternatives would exceed the low abundance threshold of 6,300 natural and hatchery escapement for Nisqually River fall-run Chinook and also meet the target harvest objective of 47 percent total ER (Table 4-4) while only the Proposed Action implements the selective gear evaluation study as proposed. The No Fishing Action would result in the greatest escapement (16,894) with the Proposed Action resulting in an estimated escapement of 507 fish more than the No Action (Table 4-2).

4.5.1.1.11 Skokomish River Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Skokomish River fall-run Chinook salmon management unit has a total exploitation rate ceiling (50 percent), a low abundance threshold (800 fish), and a critical exploitation ceiling (12 percent pre-terminal SUS) as shown in Table 3-2. Escapement in the Skokomish River of fall-run Chinook salmon since 2003 was below the low abundance threshold of 800 natural spawners in 2007 and 2015 (Table 3-24), although returns to George Adams Hatchery well exceeded its portion of the low abundance threshold of 500 fish. Recent harvest distribution data indicates that Skokomish River fall-run Chinook salmon are primarily taken during U.S. net and U.S. sport fisheries (Table 3-23). In 2021, there is a 13 percent decrease in the total pre-season forecast with a 14 percent decrease in natural-origin Skokomish River fall-run Chinook salmon compared to 2020.

Under No Action, FRAM model results predict an escapement of 3,863 natural spawners (Table 4-2) for Skokomish River fall-run Chinook salmon, which meets the low abundance threshold of 800 natural spawning fish and triggers the exploitation rate ceiling of 50 percent total ER (Table 3-2). Under No Action, the total exploitation rate would be 48.7 percent total ER (Table 4-3), which meets the exploitation rate ceiling of 50 percent total exploitation rate (Table 4-4).

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Under the Proposed Action, FRAM model results predict an escapement of 3,787 natural spawners (Table 4-2) for Skokomish River fall-run Chinook salmon, which meets the low abundance threshold of 800 natural spawning fish and triggers the exploitation rate ceiling of 50 percent total ER (Table 3-2). Under the Proposed Action, the total exploitation rate would be 49.2 percent total ER (Table 4-3), which is below the exploitation rate ceiling of 50 percent total exploitation rate (Table 4-4).

Under No Fishing, FRAM model results predict an escapement of 6,462 natural spawners (Table 4-2) for Skokomish River fall-run Chinook salmon, which meets the low abundance threshold of 800 natural spawning fish and triggers the exploitation rate ceiling of 50 percent total ER (Table 3-2). Under No Fishing, the total exploitation rate would be 16.2 percent total ER (Table 4-3), which is below the exploitation rate ceiling of 50 percent total exploitation rate (Table 4-4).

In summary, all three alternatives result in an estimated escapement in excess of the Low Abundance Threshold and comply with the targeted harvest objective of 50 percent total ER (Table 4-4). Escapement is expected to be greatest under the No Fishing Action and lowest under the Proposed Action (Table 4-2).

4.5.1.1.12 Mid-Hood Canal Fall-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Mid-Hood Canal fall-run Chinook salmon management unit has an exploitation rate ceiling (15 percent preterminal SUS), a low abundance threshold (400 fish), and a critical exploitation ceiling (12.4 percent pre-terminal SUS) as shown in Table 3-2. Recent harvest distribution data indicate that Mid-Hood Canal fall-run Chinook salmon are primarily taken during Canadian and U.S. sport fisheries (Table 3-26). The Mid-Hood Canal fall-run Chinook salmon population has only exceeded its low abundance threshold of 400 total natural spawners twice times since 2003 (Table 3-26). In 2021, there is a 53 percent decrease in forecasted natural-origin Mid-Hood Canal fall-run Chinook salmon compared to 2020.

Under No Action, FRAM model results suggest an estimated escapement of 17 fish (Table 4-2) for Mid-Hood Canal fall-run Chinook salmon which is below the Low Abundance Threshold of 400 fish and triggers the critical exploitation rate ceiling of 12.4 percent pre-terminal SUS ER (Table 3-2). Under No Action, the expected fishery related exploitation rate is predicted to be 12.6 percent pre-terminal SUS ER (Table 4-3) which exceeds the exploitation rate ceiling objective specified for Mid-Hood Canal fall-run Chinook salmon (Table 4-4).

Under the Proposed Action, FRAM model results suggest an estimated escapement of 18 fish (Table 4-2) for Mid-Hood Canal fall-run Chinook salmon which is below the Low Abundance Threshold of 400 fish and triggers the critical exploitation rate ceiling of 12.4 percent pre-terminal SUS ER (Table 3-2). Under the Proposed Action, the expected fishery related exploitation rate is predicted to be 12.1 percent pre-terminal SUS ER (Table 4-3) which achieves the critical exploitation rate ceiling specified for Mid-Hood Canal fall-run Chinook salmon (Table 4-4).

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Under No Fishing, FRAM model results suggest an estimated escapement of 19 fish (Table 4-2) for Mid-Hood Canal fall-run Chinook salmon which is below the Low Abundance Threshold of 400 fish and triggers the critical exploitation rate ceiling of 12.4 percent pre-terminal SUS ER (Table 3-2). Under No Action, the expected fishery related exploitation rate is predicted to be 7.2 percent pre-terminal SUS ER (Table 4-3) which achieves the critical exploitation rate ceiling specified for Mid-Hood Canal fall-run Chinook salmon (Table 4-4).

In summary, all three alternatives are projected to result in escapement well below the low abundance threshold but only the Proposed Action and No Fishing Action would meet the targeted harvest objective of 12.4 percent per-terminal SUS exploitation rate (Table 4-4). Escapement would be lowest under the the No Fishing Action, while the Proposed Action would result in an estimated 1 more fish escaping to the spawning grounds compared to the No Fishing Action.

4.5.1.1.13 Dungeness River Spring-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Dungeness River spring-run Chinook salmon management unit has an exploitation rate ceiling (10 percent SUS), a low abundance threshold (500 fish), and a critical exploitation rate ceiling (6 percent SUS) as shown in Table 3-2. Escapement of Dungeness River spring-run Chinook salmon has fallen below the low abundance threshold of 500 fish seven times since 2007 (Table 3-27). As a result, this population is often a constraining stock for fisheries harvest management. In 2021, there is an 11 percent decrease in the total pre-season forecast with a 24 percent increase in natural-origin Dungeness River Chinook salmon compared to 2020.

Under No Action, FRAM model runs predict an escapement of 695 fish (Table 4-2). This escapement exceeds the Low Abundance Threshold of 500 fish and therefore triggers the exploitation rate management objective of 10 percent SUS (Table 3-2). Under No Action, the projected SUS exploitation rate on Dungeness River spring-run Chinook salmon is 3.7 percent (Table 4-3), which achieves the exploitation rate objective for 2021 (Table 4-4).

Under the Proposed Action, FRAM model runs predict an escapement of 699 fish (Table 4-2). This escapement exceeds the Low Abundance Threshold of 500 fish and therefore triggers the exploitation rate management objective of 10 percent SUS (Table 3-2). Under the Proposed Action, the projected SUS exploitation rate on Dungeness River spring-run Chinook salmon is 3.6 percent (Table 4-3), which meets the exploitation rate objective of 10 percent SUS exploitation rate (Table 4-4).

Under No Fishing, FRAM model run suggests an escapement of 702 fish (Table 4-2). This escapement is above the Low Abundance Threshold of 500 fish and therefore triggers the exploitation rate management objective of 10 percent SUS (Table 3-2). Under No Fishing, the projected SUS exploitation rate on Dungeness River spring-run Chinook salmon is 1.2 percent (Table 4-3), which satisfies the exploitation rate management objective (Table 4-4).

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In summary, all three alternative result in an estimated escapements exceeding the low abundance threshold and meet the exploitation rate ceiling of 10 percent SUS (Table 4-4). Escapement would be greatest under the No Fishing Action, however with only three more spawners compared to the Proposed Action (Table 4-2).

4.5.1.1.14 Elwha River Summer-run Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Elwha River summer-run Chinook salmon management unit has a total exploitation rate ceiling (10 percent SUS), a low abundance threshold (1,500 fish), and a critical exploitation rate ceiling (6 percent SUS) (Table 3-2). Recent harvest distribution data for return years 2015 through 2019 indicate that over 50 percent of the harvest of Elwha River summer-run Chinook salmon population occurs in Alaska and Canadian fisheries with approximately 40 percent harvested in U.S. sport fisheries (Table 3-28). Escapement of Elwha River summer-run Chinook salmon was below the low abundance threshold of 1,500 three times since 2003 (Table 3-29). In 2021, there is an 15 percent increase in the total pre-season forecast with a 16 percent increase in natural-origin Elwha River summer-run Chinook salmon compared to 2020.

Under No Action, FRAM model run predicts an escapement of 4,062 fish (Table 4-2) which exceeds the Low Abundance Threshold of 1,500 fish and triggers the exploitation rate ceiling management objective of 10 precent SUS ER (Table 3-2). Under No Action, the SUS exploitation rate on Elwha River summer-run Chinook salmon is 3.5 percent (Table 4-3) and achieves the implemented management objective (Table 4-4).

Under the Proposed Action, FRAM model run predicts an escapement of 4,089 fish (Table 4-2) which exceeds the Low Abundance Threshold of 1,500 fish and triggers the exploitation rate ceiling management objective of 10 precent SUS ER (Table 3-2). Under the Proposed Action, the SUS exploitation rate on Elwha River summer-run Chinook salmon is 3.8 percent (Table 4-3) and achieves the implemented management objective (Table 4-4).

Under No Fishing, FRAM model run predicts an escapement of 4,106 fish (Table 4-2) which exceeds the Low Abundance Threshold of 1,500 fish and triggers the exploitation rate ceiling management objective of 10 precent SUS ER (Table 3-2). Under No Fishing Action, the SUS exploitation rate on Elwha River summer-run Chinook salmon is 1.1 percent (Table 4-3) and achieves the implemented management objective (Table 4-4).

In summary, all three alternatives result in an estimated escapement above the low abundance threshold as well as meeting the targeted harvest objective of 10 percent SUS ER (Table 4-4). Escapement is estimated to be greatest under the No Fishing Action while the Proposed Action would result in 27 fewer fish estimated to reach to spawning grounds compared to No Action (Table 4-2).

4.5.1.1.15 Western Strait of Juan de Fuca Chinook Salmon

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, the Western Strait of Juan de Fuca Chinook salmon management unit has a total exploitation rate ceiling (10 SUS), a low

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abundance threshold (500 fish), and a critical exploitation rate ceiling (6 percent SUS) (Table 3-2). Nearly 90 percent of the harvest of Hoko River fall-run Chinook salmon are caught in northern fisheries in Canada and Alaska, with relatively little harvest in U.S. fisheries (Table 3-30). Escapement of Hoko River fall-run Chinook salmon fell below the low abundance threshold in 2005, 2008, and 2009, and besides 2012, has seen stronger escapements in the last six years (Table 3-31). In 2021, there is a 53 percent decrease in the total pre-season forecast with a 55 percent decrease in natural-origin Hoko River fall-run Chinook salmon compared to 2020.

Under No Action, FRAM model run predicts an escapement of 1,065 fish for Hoko fall-run Chinook salmon (Table 4-2) which is above the Low Abundance Threshold of 500 fish and triggers the exploitation rate ceiling of 10 percent SUS ER (Table 3-2). Under No Action, the exploitation rate on Hoko River fall-run Chinook salmon is expected to be 2.0 perccent SUS ER (Table 4-3) which satisfies the implemented management objective exploitation rate (Table 4-4).

Under the Proposed Action, FRAM model run predicts an escapement of 1,054 fish for Hoko River fall-run Chinook salmon (Table 4-2) which is above the Low Abundance Threshold of 500 fish and triggers the exploitation rate ceiling of 10 percent SUS ER (Table 3-2). Under the Proposed Action, the exploitation rate on Hoko River fall-run Chinook salmon is expected to be 2.0 perccent SUS ER (Table 4-3) which satisfies the implemented management objective exploitation rate (Table 4-4).

Under No Fishing, FRAM model run predicts an escapement of 1,057 fish for Hoko fall-run Chinook salmon (Table 4-2) which is above the Low Abundance Threshold of 500 fish and triggers the exploitation rate ceiling of 10 percent SUS ER (Table 3-2). Under No Action, the exploitation rate on Hoko River fall-run Chinook salmon is expected to be 1.6 perccent SUS ER (Table 4-3) which satisfies the implemented management objective exploitation rate (Table 4-4).

In summary, all three alternatives present low risk to the Hoko River fall-run Chinook salmon with escapements exceeding the low abundance threshold and harvest impacts below the targeted harvest objective (Table 4-4). Escapement would be greatest under the No Action followed by the No Fishing Action and Proposed Action, respectively (Table 4-2).

4.5.1.1.16 Other Hatchery-origin Chinook Salmon Stocks

As described in Section 3.5.1.1, *Puget Sound Chinook Salmon*, under "Other Hatchery-origin Chinook Salmon Stocks," there are expected forecasts of 85,275 fish from nine separate hatchery-origin stocks.

Management for these hatchery stocks is anticipated to result in the same escapements for both the No Action and the Proposed Action alternatives. These hatchery programs provide both ecological benefits and increased harvest opportunity for both treaty and non-treaty fishers throughout the migratory range of these stocks. Attainment of hatchery egg take goals is an important management objective and fisheries are structured to ensure hatchery rack returns are achieved for these hatcheries. Thus, both the No Action and Proposed Action would be expected

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to meet the hatchery rack return objectives for these facilities. Under No Fishing Action, hatchery rack returns would be anticipated to exceed the returns necessary for egg take goals and the excess fish would be surplussed.

4.5.1.1.17 Summary for Chinook Salmon

Total Chinook salmon harvest in the action area would be decreased by 61,471 fish under the Proposed Action compared to No Action (Table 2-1). Escapement would increase under the Proposed Action by 19 percent compared to the No Actoin (35,060 fish under No Action compared to 41,617 fish under the Proposed Action) (Table 4-2). Compared to the Proposed Action, the No Fishing Action would increase escapement by an estimated 21,069 fish (Table 4-2) while decreasing harvest by 163,626 fish (Table 2-1). All management units would meet their designated management objectives under the Proposed Action and the No Fishing Action, while four management units (Skagit River summer/fall, Stillaguamish summer/fall, Nisqually fall-run, and Mid-Hood Canal fall-run Chinook) exceed their targeted harvest objectives under the No Action (Table 4-4). There are five management units (Nooksack River early Chinook, Skagit sprin-run, Snohomish summer/fall-run Chinook, Stillaguamish summer/fall-run Chinook, and Mid-Hood Canal fall-run Chinook) under all three alternatives which do not meet their specified low abundance thresholds (Table 4-4) and are managed to their respective critical exploitation rate objectives. Overall, the No Action would result in medium, negative effect as a result of not meeting all specified harvest target objectives. The Proposed Action would result in a low positive, effect as a result of shaping fisheries to meet targeted harvest management objectives. Relative to the Proposed Actoin, the No Fishing Action would result in a low, positive effect overall as a result of increased estimated escapement.

4.5.1.2 Hood Canal Summer-run Chum Salmon

As described in Subsection 3.5.1.2, *Hood Canal Summer-run Salmon*, the ESU comprises six distinct management units. Harvest management of this species is under the Base Conservation Regime, which restricts directed harvest of summer-run chum salmon and increases time and area closures or the release of summer-run chum salmon during fisheries directed at other species. The Base Conservation Regime is anticipated to result in an average total exploitation rate of 10.9 percent for Hood Canal region management units and 8.8 percent for Strait of Juan de Fuca management units. The escapement objective is 4,990 fish for the ESU (Table 3-32 and Table 3-33).

Hood Canal summer-run chum salmon management is anticipated to result in approximately 93 summer-run chum salmon harvested under the No Action alteranative and approximately 88 summer-run chum salmon harvested under the Proposed Action (Table 2-1), because of reduced forecast for 2021 compared to 2020. Under the No Fishing Action, zero Hood Canal summer-run chum salmon would be expected to be harvested in Puget Sound Fisheries (Table 2-1). As a result, escapement would be expected to increase by approximately the same amount.

The effect under No Action and Proposed Action would result in a negligible, negative effect on Hood Canal summer-run chum salmon. Under No Fishing, the effect on Hood Canal summer-run chum salmon is a negligible positive effect as a result of slightly higher expected escapement.

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4.5.1.3 Puget Sound Steelhead

As described in Section 3.5.1.3, *Puget Sound Steelhead*, the Puget Sound steelhead DPS comprises 32 demographically independent populations (DIPs) from three major population groups of which 23 populations are winter-run, 5 populations are summer-run, and 4 populations are summer/winter-runs. Forecasts for the 2021-2022 fishing season are not available, and the 2019-2020 forecasts, where developed, are considered as surrogates.

Puget Sound steelhead management is anticipated to result in the same escapements for the No Action and Proposed Action as these fisheries are structured for minimal impact on natural stocks and target hatchery surplus where available. Hatchery-origin steelhead harvestable abundance was considered in freshwater areas with expected hatchery returns in 2021. For 2020, extereme terminal-area harvest expectations are for approximately 3,082 fish, including summer-run hatchery-origin and winter-run hatchery-origin fish as well as incidental natural-origin steelhead impacts during directed hatchery-origin steelhead fisheries. An additional 2 steelhead are expected as incidental catches in late-run chum salmon fisheries and approximately 10 steelhead for ceremonial and subsistence purposes in rivers without hatchery steelhead fisheries in 2020. In marine waters, a catch of 215 mixed origin steelhead is anticipated. Total harvest would be expected to decrease by 436 steelhead under the Proposed Action compared to No Action (Table 2-1), as a result of cessation of some early-winter steelhead hatchery release programs and lower forecasted returns of summer-run hatchery programs. Overall, relative to Existing Condidtion, both the No Action and the Proposed Action would result in a negligible negative effect for steelhead, while the No Fishing Action would result in a negligible positive effect.

4.5.2 Non-listed Salmon

4.5.2.1 Coho Salmon

As described in Section 3.5.2.1, *Coho Salmon*, there are 40 populations of coho salmon within the Puget Sound/Strait of Georgia ESU divided into seven management consisting of five primary natural-origin management units and two hatchery-origin management units. A total of 614,948 coho salmon are forecasted to return in 2021 with 40 percent as natural-origin fish (WDFW 2021c). In comparison, the 2020 runsize forecast was 504,604 coho salmon, with 32 percent as natural-origin fish (WDFW 2020c). The predicted total forecasts for Puget Sound coho salmon in 2021 represents a 23 percent increase compared to 2020 forecasted abundance

Under No Action, all primary natural management units would meet their targeted exploitation rates (Table 4-5). Strait of Juan de Fuca and Snohomish River primary management units estimated returns are below the low abundance threshold in 2021 and are managed to their critical exploitation rate of 10 percent SUS or less. Snohomish River natural coho management unit's estimated escapement of 48,331 does not meet the rebuilding plan escapement goal of 50,000 spawners to begin rebuilding from an oversfished status. Under No Action, escapement of natural-origin coho salmon to the five primary natural-origin management units is 134,050 (Table 4-6).

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Under the Proposed Action, escapement to primary natural-origin Coho salmon management units would be 123,139 coho salmon, ranging from 43,076 for the Snohomish River natural-origin coho salmon to 6,089 for Strait of Juan de Fuca natural-origin coho salmon (Table 4-6). The Strait of Juan de Fuca and Snohomish River management unit would be below its low abundance break point and manged to harvest objectives below 10 percent SUS. A total of 276,607 coho salmon (200,263 hatchery-origin and 76,344 natural-origin; Table 2-1) are anticipated to be harvested under the Proposed Action.

Under No Fishing, all primary natural-origin management units for Puget Sound coho salmon meet their targeted exploitation rate objectives with expected impacts ranging from 4.8 to 7.9 percent total ER (Table 4-5). The Strait of Juan de Fuca management units would still be at crucial status under No Fishing and the estimated SUS ER impact for that stock is 2.0 percent, ly (Table 4-5). The Snohomish River natural coho management unit's estimated escapement of 57,227 does meet the co-managers escapement goal of 50,000 spawners to begin rebuilding from an oversfished status. Escapement of natural-origin coho salmon to the five primary natural management units is estimated to be 170,060 (Table 4-6).

Overall, all three alternatives would meet the targeted harvest objectives for all five primary natural-origin coho management units. Escapement under the Proposed Action would result in an decrease of 10,911 Coho salmon (8 percent decrease) relative to No Action as a result of increased forecasted abundaces an higher relative harvest objectives. Under No Fishing, 46,921 more Coho salmon (38 percent increase) would be expected to spawn in primary naural-origin management units relative to the Proposed Action (Table 4-6). Harvest would be greatest under the Proposed Action alternative with 5,624 more coho salmon harvested compared to the Proposed Action (Table 2-1). As a result, the No Action and Proposed Action would both result in negligible, positive effect as all management units would meet their expected harvest objective. The No Fishing Action would result in a low positive effect as a consequenc of higher escapement including the Snohomish Management Unit exceeding is targeted rebuilding escapement.

Table 4-5. Predicted total and Southern U.S. exploitation rate for primary natural-origin coho salmon management units under the No Action, the Proposed Action, and the No Fishing Action alternatives.

Management Unit	2020 Exploitation Rate Objective (%)	Predicted Exploitation Rate (%)		
		No Action (Total/SUS)	Proposed Action (Total/SUS)	No Fishing Action (Total/SUS)
Skagit	35 Total	**28.5 Total** / 25.0 SUS	**34.9 Total** / 30.0 SUS	**7.5 Total** / 2.0 SUS
Stillaguamish	50 Total	**24.8 Total** / 22.0 SUS	**28.6 Total** / 25.0 SUS	**4.8 Total** / 1.0 SUS
Snohomish	40 Total	**19.6 Total** / 17.1 SUS	**28.5 Total /** 25.1 SUS	**4.8 Total** / 1.4 SUS
Hood Canal	45 Total	**40.0 Total** / 36.0 SUS	**43.1 Total** / 38.0 SUS	**7.9 Total** / 2.0 SUS
Juan de Fuca Tributaries	10 SUS	7.5 Total / **4.4 SUS**	9.2 Total /**5.7 SUS**	5.5 Total / **2.0 SUS**

Table 4-6. Predicted coho salmon escapement for primary natural-origin coho salmon management units under the No Action, the Proposed Action, and the No Fishing Action.

Management Unit	Predicted Spawning Escapement (# of fish)

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	No Action	Proposed Action	No Fishing Action
Skagit	41,954	38,271	54,520
Stillaguamish	20,226	19,242	25,587
Snohomish	48,331	43,076	57,227
Hood Canal	17,346	16,461	26,661
Juan de Fuca Tributaries	6,193	6,089	6,335
Total	**134,050**	**123,139**	**170,060**

4.5.2.2 Fall- and Winter-run Chum Salmon

As described in Section 3.5.2.2, *Fall-run and Winter-run Chum Salmon*, escapement objectives for fall-run and winter-run chum salmon varies between odd-numbered and even-numbered years. For 2021, given the recent decline in South Sound fall chum stocks and the historically low pre-season forecast for 2021, as well as concerns for incidental impacts to Nisqually winter chum stocks also forecasted below escapement, the co-managers (State and Tribal) have planned to forgo planning preseason pre-terminal directed fisheries in Marine Areas 10 and 11 (and the associated impacts on Nisqually winter chum) as well as recreational fisheries directed at any of the South Sound chum stocks pending agreement on an inseason runsize update trigger for the 2021 fishery (WDFW and Puget Sound Treaty Tribes 2021b). Approximately 550,438 fall-run and winter-run chum salmon are forecasted to return in 2021. The odd-year escapement goal for all Puget Sound fall-run chum salmon, excluding South Sound fall-run chum salmon, is 167,213 fish, for South Sound natural-origin fall-run chum salmon is 72,275, and for winter-run chum salmon is 22,373 for 2020 (Table 3-41).

Fall- and winter-run chum salmon directed fisheries on U.S. stocks have been primarily limited to southern Puget Sound and Hood Canal stocks. Chum harvest opportunity for north Puget Sound and Strait of Juan de Fuca stocks have been limited to marine fisheries targeting harvestable British Columbia stocks (i.e Fraser River chum salmon). The 2021 Puget Sound forecasted runsize is 54 percent less than the previous year with four fall-run stocks (Skagit River, Stillaguamish River, Snohomish River, and Strait of Juan de Fuca) forecasted below their targeted escapment goals. Additionally, Puyallup winter-run hatchery-origin chum salmon are also forecasted below their broodstock goal. Beyond these four stocks, forecasted returns provide for harvest opportunity and under the No Action alternative, approximately 613,326 chum, including 125,000 Fraser River chum would be anticipated to be harvested which exceeds the allowable harvest to still meet the escapement goals for the stocks with harvestable abundance. Under the Proposed action, an estimated 333,670 chum including 125,000 Fraser River chum are anticipated to be harvested (Table 2-1). The chum salmon fisheries in 2021 are structured in consideration of incidental impacts to coho salmon and Chinook salmon, which are included in the modeling of all alternatives for those species. Under the Proposed Action, harvest would decrease by 279,656 fish compared to No Action (Table 2-1). Under the No Action the overall effect would be a moderate negative effect as harvest would be expected to nearly exceed the forecasted runsize of Puget Sound chum salmon, resulting in increased uncertainty of some individual stocks not meeting escapement goals. Under the Proposed Action, the overall effect would be a low negative effect, as alternative management actions would be implemented address concerns for South Sound fall-run chum salmon and Nisqually winter-run chum salmon and harvest constrained to increase likelihood of meeting escapement objectives for South Sound chum. Under No Fishing, zero Puget Sound fall and winter-run chum

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salmon nor Fraser River chum salmon would be harvested in the action area (Table 2-1) resulting in a low positive effect for the resource, although fisheries in Canada could harvest the forgone US share of Fraser River chum salmon.

4.5.2.3 Pink Salmon

Although pink salmon are expected to return in 2021/2022 as Puget Sound pink salmon exhibit an odd-year return life-history, no pink Salmn fisheries were promulgated in 2020/2021. Under the No Action alternative, no pink salmon would be harvested as fisheries were not developed to target pink Salmon in 2020/2021(Table 2-1). All forecasted pink salmon would be expected to return to the spawning grounds and spawn under the No Action alternative, resulting in a low, positive effect.

Under the Proposed Action, approximately 1,879,222 pink Salmon (Table 2-1), including approximately 48,830 Fraser River origin pink salmon, would be expected to be harvested. Based on pink salmon escapment goal objectives, the Proposed action would result in escapement of 737,330 pink Salmon. As a result, the Proposed Action would result in a negilible, negative effect on pink salmon.

There would be no expected harvest of pink salmon in 2021 under the No Fishing alternative and, similar to the No Action alternative, all pink salmon returns in the Puget Sound would be expected to return to spawn, resulting in a low, positive effect.

4.5.2.4 Sockeye Salmon

Sockeye fisheries within Puget Sound primarily target returning Fraser River sockeye salmon (Canada) in marine waters and U.S. origin sockeye salmon stocks in terminal fisheries. As described in Section 3.5.2.3, *Sockeye Salmon*, the two largest returning domestic sockeye salmon populations are Baker River and Lake Washington. Returns to Baker River allow for limited commercial and sport harvest opportunities in 2021, which is reflective of a 7 percent decrease in forecasted runsize relative to 2020. The Lake Washington forecasted return of 24,807 sockeye salmon in 2021 does not provide for harvest opportunity as the escapement goal is 350,000 fish.

Sockeye salmon management is anticipated to result in similar escapements for Lake Washington stock for all three alternatives as no harvest is anticipated on that stock. For the Baker River sockeye salmon, under the No Action alternative, 11,428 sockeye would be expected to be harvested resulting in an escapement of 1,814 fish, well below the 10,000 escapement goal. Under the Proposed Action, 2,253 Baker River sockeye would be expected to be harvested resulting in an escapment of 10,000 fish. Under all alternatives, no Fraser River sockeye salmon would be harvested, as both the 2020 and 2021 Fraser Sockeye forecasts below levels that would allow an allowable harvest under the PST agreement. Under the No Fishing Action, zero sockeye salmon would be expected to be harvested and all forecasted Baker River sockeye would be expected to return to the spawning grounds or to the hatchery program.

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As a result, the No Action would have a high negative effect as a result over-harvesting Baker River sockey salmon below the targeted escapment objective. The Proposed Action would have a low negative effect from harvest of domestic sockeye salmon stock, while the No Fishing Action would result in a low positive effect primarily on Baker River sockeye salmon as they are the only domestic sockeye stock expected to be harvested in U.S. fisheries.

4.5.2.5 Summary

Under existing conditions, harvest has been planned by co-managers through the North of Falcon and PFMC processes (Section 1.5.2, *Fisheries Co-Management*) and was based on review of pre-season forecasts and FRAM modeling. Under No Action, harvest would not be planned under these two processes, would not be changed from the prior year to accommodate for changes in salmon and steelhead pre-season forecasts, and would not be planned to meet the exploitation rates for Chinook salmon. As a result, the No Action would result in a greater impact than existing conditions. In comparison, the Proposed Action would include determining the appropriate harvest rates using the North of Falcon and PFMC processes. Harvest was planned to meet the exploitation rates for all 14 Chinook salmon management units. For 2021, Fraser River sockeye salmon returns would not be available for harvest. The Proposed Action would have an overall effect similar to existing conditions, but with a decrease in harvest of all salmon, except pink salmon. Considering the anticipated 1,879,222 pink salmon harvest under the Proposed Action, total salmon and steelhead harvest would increase by 1,541,071 relative to total salmon and steelhead harvested under the No Action. Under the No Fishing Action, no salmon or steelhead fisheries would be promulgated in the action area. However, ocean fisheries under PFMC control or northern fisheries in Alaska and Canada would continue to have harvest impacts Puget Sound salmon, esepecially Chinook salmon and coho salmon. As a result, the No Fishing Action is expected to result in an overall low positive effect on Puget Sound salmon and steelhead.

4.5.3 Other Fish

Table 3-42 describes other fish that occur in Puget Sound and their relationship with salmon and steelhead. Some fish are predators of salmon and steelhead, whereas other fish are prey of salmon and steelhead (Section 3.5.7, *Other Fish*). Considering both types of ecological relationships, harvest of salmon and steelhead would result in a benefit for fish that are prey of adult salmon, a negative impact for fish that prey on adult salmon, and no effect for prey and predators of juvenile salmon (which are not harvested). As a result, under existing conditions, the overall effect of harvest to other fish would be negligible. For other fish species, including Bull Trout, which may be incidentally caught during salmon and steelhead fisheries, harvest from salmon and steelhead fisheries under existing conditions would have negligible, negative effect.

Under No Action the effect would also be negligible since changes in species harvested, extent of harvest, location, timing, closures, gear, and type (Table 2-2) would not change the predator prey relationship of other fish with salmon and steelhead or the overall total abundance of other fish. Under the Proposed Action, 138 percent more salmon and steelhead, primarily pink salmon, would be harvested compared to No Action (Table 2-1). As a result, the Proposed Action would also result in a negligible negative, effect similar to existing conditions and No Action and negligible negative effect to other fish, including Bull Trout, which are caught

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incidentally during salmon and steelhead harvest, as it would not change the predator prey relationship of other fish with salmon and steelhead or the overall abundance of other fish. Under No Fishing, the effect would be a low negative effect for fish that are prey of salmon and steelhead and low positive effect for other fish that prey on salmon and steelhead, compared to existing conditions and the Proposed Action. Overall, the effect of No Fishing would balance out to Negligible Effect between predator and prey species, compared to the Proposed Action, while incidental catch of other fish, including Bull Trout, will result in a negligible, positive effect.

4.5.4 Fish Habitat Affected by Salmon Fishing

As described in Section 3.5.4, *Fish Habitat Affected by Salmon Fishing*, harvest and associated boat operations can impact fish habitat through fishing equipment scouring the seabed or river bottom, noise and light disturbance, and the presence of derelict fishing gear, among other fishing activities. These impacts are considered a low negative effect under existing operations. Under No Action, fishing operations associated with the 2020-2021 fishing season would continue to have a low negative effect on fish habitat.

Under the Proposed Action, 138 percent more salmon and steelhead, primarily pink salmon, would be harvested compared to No Action (Table 2-1). The proposed action would continue to have a low, negative effect on fish habitat disturbance, which is the same as existing conditions and No Action.

Under No Fishing, impacts to fish habitat from fishing activities would be alleviated resulting in a low positive effect on fish habitat relative to the Proposed Action.

4.5.5 Marine-derived Nutrients from Salmon Spawners

The alternative evaluation of marine-derived nutrients to salmon and steelhead would be the same as described under wildlife, which is in Section 4.4.2, *Salmon Carcass Nutrient Benefits*.

4.5.6 Selectivity of Biological Characteristics of Salmon

As described in Section 3.5.6, *Selectivity of Biological Characteristics of Salmon*, harvest selectivity for specific fish features has not been shown to impact the abundance, growth, and productivity of salmon and steelhead. Thus, this topic is not evaluated further in this EA analysis.

4.5.7 Harvest of Hatchery-Origin Fish

Hatchery production in Puget Sound produces fish for either conservation purposes (rebuilding salmon and steelhead stocks) and/or for harvest. Production of hatchery-origin fish is beneficial for treaty tribes, as well as for commercial and recreational fishers, particularly for those harvesting Chinook salmon where more than 85 percent of all Chinook salmon harvested are hatchery-origin fish (Table 2-1). However, the harvest of hatchery-origin fish can impact natural-origin fish through incidental bycatch (Section 3.5.11, *Hatchery Related Fishery Effects on Salmon*).

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The Proposed Action would result in 138 percent more salmon and steelhead harvested, primarily natural-origin pink salmon, compared to No Action (Table 2-1). Effects of this harvest level on natural origin Chinook salmon and Coho salmon are assessed and accounted for in meeting their respective management objectives. As a result, the Proposed Action would also result in a low, negative effect to natural-origin salmon, which is the same as No Action and existing conditions.

Under No Fishing action, no hatchery origin salmon or steelhead would be harvested in the action area and those fish entering Puget Sound would be expected to return to either hatchery racks or stray to spawning grounds. As a result, more hatchery fish would stray to spawning grounds than under the Proposed Action and hatchery racks and facilities would surplus excess fish returning to their facilities beyond their broodstock needs. Overall, the No Fishing Action, would be expected to result in a medium, negative effect for hatchery fish compared to existing conditions and the Proposed Action.

4.5.8 Treaty Indian Ceremonial and Subsistence Salmon Uses

Treaty tribes prioritize their ceremonial and subsistence needs over commercial sales and may fish for ceremonial and subsistence uses when there are no concurrent commercial fisheries (Section 3.5.12, *Treaty Indian Ceremonial and Subsistence Salmon Uses*). Under existing conditions, tribes have the opportunity to harvest salmon and steelhead for ceremonial and subsistence uses. Although treaty tribes may desire increased harvest of salmon and steelhead for ceremonial and subsistence purposes, existing conditions assume that a similar portion of salmon and steelhead for these purposes would be harvested, and that the treaty tribes have been able to determine the amount needed for subsistence ceremonial purposes. The treaty right to harvest salmon and steelhead for subsistence and ceremonial purposes is considered a high positive effect under existing conditions. Since the No Action represents continued harvest for ceremonial and subsistence purposes similar to that which occurred in 2020-2021, the No Action alternative would result in a moderate negative effect, since there were reductions in ceremonial and subsistence harvest of Chinook salmon and coho salmon for some tribes during the 2020-2021 fishing season (BIA 2020).

Ceremonial and subsistence harvest is prioritized over commercial fisheries (Section 3.5.12, *Treaty Indian Ceremonial and Subsistence Salmon Uses*) and provides for cultural, spiritual, and environmental connection for Tribes. Under the Proposed Action, there are decreases in harvest for ceremonial and subsistence harvest of Chinook salmon by some tribes compared to No Action. As a result, the Proposed Action would be a moderate, negative effect in comparison to No Action because of the cultural importance of ceremonial and subsistence needs and not at the level desired by most tribes.

Under No Fishing, no ceremonial or subsistence fisheries would occur due to lack of ESA authorization. As a result, the No Fishing alternative would have a high, negative effect on treaty tribes exercise of the treaty reserved rights and disruption of ceremonial and subsistence harvest needs.

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4.6 Invertebrates

As described in Section 3.6, invertebrates serve as prey for salmon and steelhead, or are prey consumed by other fish that are then consumed by salmon and steelhead. Recent studies have shown an overall increase in adverse effects to invertebrates in Puget Sound due to declining sediment quality, which impacts forage resources of salmon and steelhead. However, these effects are not the result of salmon and steelhead fishing. Thus, under existing conditions, salmon and steelhead harvest has no effect on the abundance and health of invertebrates. Under No Action, harvest would continue to have no effect.

Under the Proposed Action, 138 percent more salmon and steelhead would be harvested, including 1,879,222 more pink salmon harvested, compared to No Action (Table 2-1). Despite changes in species harvested as noted and extent of harvest, location, timing, closures, gear, and type (Table 2-2), the Proposed Action is anticipated to have no measurable effect on invertebrate health and/or abundance, which is the same effect as existing conditions and No Action.

Under No Fishing, harvest action would also have no measurable effect on invertebrate abundance or health.

4.7 Socioeconomics

This section presents the results of analyzing the effects of the No Action, Proposed Action, and No Fishing alternatives on commercial salmon fisheries, including tribal and non-tribal fishers, recreational salmon fisheries, and on the Puget Sound regional economy, relative to the Existing Conditions described in Section 3.7, *Socioeconomics*. The estimates presented in this section are based on data sources and assumptions discussed in Appendix C, *Socioeconomics Methods*.

As described in Section 2.3.1, No Action represents the predicted commercial harvest of salmon and steelhead and numbers of sport fishing trips based on 2020-21 agreed upon fisheries and the 2021-2022 forecasted abundance of salmon and steelhead. No Action incorporates harvest management focused on 2020 conservation concerns for natural-origin ESA-listed Puget Sound Chinook salmon as well as coho and chum salmon. Under the Proposed Action, fisheries harvest are adjusted from the harvest allocated during the 2020-2021 season to targeted management objectives for coho salmon, ESA-listed Chinook salmon, Nisqually winter-run Chum salmon, and South Sound fall-run Chum 2021 conservation concerns. The No Fishing action assumes that fishing activity targeting salmon and steelhead resources in the Puget Sound region are not allowed and, as a result, levels of commercial harvesting and sport fishing effort associated with these resources would be zero.

As indicated in Section 3.7, *Socioeconomics*, table values and corresponding values reported in the sections are not rounded to aid the reader in finding corresponding numbers in the tables and text. The use of unrounded numbers, however, should not be interpreted as suggestive of unusually high levels of precision in the estimates. All numbers presented represent a reasonable estimate of the underlying values.

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4.7.1 Commercial Salmon Fisheries

4.7.1.1 No Action

Under No Action, the commercial harvest of salmon and steelhead in Puget Sound waters would be generally greater than under modeled 2020 Existing Conditions, primarily because of greater harvest of coho salmon (Table 4-7). The commercial harvest of Chinook salmon would be 10,395 fish less (or a decrease of more than 8 percent) compared to levels under modeled 2020 Existing Conditions, whereas the harvest of coho salmon would be 34,186 fish more (almost 23 percent) than under modeled 2020 Existing Conditions. Under No Action, no commercial harvesting of pink salmon is expected in Puget Sound waters, similar to modeled 2020 Existing Conditions.

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Table 4-7. Puget Sound commercial harvest by species and catch area under Modeled 2020 Existing Conditions and No Action.

SPECIES/CATCH AREA	Modeled 2020 Existing Conditions	No Action		
	Value (Number of Fish)	Value (Number of Fish)	Change from Existing Conditions (Number of Fish)	Percent Change (%)
Chinook salmon				
Strait of Strait of Juan de Fuca (Area 5, 6)	3,808	3,808	0	0
North Puget Sound (Area 7)	18,135	18,256	+120	+0.7
Central Puget Sound (Area 8, 9)	8,212	7,947	-264	-3.2
South Puget Sound (Area 10,11,13)	41,341	33,335	-8,005	-19.4
Hood Canal (Area 12)	50,217	47,971	-2,246	-4.5
Total	121,713	111,318	-10,395	-8.5
Coho Salmon				
Strait of Juan de Fuca (Area 5, 6)	9,677	7,023	-2,654	-27.4
North Puget Sound (Area 7)	30,802	47,681	+16,879	+54.8
Central Puget Sound (Area 8, 9)	22,254	33,071	+10,817	+48.6
South Puget Sound (Area 10,11,13)	59,130	72,987	+13,857	+23.4
Hood Canal (Area 12)	28,968	24,254	-4,714	-16.3
Total	150,831	185,017	+34,186	+22.7
Sockeye Salmon				
Strait of Juan de Fuca (Area 5, 6)	0	0	0	0
North Puget Sound (Area 7)	0	0	0	0
Central Puget Sound (Area 8, 9)	1,301	1,301	0	0
South Puget Sound (Area 10,11,13)	0	0	0	0
Hood Canal (Area 12)	0	0	0	0
Total	1,301	1,301	0	0
Pink Salmon				
Strait of Juan de Fuca (Area 5, 6)	0	0	0	0
North Puget Sound (Area 7)	0	0	0	0
Central Puget Sound (Area 8, 9)	0	0	0	0
South Puget Sound (Area 10,11,13)	0	0	0	0
Hood Canal (Area 12)	0	0	0	0
Total	0	0	0	0
Chum Salmon				
Strait of Juan de Fuca (Area 5, 6)	322	322	0	0
North Puget Sound (Area 7)	129,071	129,071	0	0
Central Puget Sound (Area 8, 9)	18,512	18,512	0	0
South Puget Sound (Area 10,11,13)	96,672	96,672	0	0
Hood Canal (Area 12)	368,749	368,749	0	0
Total	613,326	613,326	0	0
Steelhead				
Strait of Juan de Fuca (Area 5, 6)	95	95	0	0
North Puget Sound (Area 7)	105	105	0	0

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SPECIES/CATCH AREA	Modeled 2020 Existing Conditions	No Action		
	Value (Number of Fish)	Value (Number of Fish)	Change from Existing Conditions (Number of Fish)	Percent Change (%)
Central Puget Sound (Area 8, 9)	85	85	0	0
South Puget Sound (Area 10,11,13)	0	0	0	0
Hood Canal (Area 12)	0	0	0	0
Total	285	285	0	0
ALL SPECIES				
Strait of Juan de Fuca (Area 5, 6)	13,902	11,249	-2,654	-19.1
North Puget Sound (Area 7)	178,113	195,113	+17,000	+9.5
Central Puget Sound (Area 8, 9)	50,364	60,917	+10,553	+21.0
South Puget Sound (Area 10,11,13)	197,143	202,994	+5,852	+3.0
Hood Canal (Area 12)	447,935	440,975	-6,960	-1.6
TOTAL	887,456	911,247	+23,791	+2.7

Note: Harvest estimates includes both freshwater and marine catch, and tribal and non-tribal commercial harvest, as shown in Table 3-43 under modeled 2020 conditions.

Source: Harvest estimates provided by NWIFC (James pers. comm.).

Along with an overall increase in harvest (23,791 fish), as reported in Table 4-7, there would be an increase ($42,100) in the total ex-vessel value of commercial salmon and steelhead landings under No Action. In the North Puget Sound subregion, ex-vessel value of landings would be an estimated $318,900 higher (+7.2 percent) (Table 4-8) than under Modeled 2020 Existing Conditions. Tribal fishers would benefit most from this increased value, with an estimated $306,100 increase in ex-vessel value (+10.4 percent) relative to Modeled 2020 Existing Conditions (Table 4-8). Non-tribal fishers would benefit to a lesser extent, with a 0.7 percent increase in catch and a 0.9 percent increase in ex-vessel value as compared to Modeled 2020 Existing Conditions (Table 4-8).

In the South Puget Sound subregion, the ex-vessel value of salmon and steelhead landed at ports in the subregion would be lower by an estimated $243,000 relative to Modeled 2020 Existing Conditions (Table 4-8). Tribal fishers would incur most of the decrease in ex-vessel value, with an estimated reduction of $233,300 (Table 4-8), whereas non-tribal fishers would experience a decrease of an estimated $9,700 (-1.0 percent) in ex-vessel value (Table 4-8). In the Strait of Juan de Fuca subregion, the ex-vessel value of salmon and steelhead landed at regional ports under No Action would be an estimated $33,900 lower (a 6.3 percent reduction) compared to Modeled 2020 Existing Conditions (Table 4-8). Non-tribal fishers would experience most ($30,900) of this reduction in ex-vessel value.

Regionwide, the tribal commercial harvest under No Action would be higher by 25,300 fish and their ex-vessel value would be $69,800 higher than under Modeled 2020 Existing Conditions (Table 4-8). Non-tribal fishers would experience an overall slight reduction in the number of fish

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caught (1,600 fish) and a corresponding decrease of $27,700 in ex-vessel value. The net economic value of all salmon harvested under No Action, which is represented by the difference between the ex-vessel value of the salmon harvest and out-of-pocket expenses (including the cost of labor) for commercial operators, would be an estimated $6,619,000 (in year 2020 dollars), which represents an increase of $46,000 (0.7 percent) compared to Modeled 2020 Existing Conditions.

Table 4-8. Commercial harvest and ex-vessel values of salmon and steelhead resources harvested under Modeled 2020 Existing Conditions and under No Action, by Puget Sound subregion.

SUBREGION	Modeled 2020 Existing Conditions	No Action		
	Value (Number of Fish or $)	Value (Number of Fish or $)	Change from Existing Conditions (Number of Fish or $)	Percent Change
North Puget Sound				
Non-Tribal				
Harvest (thousand fish)	149.1	150.2	+1.1	+0.7%
Ex-vessel harvest value ($ thous.)	1,475.6	1,488.4	+12.9	+0.9%
Tribal				
Harvest (thousand fish)	265.5	291.1	+25.6	+9.6%
Ex-vessel harvest value ($ thous.)	2,934.9	3,240.9	+306.1	+10.4%
Total				
Harvest (thousand fish)	414.6	441.3	+26.7	+6.4%
Ex-vessel harvest value ($ thous.)	4,410.4	4,729.4	+318.9	+7.2%
South Puget Sound				
Non-Tribal				
Harvest (thousand fish)	97.3	96.6	-0.7	-0.7%
Ex-vessel harvest value ($ thous.)	1,011.7	1,002.0	-9.7	-1.0%
Tribal				
Harvest (thousand fish)	344.7	344.6	-0.1	-0.0%
Ex-vessel harvest value ($ thous.)	5,341.1	5,107.8	-233.3	-4.4%
Total				
Harvest (thousand fish)	442.0	441.2	-0.8	-0.2%
Ex-vessel harvest value ($ thous.)	6,352.7	6,109.8	-243.0	-3.8%
Strait of Strait of Juan de Fuca				
Non-Tribal				
Harvest (thousand fish)	9.1	7.2	-1.9	-20.9%
Ex-vessel harvest value ($ thous.)	142.9	112.0	-30.9	-21.6%
Tribal				
Harvest (thousand fish)	21.8	21.7	-0.1	-0.6%
Ex-vessel harvest value ($ thous.)	399.4	396.4	-3.0	-0.7%
Total				

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SUBREGION	Modeled 2020 Existing Conditions	No Action		
	Value (Number of Fish or $)	Value (Number of Fish or $)	Change from Existing Conditions (Number of Fish or $)	Percent Change
Harvest (thousand fish)	30.9	28.8	-2.0	-6.6%
Ex-vessel harvest value ($ thous.)	542.3	508.4	-33.9	-6.3%
Total (all regions)				
Non-Tribal				
Harvest (thousand fish)	255.5	253.9	-1.6	-0.6%
Ex-vessel harvest value ($ thous.)	2,630.2	2,602.4	-27.7	-1.1%
Tribal				
Harvest (thousand fish)	632.0	657.3	+25.3	+4.0%
Ex-vessel harvest value ($ thous.)	8,675.3	8,745.1	+69.8	+0.8%
Total				
Harvest (thousand fish)	887.5	911.2	+23.8	+2.7%
Ex-vessel harvest value ($ thous.)	11,305.5	11,347.5	+42.1	+0.4%

Note: Includes both freshwater and marine harvest.

All monetary values are reported in 2020 dollars.

Source: Derived by TCW Economics using its economic impact model with harvest estimates provided by NWIFC (Table 4-6).

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4.7.1.2 Proposed Action

Under the Proposed Action, commercial harvest levels would substantially increase (by an estimated 750,195 fish) compared to Modeled 2020 Existing Conditions, and by 726,404 fish compared to harvest conditions under No Action (Table 4-9). The harvest increase under the Proposed Action is primarily driven by the projected pink salmon harvest (1,018,935 fish) and, to a much lesser extent, by estimated increases in the coho harvest (38,789 fish) as compared to Modeled 2020 Existing Conditions.

The commercial harvest of Chinook salmon under the Proposed Action would be 27,681 fish less than under Modeled 2020 Existing Conditions, a reduction of about 23 percent; the commercial harvest of coho salmon would increase by an estimated 38,789 fish (26 percent); and the commercial harvest of chum salmon under the Proposed Action would decrease substantially (by an estimated -279,617 fish or about 46 percent) as compared to Modeled 2020 Existing Conditions (Table 4-9). Changes in the harvest of sockeye and steelhead under the Proposed Action are expected to be minor relative to the harvest under Modeled 2020 Existing Conditions.

In contrast to the increase in the overall number of fish harvested, the ex-vessel value of all commercial salmon and steelhead landings under the Proposed Action would be lower by an estimated $1,498,800 (-13 percent) compared to the value under the Modeled 2020 Existing Conditions (Table 4-10). The primary reason for this non-intuitive result is that the number of pink salmon harvested under the Proposed Action is an estimated 1,018,935 more fish than under the Existing (modeled 2021) Conditions or No Action (both conditions would have zero pink salmon harvested). However, because the Proposed Action would have about 280,000 fewer chum harvested compared to Modeled 2020 Existing Conditions and No Action, the total number of salmon and steelhead harvested under the Proposed Action is about 750,200 more total fish than under Modeled 2020 Existing Conditions, and about 726,400 more fish than under No Action (Table 4-9). But because the average size of pink salmon is only about one-half that of chum salmon, and the ex-vessel value per pound of pink salmon is about one-third that of chum salmon (see Appendix C), the net result of the harvest changes under the Proposed Action is that the ex-vessel value under the Proposed Action is an estimated $1,498,800 less than under the Modeled 2020 Existing Conditions and an estimated $1,540,000 less than under No Action.

In the North Puget Sound subregion, the ex-vessel value of landed salmon and steelhead under the Proposed Action would be $304,900 higher than ex-vessel values under Modeled 2020 Existing Conditions, and an estimated $14,000 lower than under No Action. Under the Proposed Action, ex-vessel values to tribal commercial fishers in the North Puget Sound subregion would be higher (by $553,300) but lower (by $248,300) for non-tribal commercial fishers (compared to Existing [modeled 2020-21] Conditions) primarily due odd-year pink salmon abundances forecasted in 2021 (Table 4-10) with minimal expected non-tribal commercial harvest in North Puget Sound on Fraser River pink salmon.

In the South Puget Sound subregion, the ex-vessel value of salmon and steelhead landed under the Proposed Action would be lower by an estimated $1,627,200 compared to Modeled 2020 Existing Conditions, and lower by $1,384,300 compared to No Action conditions. Under the Proposed Action, ex-vessel values would be lower for both tribal commercial fishers (by an

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estimated $1,082,600) and for non-tribal commercial fishers (by an estimated $544,600 in the South Puget Sound subregion when compared to values under Existing [modeled 2020-21] Conditions (Table 4-10).

In the Strait of Juan de Fuca subregion, the ex-vessel value of salmon and steelhead landed at regional ports under the Proposed Action would be lower by an estimated $176,500 as compared to values under Modeled 2020 Existing Conditions, and would be lower by $142,600 compared to values under No Action (Table 4-10). Ex-vessel values would be lower for both tribal commercial fishers (by an estimated $108,100) and for non-tribal commercial fishers (by an estimated $68,400) in the Strait of Juan de Fuca subregion when compared to values under Existing [modeled 2020-21] Conditions (Table 4-10).

Regionwide, non-tribal fishers under the Proposed Action would experience both decreased harvest and ex-vessel value as compared to the Modeled 2020 Existing Conditions and to No Action conditions, whereas tribal fishers under the Proposed Action would have increased harvest but decreased ex-vessel value as compared to the Modeled 2020 Existing Conditions and No Action conditions. As indicated above, the contribution of pink salmon to the total harvest but reduction in chum salmon under the Proposed Action results in net increase in the number of fish harvested but decreased ex-vessel value. Total harvest and ex-vessel values under No Action would be higher by 23,800 fish and $42,100 than under Modeled 2020 Existing Conditions (Table 4-10).

Under the Proposed Action, non-tribal fishers would experience a reduction in harvest by about 6,500 fish and a corresponding decrease in ex-vessel value of an estimated $861,300 compared to Modeled 2020 Existing Conditions, primarily as a result of decreased chum salmon harvested in South Puget Sound (Table 4-10). Under the Proposed Action, tribal fishers would experience an increase in the number of salmon and steelhead harvested by an estimated 756,700 fish but a decrease in ex-vessel value of about $637,500. The net economic value of the salmon and steelhead harvest under the Proposed Action, which is represented by the difference between the ex-vessel value of the salmon and steelhead harvest and out-of-pocket expenses for commercial operators, would be an estimated $5,718,000 (in year 2020 dollars), a decrease of $901,000 (13.6 percent) compared to values under Modeled 2020 Existing Conditions.

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Table 4-9. Puget Sound commercial harvest under Modeled 2020 Existing Conditions, No Action, and Proposed Action, by species and Puget Sound catch area.

SPECIES/CATCH AREA	Modeled 2020 Existing Conditions	No Action	Proposed Action		
	Value (Number of Fish)	Value (Number of Fish)	Value (Number of Fish)	Change from Existing Conditions (Number of Fish)	Percent Change (%)
Chinook salmon					
Strait of Juan de Fuca (Area 5, 6)	3,808	3,808	2,690	-1,118	-29.4
North Puget Sound (Area 7)	18,135	18,256	19,860	+1,725	+9.5
Central Puget Sound (Area 8, 9)	8,212	7,947	9,202	+990	+12.1
South Puget Sound (Area 10,11,13)	41,341	33,335	29,227	-12,113	-29.3
Hood Canal (Area 12)	50,217	47,971	33,053	-17,164	-34.2
Total	121,713	111,318	94,033	-27,681	-22.7
Coho Salmon					
Strait of Juan de Fuca (Area 5, 6)	9,677	7,023	7,130	-2,547	-26.3
North Puget Sound (Area 7)	30,802	47,681	49,036	+18,234	+59.2
Central Puget Sound (Area 8, 9)	22,254	33,071	41,280	+19,026	+85.5
South Puget Sound (Area 10,11,13)	59,130	72,987	68,986	+9,856	+16.7
Hood Canal (Area 12)	28,968	24,254	23,188	-5,780	-20.0
Total	150,831	185,017	189,620	+38,789	+25.7
Sockeye Salmon					
Strait of Juan de Fuca (Area 5, 6)	0	0	0	0	0
North Puget Sound (Area 7)	0	0	0	0	0
Central Puget Sound (Area 8, 9)	1,301	1,301	1,127	-174	-13.4
South Puget Sound (Area 10,11,13)	0	0	0	0	0
Hood Canal (Area 12)	0	0	0	0	0
Total	1,301	1,301	1,127	-174	-13.4
Pink Salmon					
Strait of Juan de Fuca (Area 5, 6)	0	0	245	+245	+100
North Puget Sound (Area 7)	0	0	143,876	+143,876	+100
Central Puget Sound (Area 8, 9)	0	0	516,610	+516,610	+100
South Puget Sound (Area 10,11,13)	0	0	308,960	+308,960	+100
Hood Canal (Area 12)	0	0	49,244	+49,244	+100
Total	0	0	1,018,935	+1,018,935	+100
Chum Salmon					
Strait of Juan de Fuca (Area 5, 6)	322	322	401	+79	+24.5
North Puget Sound (Area 7)	129,071	129,071	130,073	+1,002	+0.8
Central Puget Sound (Area 8, 9)	18,512	18,512	9,713	-8,799	-47.5
South Puget Sound (Area 10,11,13)	96,672	96,672	0	-96,672	-100.0
Hood Canal (Area 12)	368,749	368,749	193,522	-175,227	-47.5
Total	613,326	613,326	333,709	-279,617	-45.6
Steelhead					

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SPECIES/CATCH AREA	Modeled 2020 Existing Conditions	No Action	Proposed Action		
	Value (Number of Fish)	Value (Number of Fish)	Value (Number of Fish)	Change from Existing Conditions (Number of Fish)	Percent Change (%)
Strait of Juan de Fuca (Area 5, 6)	95	95	95	0	0
North Puget Sound (Area 7)	105	105	75	-30	-28.6
Central Puget Sound (Area 8, 9)	85	85	57	-28	-32.9
South Puget Sound (Area 10,11,13)	0	0	0	0	0
Hood Canal (Area 12)	0	0	0	0	0
Total	285	285	227	-58	-20.4
ALL SPECIES					
Strait of Juan de Fuca (Area 5, 6)	13,902	11,249	10,561	-3,341	-24.0
North Puget Sound (Area 7)	178,113	195,113	342,920	+164,807	+92.5
Central Puget Sound (Area 8, 9)	50,364	60,917	577,989	+527,625	+1047.6
South Puget Sound (Area 10,11,13)	197,143	202,994	407,173	+210,031	+106.5
Hood Canal (Area 12)	447,935	440,975	299,008	-148,927	-33.2
TOTAL	887,456	911,247	1,637,651	+750,195	+84.5

Note: Harvest estimates includes both freshwater and marine catch, and tribal and non-tribal commercial harvest, as shown in Table 3-43 under Modeled 2020 Existing Conditions.

Source: Harvest estimates provided by NWIFC (James pers. comm.).

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Table 4-10. Impacts on commercial harvest and ex-vessel value of No Action and Proposed Action compared to Modeled 2020 Existing Conditions, by Puget Sound subregion.

SUBREGION	Modeled 2020 Existing Conditions	No Action	Proposed Action		
	Value (Number of Fish or $)	Value (Number of Fish or $)	Value (Number of Fish or $)	Change from Modeled 2020 Existing Conditions (Number of Fish or $)	Percent Change (%)
North Puget Sound					
Non-Tribal					
Harvest (thousand fish)	149.1	150.2	148.4	-0.8	-0.5
Ex-vessel harvest value ($ thous.)	1,475.6	1,488.4	1,227.2	-248.3	-16.8
Tribal					
Harvest (thousand fish)	265.5	291.1	838.4	+572.9	+215.8
Ex-vessel harvest value ($ thous.)	2,934.9	3,240.9	3,488.1	+553.3	+18.9
Total					
Harvest (thousand fish)	414.6	441.3	986.8	+572.2	+138.0
Ex-vessel harvest value ($ thous.)	4,410.4	4,729.4	4,715.4	+304.9	+6.9
South Puget Sound					
Non-Tribal					
Harvest (thousand fish)	97.3	96.6	95.2	-2.1	-2.2
Ex-vessel harvest value ($ thous.)	1,011.7	1,002.0	467.0	-544.6	-53.8
Tribal					
Harvest (thousand fish)	344.7	344.6	532.7	+188.0	+54.6
Ex-vessel harvest value ($ thous.)	5,341.1	5,107.8	4,258.4	-1,082.6	-20.3
Total					
Harvest (thousand fish)	442.0	441.2	627.9	+185.9	+42.1
Ex-vessel harvest value ($ thous.)	6,352.7	6,109.8	4,725.5	-1,627.2	-25.6
Strait of Strait of Juan de Fuca					
Non-Tribal					
Harvest (thousand fish)	9.1	7.2	5.5	-3.6	-39.8
Ex-vessel harvest value ($ thous.)	142.9	112.0	74.5	-68.4	-47.8
Tribal					
Harvest (thousand fish)	21.8	21.7	17.5	-4.3	-19.6
Ex-vessel harvest value ($ thous.)	399.4	396.4	291.2	-108.1	-27.1
Total					
Harvest (thousand fish)	30.9	28.8	23.0	-7.9	-25.5

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SUBREGION	Modeled 2020 Existing Conditions	No Action	Proposed Action		
	Value (Number of Fish or $)	Value (Number of Fish or $)	Value (Number of Fish or $)	Change from Modeled 2020 Existing Conditions (Number of Fish or $)	Percent Change (%)
Ex-vessel harvest value ($ thous.)	542.3	508.4	365.8	-176.5	-32.5
Total (all regions)					
Non-Tribal					
Harvest (thousand fish)	255.5	253.9	249.0	-6.5	-2.5
Ex-vessel harvest value ($ thous.)	2,630.2	2,602.4	1,768.8	-861.3	-32.7
Tribal					
Harvest (thousand fish)	632.0	657.3	1,388.7	+756.7	+119.7
Ex-vessel harvest value ($ thous.)	8,675.3	8,745.1	8,037.8	-637.5	-7.3
Total					
Harvest (thousand fish)	887.5	911.2	1,637.7	+750.2	+84.5
Ex-vessel harvest value ($ thous.)	11,305.5	11,347.5	9,806.6	-1,498.8	-13.3

Note: Includes both freshwater and marine harvest.

All monetary values are reported in 2020 dollars.

Source: Derived by TCW Economics using its economic impact model with harvest estimates provided by NWIFC (Table 4-9).

4.7.1.3 No Fishing Action

Under the No Fishing action, no salmon or steelhead would be harvested in the action area and commercial harvest levels would be zero (Table 4-11). Compared to the Proposed Action, the No Fishing action would result in a reduction of 1,637,651 salmon and steelhead harvested in the Puget Sound region, impacting both tribal and non-tribal fishers and related industries (Table 4-11). Compared to the Proposed Action, the No Fishing action would result in a loss in ex-vessel value of $9,806,600 throughout the Puget Sound region, impacting both tribal and non-tribal fisheries (Table 4-12).

By subregion, fisheries in the South Puget Sound subregion would experience the greatest loss in ex-vessel value compared to the Proposed Action from eliminating the commercial salmon and steelhead harvest ($4,725,500), followed closely by the North Puget Sound subregion ($4,715,400), and the Strait of Juan de Fuca subregion (-$365,800) compared to the Proposed Action. Regionwide, tribal fishers would be most impacted under the No Fishing Action as compared to the Proposed Action (a reduction of $8,037,800 in ex-vessel value) whereas non-tribal fisheries would experience a reduction in ex-vessel value of $1,768,800 (Table 4-12). The

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loss in the net economic value of the commercial salmon and steelhead harvest under the No Fishing action would be an estimated $6,618,000 (in year 2020 dollars) compared to the Proposed Action.

Table 4-11. Puget Sound commercial harvest by species and Puget Sound catch area for Proposed Action and No Fishing Action.

SPECIES/CATCH AREA	Proposed Action	No Fishing Action		
	Value (Number of Fish)	Value (Number of Fish)	Change from Proposed Action (Number of Fish)	Percent Change (%)
Chinook salmon				
Strait of Juan de Fuca (Area 5, 6)	2,690	0	-2,690	-100
North Puget Sound (Area 7)	19,860	0	-19,860	-100
Central Puget Sound (Area 8, 9)	9,202	0	-9,202	-100
South Puget Sound (Area 10,11,13)	29,227	0	-29,227	-100
Hood Canal (Area 12)	33,053	0	-33,053	-100
Total	94,033	0	-94,033	-100
Coho Salmon				
Strait of Juan de Fuca (Area 5, 6)	7,130	0	-7,130	-100
North Puget Sound (Area 7)	49,036	0	-49,036	-100
Central Puget Sound (Area 8, 9)	41,280	0	-41,280	-100
South Puget Sound (Area 10,11,13)	68,986	0	-68,986	-100
Hood Canal (Area 12)	23,188	0	-23,188	-100
Total	189,620	0	-189,620	-100
Sockeye Salmon				
Strait of Juan de Fuca (Area 5, 6)	0	0	0	0
North Puget Sound (Area 7)	0	0	0	0
Central Puget Sound (Area 8, 9)	1,127	0	-1,127	-100
South Puget Sound (Area 10,11,13)	0	0	0	0
Hood Canal (Area 12)	0	0	0	0
Total	1,127	0	-1,127	-100
Pink Salmon				
Strait of Juan de Fuca (Area 5, 6)	245	0	-245	-100
North Puget Sound (Area 7)	143,876	0	-143,876	-100
Central Puget Sound (Area 8, 9)	516,610	0	-516,610	-100
South Puget Sound (Area 10,11,13)	308,960	0	-308,960	-100
Hood Canal (Area 12)	49,244	0	-49,244	-100
Total	1,018,935	0	-1,018,935	-100
Chum Salmon				
Strait of Juan de Fuca (Area 5, 6)	401	0	-401	-100
North Puget Sound (Area 7)	130,073	0	-130,073	-100
Central Puget Sound (Area 8, 9)	9,713	0	-9,713	-100
South Puget Sound (Area 10,11,13)	0	0	0	0
Hood Canal (Area 12)	193,522	0	-193,522	-100

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SPECIES/CATCH AREA	Proposed Action	No Fishing Action		
	Value (Number of Fish)	Value (Number of Fish)	Change from Proposed Action (Number of Fish)	Percent Change (%)
Total	333,709	0	-333,709	-100
Steelhead				
Strait of Juan de Fuca (Area 5, 6)	95	0	-95	-100
North Puget Sound (Area 7)	75	0	-75	-100
Central Puget Sound (Area 8, 9)	57	0	-57	-100
South Puget Sound (Area 10,11,13)	0	0	0	0
Hood Canal (Area 12)	0	0	0	0
Total	227	0	-227	-100
ALL SPECIES				
Strait of Juan de Fuca (Area 5, 6)	10,561	0	-10,561	-100
North Puget Sound (Area 7)	342,920	0	-342,920	-100
Central Puget Sound (Area 8, 9)	577,989	0	-577,989	-100
South Puget Sound (Area 10,11,13)	407,173	0	-407,173	-100
Hood Canal (Area 12)	299,008	0	-299,008	-100
TOTAL	1,637,651	**0**	-1,637,651	-100

Note: Harvest estimates includes both freshwater and marine catch, and tribal and non-tribal commercial harvest, as shown in Table 3-43 under Modeled 2020 Existing Conditions.

Source: Harvest estimates provided by NWIFC (James pers. comm.).

Table 4-12. Impact of No Fishing Action and Proposed Action on the ex-vessel value of Puget Sound commercial salmon and steelhead, by Puget Sound subregion.

SUBREGION	Proposed Action	No Fishing Action		
	Value (Number of Fish or $)	Value (Number of Fish or $)	Change from Proposed Action (Number of Fish or $)	Percent Change (%)
North Puget Sound				
Non-Tribal				
Harvest (thousand fish)	148.4	0	-148.4	-100
Ex-vessel harvest value ($ thous.)	1,227.2	0	-1,227.2	-100
Tribal				
Harvest (thousand fish)	838.4	0	-838.4	-100
Ex-vessel harvest value ($ thous.)	3,488.1	0	-3,488.1	-100
Total				
Harvest (thousand fish)	986.8	0	-986.8	-100
Ex-vessel harvest value ($ thous.)	4,715.4	0	-4,715.4	-100
South Puget Sound				
Non-Tribal				
Harvest (thousand fish)	95.2	0	-95.2	-100
Ex-vessel harvest value ($ thous.)	467.0	0	-467.0	-100

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Tribal				
Harvest (thousand fish)	532.7	0	-532.7	-100
Ex-vessel harvest value ($ thous.)	4,258.4	0	-4,258.4	-100
Total				
Harvest (thousand fish)	627.9	0	-627.9	-100
Ex-vessel harvest value ($ thous.)	4,725.5	0	-4,725.5	-100
Strait of Strait of Juan de Fuca				
Non-Tribal				
Harvest (thousand fish)	5.5	0	-5.5	-100
Ex-vessel harvest value ($ thous.)	74.5	0	-74.5	-100
Tribal				
Harvest (thousand fish)	17.5	0	-17.5	-100
Ex-vessel harvest value ($ thous.)	291.2	0	-291.2	-100
Total				
Harvest (thousand fish)	23.0	0	-23.0	-100
Ex-vessel harvest value ($ thous.)	365.8	0	-365.8	-100
Total (all regions)				
Non-Tribal				
Harvest (thousand fish)	249.0	0	-249.0	-100
Ex-vessel harvest value ($ thous.)	1,768.8	0	-1,768.8	-100
Tribal				
Harvest (thousand fish)	1,388.7	0	-1,388.7	-100
Ex-vessel harvest value ($ thous.)	8,037.8	0	-8,037.8	-100
Total				
Harvest (thousand fish)	1,637.7	0	-1,637.7	-100
Ex-vessel harvest value ($ thous.)	9,806.6	0	-9,806.6	-100

Note: Includes both freshwater and marine harvest.

All monetary values are reported in 2020 dollars.

Source: Derived by TCW Economics and its economic impact model using harvest estimates provided by NWIFC (Table 4-11).

Summary

In summary, because of the large contribution of pink salmon to the commercial harvest under the Proposed Action, which are tempered somewhat by the substantial reduction in the commercial harvest of chum salmon (279,617 fish) under the Proposed Action, the total number of salmon and steelhead harvested increases substantially (750,195 fish) under the Proposed Action but the ex-vessel value of the commercial harvest decreases notably (-$1,498,800) as compared to Modeled 2020 Existing Conditions. Besides the contribution of more than one million pink salmon harvested, compared to zero under both Modeled 2020 Existing Conditions and No Action, the Proposed Action would have a 22.7 percent decrease in the Chinook harvest and a 25.7 percent increase in the harvest of coho salmon as compared to Modeled 2020 Existing Conditions. Clearly, commercial harvest and related economic values among the different alternatives are being driven by large changes in the harvest of individual salmon species, notably pink salmon, chum salmon, Chinook and coho salmon.

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Commercial salmon fishers operating out of ports in the North Puget Sound subregion would experience substantial increases in the commercial salmon harvest under the Proposed Action but relatively small positive effects on related ex-vessel values. Tribal fisheries would benefit from increases in the number of fish harvested and its ex-vessel value, whereas non-tribal commercial fishers would experience reductions in both the number of fish harvested and its ex-vessel value. Tribal fisheries would benefit from increases in the number of fish harvested and associated ex-vessel value, whereas non-tribal commercial fishers would experience reductions in both the number of fish harvested and its ex-vessel value. In the South Puget Sound subregion, commercial salmon fishers operating out of ports would experience a relatively substantial increase (42 percent) in the number of commercial salmon harvested but have an overall reduction (25.6 percent) in related ex-vessel values. Consistent with this regional effect, tribal fisheries would benefit from increases in the number of fish harvested but the ex-vessel value of the harvest would decrease; non-tribal commercial fishers in the South Puget Sound subregion would experience reductions in both the number of fish harvested and its ex-vessel value. Commercial salmon fishers operating out of ports in the Strait of Juan de Fuca subregion would experience a moderately substantial decrease (25.5 percent) in the commercial salmon harvest, as well as a moderately substantial decrease (32.5 percent) on related ex-vessel values. Both tribal and non-tribal fishers in the subregion would experience a decrease in the number of fish harvested and its ex-vessel value.

Under No Fishing, both tribal and non-tribal fisheries would experience substantial economic losses as a result of no commercial fisheries operating compared to the Proposed Action. The overall effect on commercial salmon and steelhead fishers under the Proposed Action would be moderately negative compared to Modeled 2020 Existing Conditions and No Action, due to decreased economic revenue from reduced harvest of relatively higher value fish, primarily chum salmon, Chinook salmon, and sockeye salmon. The overall effect of the No Fishing action would be a large negative effect on the regional economy compared to the Proposed Action.

4.7.2 Recreational Salmon Fisheries

4.7.2.1 No Action

The number of recreational fishing trips targeting salmon and steelhead under No Action would increase by an estimated 898,314 trips, a gain of 188.1 percent, relative to Modeled 2020 Existing Conditions (Table 4-13). The number of recreational fishing trips for salmon and steelhead in marine waters would increase by 116,468 trips (81.2 percent) under No Action compared to the Modeled 2020 Existing Conditions, whereas the number of recreational fishing trips in fresh waters of Puget Sound would increase by an estimated 781,846 trips (234.1 percent). Most of the increase (71.6 percent) in recreational fishing trips under No Action would occur in the South Puget Sound area (Catch Areas 10,11, and 13) compared to Modeled 2020 Existing Conditions (Table 4-13).

Along with an increase in the number of trips under No Action, there would be a corresponding increase in overall total trip-related angler expenditures compared to Modeled 2020 Existing Conditions (Table 4-13). There would be an increase of an estimated $130,862,000 in trip-related expenditures under No Action compared to Modeled 2020 Existing Conditions. In the marine waters of Puget Sound, the increase in trip-related expenditures would be an estimated

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$22,181,000, whereas in the fresh waters of Puget Sound the increase in trip-related expenditures would be an estimated $108,681,000.

The increase in the number of recreational fishing trips under No Action that target salmon and steelhead compared to Modeled 2020 Existing Conditions also would increase net economic values (the values of recreation fishing over and above trip-related expenditures). The regionwide increase in net economic values to anglers under No Action compared to the Modeled 2020 Existing Conditions would be an estimated $65,076,000, based on an average value of $72 per trip (refer to Appendix C, *Socioeconomics Methods*).

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Table 4-13. Impacts of No Action and Proposed Action on recreational trips and trip-related angler expenditures.

Type of Recreational Fishery	Modeled 2020 Existing Conditions	No Action			Proposed Action		
	Value (Number of Trips or $)	Number of Trips	Change from Existing Conditions (Number of Trips or $)	Percent Change (%)	Number of Trips	Change from Existing Conditions (Number of Trips or $)	Percent Change (%)
Marine							
Strait of Juan de Fuca (Area 5, 6)	35,129	53,795	+18,666	+53.1	36,123	+995	+2.8
North Puget Sound (Area 7)	20,382	30,591	+10,209	+50.1	21,209	+827	+4.1
Central Sound (Area 8, 9)	15,660	70,632	+54,972	+351.0	27,304	+11,643	+74.3
South Puget Sound (Area 10,11,13)	57,747	89,016	+31,269	+54.1	76,800	+19,053	+33.0
Hood Canal (Area 12)	14,592	15,944	+1,352	+9.3	4,294	-10,298	-70.6
Total Marine Trips	143,509	259,977	+116,468	+81.2	165,729	+22,220	+15.5
Marine Trip-Related Angler Expenditures ($ Thous.)	$27,331	$49,512	+22,181	+81.2	$31,563	+4,232	+15.5
Fresh Water							
Strait of Juan de Fuca (Area 5, 6)	3,173	3,820	+648	+20.4	3,505	+332	+10.5
North Puget Sound (Area 7)	56,917	59,671	+2,754	+4.8	41,323	-15,594	-27.4
Central Sound (Area 8, 9)	77,836	303,783	+225,947	+290.3	442,823	+364,987	+468.9
South Puget Sound (Area 10,11,13)	179,539	739,020	+559,482	+311.6	584,043	+404,504	+225.3
Hood Canal (Area 12)	16,477	9,493	-6,984	-42.4	8,716	-7,761	-47.1
Total	333,941	1,115,787	+781,846	+234.1	1,080,409	+746,468	+223.5
Freshwater Trip-Related Angler Expenditures ($ Thous.)	$46,420	$155,100	+108,681	+234.1	$150,182	+103,763	+223.5
All Waters							
Strait of Juan de Fuca (Area 5, 6)	38,301	57,615	+19,314	+50.4	39,628	+1,326	+3.5
North Puget Sound (Area 7)	77,299	90,261	+12,963	+16.8	62,532	-14,767	-19.1
Central Sound (Area 8, 9)	93,496	374,415	+280,919	+300.5	470,127	+376,630	+402.8
South Puget Sound (Area 10,11,13)	237,285	828,036	+590,750	+249.0	660,842	+423,557	+178.5

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Type of Recreational Fishery	Modeled 2020 Existing Conditions	No Action			Proposed Action		
	Value (Number of Trips or $)	Number of Trips	Change from Existing Conditions (Number of Trips or $)	Percent Change (%)	Number of Trips	Change from Existing Conditions (Number of Trips or $)	Percent Change (%)
Hood Canal (Area 12)	31,068	25,437	-5,632	-18.1	13,009	-18,059	-58.1
TOTAL TRIPS	477,450	1,375,764	+898,314	+188.1	1,246,138	+768,688	+161.0
TOTAL TRIP-RELATED EXPENDITURES ($ Thous.)	$73,751	$204,612	+130,862	+177.4	$181,745	+107,995	+146.4

Note: All monetary values are reported in 2020 dollars.

4.7.2.2 Proposed Action

Under the Proposed Action, recreational fishing activity targeting salmon and steelhead in Puget Sound waters would be greater than under Modeled 2020 Existing Conditions but less than under No Action. The number of recreational fishing trips targeting salmon and steelhead under the Proposed Action would increase by an estimated 768,688 trips (+161 percent) relative to Modeled 2020 Existing Conditions but decrease by an estimated 129,626 trips compared to No Action. The overall increase of 768,688 trips includes an increase of 22,220 trips (15.5 percent) in marine waters and an increase of 746,468 trips (223.5 percent) in fresh waters compared to Modeled 2020 Existing Conditions. Similar to the increase under No Action, most of the increase (54.2 percent) in recreational fishing trips under the Proposed Action would occur in the South Puget Sound area.

Along with the increase in recreational fishing trips, the Proposed Action would result in increases in total trip-related angler expenditures ($107,994,600) compared to the Modeled 2020 Existing Conditions; however, the Proposed Action would result in decreases in trip-related angler expenditures ($22,867,000) compared to the No Action (Table 4-13). Most of the increase in recreational fishing trips and trip-related expenditures under the Proposed Action as compared to Modeled 2020 Existing Conditions is accounted for by more freshwater recreational trips. Based on an average value of $72 per trip (refer to Appendix C, *Socioeconomics Methods*), the Proposed Action also would increase net economic values by $55,686,000 (161 percent) compared to Modeled 2020 Existing Conditions, but reduce net economic values by $9,390,500 (9.4 percent) compared to No Action.

4.7.2.3 No Fishing Action

Under the No Fishing Action, no recreational salmon or steelhead fishing trips would occur in Puget Sound marine or fresh waters and no trip-related angler expenditures would occur (Table 4-14). As a result, $181,745,000 in trip-related angler spending would be displaced from the regional economy compared to the Proposed Action (Table 4-14). Based on an average value of $72 per trip (refer to Appendix C, *Socioeconomics Methods*), the No Fishing Action would reduce net economic values by $90,273,900 compared to the Proposed Action.

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Table 4-14. Impacts of Proposed Action and No Fishing action on recreational trips and trip-related angler expenditures.

Type of Recreational Fishery	Proposed Action	No Fishing Action		
	Value ($)	Number of Trips	Change from Proposed Action (Number of Trips or $)	Percent Change (%)
Marine				
Strait of Juan de Fuca (Area 5, 6)	36,123	0	-36,123	-100
North Puget Sound (Area 7)	21,209	0	-21,209	-100
Central Sound (Area 8, 9)	27,304	0	-27,304	-100
South Puget Sound (Area 10,11,13)	76,800	0	-76,800	-100
Hood Canal (Area 12)	4,294	0	-4,294	-100
Total Marine Trips	165,729	0	-165,729	-100
Marine Trip-Related Angler Expenditures ($ Thous.)	$31,563	0	-$31,563	-100
Fresh Water				
Strait of Juan de Fuca (Area 5, 6)	3,505	0	-3,505	-100
North Puget Sound (Area 7)	41,323	0	-41,323	-100
Central Sound (Area 8, 9)	442,823	0	-442,823	-100
South Puget Sound (Area 10,11,13)	584,043	0	-584,043	-100
Hood Canal (Area 12)	8,716	0	-8,716	-100
Total	1,080,409	0	-1,080,409	-100
Freshwater Trip-Related Angler Expenditures ($ Thous.)	$150,182	0	- $150,182	-100
All Waters				
Strait of Juan de Fuca (Area 5, 6)	39,628	0	-39,628	-100
North Puget Sound (Area 7)	62,532	0	-62,532	-100
Central Sound (Area 8, 9)	470,127	0	-470,127	-100
South Puget Sound (Area 10,11,13)	660,842	0	-660,842	-100
Hood Canal (Area 12)	13,009	0	-13,009	-100
TOTAL TRIPS	1,246,138	**0**	-1,246,138	**-100**
TOTAL TRIP-RELATED EXPENDITURES ($ Thous.)	$181,745	**0**	- $181,745	**-100**

Note: All monetary values are reported in 2020 dollars.

In summary, the number of recreational fishing trips and associated economic values under the Proposed Action would increase relative to Existing (modeled 2020-21) Condition but would decrease relative to the No Action. Under the No Fishing Action, no recreational fishing trips targeting salmon and steelhead would occur in Puget Sound area waters, and trip-related angler expenditures of an estimated $181,745,000 would not occur in the action area.

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4.7.3 Effects on the Regional Economy

Changes in commercial salmon harvest and recreational fishing activities under the No Action, the Proposed Action, or the No Fishing Action would affect local and regional employment and levels of personal income compared to Modeled 2020 Existing Conditions. These effects would not only include those directly related to commercial harvesting of salmon and steelhead and to angler expenditures associated with recreation fishing activities targeting salmon and steelhead, but also include effects resulting from secondary (indirect and induced) impacts on salmon processors and other businesses that provide goods and services to commercial fishing operators and recreational anglers. This section describes the total (i.e., direct and secondary) regional economic effects in each subregion of the Puget Sound project area that would result from implementing the No Action, Proposed Action, and the No Fishing Action, as compared to the Modeled 2020 Existing Conditions. The estimated effects identified in Table 4-15 are based on assumptions and data sources described in Appendix C, *Socioeconomics Methods*.

It should be noted that the number of jobs identified in Table 4-15 are expressed as full-time equivalents (FTEs). Because most jobs in the commercial fishing industry are part-time positions due to the seasonality of commercial salmon fishing in Puget Sound, the values reported in Table 4-15 are an underestimate of the total number of jobs affected. Many persons engaged in commercial salmon fishing also participate in other fisheries and/or have other occupations. These circumstances should be considered in interpreting the employment effects of changes in the commercial salmon harvest (and to a lesser extent the number of recreational fishing trips) associated with the results presented below.

4.7.3.1 No Action

Under No Action, the number of FTEs and amount of personal income directly and indirectly generated by commercial fishing for salmon in Puget Sound's marine and fresh waters are estimated at 345 FTEs and $20,498,000, respectively (Table 4-15). Compared to Modeled 2020 Existing Conditions, the No Action levels of employment and personal income represent slight increases of 0.1 FTEs and $76,200 in personal income. Among the three subregions of the Puget Sound region, changes in total (direct and secondary) effects on economic activity related to commercial salmon fisheries under the No Action would be greatest in the North Puget Sound region, where an estimated increase of 10.2 FTEs and $576,500 in personal income would result as compared to Modeled 2020 Existing Conditions.

The effects of No Action on recreational fishing-related employment and personal income also are presented in Table 4-15. Under No Action, recreational fishing activity targeting salmon and steelhead in Puget Sound's marine and fresh waters are estimated to support 2,339 FTEs and generate $161,142,000 in personal income. Compared to Modeled 2020 Existing Conditions, these levels of employment and personal income represent an increase of an estimated 1,440 FTEs and $101,557,900 in personal income. These changes represent a 160 percent increase in employment and a 170 percent increase in personal income relative to Modeled 2020 Existing Conditions (Table 4-15). Among the three subregions of the Puget Sound project area, changes in total (direct and secondary) effects on economic activity related to recreational salmon fisheries would be greatest in the South Puget Sound region, where estimated increases of 921 jobs (183 percent) and $68,454,900 in personal income (186 percent increase) would occur compared to

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Modeled 2020 Existing Conditions. Overall, these impacts would be considered a moderate positive effect on the regional economy compared to Modeled 2020 Existing Conditions.

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Table 4-15. Effects of salmon harvest on employment and personal income under No Action and Proposed Action by Puget Sound subregion.

SUBREGION	Existing (Modeled 2020 Conditions	No Action			Proposed Action		
	Value ($ Thousands or FTEs)	Value ($ Thousands or FTEs)	Change from Existing Conditions ($ Thousands or FTEs)	Percent Change (%)	Value ($ Thousands or FTEs)	Change from Existing Conditions ($ Thousands or FTEs)	Percent Change (%)
North Puget Sound							
Commercial							
Personal income ($ Thous.)	7,972	8,549	+576.5	+7.2	8,523	+551.2	+6.9
Jobs	140	150	+10.2	+7.3	149	+9.3	+6.7
Recreational							
Personal income ($ Thous.)	19,231	50,052	+30,821.1	+160.3	49,744	+30,513.0	+158.7
Jobs	318	786	+468.1	+147.1	770	+452.1	+142.1
South Puget Sound							
Commercial							
Personal income ($ Thous.)	11,483	11,044	-439.2	-3.8	8,542	-2,941.3	-25.6
Jobs	184	175	-8.8	-4.8	136	-47.5	-25.9
Recreational							
Personal income ($ Thous.)	36,892	105,347	+68,454.9	+185.6	86,931	+50,039.0	+135.6
Jobs	504	1,425	+920.7	+182.7	1169	+665.0	+131.9
Strait of Strait of Juan de Fuca							
Commercial							
Personal income ($ Thous.)	967	906	-61.2	-6.3	656	-311.6	-32.2
Jobs	22	20	-1.3	-6.1	15	-7.1	-32.9
Recreational							
Personal income	3,461	5,743	+2,281.9	+65.9	4,492	+1,031.1	+29.8
Jobs	77	128	+51.5	+67.1	101	+24.2	+31.5
Total (all regions)							
Commercial							
Personal income ($ Thous.)	20,422	20,498	+76.2	+0.4	17,720	-2,701.8	-13.2
Jobs	345	345	+0.1	+0.0	300	-45.3	-13.1

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SUBREGION	Existing (Modeled 2020 Conditions	No Action			Proposed Action		
	Value ($ Thousands or FTEs)	Value ($ Thousands or FTEs)	Change from Existing Conditions ($ Thousands or FTEs)	Percent Change (%)	Value ($ Thousands or FTEs)	Change from Existing Conditions ($ Thousands or FTEs)	Percent Change (%)
Recreational							
Personal income ($ Thous.)	59,584	161,142	+101,557.9	+170.4	141,167	+81,583.0	+136.9
Jobs	899	2,339	+1,440.3	+160.2	2,040	+1,143.3	+126.9

Note: Includes direct, indirect and induced effects in 2020 dollars.

Source: Derived by TCW Economics using estimates of commercial salmon harvest (Table 4.7-1) and recreation fishing trips (Table 4.7-2) provided by NWIFC, and simulation of its economic impact model. Refer to Appendix C, *Socioeconomic Methods* for details.

4.7.3.2 Proposed Action

Under the Proposed Action, the effect on economic activity (jobs and personal income) directly and indirectly generated by commercial fishing for salmon in Puget Sound's marine and fresh waters are estimated at 300 FTEs and $17,720,000 in personal income (Table 4-15). Compared to Modeled 2020 Existing Conditions, the Proposed Action results in a decrease of 45.3 FTEs and $2,701,800 in personal income directly and indirectly by commercial fishing in Puget Sound. Compared to No Action, the Proposed Action would decrease employment by an estimated 45 FTEs and $2,778,000 in personal income (Table 4-15).

Among the Puget Sound region, decreases in total (direct and secondary) effects on personal income and jobs related to commercial salmon fisheries would occur in the South Puget Sound and Strait of Juan de Fuca subregions under the Proposed Action compared to Modeled 2020 Existing Conditions, but in the North Puget Sound region increases in total personal income and jobs related to commercial salmon fisheries would occur (Table 4-15).

Across the region, the Proposed Action also would result in increases in recreational fishing-related employment and personal income relative to Modeled 2020 Existing Conditions, with increases estimated at 1,141 FTEs and $81,583,000 in personal income (Table 4-15). These increases in economic activity represent an estimated 127 percent increase in FTEs and 137 percent increase in personal income compared to Modeled 2020 Existing Conditions. Compared to No Action, there would be an employment loss of 299 FTEs and $19,975,000 in personal income under the Proposed Action (Table 4-15).

Among the three subregions of the Puget Sound project area, changes in total (direct and secondary) effects on economic activity related to recreational salmon fisheries under the Proposed Action would be greatest in the South Puget Sound region, where an estimated increase of 665 FTEs and $50,039,000 in personal income would occur compared to Modeled 2020 Existing Conditions.

4.7.3.3 No Fishing Action

Under the No Fishing action, no economic activity (jobs and personal income), either directly or indirectly, would be generated by commercial fishing for salmon in Puget Sound's marine and fresh waters (Table 4-16). Compared to the Proposed Action, the No Fishing action results in the decrease of 300 FTEs and $17,720,000 directly and indirectly by commercial fishing in Puget Sound (Table 4-16). Among the three subregions of the Puget Sound region, changes in total (direct and secondary) effects on economic activity related to commercial salmon fisheries would be greatest in the South Puget Sound region, where an estimated reduction of 136 FTEs and $8,542,000 in personal income would occur as compared to the Proposed Action (Table 4-16).

The No Fishing action also would result in reductions of recreational fishing-related employment and personal income relative to the Proposed Action, with total reductions estimated at 2,040 FTEs and $141,167,000 in personal income (Table 4-16). Among the three subregions of the Puget Sound action area, changes in total (direct and secondary) effects on economic activity related to recreational salmon fisheries under the No Fishing action would be greatest in the

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South Puget Sound region, where an estimated reduction of 1,169 FTEs and $86,931,000 in personal income would occur compared to the Proposed Action.

In summary, the effects on economic activity (employment and personal income) of the Proposed Action for recreational fisheries would be positive and moderately substantial compared to Modeled 2020 Existing Conditions, resulting in a moderate positive effect. Compared to No Action, the change in economic activity associated with recreational salmon and steelhead fisheries under the Proposed Action would be negative and moderately substantial. The reduction of regional economic activity (employment and personal income) related to changes in commercial fisheries under the Proposed Action would be considered as a moderate negative impact compared to Existing (modeled 2020-21) Conditions and to No Action. The economies of local communities that are more dependent on recreation fishing activities, as opposed to commercial fishing activities, would be most affected by the Proposed Action. Under No Fishing, the effects on economic activity in the action area would be adverse and severe compared to the Proposed Action, resulting in a high negative effect.

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Table 4-16. Effects of salmon harvest on employment and personal income under the Proposed Action and No Fishing action by Puget Sound subregion.

SUBREGION	Proposed Action	No Fishing Action		
	Value ($ or FTEs)	Value ($ or FTEs)	Change from Proposed Action ($ or FTEs)	Percent Change (%)
North Puget Sound				
Commercial				
Personal income ($ Thous.)	8,523	0	-8,523	-100
Jobs	149	0	-149	-100
Recreational				
Personal income ($ Thous.)	49,744	0	-49,744	-100
Jobs	770	0	-770	-100
South Puget Sound				
Commercial				
Personal income ($ Thous.)	8,542	0	-8,542	-100
Jobs	136	0	-136	-100
Recreational				
Personal income ($ Thous.)	86,931	0	-86,931	-100
Jobs	1,169	0	-1,169	-100
Strait of Strait of Juan de Fuca				
Commercial				
Personal income ($ Thous.)	656	0	-656	-100
Jobs	15	0	-15	-100
Recreational				
Personal income ($ Thous.)	4,492	0	-4,492	-100
Jobs	101	0	-101	-100
Total (all regions)				
Commercial				
Personal income ($ Thous.)	17,720	0	-17,720	-100
Jobs	300	0	-300	-100
Recreational				
Personal income ($ Thous.)	141,167	0	-141,167	-100
Jobs	2,040	0	2,040	-100

Note: Includes direct, indirect and induced effects in 2020 dollars

Source: Derived by TCW Economics using estimates of commercial salmon harvest (Table 4-6) and recreation fishing trips (Table 4-13) provided by NWIFC, and simulation of its economic impact model. Refer to Appendix C, *Socioeconomic Methods* for details.

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4.8 Environmental Justice

Under Section 3.8, *Environmental Justice*, six minority communities of concern are identified (King, Kitsap, Pierce, Skagit, Snohomish, and Thuston County), five low-income communities of concern are identified (Clallam, Jefferson, Mason, Skagit, and Whatcom counties) including two low-income port communities of concern are identified (Bellingham Bay-Whatcom County and Shelton-Mason County), and Native American tribes, as a group, are considered Environmental Justice communities. The following factors are evaluated by each community of concern:

- Minority
- Low income
- Native American

Under No Action, commercial non-tribal harvest and ex-vessel harvest values would decrease for South Puget Sound (700 fewer fish and $9,700 less in ex-vessel value) and Strait of Juan deFuca (1,900 fewer fish and $30,900 less in ex-vessel value) regions while increasing for North Puget Sound region (1,100 more fish and $12,900 increase in ex-vessel revenue) compared to existing conditions (Table 4-8.), and would be a low risk to minority and low income communities of concern in King, Skagit, Snohomish, Thurston, Kitsap, Whatcom and Pierce Counties. Under No Action, tribal harvest (2,200 to 96,600 fewer fish) and ex-vessel harvest values ($19,400 to $540,200 less revenue, 3 to 8 percent loss) would decrease in South Sound and Strait of Juan de Fuca regions relative to Existing Conditions while increasing in the North Puget Sound region impacting Native American tribal communities. Overall, for all communities of concern including Native American tribes, the impact would result in a low negative effect compared to Existing Conditions, which affects their catch revenue, overall per capita income, poverty rates, and community health.

Under the Proposed Action, commercial non-tribal harvest and ex-vessel value would decrease while tribal harvest would increase and mixed affects on ex-vessel harvest values compared to No Action (**Error! Reference source not found.**), due to differences in specific species harvested across the regions (see Section 4.7.1.2). Compared to existing conditions for all three subregions, the ex-vessel harvest value loss would be greatest (33 percent loss) to non-tribal communities of concern across the entire action area under the Proposed Action. For Native American communities there would be a 7 percent loss in ex-vessel value under the Proposed Action relative to Existing Conditions. The Proposed Action would present a moderate, negative economic loss to communities of concern due to reduced catch revenue, overall per capita income, poverty rates, and community health, as well as reductions in subsistence and ceremonial values and cultural viability for Native Americans in some communities.

Under the No Fishing Action, commercial non-tribal and tribal harvest and ex-vessel harvest values would be eliminated in the action area. Compared to Proposed Action for all three subregions, the impact would be greatest to tribal communities of concern (Native Americans) who would lose $8.0 million of economic revenue. For all communities of concern, the impact would result in a high, negative impact compared to existing conditions and the Prposed Action.

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The No Fishing Action would have a high, negative impact to communities of concern catch revenue, overall per capita income, poverty rates, and community health, as well as subsistence and ceremonial values and cultural viability for Native Americans.

4.9 Recreation and Recreational Fishing

As described under Section 3.9, Washington residents spend $21.6 billion annually for recreational activities with expenditures highest in recreation associated with public waters, such as recreational fishing, which directly or indirectly supports (in 2006) 12,850 jobs with 725,000 residents who live and fish in Washington. Recreational fishing has regulations intended to protect weaker stocks, such as those needed for ESA listed salmon and steelhead. Under existing conditions, recreational fishing is considered beneficial to anglers' quality of life, and a low positive effect. Under No Action, the total number of fishing trips would be higher in marine waters and fresh water relative to Existing Conditions (Table 4-13.). Overall, the total value of the recreational fishery would increase by 177 percent (Table 4-13.) compared to Existing Conditions, which would be a moderate positvie effect.

Under the Proposed Action, 15.5 percent more marine salmon and steelhead recreational trips would be taken, while 223 percent more trips would occur in freshwater compared to Existing Conditions (Table 4-13.). Fishing expenditures in marine waters would 15crease by 15 percent but increase by 223 percent in fresh water, compared to Existing Conditions (Table 4-13.). The all water trip increase under the Proposed Action compared to Existing Condition would be 161 percent more trips, also resulting in a moderate, positive effect (Table 4-13.).

Under the No Fishing Action, there would be no recreational trips targeting salmon or steelhead in the action area (Table 2-1). Fishing expenditures in marine waters would be eliminated resulting in total recreational trip economic loss of $181,745,000 compared to the Proposed Action (Table 4-14.). The total trip decrease of 1,246,138 trips under the No Fishing Action compared to the Proposed Action would result in a high, negative effect.

4.10 Marine Protected Areas

There are 109 Marine Protected Areas in Puget Sound with different fishing harvest restrictions from unrestricted to completely restricted (Section 3.10, *Marine Protected Areas*). The WDFW Sport Fishing Pamphlet identifies Marine Protected Areas where salmon and steelhead harvest is not allowed. The Marine Protected Areas are intended to help conserve marine aquatic resource habitat and support long-term sustainability, but does not effect salmon and steelhead spawning areas which occur only in freshwater streams. As a result, Marine Protected Areas have Negligible Effect as harvest is not expected to affect Marine Protected Areas. Implementation of No Action would result in no change to Marine Protected Areas and thus would have Neglibible Effect, similar existing conditions.

Under the Proposed Action, fisheries harvest would alter by species, extent of harvest, location, timing, closures, gear, and type (Table 2-2). However, these changes would not affect Marine

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Protected Areas and the effect would continue to be Negligible Effect, which is the same as existing conditions and No Action.

Under No Fishing, no salmon or steelhead fishing would occur in the Puget Sound action area and would have Negligible Effect on marine protected areas relative to the proposed action.

4.11 Noise and Light

As described under Section 3.11, *Noise and Light*, fishing results in noise and light pollution (boat use during evening hours) and contributes to noise and light levels in the aquatic environment. Noise impacts aquatic organisms through damage to hearing and equilibrium while light impacts aquatic organisms through migratory disorientation. However, overall light impacts from other shoreline sources, as part of the existing environment, a far greater than those from boat use during the harvest season. Noise and light levels under No Action would be the same as under existing conditions and result in a negligible negative effect to aquatic life for light compared to negligible negative effect from boat operational noise. The No Action would not alter the potential for noise and light effects to aquatic organisms.

Under Proposed Action, although fisheries harvest would alter by species, extent of harvest, location, timing, closures, gear, and type (Table 2-2) compared to No Action, these changes would not affect the overall assessment of a negligible negative effect for light, and negligible negative effect for noise, which is the same as No Action and existing conditions.

Under No Fishing Action, fisheries harvest would not occur in the action area and would result in a negligible positive effect on noise and light pollution to aquatic organisms relative to existing conditions and the proposed action.

4.12 Public Health and Safety

4.12.1 Public Health

Due to pollutants that may occur in salmon and steelhead, DOH recommends that consumption of salmon and steelhead be restricted to once a week or four times per month (Section 3.12.1, *Public Health*). Although fisheries harvest does not directly cause pollutants to occur in salmon and fish, boat operations and the resulting release of petroleum-related compounds contribute to pollution in Puget Sound marine and freshwater areas (Subsection 3.2, Water Quality), which affects all trophic organisms including salmon and steelhead and people who consume salmon and steelhead. However, pollutants from boat operations are one of many sources of toxic chemicals in Puget Sound. As a result, under existing conditions, the effect of boat use for fisheries harvest on public health would result in a low negative effect, and continued implementation of the 2020-2021 List of Agreed Fisheries during the 2021-2022 fishing season (No Action) would result in a similar low negative effect.

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Under the Proposed Action, fisheries harvest would change by species, location, timing, closures, gear, and type compared to No Action (Table 2-2). However, boat operations between No Action and the Proposed Action are not expected to be substantially different. Thus, similar to No Action and existing conditions, the Proposed Action would result in a low negative effect to public health.

Under No Fishing Action, harvest of salmon and steelhead in the Puget Sound action area would not occur, resulting in a low positive effect compared to the propsed action.

4.12.2 Safety

Boat operations must meet NIOSH regulations that are intended to reduce the potential for boating accidents. Tribal salmon fisheries have resulted in a high number of accidents and mortalities and are mostly related to fishing during poor weather conditions (Section 3.12.2, *Safety*). Although NIOSH studies and continuing public education regarding methods to improve boating safety have helped reduce the potential for boating accidents, there is potential for boating accidents to continue in Washington marine and fresh waters and result in a low negative effect. Implementation of No Action would have similar safety effects because fisheries harvest by the public and treaty tribes would continue to occur.

Under the Proposed Action, changes in species harvest, location, timing, closures, gear, and type was intended to help resource conservation and long-term salmon and steelhead sustainability, thus, increased safety was not the intended benefit. There are no new boat operations safety rules identified under the Proposed Action. As a result, implementation of the Proposed Action would result in a low negative effect, which is the same as No Action and existing conditions. Under No Fishing, boat operation supporting salmon and steelhead harvest would not occur resulting in a low, positive effect to human safety as a result.

4.13 Indian Trust Assets – Fishing

Puget Sound Treaty Tribes have the right to access usual and accustomed fishing places and grounds; additionally, under the holding of *United States v. Washington, cited supra.,* their treaties and secure them a right to equitable shares of each run of anadromous fish that pass through tribal fishing areas (Section 3.13, *Indian Treaty Fishing*). Typically, Puget Sound Treaty Tribes and WDFW participate in two key fish management processes to ensure an equitable sharing of the salmon and steelhead fisheries resource (PFMC and North of Falcon processes), which set the salmon fishing season in inland waters (Section 1.5.2, *Fisheries Co-Management*). The North of Falcon process represents the government-to-government negotiation between two states and the 24 Northwest Indian tribes with federally recognized treaty fishing rights, including the 17 treaty tribes that have fishing rights in Puget Sound. The objective of the North of Falcon process is to develop the fisheries plan (Co-managers' List of Agreed Fisheries) that provides for resource conservation, sustainable fisheries, and assures that all parties are afforded harvest opportunity.

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Under existing conditions (considered the 2020-2021 fishing season for comparative purposes), the Co-managers' List of Agreed Fisheries was developed to achieve resource conservation, sustainable fisheries, and treaty tribes' harvest opportunity.

Under No Action, it is assumed that the co-managers did not meet to manage the fisheries resource and the extent of harvest planned for the 2020-2021 fishing season would be directly applied to the 2021-2022 fishing season with no changes, regardless of different pre-season forecasts between the 2020-2021 and 2021-2022 fishing seasons. The lack of co-manager meeting to seek agreement to manage salmon and steelhead stocks for the long term under No Action and the inability for tribes to protect their future fishing opportunities through ongoing up-to-date salmon and steelhead management, would result in a high negative effect.

Under the Proposed Action, the 2021-2022 List of Agreed Fisheries that was developed by Puget Sound Treaty Tribes and WDFW was based on expected salmon and steelhead returns and the agreed to sharing of the fisheries resource. With continued forecast for some Chinook salmon, coho salmon, chum salmon, and sockeye salmon stocks to be depressed, fisheries harvest was structured to ensure resource conservation, sustainable fisheries, and agreeable sharing between Puget Sound Treaty Tribes and WDFW. However, in order to meet ESA conservation guidelines, some Tribes limited their utilization of ceremonial and substistence fisheries, including Chinook for first salmon ceremonies. Thus, the Proposed Action would be beneficial to Puget Sound Treaty Tribes compared to No Action as a result of reaching agreement with co-managers and adjusting fisheries to ensure continued resource sustainability which would result in a high positive benefit and is similar to existing conditions. However, the reduction in ceremonial and subsistence fish utilization so some tribal communities is a high, negative impact. Overall, reaching agreement with all co-managers is a moderate positive, effect but tempered by the substantial risk to those tribal communities where ceremonial and subsistence fisheries were limited for conservation purposes.

Under the No Fishing Action, tribal, as well as non-tribal, salmon and steelhead fisheries would not be implemented in the Puget Sound action area, resulting in a high negative effect to treaty trust assessts compared to the Proposed Action.

5.0 Cumulative Effects

NEPA defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective, but rather, the intent is to focus on those effects that are truly meaningful. In other words, if several separate actions have been taken or are intended to be taken within the same geographic area, all of the relevant actions together (cumulatively) need to be reviewed, to determine whether the actions together could have a significant impact on the human environment. Past, present, and reasonably foreseeable future actions include those that are Federal and non-Federal. For this EA analysis, the focus is on the contribution of the No Action (2020 forecasted returns with 2019-2020 harvest season) or Proposed Action (2020-2021 harvest based on expected 2020 salmon and steelhead returns) to cumulative effects considering other past, present, and future actions that occurred, are occurring, or are expected to occur in Puget Sound.

Section 3, *Affected Environment*, describes existing conditions and reflects environmental effects from past and existing conditions for 13 resource areas. Chapter 4, *Environmental Consequences*, evaluates the direct and indirect effects of the No Action and Proposed Action on these resources. This chapter considers the cumulative effects of the No Action and Proposed Action in the context of past actions, present conditions, and reasonably foreseeable future actions and conditions.

5.1 Geographic and Temporal Scales

The cumulative effect area considers Puget Sound fresh water and marine waters as the geographic extent of the cumulative effects area. Although salmon and steelhead produced in Puget Sound waters migrate to Alaska, Oregon, and British Columbia, harvest of these fish in Puget Sound is considered the primary project effect. The temporal scope of past, present, and future actions includes archaeological and historical context of fishing in Puget Sound through projected environmental conditions over the next 10 years.

5.2 Past Actions

The earliest evidence of human presence in the Pacific Northwest was about 8000 B.P. (and much earlier in Alaska) where there was evidence of human remains found at the mouth of the Fraser River and lower Columbia River (summary provided in Ecology 2016). Over the next several thousands of years, there was archaeological evidence of fishing villages and fish supplies used at the villages. Fishing continued to the present by Native Americans and by Europeans who migrated to the Pacific Northwest, British Columbia, and Alaska. In the 1800s, declines in salmon runs started occurring from hydropower development, logging, farming, and fishing (summary in Washington State Agricultural Bibliography 2016). In addition, salmon canneries and hatcheries were constructed and operated. Harvest peaked in 1883 when 3,000,000 Chinook salmon and 25 million pounds of other salmon species and steelhead were harvested in

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one season, the catch of which declined subsequently over the years to present conditions (Ecology 2016).

Conservation laws and regulations to protect salmon and steelhead runs were initially passed in the 1800s and continued to the present including restrictions on gear, species caught, area harvested, and extent of removal of eggs and natural-origin spawning fish for hatchery use. However, hydropower and industrial development continued to result in loss of substantial fish habitat, particularly in the Sacramento/Central Valley, California and the Columbia and Snake Rivers as well as Puget Sound. With the continued decrease in salmon and steelhead and listing of threatened and endangered salmon and steelhead throughout the Pacific Northwest, salmon fisheries were either closed or reduced substantially in size over time. Conservation measures to protect listed species have been ongoing with more recent efforts to better estimate salmon and steelhead returns and propose harvest plans that would better protect salmon and steelhead over the long term (Puget Sound Indian Tribes and WDFW 2004).

5.3 Climate Change and Trends

Long-term climate changes that have occurred in the Pacific Northwest, British Columbia, and Alaska are expected to continue and include increased precipitation during winter months with less precipitation during summer months and mean annual air warming trend of at least 0.2°F per decade (as summarized in Joint Institute for the Study of Atmosphere and Ocean Climate Impacts Group 1999; Climate Impacts Group 2004; West Coast Governors' Global Warming Initiative 2004; Kay et al. 2005; Independent Science Advisory Board [ISAB] 2007; Mote and Salathe 2009, NWIFC 2016). These changes have resulted in the following climatic trends:

- Warmer air temperatures resulting in more precipitation falling as rain rather than snow.
- Snow pack and glaciers will diminish altering stream flow timing and quantity.
- Peak river flows will likely increase in intensity and frequency as well as decreases in summer (i.e. basal) flows.
- Stream and ocean temperatures will continue to rise.
- Sea levels will continue to rise, resulting in coastal erosion and an increased proportion of salinity in estuaries.
- There will be increased stratification in lakes, marine estuaries, and the ocean.
- Ocean chemistry will change due to ocean acidification and levels of dissolved oxygen.
- The likelihood of extreme events (floods, droughts, fires, and insect outbreaks) is expected to increase.

In general, the long-term effects of climate change would likely be similar in nature throughout Puget Sound, but greater in magnitude, compared to the effects of short-term climate variability observed on an annual basis. This would be a result of similarities between the regional climate shifts projected for anthropogenic climate change (warmer wetter winters, resulting in increased winter stream flow; warmer summers; and increased sea level) and some of those experienced during La Niña winters (increased precipitation and winter stream flow) and El Niño years

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(warmer winters, resulting in decreased spring and summer stream flow and increased sea level). Some short-term (annual and decadal) climate variation is normal for the Pacific Northwest, but longer-term trends indicate a changing climate (Climate Impacts Group 2010). Salmon and steelhead populations are limited by changing environmental factors such as low summer streamflow, increased stream temperatures, increased flood frequency in winter, channel instability, excess fine sediment, and lack of habitat complexity which all limit suitable habitat for salmonid life stages. Loss of glaciers and increasing peak flows lead to greater sediment loads in streams, while high stream temperatures affect growth, reproduction, and susceptibility to disease. Increasing water temperatures, changing hydrological patterns, and changing ocean chemistry alters the timing of prey availability, the type of prey, and amount of competition from warm-water species. These changes affect salmon and steelhead habitat availability, abundance, and run timing, and are generally detrimental to their long-term survival.

5.4 Development and Habitat Loss

Development that has occurred over the past century and is ongoing has affected the abundance, distribution, and health of salmon and steelhead, other fish, economic income, wildlife, air, and water quantity and quality. Generally, development has resulted in the loss of fish habitat along marine shorelines, estuaries, and freshwater streams and rivers. Most of the impacts have occurred from hydropower, shoreline armoring, bank armoring, residential/urban development of floodplains, logging alongside streams, farming and chemical releases, stormwater releases, and industrial and wastewater discharges. The effects include loss of spawning habitat and cover, shifts in peak-hydrograph, and degraded water quality conditions, which has resulted in a decrease in overall fish productivity and consequently abundance (Quinn 2010).

Human activity continues to impact key aquatic habitat attributes, such as streamside vegetation, instream habitat complexity, habitat connectivity, and stream flow. This loss and degradation of aquatic habitat threatens both salmon and steelhead as well as tribal culture and treaty rights. In 2012, an assessment of current habitat trends revealed that salmon habitat is being damaged and destroyed faster than it can be recovered within western Washington (NWIFC 2012) with no indication of slowing (NWIFC 2016a).

5.5 Hatcheries

Hatchery development in the Pacific Northwest has resulted in some reduction of natural-origin salmon and steelhead through genetic introgression of hatchery-origin fish into natural-origin fish populations, opportunity of competition and predation by hatchery-origin fish on natural-origin fish, and impacts from construction and operation of hatchery facilities that blocked fish passage, removed water from streams, and released contaminated water into streams (Hatchery Scientific Review Group 2004). Over time, many of these hatchery impacts to natural-origin fish have been corrected and some hatcheries are now being operated to help recover listed and/or declining populations (WDFW and Puget Sound Treaty Tribes 2004; WDFW 2016).

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5.6 Hydropower and Culvert Blockage

Use of hydropower and placement of incorrectly sized and designed culverts at stream crossings have been responsible for blocking fish passage to upstream habitat (Harrison 2008). Over time, some dams have attempted to restore fish passage through a series of fish ladders and trucking operations. Some dams have also modified operations to restore river flows, more effectively control sediment and manage erosion, and provide more natural temperature and oxygen levels of water released from dams. Some hydropower projects are being removed altogether. Culverts are being restored and/or replaced to allow increased fish passage (WDOT 2016). Implementation of this corrective action has taken on a greater emphasis in response to the culvert decision within U.S. v. Washington[3] in which Washington State was required to replace blocking culverts over time. As a result, the impact of hydropower development and culvert blockage has decreased over time. However, uncertainty exists as the State of Washington continues to insufficiently fund culvert replacement projects.

5.7 Harvest

During the 18th and 19th centuries when Europeans began to populate Puget Sound, harvest of salmon and steelhead was uncontrolled, which resulted in substantial decreases in salmon and steelhead abundance. Over time, as regulations to protect salmon and steelhead resources were developed, harvest decreased to protect and conserve remaining salmon and steelhead resources. With implementation of the Puget Sound Chinook Harvest Management Plan (Puget Sound Indian Tribes and WDFW 2004), planned harvest relied on escapement estimates to protect and conserve weaker stocks. In addition, *U.S. v. Washington* also helped in fisheries management through the sharing of the fishery resource between treaty tribes and Washington State. Currently, and as expected in the future, harvest management plans between WDFW and the treaty tribes, as co-managers, will continue to help conserve salmon while allowing for harvest that would not result in depletion of fish stocks. Other regulations, policies, treaties, and practices that help protect Puget Sound fishery resources, while allowing for controlled harvest, include the Magnuson-Stevens Fishery Conservation and Management Act, U.S./Canada Pacific Salmon Treaty, exercise of treaty rights, WDFW fish policies and regulations, PFMC's Framework Salmon Management Plan (PFMC 2016), pertinent state/tribal agreements, and the North of Falcon and PFMC processes (Section 1.5.2, *Fisheries Co-Management*). NMFS also reviews and advises on planned fisheries harvest so that listed salmon and steelhead stocks are protected as needed from excessive exploitation. Based on these practices, WDFW and the

[3] *United States v. Washington* is the ongoing federal court proceeding that enforces and implements reserved tribal treaty fishing rights with regard to salmon and steelhead returning to western Washington. Five treaties between the United States and various Washington tribes (1854 through 1856) described the reserved tribal fishing rights in common with citizens of the territory. The "Culvert Case" is a designated subproceeding of *United States, et al., v. State of Washington, et al*., C70-9213. The United States, in conjunction with the Tribes, initiated this sub-proceeding in early 2001, seeking to compel the State of Washington to repair or replace any culverts that are impeding salmon migration to or from the spawning grounds. On March 29, 2013, United States District Judge Ricardo S. Martinez ordered the state of Washington to replace culverts under state-owned roads that block the passage of salmon to critical habitat. The court earlier found those culverts violated tribal treaty rights. The reasoning is that the Stevens treaties of 1855 require protection of the environment including protecting the viability of treaty-protected fish. The Ninth Circuit Court of Appeals affirmed the lower court decision. *United States v. Washington*, No. 13-35474, June 27, 2016. Currently, the state of Washington has filed a motion for rehearing by the Circuit Court.

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Puget Sound Treaty Tribes, as co-managers, issue agreed-upon harvest regulations to protect salmon and steelhead resources over the long term.

5.8 Cumulative Effects by Resource

Where applicable, the relative magnitude of impacts are described using the following terms:

- No Effect – The alternative would have no effect on the resource.
- Undetectable – The impact would not be detectable.
- Negligible – The impact would be at the lower levels of detection.
- Low – The impact would be slight, but detectable.
- Medium – The impact would be readily apparent.
- High – The impact would be substantially large.

Effects are also described as either being positive (beneficial), or negative (detrimental), when applicable.

5.8.1 Water Quality

Past, present, and future human-based activities that affect water quality (industrial, agricultural, and wastewater discharges; shoreline development; and vessel operations) contribute to its degradation within Puget Sound. Fisheries harvest affects water quality through boat engine emissions and exhaust and boat propeller contact with sediments resulting in water pollution, turbidity, and shoreline erosion (Section 3.2, *Water Quality*). However, regulations, remediation, and restoration activities, and new boat engines that decrease gas releases help to reduce overall water quality impacts over the long term. Climate change (particularly the rising ocean temperatures and ocean acidification), hydropower (also increasing water temperatures), and legacy industrial practices have resulted in substantial impacts to water quality, whereas hatcheries have changed practices to minimize impacts to water quality. Considering the cumulative effects from past, present, and future contributions that affect water quality, the contribution of No Action and Proposed Action to cumulative water quality impacts would be a negligible negative effect while No Fishing Action would be negligible, positive effect (Table 5-1).

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Table 5-1. Summary of cumulative effects by resource.

Resource Area	No Action	Proposed Action	No Fishing Action
Water Quality	Negligible negative effect	Same as No Action	Negligible positive effect
Air, Greenhouse Gases, Pollutants	Negligible negative	Same as No action	Negligible positive effect
Wildlife – Predator/Prey Relationships	Undetectable for most wildlife species, and negligible, negative effect for species dependent on salmon and steelhead	Same as No Action	Same as No Action, but negligible positive effect for species dependent on salmon and steelhead
Wildlife – SRKW	Negligible, negative effect	Same as No Action	Negligible positive effect
Wildlife – Salmon Carcass Nutrient Benefits	Negligible positive effect from carcasses in streams	Same as No Action	Low positive effect
Wildlife- Transfer of Toxins from Salmon to Wildlife	No effect	Same as No Action	Same as No Action
Wildlife – Wildlife Habitat Disturbance	Negligible negative effect	Same as No Action	Negligible positive effect
Wildlife - Bycatch	Low negative effect	Same as No Action	Low positive effect
Wildlife – Derelict Fishing Gear	Low negative effect	Same as No Action	Low positive effect
Fish – Chinook Salmon	Medium negative Effect	Negligible negative effect	Negligible negative effect
Fish – Summer-run Chum Salmon	Negligible negative effect	Same as No Action	Negligible positive effect
Fish - Steelhead	Negligible negative effect	Same as No Action	Negligible positive effect
Fish – Coho Salmon	Negligible negative effect	Negligible negative effect	Negligible positive effect
Fish – Chum Salmon	Moderate, negative effect	Low, negative effect	Low, positive effect
Fish – Pink Salmon	No Effect	Low, negative effect	Low, Positive effect
Fish – Sockeye Salmon	Low, negative effect	Same as No Action	Low, positive effect
Fish – Other Fish	Negligible effect	Same as No Action	Same as No Action
Fish – Fish Habitat	Negligible negative effect	Same as No Action	Negligible positive effect
Fish – Marine-derived Nutrients	Low negative effect	Same as No Action	Low positive effect
Fish – Selectivity of Biological Characteristics of Salmon	No effect	Same as No Action	Same as No Action
Fish – Harvest of Hatchery-origin Fish	Low negative effect	Same as No Action	Same as No Action
Fish - Treaty Indian Ceremonial and Subsistence Salmon Uses	Low positive effect	Low positive effect	High negative effect

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Resource Area	No Action	Proposed Action	No Fishing Action
Invertebrates	Negligible negative effect	Same as No Action	Negligible positive effect
Socioeconomics	Moderate positive effect	Low, positive effect	High negative effect
Environmental Justice	Negligible, negative effect	Same as No Action	High Negative effect
Recreation and Recreational Fishing	High, positive effect	Same as No Action	Moderate, negative effect
Marine Protected Areas	No effect	Same as No Action	Same as No Action
Noise and Light	Undetectable for light and negligible negative for noise	Same as No Action	Undetectable for light and negligible positive for noise
Public Health and Safety	Negligible negative for public health, low negative for safety	Same as No Action	Negligible positive for public health, low positive for safety
Indian Trust Assets	High negative effect	High positive effect	High negative effect

5.8.2 Air, Greenhouse Gases, Pollutants

Puget Sound air quality is primarily impacted from industrial and transportation related emissions (Section 3.3, *Air and Greenhouse Gases*). Boat operations during harvest activities also contribute to air quality degradation. Climate change (increasing air temperatures, changes in the ozone layer, and increasing likelihood for fires) affects air quality over the long term, as well as increased residential populations that require more development and the need for transportation services, which contribute to air quality degradation. Regulations, required remedial activities for industrial development, and increased reliance on mass-transit help to improve Puget Sound air quality over the long term. The effect on air quality from No Action or Proposed Action is a cumulative negligible negative impact recognizing all other sources of air emissions in Puget Sound (Table 5-1). The effect on air quality and greenhouse gases from No Fishing Action is a negligible positive effect relative to all other sources of air emissions in Puget Sound.

5.8.3 Wildlife

Predator/Prey Relationships. As described in Section 3.4, *Wildlife*, salmon and steelhead serve as predators and prey of wildlife, including that for threatened and endangered species, marine mammals, bald eagles and golden eagles, and migratory birds. Harvest can be both a benefit and a disadvantage to wildlife through loss of a food source or a decrease of predator abundance, respectively. Future residential and industrial development and climate change would reduce wildlife habitat while restoration activities would help to restore lost habitat. With the substantial effects to wildlife in general from other sources outside of harvest, and the overall neutral effect of harvest to wildlife in general, excepting for a few species that have a Strong, Recurrent relationship (Cederholm 2000) with salmon and steelhead, the overall cumulative effect to wildlife predators and prey from the Proposed Action and No Fishing would be undetectable. For those species that have a Strong, Recurrent relationship (e.g., Southern Resident killer whale, bald eagle) the cumulative effects from the Proposed Action would be a cumulative negligible negative effect because unharvested abundances would continue to provide a source of prey for these species and harvest impacts to populations are temporary by providing spawning abundances intended to meet maximum production while habitat degradation permanently reduces salmon and steelhead

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abundance and productivity (Table 5-1). Under the No Fishing Action, cumulative effects for species with a strong, recurrent relationship to salmon and steelhead would result in a cumulative negligible positive effect.

Salmon Carcass Nutrient Benefits. As described in Section 3.4.2, *Salmon Carcass Nutrient Benefits*, salmon carcasses provide nutrient benefits to wildlife. This benefit is the result of the extent of escapement to spawning grounds and is affected by increasing habitat from restoration activities, as well as decreasing habitat from direct loss and disturbance. The benefit is a cumulative negligible positive effect to wildlife for both the No Action and Proposed Action because salmon carcasses would continue to provide a benefit to aquatic life under either alternative (Table 5-1). Under No Fishing, the benefit would be a cumulative low positive effect as more carcasses would reach the spawning grounds and provide nutrients for aquatic life.

Transfer of Toxins from Salmon to Wildlife. Wildlife that consume salmon and steelhead are susceptible to toxic contaminants and/or pathogens that may be within the fish they consume (Section 3.4.4, *Transfer of Toxins from Salmon to Wildlife*). However, harvest does not affect this transfer of toxins from salmon to wildlife. Thus, there is no cumulative effect to wildlife from either the No Action, Proposed Action, or No Fishing Action (Table 5-1).

Wildlife Habitat Disturbance. As described in Section 3.4.4, *Harvest Habitat Disturbance*, fisheries harvest can temporarily impact wildlife habitat while harvest operations are occurring. Wildlife species would be expected to return to their habitat once harvest is completed. Considering development and human presence caused by other activities, wildlife habitat disturbance would be a cumulative negligible negative effect for No Action and Proposed Action (Table 5-1). Considering development and human presence caused by other activities, wildlife habitat disturbance would be a cumulative negligible positive effect for the No Fishing Action.

Bycatch. Wildlife species of concern in Puget Sound that can be impacted as bycatch are killer whales, Steller sea lions, marbled murrelets, and common murrres, as well as other seabirds, sea turtles, dolphins, and whales (Subsection 3.6.5, *Fisheries Bycatch*). Bycatch can result from all fishing methods, fishing for all types of fish and shellfish, locations, and timing. Although the co-managers have worked to reduce bycatch, the potential for bycatch cannot be eliminated altogether. In consideration with all other fisheries and in consideration of development and climate change, bycatch from harvest of salmon and steelhead would be a cumulative low negative effect under both No Action and Proposed Action (Table 5-1). In consideration with all other fisheries and in consideration of development and climate change, bycatch from harvest of salmon and steelhead would be a cumulative low positive effect under No Fishing Action.

Derelict Fishing Gear. As described in Section 3.4.6, *Derelict Fishing Gear*, the accidental loss of fishing gear on the seafloor, can trap, wound, and/or kill seabirds, sea turtles, and marine mammals. In addition to salmon and steelhead harvest, the remains of derelict fishing gear are also left behind by harvest of other fish and shellfish. Considering all contributors to derelict fishing gear, the contribution from salmon and steelhead harvest would be a cumulative low negative effect for both No Action and Proposed Action (Table 5-1). Considering all contributors to derelict fishing gear, the contribution from the No Fishing Action for salmon and steelhead harvest would be a cumulative low positive effect.

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5.8.4 Fish

Chinook Salmon. Puget Sound Chinook Salmon would be harvested as described in Section 3.5.1.1, *Chinook Salmon*, and Section 4.5.1.1, *Chinook Salmon*. In consideration of other factors influencing the survival and productivity of Puget Sound Chinook Salmon – climate change, development and habitat loss, hydropower and culvert blockages, and hatcheries; the impact from No Action would be a medium negative effect because harvest in Puget Sound would not be planned in accordance with pre-season forecasts, FRAM modeling, nor would it be guaraunteed to meet targeted harvest objectives and co-managers conservation considerations. Under the Proposed Action, harvest of Chinook salmon would be under the North of Falcon and PFMC processes and would be developed to meet management objectives and co-managers conservation considerations. As a result, considering all other actions affecting the survival and productivity of Chinook salmon in the Action Area, the effect under the Proposed Action would be a cumulative negligible, negative effect (Table 5-1). Under the No Fishing Action, harvest of Chinook salmon would not occur in the project area, but would occur in the other fisheries under PFMC management. As a result, considering the impacts of all other actions affecting the surivival and productivity of the Chinook salmon in the Action Area, the effect under the No Fishing Action would result in a negligible, negative effect as large proportions for many Chinook stocks from the Action Area are harvested in fisheries outside the Action Area.

Hood Canal Summer-run Chum Salmon. Hood Canal Summer-run Chum Salmon would be incidentally harvested under No Action and the Proposed Action as described in Section 3.5.1.2, *Hood Canal Summer-run Chum Salmon*, and Section 4.5.1.2, *Hood Canal Summer-run Chum Salmon*. In consideration of other factors influencing the survival and productivity of Hood Canal Summer-run Chum Salmon – climate change, development and habitat loss, hydropower and culvert blockages, and hatcheries – the impact from both the No Action and Proposed Action alternatives would be a cumulative negligible negative impact and a cumulative negligible positive effect under No Fishing (Table 5-1).

Puget Sound Steelhead. Puget Sound Steelhead would be incidentally harvested under No Action and the Proposed Action at relatively low leves as described in Section 3.5.1.3, *Steelhead*, and Section 4.5.1.3, *Steelhead*. In consideration of other factors influencing the survival and productivity of Puget Sound Steelhead – climate change, development and habitat loss, hydropower and culvert blockages, and hatcheries – the impact from both the No Action and Proposed Action alternatives would be a cumulative negligible negative impact and a cumulative negligible positive impact under No Fishing (Table 5-1).

Coho Salmon. Puget Sound Coho Salmon would be harvested by the No Action and Proposed Action as described in Section 3.5.2.1, *Coho Salmon*, and Section 4.5.1.1, *Coho Salmon*. In consideration of other factors influencing the survival and productivity of Puget Sound Coho Salmon – climate change, development and habitat loss, hydropower and culvert blockages, and hatcheries – the impact from the No Action and Proposed Action alternatives would be a cumulative negligible negative impact while the No Fishing Action would be a cumulative low, positive impact (Table 5-1).

Chum Salmon (non-listed). Puget Sound fall and winter-run chum salmon would be harvested under the No Action and Proposed Action as described in Section 3.5.2.2, *Fall- and Winter-run*

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Chum Salmon, and Section 4.5.2.2, *Fall- and Winter-run Chum Salmon*. In consideration of other factors influencing the survival and productivity of Puget Sound fall- and winter-run chum salmon – climate change, development and habitat loss, hydropower and culvert blockages, and hatcheries – the impact from the No Action would be a moderate negative impact as some stocks within aggregate management units might fail to meet their escapment goals. Under the Proposed Action alternative, there would be a cumulative low negative impact through actions intended to promote greater escapement in component stocks of aggregate management units (Table 5-1). Under the No Fishing Action alternative, there would be a low positive effect as all chum salmon returning to spawn would recruit to escapement for all stocks.

Pink Salmon. As described in Section 3.5.2.3, *Pink Salmon*, and Section 4.5.2.3, *Pink Salmon*, this species is predominantly an odd-year return within Puget Sound. Therefore, in consideration of other factors influencing the survival and productivity of Puget Sound odd-year pink salmon – climate change, development and habitat loss, hydropower and culvert blockages, and hatcheries – impacts from the No Action would have No Effect, while the Proposed Action would have low negative effect on pink salmon and the No Fishing Action a low positive effect (Table 5-1).

Sockeye Salmon. Sockeye salmon would be harvested under No Action and the Proposed Action as described in Section 3.5.2.4, *Sockeye Salmon*, and Section 4.5.2.4, *Sockeye Salmon*. In consideration of other factors influencing the survival and productivity of sockeye salmon – climate change, development and habitat loss, hydropower and culvert blockages, and hatcheries – the impact from either No Action or Proposed Action would be a cumulative low negative impact (Table 5-1). The impact from the No Fishing Action would be a cumulative low positive impact as no Sockeye salmon would be harvested in the action area.

Other Fish. Some fish species benefit (salmon and steelhead prey) and other fish species are negatively impacted (salmon and steelhead predators) from harvest of salmon and steelhead (Section 3.5.3, *Other Fish*). Considering development, climate change, hydropower, culvert blockage, and other cumulative effects to other fish, the impact of fisheries harvest to survival and reproduction of other fish would be a cumulative negligible effect under the No Action, the Proposed Action, and the No Fishing Action (Table 5-1).

Fish Habitat. Fish habitat can be temporarily impacted by salmon and steelhead harvest from nets scouring the seabed, derelict fishing gear covering habitat, and human disturbance and waste (i.e., stream wading, light, noise, contaminants) as described in Section 3.5.4, *Fish Habitat Affected by Salmon Fishing*. Under cumulative effects and considering all temporary and long-term contributors that impact fish habitat, the contribution of fish harvest would be cumulative negligible negative effect for both No Action and the Proposed Action and a cumulative negligible positive effect for the No Fishing Action (Table 5-1).

Marine-Derived Nutrients. Marine-derived nutrients provide a direct food source for juvenile salmonids and increase primary and secondary production, which benefits the ecosystem (Section 3.5.5, *Marine-Derived Nutrients from Salmon Spawners*). Escapement, spawning, and resulting carcass deposition in freshwater streams would continue under either alterative. Considering overall cumulative effects, fisheries effects to marine-derived nutrients would continue to occur

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under both No Action and the Proposed Action as a cumulative low negative effect and a cumulative low positive effect under the No Fishing Action (Table 5-1).

Selectivity of Biological Characteristics of Salmon. Harvest has not been shown to have an effect on the biological characteristics of salmon and steelhead as described in Section 3.5.6, *Selectivity of Biological Characteristics of Salmon and Steelhead* (Table 5-1). Under the No Action, Proposed Action, and No Fishing Action, selectivity of biological characteristics of salmon would have no effect cumulatively (Table 5-1).

Harvest of Hatchery-Origin Fish. The production of hatchery-origin fish allows for increased harvest of salmon and steelhead when hatchery-origin fish return to Puget Sound and also helps to decrease harvest impacts on natural-origin fish (Section 3.5.7, *Harvest of Hatchery-origin Fish*). Hatchery-origin fish also can impact natural-origin fish through competition, predation, genetics, and facility operation, and harvesting hatchery-origin fish has the potential to impact natural-origin fish through the incidental taking of natural-origin fish (bycatch). Past and present development and climate change do not affect harvest of hatchery-origin fish. As a result, the effects of harvest of hatchery-origin fish are similar to that described in Section 4.5.7, *Harvest of Hatchery-Origin Fish*, which is that the No Action and the Proposed Action would result in a cumulative low negative effect (Table 5-1). Although no incidental harvest of natural-origin fish would occur under No Fishing Action, the impact of the action would still be a cumulative low negative effect as a result of more hatchery origin fish likely straying to the spawning grounds.

Treaty Indian Ceremonial and Subsistence Salmon Uses. Ceremonial and subsistence fishing maintain cultural viability and provide valuable food resources that also are important for use in tribal ceremonies (Section 3.5.8, *Treaty Indian Ceremonial and Subsistence Salmon Uses*). When considering past and present development and climate change effects to treaty Indian ceremonial and subsistence uses resulting in lower levels of harvest opportunities for ceremonial and subsistence purposes, the No Action and Proposed Action provide a cumulative low positive effect to treaty tribes (Table 5-1) which is tempered by the negative impact experienced by some tribal communities having reduced their ceremonial and subsistence fisheries for conservation purposes. Considering past and present development and climate change effects to treaty Indian ceremonial and subsistence uses, the No Fishing Action would result in a cumulative high negative effect to treaty tribes.

5.8.5 Invertebrates

Invertebrates serve as a primary food source to salmon and steelhead and can transfer toxins to salmon and steelhead when consumed (Section 3.6, Invertebrates). Harvest can impact invertebrates when nets are dragged along the substrate surface. When considering past and present development, other fishing activities that also impact invertebrates, and climate change effects to invertebrates, No Action and Proposed Action would both have a cumulative negligible negative effect on invertebrate communities while No Fishing Action would have a negligible positive effect (Table 5-1).

5.8.6 Socioeconomics

Commercial and sport fisheries in the Puget Sound region that generate economic activity are characterized by various economic measures. For this assessment, employment and personal

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income are used to estimate economic activity generated by commercial and recreational salmon and steelhead fishing activity in the Puget Sound project area. For the project area, the total contribution of commercial salmon and steelhead fisheries to the Puget Sound regional economy includes 345 FTEs and $20.4 million in personal income, and recreational salmon and steelhead fisheries support an estimated 899 FTEs and generate $59.6 million in personal income under modeled 2020 conditions. Under No Action, there would be minimal job and monetary change in commercial harvest in Puget Sound but substantial increase in jobs and personal income relative to recreational fishing resulting in a moderate positive effect due to the increase of income to the regional economy related to fishing activities. Under the Proposed Action, there would be moderate decrease in commercial harvest and monetary revenue and substantial increases in recreational revenues in Puget Sound. As a result, the cumulative effect to socioeconomic effects would result in a low positive effect due to the overall increase of income from fishing activities. Under the No Fishing Action, there would be a complete loss of harvest and fishery related monetary revenue through the Puget Sound Region and the socioeconomic effect would result in a high negative effect.

5.8.7 Environmental Justice

The environmental justice communities of concern within Puget Sound include low income and minority populations and Native Americans (Section 3.8, *Environmental Justice*). Harvest helps to increase income for these communities of concern, particularly for Native Americans who benefit from an economic, subsistence, and ceremonial perspective. Development and climate change have reduced the overall abundance of salmon and steelhead in Puget Sound, which has resulted in substantial harvest declines over the past 200 years that has impacted environmental justice communities of concern. The long-term decline in salmon and steelhead abundance has resulted in the loss of fishing opportunity and income over the long-term. The No Action and Proposed Action would provide a cumulative negligible positive effect to environmental justice communities of concern considering a mearuable amount of improvement from harvest opportutinities, but much reduced due to the historical overall decrease in fishing opportunity caused by human development and climate change (Table 5-1). The No Fishing alternative, would provide a cumulative high negative effect to environmental communities of concern considering complete loss of harvest for economic, subsistence, and ceremonial perspectives, relative to the overall historic decrease in fishing opportunity caused by human development and climate change (Table 5-1).

5.8.8 Recreation and Recreational Fishing

Outdoor recreation is important to Washington residents and contributes $21.6 billion in annual expenditures. Recreational fishing also contributes to the quality of life, employment, and overall income of Washington residents (Section 3.9, *Recreation and Recreational Fishing*). Future development and population growth can have both positive and negative effects to recreation by helping to bring tax revenues for recreational development and by increasing competition for recreation resources. Climate change and increased weather-related events can impact recreational development and the opportunity to recreate on marine and fresh water. No Action and the Proposed Action help to provide recreational opportunity for fishers and would result in a high positive effect to the economy and residents of Washington State (Table 5-1). No Fishing Action would eliminate recreational opportunities for fisher in the project area, although salmon and steelhead recreational fishing opportunities would still exist in the State of Washington (e.g.

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coastal Washington and Columbia River) and would result in a cumulative moderate negative effect.

5.8.9 Marine Protected Areas

Marine protected areas generally have restricted fishing access to provide wildlife and fish populations secure habitat, cover, and breeding areas that are protected from human disturbance (Section 3.10, *Marine Protected Areas*). With these fishing restrictions on marine protected areas, the cumulative effect of No Action, Proposed Action, and No Fishing Action would result in no effect on Marine Protected Areas (Table 5-1).

5.8.10 Noise and Light

Fisheries harvest contributes to increased noise and evening lighting in aquatic waters, which affects the growth, abundance, and movement of biological organisms (Section 3.11, *Noise and Light*). However, when considering noise and light from other large vessels, development, transportation, recreation, and other industrial contributors to cumulative effects; the noise and light from boat operations during salmon and steelhead fishing under either No Action or Proposed Action, the cumulative effect would be undetectable for light and a negligible negative for noise (Table 5-1). Considering impacts under No Fishing Action, the cumulative effect would be undetectable for light and a negligible positive effect for noise in consideration of other sources of light and noise pollution in the action area.

5.8.11 Public Health and Safety

Past effects from industrial, agricultural, and wastewater discharges to marine and fresh water have contributed to contamination in these waters and impacted the health of aquatic organisms. Petroleum-based boat emissions (including that from fishing) also contribute to contamination in Puget Sound. Federal and state regulations, monitoring, and remediation activities have helped to remove contaminants from Puget Sound and reduce these impacts over time.

As a result of contaminates within marine and fresh water, DOH recommends limited consumption of Chinook salmon due to the potential for these fish to carry and transfer these contaminants from fish to the consumer (Section 3.12.1, *Public Health*). Due to the limited opportunity to harvest Chinook salmon, these recommendations can be easily followed by the general public. However, tribal communities and other segments of the larger society have a greater cultural and/or subsistence reliance on a fish-based diet, making adherence to these recommendations more challenging. Based on past sampling results, DOH did not recommend consumption limits for other salmon and steelhead.

Considering all other causes of contamination in Puget Sound, ongoing remediation efforts, and the limited consumption of Chinook salmon, No Action and the Proposed Action would continue to result in cumulative negligible negative to public health while the No Fishing would result in a cumulative negligible positive effect (Table 5-1).

Fishing is considered hazardous from a safety perspective due to vessel disasters, falls overboard, and machinery on deck that cause on-deck injuries (Section 3.12.2, *Safety*). Over time, NIOSH regulations and guidelines have helped reduce these occupational hazards. Climate change, habitat

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loss, and hydropower do not directly affect safety. Harvesting salmon and steelhead under No Action or Proposed Action would similarly contribute to cumulative effects regarding safety in Puget Sound as a low negative effect and a low positive effect under No Fishing Action (Table 5-1).

5.8.12 Indian Treaty Fishing

As described in Section 3.13, *Indian Trust Assets – Fishing*, sharing of the yearly harvest between non-treaty fishers and Indian treaty tribes represents the right of treaty tribes to co-manage the salmon and steelhead resource within the state of Washington, as well as represents the equitable sharing of harvest among tribes, and between treaty and non-treaty fishers as determined under *U.S. v. Washington*. Co-management and sharing of fisheries harvest represents an Indian trust asset. Prior to *U.S. v. Washington*, treaty tribes were not guaranteed the legal right to this allocation. Historically, these trust assets were impacted through overharvest in the 1800s and 1900s, habitat loss, hydropower development, culvert blockage, and climate change effects that resulted in substantial long-term loss of the salmon and steelhead fisheries resource.

Based on the Comprehensive Management Plan for Puget Sound Chinook: Harvest Management Component (Puget Sound Indian Tribes and WDFW 2004), harvest management objectives changed over the past 30 years to protect, conserve, and sustain the fisheries resource and this Indian trust asset. However, No Action would not include use of the North of Falcon or PFMC processes where the salmon and steelhead resource share is agreed to between Washington State and the treaty tribes based on pre-season forecasts and FRAM modeling. As a result, No Action represents a cumulative high negative effect. In contrast, the Proposed Action would achieve the 2020-21 co-managers' conservation objectives and NOAA's guidance for consultation standards and conservation needs for Puget Sound Chinook through negotiations between the treaty tribes and WDFW under the North of Falcon and PFMC processes. The Proposed Action would result in a cumulative high positive effect. The No Fishing Action represents a lack of ESA coverage for tribal and non-tribal fisheries and therefore no commercial, ceremonial and subsistence, or recreational salmon or steelhead fishing would occur. The No Fishing action would result in a cumulative high negative effect, as it would preclude treaty Tribes from exercising their right to harvest fish.

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Appendix A. Proposed Action – 2020-2021 Co-Managers' List of Agreed Fisheries.

2020 – 2021 Co-Managers' List of Agreed Fisheries
(May 1, 2020 – April 30, 2021)

[Bracketed and bolded language signifies areas where some unresolved issues remain. Additional Co-manager discussions will occur prior to the fisheries to resolve these remaining issues.]

AR004602

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Part I. Treaty/Non-Treaty OCEAN Fisheries (FRAM #3120 (Chinook) & #2032(Coho))

Treaty Troll Quota	35,000 Chinook; 16,500 Coho
Non-treaty TAC	54,000 Chinook and 28,500 marked Coho.
NT Troll TAC	27,640 Chinook and 2,000 marked Coho.
Recreational TAC	26,360 Chinook and 26,500 marked Coho.

2.1 Treaty Troll: Areas 2, 3, 4 & 4B

5/1-6/30	Chinook directed fishery with sub quota of 17,500 Chinook. May 1 through June 30 or attainment of 17,500 Chinook sub quota, whichever comes first. All salmon except Coho. If the Chinook quota for the May-June fishery is not fully utilized, the excess fish may be transferred into the later all-salmon season on an impact-neutral basis for limiting stocks into the later all-salmon season. If the Chinook quota is exceeded, the excess will be deducted from the later all-salmon season.
7/1-9/15	All salmon species, with quota of 16,500 Coho and sub quota of 17,500 Chinook plus any portion of uncaught Chinook rolled over from the May 1 through June 30 time period on an impact neutral basis. Chum release 8/1-9/15 Open from July 1 through September 15, or attainment of either the Coho quota or the Chinook sub quota, whichever comes first.

AR004605

2.2 Non-Treaty Troll: U.S./Canada border to Cape Falcon

5/6- thru earliest of 6/28 or pre-season Chinook sub-quota of 13,820 (no more than 5,100 of which may be caught in the area between the U.S./Canada border and the Queets River and no more than 3,770 of which may be caught in the area between Leadbetter Pt. and Cape Falcon)	All salmon except Coho with 13,820 Chinook quota; no more than 5,100 of which may be caught in the area between the U.S./Canada border and the Queets River and no more than 3,770 of which may be caught in the area between Leadbetter Pt. and Cape Falcon; Open seven days per week. A landing and possession limit of 75 Chinook per vessel per landing week (Thurs-Wed) is in effect in the area between the U.S./Canada border and the Queets River and in the area between Leadbetter Point and Cape Falcon. An in-season conference call will occur when it is projected that 75% of the overall Chinook quota has been landed or 75% of any sub-area quota has been landed to consider modifying the open period and landing and possession limits. Mandatory Yelloweye Rockfish Conservation Area, Columbia and Cape Flattery Control Zones closed. Trip limits, gear restrictions, and guidelines may be implemented or adjusted in-season. Vessels must land their fish within 24 hours of any closure of this fishery; under state law, vessels must report their catch on a state fish receiving ticket. Vessels in possession of salmon north of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook and halibut catch aboard, and destination. Vessels in possession of salmon south of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook and halibut catch aboard, and destination. Vessels fishing, or in possession of salmon north of Leadbetter Point must land and deliver all species of fish in a Washington port and must possess a Washington troll and/or salmon deliver license. Vessels may not land fish east of the Sekiu River or east of the Megler-Astoria Bridge. For deliver to Washington ports south of Leadbetter Point, vessel must notify WDFW prior to crossing the Leadbetter Point line with area fished, total Chinook and halibut catch aboard, and destination with approximate time of delivery. During any single trip, only one side of the Leadbetter Point line may be fished. Vessels fishing, or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi.

AR004606

7/1 thru earliest of 9/30 or pre-season Chinook sub-quota of 13,820 or Coho quota of 2,000	All salmon with 13,820 Chinook quota and no more than 2,000 marked Coho quota. Open seven days per week. A landing possession limit of 10 Coho per vessel per landing week (Thurs-Wed) is in effect in all areas. All retained Coho must be marked with a healed adipose fin clip. No Chum retention north of Cape Alava, Washington beginning August 1. Mandatory Yelloweye Rockfish Conservation Area, Cape Flattery and Columbia Control Zones closed. Grays Harbor Control Zone closed beginning August 10. Trip limits, gear restrictions, and guidelines may be implemented or adjusted in-season. Vessels must land their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels in possession of salmon north of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook, Coho, and halibut catch aboard, and destination. Vessels in possession of salmon south of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook, Coho, and halibut catch aboard, and destination. Vessels fishing or in possession of salmon north of Leadbetter Point must land and deliver all species of fish in a Washington port and must possess a Washington troll and/or salmon delivery license. Vessels may not land fish east of the Sekiu River or east of the Megler-Astoria bridge. For delivery to Washington ports south of Leadbetter Point, vessels must notify WDFW prior to crossing the Leadbetter Point line with area fished, total Chinook, Coho, and halibut catch aboard, and destination with approximate time of delivery. During any single trip, only one side of the Leadbetter Point line may be fished. Vessels fishing, or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi.

2.3 Non-Treaty Recreational

Area 1: Leadbetter Point to Cape Falcon (Oregon)

6/20-9/30 (13,250 Mark Selective Fishery Coho sub quota)	June 20 – 28: Open 7 days per week; all salmon except Coho, 1 salmon per day. June 29 – September 30: Open 7 days per week, all salmon, 2 salmon per day, only one of which may be a Chinook; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 22 inches and Coho minimum size 16"; Chinook guideline: 7,000; closed in Columbia Control Zone. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.

Buoy 10

6/16-7/31	Open 7 days/week; 2 fish per day. Release all Chinook. Barbless hooks only. Closed from the Megler-Astoria Bridge downstream.
8/1-8/15	Closed
8/16-8/27	Open 7 days/week; 1 fish per day (Chinook minimum size 24 inches, Coho minimum size 16 inches). Release all salmon other than Chinook and hatchery Coho. Coho must have a healed adipose fin clip. Barbless hooks only.
8/28-9/22	Open 7 days/week; 1 fish per day (Coho minimum size 16 inches), Release all salmon other than hatchery Coho. Coho must have a healed adipose fin clip. Release all salmon other than Chinook and hatchery Coho. Barbless hooks only.
9/23-12/31	Open 7 days/week; 1 fish per day, (Chinook minimum size 24 inches, Coho minimum size 16 inches); Coho must have a healed adipose fin clip. Release all salmon other than Chinook and hatchery Coho. Barbless hooks only.
1/1-3/31	Open 7 days/week, Daily limit 6, Up to 2 adults, (minimum size 12"), Hatchery Chinook only. Barbless hooks only.
North Jetty	Open 7 days per week when Area 1 or Buoy 10 area is open. When Buoy 10 area and Area 1 are open concurrently, the daily limit and minimum size restrictions follow the most liberal regulations of those areas. Barbless hooks only.

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Area 2: Queets River to Leadbetter Point

6/20-9/30 (9,800 Mark Selective Fishery Coho sub quota	June 20 – 28: Open 7 days per week; all salmon except Coho; 1 salmon per day. June 29- September 30: Open 5 days per week (Sun- Thurs); all salmon, 2 salmon per day, only one of which may be a Chinook; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 22 inches and Coho minimum size 16 inches; Chinook guideline: 12,460. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.

Area 2-1 (east of a line from Leadbetter Point to Cape Shoalwater): Willapa Bay

6/20-7/31	Open concurrent with Area 2, when Area 2 is open for salmon. Area 2 rules apply.
8/1-1/31	6 fish limit, 2 adults, 12” min size limit. Release wild Chinook. 2 pole endorsement.

Area 2-2 (east of line between tips of exposed jetties): Grays Harbor

West of Buoy 13 line 6/20-8/9	Open concurrent with Area 2, when Area 2 is open for salmon. Area 2 rules apply. Grays Harbor Control Zone closure in effect.
East of Buoy 13 line, when open	All salmon required to be released may not be totally removed from the water, except anglers fishing from boats 30’ or longer as listed on either their State or Coast Guard regulation are exempt. Single-point barbless hooks required.
East of Buoy 13 line 6/20-7/31	Closed
East of Buoy 13 line 8/1-9/15	1 fish limit, 12” min size limit. Release wild Chinook and wild Coho. Open to salmon angling only in the area described as Humptulips – North Bay (the area conforms to the commercial SMCRA 2C).
East of Buoy 13 line 9/23-11/30	1 fish limit, 12” min size limit. Release Chinook. Open to salmon angling only in the area described as East Grays Harbor (the area conforms to the commercial SMCRA 2D).

Westport Boat Basin and Ocean Shores Boat Basin

8/16-1/31	6 fish limit, 4 adults; 12” min size limit. Release Chinook.

AR004609

Area 3: Cape Alava to Queets River

6/20-9/30 (690 Mark Selective Fishery Coho sub quota)	June 20 –28: Open 7 days per week; all salmon except Coho,1 salmon per day. June 29 – September 30: Open 7 days per week, all salmon except no Chum retention beginning August 1, 2 salmon per day; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 24 inches and Coho minimum size 16 inches; Chinook guideline: 1,300. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.

Area 4: U.S./Canada border to Cape Alava and east to Sekiu River

6/20-9/30 (2,760 Mark Selective Fishery Coho sub quota)	June 20 –28: Open 7 days per week; all salmon except Coho,1 salmon per day. June 29- September 30: Open 7 days per week, all salmon except no Chum retention beginning August 1, 2 salmon per day; retained Coho must have a healed adipose fin clip. Chinook minimum size limit 24 inches and Coho minimum size 16 inches; Chinook guideline: 5,600; no Chinook retention east of Bonilla-Tatoosh line beginning August 1. Closed waters: east of a true north-south line running through Sail Rock through July 31; **Closed to salmon angling** inside the area bounded by a line from Kydaka Point to Shipwreck Point. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.

Area 4A: Makah Bay Treaty Evaluation Marine Set Net Fishery

Chinook	Trty	Open 8/15 through 9/15 inside an area bounded by a line running from Strawberry Rock Point (48º 19' 07"N, 124º 40' 00"W) to the group of rocks (48º 19' 46"N, 124º 40' 35"W) which are located off Hobuck Beach and a line to the mouth of Hobuck Creek (48º 19' 54"N, 124º 39' 37"W), to be implemented per agreement between the Makah Tribe and WDFW.

AR004610

Part II. PUGET SOUND including STRAIT of JUAN de FUCA and SAN JUAN ISLANDS fisheries (All fisheries modeled in FRAM #3120 (Chinook) & #2032 (Coho))

2.1 Strait of Juan de Fuca Pre-terminal Areas

Areas 5, 6, 6C Treaty Troll (Ntrty net closed)

NOTE: Area 4B: 5/1-10/31 see Ocean Troll. For 11/1-12/31 & 1/1-4/15 see below.

5/1-6/15	Closed
6/16-9/30	Open for salmon, Chum release; Freshwater Bay closed, south of Angeles Pt./Observatory Pt. line; Pt. Angeles Harbor closed west of line from tip of Ediz Hook to ITT Rayonier Dock; Hoko Bay closed inside the area bounded by a line from Kydaka Point to Shipwreck Point; Area 6 closed east of a line true north from Green Point; 1,000-foot closure around stream mouths. The catch estimates for this fishery modeled in FRAM are statistically derived predictions, and are the best available pre-season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions.
10/1-10/31	Closed.
11/1-4/15	In Areas 4B, 5, 6, 6C the treaty troll fishery will be open from November 1, 2020 through April 15, 2021, or when the catch reaches the harvest ceiling of 8,500 Chinook, whichever comes first. 1,000-foot closures around stream mouths. Hoko Bay closed inside the area bounded by a line from Kydaka Point to Shipwreck Point for the month of November. The catch estimates for this fishery modeled in FRAM are statistically derived predictions, and are the best available pre-season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions. The winter troll catch ceiling is 8,500 Chinook.
4/16-4/30	Closed

Areas 4B, 5, & 6C Treaty Net (Ntrty net closed)

Note: The catch estimates for this fishery modeled in FRAM are statistically derived predictions, and are the best available pre-season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions.

AR004611

Chinook	Open for setnet gear only, 6/21 through 8/22; 7 days a week; Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point; Freshwater Bay closed, south of Angeles Pt./Observatory Pt. line; 1,000-ft. closure around stream mouths.
Sockeye	Start to be determined by Fraser River Panel. The Co-managers have identified the following management actions to control by- catch of Chinook. Estimated by-catches are best estimates and are not quotas or ceilings. The priority for this fishery is to harvest the full Treaty share of Sockeye salmon, while managing the fishery so as to not greatly exceed the projected incidental harvest of Chinook salmon. All Chinook by-catch in this fishery will be promptly reported by each Tribe to the NWIFC TOCAS database and reported to the U.S. section of the Fraser Panel at least weekly, including take home and ceremonial and subsistence (C&S). If in-season the Chinook by-catch in this fishery exceeds 1,300, the Tribes will consider management actions to limit the Chinook by-catch, such as time or area restrictions, while continuing the priority objective of harvesting Sockeye salmon. If in-season the fishery is projected to result in a total Chinook by-catch exceeding 3,300 Chinook, the Tribes will, effective with that scheduled fishery opening, prohibit any commercial sales of Chinook salmon, and any Chinook salmon landed must be delivered to the fishers' respective Tribe.

Coho	Open for gillnets starting at 6 days per week with in-season adjustments based on cumulative catch. Fishery will target Coho from the end of Fraser Panel control, through 10/10; 1,000 ft. closure around stream mouths. Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point.
Chum	Open for gillnets, starting at 6 days per week (day may be added if effort is low), 10/11 through 11/14; 1,000-foot closure around stream mouths. Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point.

Area 5 Recreational

Kydaka Point Closure: Waters south of a line from Kydaka Point westerly, approximately 4 miles to Shipwreck Point closed to salmon angling 7/1-9/30.

5/1-6/30	Closed
7/1-9/30	2 fish limit, (Chinook 22" min size); release Chum, wild Coho and wild Chinook. Release all Chinook 8/16-9/30.
10/1-2/28	Closed
3/1-4/30	2 fish limit (Chinook 22" min size), release wild Coho and wild Chinook.

Area 6 Recreational

5/1-6/30	Closed
7/1-9/30	2 fish limit, release Chinook, wild Coho, and Chum; except W. of true N/S line through “2” buoy near tip of Ediz Hook retention of marked Chinook allowed (Chinook 22" min size). South of Angeles Pt. /Observatory Pt. line – closed to angling. Pt. Angeles Hbr. W. of line from tip of Ediz Hook to ITT Rayonier Dock – closed to salmon angling. Release all Chinook 8/16-9/30.
10/1-4/30	Closed

2.2 Strait of Juan de Fuca Terminal Areas

Area 6D Dungeness Bay Net

Note: The following applies to all 6D Dungeness Bay Coho fisheries (Tribal & WDFW): Co-managers agree to examine the feasibility of creating an in-season run size update for the 6D Coho fishery prior to the start of the 2020 season. If co-managers agree on the usefulness of the update model, the update will be used in-season to evaluate the likelihood of achieving the hatchery egg take goal and guide subsequent management of the bay and river fisheries. Absent in-season conditions that support the likely achievement of egg take goals, Dungeness Bay fisheries may close early.

Chinook	All	Closed
Coho	Trty	Open 9/21 through 10/31; Additional days beyond 10/31 may be considered; 9/21 through 10/10, seven days per week, fishing daylight hours only, nets must be attended by fisher, Chinook and Chum release; 10/11 through 10/31 (or 11/5 should conditions allow), seven days per week, 24 hours per day; 1,500 ft closure around mouth of Dungeness River.
	Ntrty	Open Wk 39 (wb 9/20) through Wk 45 (wb 11/1) for skiff gillnet gear; 7AM – 7PM; Wk 39-44 M-F; Chinook and Chum NR, release by cutting ensnaring meshes; 1,500 ft. (1/4 nautical mile) closure around each river mouth and 500 ft. Closure around Meadowbrook Cr. mouth. Fishery may close early pending in-season information. Openings possible in Wk 45 (wb 11/1) based on in-season information.
Chum	All	Closed

Dungeness River (Treaty and Recreational)

Note: The following applies to all Dungeness Bay and River Coho fisheries (Tribal & WDFW): Co-managers will meet on, or prior to October 14, 2020 to review current in-season conditions and

the results of an in-season run size update, if available. Absent in-season conditions that support the likely achievement of egg take goals, Dungeness River fisheries may remain closed. If flows are precluding Coho from moving upriver to the hatchery, the Dungeness River fishery will remain closed until conditions allow Coho movement upriver.

Dungeness River Treaty (Ntrty net closed)

Chinook	Trty	Closed
Coho	Trty	Commercial fishing up to 3 days/wk, to be determined in-season, for Coho only, is scheduled to open on 10/16 and will be restricted to areas below the Dungeness hatchery intake using species selective (hand-held) gear. Subsistence fishing using selective gear is scheduled to open on 10/16. Refer to the co-management agreement above for possible emergency openings.
Chum	Trty	Closed

Elwha River Treaty (Ntrty net closed)

Chinook	Trty	Closed except Ceremonial Harvest of 4 fish in July.
Coho	Trty	Closed
Chum	Trty	Closed

Dungeness Bay Recreational

5/1-9/30	Closed to salmon.
10/1-10/31	2 fish limit, hatchery Coho only.
11/1-4/30	Closed to salmon.

Dungeness River Recreational

mouth to the forks at Dungeness Forks Campground	10/16-11/30	4 fish limit, hatchery Coho only; 12” min size.

Elwha River Recreational

Closed to salmon and gamefish

Hoko River Recreational

mouth to cement bridge (mile 7.0) on Hoko/Ozette Hwy.	Closed to salmon

All other STRAIT OF JUAN DE FUCA REGION freshwater recreational closed to salmon angling.

AR004614

2.3 San Juan Islands/Point Roberts Area

Areas 6, 7, & 7A Net

Chinook	All	Closed
Sockeye	Trty	Schedule to be determined. The Co-managers have identified the following management actions to track and control by-catch of Chinook. Estimated by-catches are best estimates and are not quotas. The priority for this fishery is to harvest the full treaty share of Sockeye salmon, while managing the fishery so as to not greatly exceed the projected incidental harvest of Chinook salmon. All Chinook by-catch in this fishery will be promptly reported by each Tribe to the NWIFC TOCAS database and reported to the U.S. Section of the Fraser Panel at least weekly, including take home and ceremonial and subsistence (C&S). Prior to achieving a by-catch of 4,200 Chinook there will be no restrictions on the retention or sale of Chinook salmon. If, during the season, the Fraser Panel schedules a fishery that is projected to result in a total Chinook by-catch exceeding 4,200 fish, the Tribes will, effective with that scheduled fishery, prohibit any commercial sales of Chinook salmon, and any Chinook salmon landed must be delivered to the fisher's respective Tribe. Reef net wild Coho, wild Chinook, and Chum NR. Reef net may retain marked Chinook through 9/30. Further policy discussion may occur among the affected parties prior to the season.
	Ntrty	Schedule to be determined. The Co-managers have identified the following management actions to track and control by-catch. Modeled by-catches are best estimates and are not quotas. All vessel operators must complete best fishing practices certification prior to fishing. PS: brailing required. Chinook and Chum NR. Reef net Chum, and unmarked Chinook NR. Reef net: fishers may retain hatchery Chinook, with a cap of 300 and unmarked Coho with a cap of 500 for all gears through 9/30. Estimates of by-catch will be shared at least weekly in the U.S. Section of the Fraser River Panel. Purse seine and gillnet fisheries will be managed to ensure that the non-treaty impact does not exceed 3,771 total Chinook (120% of pre-season estimate).

AR004615

Coho	Trty	Reef net: 7 days/wk beginning at end of Fraser Panel management through 11/7; Chinook NR after 9/30. Chum NR through 9/30.
	Ntrty	Reef net: 7 days/wk beginning at end of Fraser Mgmt through Chum mgmt wk 41 (wb 10/4); Chinook NR after 9/30; unmarked-Coho retention allowed through 9/30 with a cap of 500, then Coho retention. Chum retention prohibited until after 9/30. All vessel operators must complete best fishing practices certification prior
Chum	Trty	The Treaty fishery will open October 10 (dependent on run status updates from CDFO) and remain open. See attached 2020 7/7A Chum Fishing Plan. Reef nets open from end of Fraser Panel management through end of Chum management (11/7), 7 days/wk. Reef net release requirements listed in Coho fishery description, above.
	Ntrty	Dependent on update of run status from CDFO. PS and GN open wk 41 (wb 10/4) through wk 45 (wb 11/1). Open 10/11, 10/12, 10/14, 10/15 and may re-open through the end of the season on 10/18 or 10/19 based on conditions outlined in the attached agreement. Co-managers will meet via conference call on Friday 10/16 to discuss catch to data. PS: brailing and recovery box required, Chinook and Coho NR. GN: during wk 41, Chinook and Coho NR, recovery box required and limited soak times in effect. Reef nets open from end of Fraser Panel management through wk 45 (wb 11/1), 7 days/wk, must release all Chinook . All vessel operators must complete best fishing practices certification prior to fishing.
Subsistence	Trty	12/1 – 4/30 subsistence troll fishery (Chinook 22” min size). Bellingham Bay closed 4/1 – 4/30.

Area 7 Recreational

5/1-6/30	Closed
7/1-7/31	2 fish limit, (Chinook 22” min size); release wild Chinook; Bellingham and Samish Bay closed to salmon.
8/1-8/15	2 fish limit, release Chinook; Bellingham Bay and Samish Bay closed to salmon.
8/16-8/31	2 fish limit, (Chinook 22” min size), release wild Chinook; Samish Bay closed to salmon.
9/1-9/30	2 fish limit, Release Chinook.

AR004616

10/1-4/30	Closed

2.4 Nooksack/Samish Terminal Region

Bellingham Bay (Areas 7B, 7C, 7D; 7A On-Reservation) Net

Chinook	Trty	Areas 7B, & 7D: August 2 through September 4, open weekly 4 PM Sunday to 4 PM Friday. Fishing pattern: 5,5,5,5,5. Area 7C: August 2 through September 11, open weekly 4 PM Sunday to 4 PM Friday. Fishing pattern: 5,5,5,5,5,5. Samish Bay is closed southeasterly of a line from Oyster Creek to the fisheries marker on Samish Island, except that hand pull gillnets may fish from 4 PM Sunday to 4 PM Wednesday south to a line from Oyster Creek to Fish Point on Samish Island, August 12 through September 129 Sunday 4 PM to Wednesday 4 PM, weekly. Fishing pattern: 3,3,3,3,3,3,3. 6 ½" mesh in 7C and off-reservation areas of 7B, except when open for sockeye in Area 7 and 7A.
	Ntrty	Areas 7B & 7C: Wks 34 (wb 8/16) - 36 (wb 8/30); PS Coho NR through wk 35. GN fishing pattern: 4, 4, 5; PS fishing pattern: 1,1,1.

Coho	Trty	Area 7A on-reservation fishery: September 6 through September 30. Open weekly 4 PM Sunday to 4 PM Wednesday. Fishing pattern: 3,3,3,3.
		Areas 7B and 7D: September 6 through October 17, open Sunday 4 PM to Saturday 4 PM. Fishing pattern: 6,6,6,6,6,6.
		7C: On September 25, a Co-manager conference call will be held to determine the status of Samish Chinook escapement. If the escapement goal appears to be attainable, and through development of a Co-manager agreed in-season update methodology it is determined that there is a harvestable surplus of Samish Coho, then a Coho fishery will open September 27 to October 14, Sunday 4 PM to Wednesday 4 PM, weekly. Fishing pattern: 3,3,3.
	Ntrty	Area 7B: Wks 37 (wb 9/6) - 43 (wb 10/18); GN fishing pattern: 5,5,7,7,7,7,7 (24 hrs for all days); PS fishing pattern: 3,3,7,7,7,7,7.

AR004617

Chum	Trty	Areas 7B & 7D: Oct. 18 – Dec.7; open weekly 4 PM Sunday to 4 PM Monday; Fishing pattern: 1,1,1,1,1,1,1,1.
	Ntrty	Area 7B: Wks 44 (wb 10/25) - 49 (wb 11/29); PS; 1,1,1,1,1,1 and GN 2,2,2,2,2,2. Whatcom Creek Zone (east of line from Post Point to flashing red light at west entrance of Squalicum Harbor) Closed.

Nooksack River Treaty Net (Ntrty net closed)

Note: On a weekly basis, Nooksack Tribe commercial fisheries on the Nooksack River will open at 12:01 AM Sun, except that portion of the river between Marine Drive Bridge and the first turn ("Big Bend") in the river upstream of the Slater Road Bridge (approximately ¼ mile upriver from the Slater Road Bridge), which will open at 4:00 PM Sunday. On a weekly basis, the Nooksack Tribe's commercial Chinook fisheries will close 4:00 PM Friday; Coho fisheries will close 4:00 PM Saturday and Chum fisheries will close 4:00 PM Monday.

Chinook	4/5-6/15	April to mid-June: limited ceremonial and subsistence fishery will be managed for a total mortality of 35 NOR Chinook. A traditional fishery will occur 500 feet upriver from the Highway 9 bridge in the lower North Fork and 500 feet downriver from the Nugent's Corner Boat Launch in the mainstem (the boat launch is located just down river from Nugent's Corner Bridge) (RM 30.6 and 36.8) except that in 2020 any openings from 6/1 - 6/15 will be limited to the area downstream from the railroad trestle that is downstream of the SR 9 Bridge. This will avoid overlap with the lower portion of the WDFW recreational fishery. A total of 156 Chinook are projected in this fishery with an anticipated 8 NORs among the 156. This fishery is by permit only. Another fishery will occur in the lower Nooksack River between the Slater Road bridge and the river mouth (between RM 0.0 and 3.5). The lower is estimated to result in 27 NOR Chinook mortalities. The river fishery may be selective and/or non-selective and the selective fishery will release NOR Chinook and apply a release mortality rate of 30% to these fish. Based on in-season harvests and fishing conditions, the Nooksack Tribe and Lummi Nation may discuss alternate sharing arrangements of the allowable 35 NOR mortalities.

	8/2 – 9/5	Open weekly 4 PM Sunday to 4 PM Saturday, August 2 through 4 PM September 5. Fishing pattern: 6,6,6,6,6. The river is divided into five zones during this period. These zones open in subsequent weeks, proceeding upriver, to protect migrating spring Chinook. Zone 1 is from Marine Drive Bridge to Slater Bridge. Zone 2 is from Slater Bridge to Hannegan Bridge in Lynden. Zone 3 is from Hannegan Bridge to Nugent's Corner Bridge. Zone 4 is from Nugent's Corner Bridge to the confluence of the north and south forks. The area in Zone 4, 1.3 miles downstream of the confluence (down to Nooksack Tribe blue colored automotive shop) will remain closed to protect holding Spring Chinook.
Coho	9/6 – 10/17	Open weekly 4 PM Sunday through 4 PM Saturday. Fishing pattern: 6,6,6,6,6,6. The area in Zone 4, 1.3 miles downstream of the north and south Fork confluence (down to Nooksack Tribe blue colored automotive shop) will remain closed through 4 PM September 23 to protect holding Spring Chinook.
Chum	11/1 – 11/22	Subsistence harvest only. The Lummi Nation and Nooksack Tribe will schedule one day of subsistence fishing between November 1 and November 22.
	10/18 – 12/7	Commercial. Open weekly 4 PM Sunday to 4 PM Monday. Fishing pattern: 1,1,1,1,1,1,1,1.

Bellingham Bay Terminal Area Recreational

5/1-8/15	Closed to Salmon
8/16-9/30	4 fish limit, 2 Chinook (Chinook 22" min size); Samish Bay closed.
10/1-4/30	Closed to Salmon.

Nooksack River Recreational; mainstem and North Fork

from Lummi Indian Reservation boundary to yellow marker at the FFA high school barn in Deming	9/1 – 12/31	2 fish limit, plus 2 additional hatchery Coho; 12" min size. Release wild Chinook through 9/30. Release Chum. Night closure and anti-snagging rule 9/1 - 11/30

from yellow marker at the FFA high school barn to confluence of North and South forks	10/1 – 12/31	2 fish limit, plus 2 additional hatchery Coho; 12” min size. Release Chum. Night closure and anti-snagging rule 10/1-11/30.

Nooksack River Recreational, South Fork

from mouth to Skookum Creek	10/1 – 12/31	2 fish limit, plus 4 additional hatchery Coho; 12” min size. Release Chum. Release wild Chinook 10/1 – 10/15. Only one single-point hook allowed. Night closure.

Nooksack River Recreational, North Fork

Nooksack River, North Fork, Hwy 9 bridge to marker at top of Kendall Hatchery	6/1-6/30	2 hatchery Chinook only, 12” min size. Night Closure. Only one single-point hook allowed.
Nooksack River, North Fork, Hwy 9 bridge to Maple Creek	10/1 – 11/30	2 fish limit, plus 2 additional hatchery Coho; 12” min size. Release Chum. Night closure and anti-snagging rule.

Samish River Recreational

from mouth to Thomas Road Bridge	8/1-9/13	2 fish limit, 12” min size. Release wild Coho and Chum. Night closure. Only one single point hook allowed. Only fish hooked inside the mouth may be retained.

Dakota Creek Recreational

mouth to Giles Road Bridge		Salmon closed for 2020. Selective gear rules.

Whatcom Creek Recreational

mouth to yellow markers below foot bridge below Dupont St. in Bellingham		Closed to all fishing.

All other NOOKSACK/SAMISH TERMINAL REGION freshwater recreational: Closed to salmon angling.

2.5 Skagit Terminal Region

Terminal area fisheries will be managed so as not to exceed total projected incidental fishery mortalities of Skagit wild summer/fall Chinook. Treaty schedules may be changed in-season as necessary to meet management objectives and harvestable shares and to address river and weather conditions. Swinomish, Sauk-Suiattle, and Upper Skagit Tribes' fisheries will be managed so as not to exceed their individual shares based on the preseason forecast and any in-season update that becomes available. The modeled inter-tribal catch distributions are forecasts only and do not set a precedent for future years.

The Sauk-Suiattle, Upper Skagit and Swinomish Tribes reserve the opportunity to take C&S reserved Chinook across the entire duration of this LOAF agreement, May 1, 2020 through April 30, 2021. The Upper Skagit and Swinomish Tribes reserve the right to reallocate catch between commercial and C&S as needed and in response to changes in goals and ISUs. Further, Upper Skagit and Swinomish Tribes reserve the right to adjust fishery dates and the logistics of modeled fisheries due to water conditions or allocative reasons throughout its Usual & Accustomed fishing areas.

The Sauk-Suiattle, Upper Skagit and Swinomish Indian Tribes may propose spring Chinook fisheries to begin in April of 2021 and extending into May 2021. Opening of these fisheries would be dependent on the co-managers submission of a supplemental Skagit spring Chinook fishery plan for the spring Chinook management period, for NMFS' review and concurrence. The plan would detail the following: the forecasted Skagit spring Chinook MU run size for 2021; the management objectives that would be in place for that run-year; an estimate of allowable impacts and those estimated to be taken during the spring Chinook management period; plans for monitoring this period, and a description of how this fishery would operate within any limits in place for other ESA-listed species incidentally encountered during this fishery. The parameters of this fishery would be subject to modification by the co-managers on submission to NMFS of a revised plan, independently or as part of the 2021-2022 LOAF.

The Skagit co-managers will utilize the same update models for Sockeye (river/lake Trap method), Coho (Blakes/Spudhouse test fishery method), and Chum ISU (Bay/Jetty/Blakes test fishery method) consideration (with data from 2019 added) that have been used in recent years. Other models may be considered with co-manager agreement should they become available before the fishery.

NOTE: WDFW will share creel sampling and enforcement reports in-season as fisheries progress. The Skagit River recreational fisheries will follow sampling plans provided in past years. Communication: Co-managers will share available information from the Areas 4, 5, and 6 recreational fisheries (species, mark, size, catch, encounter) the second week of August. This information will be evaluated against pre-season expectation and provide co-managers with additional information which may be useful in management considerations.

AR004621

Skagit Bay (Area 8) Net

Note: Fishing schedules for Skagit Bay, Skagit River, and Baker River are pre-season projections. Schedules may be changed in-season as necessary to meet management objectives and harvestable shares.

Chinook	Area 8 - Trty	Swinomish Tribe may elect to take some or all of their C&S reserved Chinook in Area 8.
Spring Chinook	Area 8 – Trty	Swinomish Tribe fishing pattern: wk 18 (wb 4/26) thru wk 20 (wb 5/10):3, 3.5, 1. Additionally, Swinomish will fish the following schedule in April 2021 during the timeframe of the 2020-2021 LOAF: wk 17 (wb 4/18/2021) thru wk 18 (wb 4/25/2021): 2,2. Once a 2021 Spring Chinook forecast is available, Chinook impacts for these April 2021 fishing days will be modeled during the 2021-2022 NOF/PFMC process such that they are applied to the correct biological return year. Upper Skagit Tribe fishing pattern: No scheduled fishery.
Sockeye	Area 8 – Trty	Swinomish Tribe fisheries will be managed so as not to exceed their individual Sockeye shares based on the preseason forecast and any in-season update that becomes available. Swinomish Tribe fishing pattern: wk 27 (wb 6/28) thru wk 28 (wb 7/5):2.292, 2.292; Additional fishing dependent on ISU. Upper Skagit Tribe fishing pattern: No scheduled fishery.
	Ntrty	Closed
Coho	Trty	If ISU changes abundance status, treaty shares may be modified following co- manager discussions.
	Area 8 – Trty	Swinomish Tribe fishing pattern: wk 39 (wb 9/20) thru wk 40 (wb 9/27): 2,2. Upper Skagit Tribe fishing pattern: No scheduled fishery.
	Ntrty	Closed
Chum	Area 8 – Trty	Swinomish Tribe fishing pattern: No preseason harvestable. Upper Skagit Tribe fishing pattern: No preseason harvestable.

AR004622

	Ntrty	Closed. May open pending co-manager agreement on ISU that indicates harvestable runsize.
Chum Test	Area 8	1 boat at Jetty and 1 boat in Bay 1 day/wk 44 (wb 10/25) & 45 (wb 11/1).
	Ntrty	Closed. May open pending co-manager agreement on ISU that indicates harvestable runsize.

Skagit River Treaty Net (Ntrty net closed)

Chinook	Ceremonial and Subsistence – 2,934 fish (75 spring and 2,859 summer/fall) total: Swinomish (25 spring, 1,463 summer/fall), Sauk-Suiattle (400 summer/fall), and Upper Skagit (50 spring, 996 summer/fall) Tribes. **[The Sauk-Suiattle Tribe does not agree with a Swinomish harvest of 25 and Upper Skagit 50 as this eliminates some harvest of Spring Chinook at the Tribe's adjudicated U&A's and places all of the conservation burden upon the Sauk-Suiattle Tribe rather than being shared among the co-managers.-Upper Skagit and Swinomish object to this language]**	
Spring Chinook	Area 78C	Swinomish Tribe fishing pattern: wk 18 (wb 4/26) thru wk 20 (wb 5/10):3, 3.5, 1. Additionally, Swinomish will fish the following schedule in April 2021 during the timeframe of the 2020-2021 LOAF: wk 17 (wb 4/18/2021) thru wk 18 (wb 4/25/2021): 2,2. Once a 2021 Spring Chinook forecast is available, Chinook impacts for these April 2021 fishing days will be modeled during the 2021-2022 NOF/PFMC process such that they are applied to the correct biological return year. Upper Skagit Tribe fishing pattern: wk 18 (wb 4/26) thru wk 20 (wb 5/10):0.25, 0.625, 0.25. Additionally, Upper Skagit will fish the following schedule in 2021 during the timeframe of the 2021-2022 LOAF: wk 17 (wb 4/18/2021) thru wk 20 (wb 5/9/2021): 0.5, 0.5, 0.5, 0.5. Once a 2021 Spring Chinook forecast is available, Chinook impacts for these 2021 fishing days will be modeled during the 2021-2022 NOF/PFMC process such that they are applied to the correct biological return year.

AR004623

	Area 78D	Upper Skagit Tribe fishing pattern: wk 18 (wb 4/26) thru wk 20 (wb 5/10):0.25, 0.625, 0.25. Additionally, Upper Skagit will fish the following schedule in 2021 during the timeframe of the 2021-2022 LOAF: wk 17 (wb 4/18/2021) thru wk 20 (wb 5/9/2021): 0.5, 0.5, 0.5, 0.5. Once a 2021 Spring Chinook forecast is available, Chinook impacts for these 2021 fishing days will be modeled during the 2021-2022 NOF/PFMC process such that they are applied to the correct biological return year.
	Area 78P Cascade R.	Sauk-Suiattle Indian Tribe fishing pattern: wk 23 (wb 5/31) thru wk 31 (wb 7/26); 3,3,3,3,3,3,3,3,3. Fishery managed to a 150 spring Chinook quota. Release natural Chinook.
Sockeye	Ceremonial and Subsistence - **[200 fish Upper Skagit Tribe**.**][100 sockeye Sauk-Suiattle to be taken at Baker River upstream trap** (Upper Skagit and Swinomish object)**.]** Swinomish, **[Sauk-Suiattle** (Upper Skagit and Swinomish object)**,]** and Upper Skagit Tribes may elect to collect some of their allocation from the Baker River upstream fish trap. **[The Sauk-Suiattle Tribe has no adjudicated usual and accustomed fishing area rights to the Baker River, Baker Lake, or the Skagit downstream of the Baker River, and therefore no share of Baker sockeye, nor management authority in those areas or for this species.] [The Agreement with Puget Sound Energy requires that all four co-managers must agree by consensus if fish are to be taken from the trap. In the absence of a consensus which includes agreement by co-manager Sauk-Suiattle, Swinomish, and Upper Skagit may not collect fish from the Trap** (Upper Skagit and Swinomish object**]**.	
	Area 78C	Swinomish and Upper Skagit Tribes' fisheries will be managed so as not to exceed their individual Sockeye shares based on the preseason forecast and any in-season update that becomes available. Swinomish Tribe fishing pattern: wk 27 (wb 6/28) thru wk 28 (wb 7/5):2.292, 2.292; Additional fishing dependent on ISU. Upper Skagit Tribe fishing pattern: wk 27 (wb 6/28) thru wk 30 (wb 7/19): 0.167, 0.167, 0.167, 0.167. Additional fishing dependent on ISU.

Sockeye	Area 78D Area 78O	Swinomish and Upper Skagit Tribes' fisheries will be managed so as to not exceed their individual Sockeye shares based on the preseason forecast and any in-season update that becomes available. Swinomish Tribe fishing pattern (Area 78D-4 and Baker River): Wk 28 (wb 7/5) thru wk 29 (wb 7/12): 1, 1; Additional fishing dependent on ISU; Upper Skagit Tribe fishing pattern: wk 27 (wb 6/28) thru wk 30 (wb 7/19): 0.167, 0.167, 0.167, 0.167; Additional fishing dependent on ISU.
Coho	If ISU changes abundance status, treaty shares may be modified following co-manager discussions. Ceremonial and Subsistence 200 fish total Swinomish and Upper Skagit Tribes (100 each).	
	Area 78C:	Swinomish Tribe fishing pattern: wk 39 (wb 9/20) thru wk 40 (wb 9/27): 2,2. Upper Skagit Tribe fishing pattern: wk 39 (wb 9/20) thru wk 43 (wb 10/18): 0.583, 0.5, 0.5, 0.5, 0.5.
	Area 78D	Upper Skagit Tribe fishing pattern: wk 39 (wb 9/20) thru wk 43 (wb 10/18): 0.583, 0.5, 0.5, 0.5, 0.5.
	Area 78P Cascade R.	Sauk-Suiattle Indian Tribe fishing pattern: wk 40 (wb 9/27) thru wk 46 (wb 11/8); 3,3,3,3,3,3,3. Fishery managed to a 2000 Coho quota.
Chum	Area 78C	Swinomish and Sauk-Suiattle Tribes fishing pattern: No preseason harvestable. Upper Skagit Tribe fishing pattern: No preseason harvestable.
	Area 78D	Upper Skagit Tribe fishing pattern: No preseason harvestable.
River Test	Chinook	Area 78C - Blakes wk 19 (wb 5/3) thru wk 35 (wb 8/23);1 boat, 6 hours/wk.
	Sockeye	Area 78C – Blakes wk 24 (wb 6/7) thru wk 29 (wb 7/12); 1 boat, 12 hours/wk; Area 78D-3 - Upper Skagit - wk 23 (wb 5/31) thru wk 30 (wb 7/19);1 boat, 4 hrs/wk.
	Coho	Area 78C - Blakes Drift, wk 38 (wb 9/13) thru wk 42 (wb 10/11), 12 hours/wk; Area 78C – Spudhouse Drift, Upper Skagit, wk 34 (wb 8/16) thru wk 42 (wb 10/11);1 boat, 12 hours/wk; Area 78D-3 Wk 35 (wb 8/23) thru wk 44 (wb 10/25);1 boat, 4 hours/wk.

AR004625

	Chum	Area 78C - Blakes Drift wk 44 (wb 10/25) and wk 45 (wb 11/1);1 boat, 12 hours/wk.

Swinomish Channel Treaty Net (Ntrty net closed)

Coho	No separate openings. Area opens during Area 8 openings.

Area 8-1 Recreational

5/1-4/30	Closed

Baker River/Lake Recreational

mouth to Dam	Closed to salmon.	
Baker Lake	Dependent on return	Sockeye fishery dependent on return where a minimum of 2,500 Sockeye have been transported to Baker Lake before consideration of a fishery. Fishery would be opened by emergency rule. No fishery will be implemented sooner than Saturday, July 11, 2020. Season will be constrained to achieve spawning goals.

Cascade River Recreational

mouth to Rockport-Cascade Road Bridge	6/1 – 7/15 Open Thursdays through Sundays only	4 fish limit, only 2 may be adults, hatchery Chinook only, 12” min. size. Night closure and anti-snagging rule.
	9/16 – 11/30 Open Thursdays through Sundays only	4 fish limit, Coho only, 12” min. size.

Skagit River Recreational

Specific gear conflict closure dates have not been identified but recreational fishing for all species will close two days from the mouth to highway 530 bridge in Rockport weeks 39-43 for Coho.

Mouth to Hwy 536 at Mt. Vernon (Memorial HWY Bridge)	9/1 – 10/31	2 fish limit, release Chinook and Chum. 12” min size
from Memorial Hwy Bridge to Gilligan Creek	5/16-5/31	2 fish limit, hatchery Chinook only, 12” min size.
		Sockeye closed in 2020
	9/1 – 10/31	2 fish limit, 12” min size. Release Chinook and Chum.

AR004626

Mouth of Gilligan Creek to Dalles Bridge at Concrete	9/1 – 10/31	2 fish limit, 12” min size. Release Chinook and Chum.
Dalles Bridge at Concrete to Hwy 530 Bridge at Rockport	9/1 – 10/31	2 fish limit, 12” min size. Release Chinook and Chum.
Hwy 530 Bridge at Rockport to Cascade River Rd	6/1 – 7/15	4 fish limit, hatchery Chinook only, 12” min size. Only 2 may be adults. Night closure and anti-snagging rule.
	9/1 – 10/31	2 fish limit, 12” min size. Release Chinook and Chum.

All other SKAGIT TERMINAL REGION freshwater recreational closed to salmon angling.

AR004627

2.6 Stillaguamish/Snohomish Terminal Region

Area 8A Net

Chinook	Trty	Closed (Ceremonial set-aside of up to 100 Chinook, July-September period).
	Ntrty	Closed
Coho	Trty	Tulalip Tribes: (9/6 - 10/10) 1 day per week. Manage for 50,000 escapement to the Snohomish River (see Snohomish River Natural Coho Rebuilding Plan), with ISU at weeks 39 and 40.
	Test	Closed
	Ntrty	Closed
Chum	Trty	Closed
	Test	Closed
	Ntrty	Closed

Area 8D Net

Chinook	Trty	BS, RH, GN gear outside Tulalip Bay may be open during the following periods: (5/4 – 5/31) 5 days per week (6/1 – 8/22) 4 ½ days per week: Mon – 11:59 AM Fri (8/23 - 8/29) 4 days per week Setnets inside Tulalip Bay may be open during the following period: (5/4 – 8/22) 5 days per week (8/23 - 8/29) 4 days per week
	Ntrty	Closed (see recreational SAF)
Coho	Trty	(8/30 – 9/12) BS, RH, GN, SN gears open 4 days per week. (9/13 - 10/3) BS, RH, GN, SN gears open 3 days per week. (10/4 - 10/24) BS, RH, GN, SN gears open 4 days per week.
	Ntrty	Closed.
Chum	Trty	(10/25 – 11/28) Open to target Tulalip hatchery chum. Managed to allow for hatchery egg take needs based on Tulalip hatchery escapement updates and projections. All Area 8D fisheries will close concurrently as agreed to by Tulalip and WDFW to ensure egg take requirements are met.

AR004628

	Ntrty	Closed

Stillaguamish River Treaty Net (Ntrty net closed)

Chinook	Ceremonial fishery only; Open 5/1 – 8/15; Up to 7 days per week; maximum catch of 30 Chinook; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).
Coho	Commercial fishery; Open 9/1 – 10/31; Up to 5 days per week; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).
Chum	C&S fishery only; Open 11/1 – 12/5; Up to 3 days per week; Maximum catch of 300 Chum; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).

Snohomish River Treaty Net (Ntrty net closed)

Chinook, Coho, Chum	Closed
Coho Test	Closed

Area 8-2 Recreational

5/1-4/30	Closed

Tulalip Special Area Recreational Fishery

Same as Area 8-2 Recreational, except during the period 5/29-9/27:	5/29-9/7	Open 12:01 AM Friday – 11:59 AM Monday each week. Closed June 9. Open within Tulalip Special Area boundaries only. Closed to all angling east of the line from Mission Point to Hermosa Point. 2 fish limit salmon, 2 pole endorsement (Chinook 22” min. size), release Coho.
	9/12-9/27	Open Saturday and Sunday each week. Open within Tulalip Special Area boundaries only. Closed to all angling east of the line from Mission Point to Hermosa Point. 2 fish limit salmon, 2 pole endorsement (Chinook 22” min. size), release Coho.

Snohomish River Recreational

AR004629

mouth to confluence of the Skykomish and Snoqualmie rivers	Closed	

Snoqualmie River Recreational

mouth to Snoqualmie Falls	Closed	

Skykomish River Recreational

from mouth to Wallace River	5/23–7/31	4 fish limit, only 2 may be adults, hatchery Chinook only,12” min. size.
mouth to confluence of North and South forks	Closed	

Wallace River Recreational

mouth to 200’ upstream of water intake of salmon hatchery	9/16 – 11/30	1 fish limit, 12” min. size. Hatchery Coho only. Dependent on ISU and hatchery rack counts.

Stillaguamish River Recreational

mouth to forks	9/1 - 11/15	2 fish limit, Coho Only, 12” min size, selective gear rules.

See appendix for gamefish season regulations.

All other STILLAGUAMISH/SNOHOMISH TERMINAL REGION freshwater recreational closed to salmon angling.

AR004630

2.7 Admiralty Inlet Area

The co-managers have agreed to develop a comprehensive chum management plan over the course of the next three years. It is the intent of co-managers to address catches of Hood Canal origin fall chum, including catches in Catch Areas 9, 10, and 11 in this comprehensive chum plan. Co-managers have agreed to review the balance of pre-terminal impacts to Hood Canal origin chum between tribal and non-tribal fisheries beginning with the 2019 season. This information will identify any overly imbalanced condition that would require further co-manager discussion for future seasons in the interim period.

Area 9 Net

Chinook	Trty	Ceremonial and Subsistence – Up to 500 Chinook as agreed upon by those Tribes with U&A in Area 9, (PS and Hook & Line, release all Chum 6/1 – 9/30).
	Ntrty	Closed
Chum	Research	Wk 43 (wb 10/18) - 46 (wb 11/8) research fishery to develop stock composition/timing information. Research catch quota of up to 2,400 Chum. Reference 2020 Area 9 Chum Salmon Research Fishery Plan to be developed by NWIFC and tribal staff prior to beginning this research.
	Trty	The Area 9 fall chum fishery north of the HC bridge will open wk 43 (wb 10/18) through wk 45 (wb 11/1); fishing pattern: GN 3,4,3; and PS 4,3,3. Open area restricted to that portion of North Hood Canal bounded to the south by the Hood Canal Bridge and bounded to the north by a line from White Rock due east to landfall. Tribes with adjudicated U&A in the open section of Area 9 may choose to participate. Coho and Chinook model inputs have been modeled during NOF that anticipate the participation levels of 2020. If the fishery reaches a catch threshold of 30,000 chum salmon before 10/30, there will be a conference call among the participating Tribes to discuss any needed fishery management actions. Participating tribes agree to sample tissue for DNA analysis of their tribe's chum catch and wild coho bycatch to the extent practicable.
	Ntrty	Closed

Area 9 Recreational

5/1 – 7/15	Closed
7/16 – 8/15	2 fish limit, (Chinook 22" min size) release wild Coho, Chum and wild Chinook. Closed south and west of a line from Foulweather Bluff to Olele Point while Chinook retention is allowed.

AR004631

8/16 – 9/30	2 fish limit; release wild Coho, Chum and Chinook.
10/1 – 4/30	Closed

Edmonds Pier Recreational

Year-Round	2 fish limit, 1 Chinook (Chinook 22" min size), release Chum 8/1-8/31.

3.0 South Sound Region

3.1 Area 10 Sub region

Area 10 Net

Chinook	Closed	
Sockeye	Trty	Fishery dependent upon ISU (Ballard lock counts)
	Ntrty	Closed
Coho	Test	Gillnet: Wk 37 (wb 9/6) - wk 39 (wb 9/20); 3 boats, 3 sites; fishing pattern: 2,2,2.
	Trty	On-Reservation only; wk 38 (wb 9/13) – wk 43 (wb 10/18); gillnet/beach seine; 7 days/wk. Wk 36 (wb 8/30) – wk 40 (wb 9/27). Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983).
	Ntrty	Closed
Chum		
	Test	Purse Seine: Wk 41 (wb 10/4 - wk 46 (wb 11/8); 1 site, fishing pattern: 1,1,1,1,1,1.

Chum	Trty	Suquamish – Tulalip - Treaty allocation based on intertribal sharing agreement. Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983). Fishing pattern: weeks and days/week – ISU dependent. Weekly ISU calls will discuss potential Nisqually winter Chum impacts using '*Area 10-11 chum stock comp estimation 4-5-20 Lates reviewed_Apr7'*. <u>Suquamish</u> - Wk 41 (wb 10/4) – Wk 45 (wb 11/1) up to 7 days per week. A conference call on Nisqually winter chum will be scheduled on October 31 to discuss the Wk 45 fishery. <u>Tulalip</u> – Wk 41 – 43 (10/04-10/24) up to 5 days per week. Tribal managers will have a call on October 23 to discuss a fishery in week 44 dependent on Wk 43 ISU. <u>Suquamish</u> – On-Reservation only (set net gear only): Wk 42 (wb 10/11) – Wk 50 (wb 12/6) up to 7 days per week dependent upon Chum return to the Grovers Creek Hatchery.
	Ntrty	Wk 42 (wb 10/11) - 45 (wb 11/1) Fishing will be dependent on result from ACP ISU and co-manager concurrence on fishing. PS Chinook and Coho NR; PS fishing pattern: 1,1,1,2; GN fishing pattern: 1,2,2,2. The area east of a line from Four Mile Rock south to Alki Point is closed. PS and GN restricted from fishing in modified closure areas 10(5) and 10(6) as described in WAC 220-354-080.

Area 10A Treaty Net (Ntrty net closed): That portion of Elliott Bay east of the line from Pier 91 to the light at Duwamish Head.

Chinook	Trty Test	Gillnet: Wk 29 (wb 7/12) – Wk 31 (wb 7/26); 7/15,7/22,7/29 (Wednesday nights); 5 fishing sites (one boat per site). 8 PM to 8 AM.
	Trty	Gillnet: Wk 32 (wb 8/2) 8/5; 8 PM to 8 AM. Based on ISU: Wk 33 (wb 8/9) 8/12; 8 PM to 8 AM. Based on ISU. (Any additional openings (after 8/12) will be discussed & agreed by co-managers)

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	Trty	Ceremonial and subsistence fisheries
Coho	Trty	Gillnet: Fishery will open Wk 37 (wb 9/6) – Wk 42 (wb 10/11) up to 5 days per week (Sun – Fri). (Fishery will close if the Duwamish/Green River ISU does not show harvestable Coho. If the ISU shows harvestable Coho the fishing pattern will be as stated above).
	Trty	Ceremonial and subsistence fisheries
Chum	Trty	Gillnet: Wk 43 (wb 10/18) - Wk 48 (wb 11/22); fishing pattern: up to 5 days per week (Sun – Fri).
	Trty	Ceremonial and subsistence fisheries

Duwamish/Green River (Area 80B) Treaty Net (Ntrty net closed)

Chinook	Trty	Gillnet: Wk 32 (wb 8/2) 8/5; 8 PM to 8 AM. Based on ISU: Wk 33 (wb 8/9) 8/12; 8PM to 8 AM. Based on ISU. (Any additional openings (after 8/12) will be discussed & agreed by co-managers)
	Trty	Ceremonial and subsistence fisheries
Coho	Trty Test	Wk 37 (wb 9/6) Coho ISU test fishery on the river (from the mouth of the East and West waterways up to 16th Ave. Bridge). The 6 sites are as follows: East Waterway, West Waterway, Old Riverside Marina, Kellogg Island, 1st Ave Bridge and 16th Ave Bridge.
Coho	Trty	Gillnet: Fishery will open Wk 38 (wb 9/13) up to the Boeing St. bridge. Starting on Wk 39 (wb 9/20) the fishery will open up to the HWY 99 bridge. Up to 5 days per week (Sun – Fri). (Fishery will be closed if the treaty test ISU does not show harvestable Coho. If the ISU shows harvestable Coho the fishing pattern will be as stated above).
	Trty	Ceremonial and subsistence fisheries
Chum	Trty	Gillnet: Wk 44 (wb 10/25) – Wk 48 (wb 11/22); fishing pattern: 5 days per week (Sun – Fri).
	Trty	Ceremonial and subsistence fisheries

Area 10E Treaty Net (Ntrty net closed; see below for recreational SAF)

Chinook	Trty	Wk 30 (wb 7/19) - wk 38 (wb 9/13); fishing pattern: 7 days/wk. Possible extension for Sinclair Inlet.
Coho	Trty	On-Reservation only; wk 38 (wb 9/13) - wk 43 (wb 10/18); gillnet/beach seine; 7 days/wk.

AR004634

Chum	Trty	Wk 43 (wb 10/18) - wk 50 (wb 12/6); schedule dependent upon ISU.

Lake Washington System (includes Lake, Lake Union, Ship Canal, & Lake Sammamish)

Areas 10F, 10G, 10C, 10D Treaty Net (Ntrty net closed)

Sockeye	Wk 23 (wb 5/31) – Wk 32 (wb 8/2) Based on ISU (lock counts).	
	Wk 23 (wb 5/31) – Wk 33 (wb 8/9) Bio-sample program	
	Wk 25 (wb 6/14) PSC test fishery	
	Ceremonial and subsistence fisheries	
Chinook	Closed.	
	Ceremonial and subsistence fisheries	
Coho	Coho fisheries in the four following areas are dependent upon the ISU (if lock counts project run size < 10,000 Coho entering the lake), then the Coho fishery will remain closed in all four areas including Lake Sammamish):	
	Ceremonial and subsistence fisheries	
	Lower ship canal (below Ballard Locks)	If the ISU is > than 10,000 the fishery could open as early as Wk 38 (wb 9/13) – Wk 44 (wb 10/25) with the fishing pattern up to 7 days per week (Sun – Sat).
	Upper ship canal (above Ballard Locks):	If the ISU is > than 10,000 the fishery could open as early as Wk 38 (wb 9/13) – Wk 44 (wb 10/25) with the fishing pattern up to 5 days per week (Sun – Fri).
	North end Lake Washington (North of Hwy. 520 bridge):	If the ISU is > than 10,000 the fishery could open Wk 39 (wb 9/20) – Wk 46 (wb 11/8) with the fishing pattern up to 5 days per week (Sun – Fri).

Lake Sammamish Treaty Net

Chinook	Based on ISU – hatchery surplus.
	Ceremonial and subsistence fisheries
Coho	Based on ISU – hatchery surplus
	Ceremonial and subsistence fisheries

Area 10 Recreational

AR004635

5/1-5/31	Closed
6/1-7/15	2 fish limit, release Chinook and Chum.
7/16-8/31	2 fish limit, (Chinook 22” min size), release wild Chinook and Chum.
9/1-11/15	2 fish limit, release Chinook and release Chum through 9/15.
11/16-12/31	Closed
1/1-3/31	2 fish limit, (Chinook 22” min size), release wild Chinook.
4/1-4/30	Closed.

Shilshole Bay (East of Meadow Point/West Point line) closed to salmon 7/1-8/31.

Outer Elliott Bay (E of West Pt. /Alki Pt line to Pier 91/Duwamish Head line) closed to salmon 7/1-8/31.

Inner Elliott Bay (E of Pier 91/Duwamish Head line) closed to salmon 7/1-8/31.

Area 10 Piers Recreational		
Seacrest Pier, Waterman Pier, Bremerton Boardwalk, Illahee State Park Pier	Year-Round	2 fish limit, 1 Chinook (22" min size), release Chum 8/1-9/15.

Elliott Bay Recreational SAF	
5/1- 6/30	Same as Area 10.
7/1- 7/30	Closed
7/31-8/3 (noon)	2 fish limit. Inner Elliot Bay waters open east of a line from Pier 91 to Duwamish head. Openings contingent upon ISU model results.
8/4-8/31	Closed
9/1- 4/30	Same as Area 10.

Sinclair Inlet Recreational SAF	
5/1-6/30	Same regulations as Area 10.

AR004636

7/1-9/30	Open S of Manette Bridge, S of line drawn true W from Battle Point, and W of line drawn true S from Point White; 3 fish limit, (Chinook 22" min size), release wild Chinook and wild Coho, release Chum 8/1-9/15, 2 pole endorsement.
10/1-4/30	Same as Area 10.

Green River Recreational

WDFW and MIT commit to developing and executing a monitoring plan to assess Chinook encounter rates and non-retention mortality rates in both directed Chinook fisheries and non-Chinook directed fisheries within the system prior to the beginning of the 2020 river fishery. The implementation of either portion of the plan is contingent on available funding. The portion of the plan to estimate encounter rates is likely to cost significantly less than the portion to estimate mortality rates and will be prioritized due to the higher likelihood there will be sufficient funds available to cover its implementation.

From an east-west line extending through the southernmost tip of Harbor Island to Tukwila International Boulevard/Old Hwy. 99	9/1 – 12/31	Daily limit 6. No more than 3 adults may be Coho and Chum, 12” min size, release Chinook.
Tukwila International Boulevard/Old Hwy. 99 to the South 212nd Street Bridge	9/1 – 12/31	Daily limit 6. No more than 3 adults may be Coho and Chum, only 1 Chinook, 12” min size.
South 212th Street Bridge to Auburn-Black Diamond Road Bridge	10/1 – 12/31	Daily limit 6. No more than 3 adults may be Coho and Chum, 12” min size, release Chinook. Closed within 150’ of the mouth of Big Soos Creek (from the eastbound Bridge of Highway 18 to Auburn Black Diamond Road).
from Auburn-Black Diamond Rd Bridge to Tacoma Headworks Dam	11/1 – 12/31	Daily limit 6. No more than 3 adults may be Coho and Chum, 12” min size, release Chinook, Closed waters - within 150’ of the mouth of Keta (Crisp) Creek and upstream of the Tacoma Municipal Watershed Boundary Marker (1.3 miles downstream of Tacoma Headworks Dam).

Chinook fishery is dependent upon ISU and co-manager agreement.

The 2020/21 WDFW sport pamphlet will reflect the following season end dates for trout and other game fish fall/winter season.

Mouth to Tacoma Headworks Dam: Dec. 31

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Soos Creek Recreational

Closed to salmon.

Lake Washington Recreational

North of Hwy 520 Bridge and east of Montlake Bridge, including that portion of Sammamish River from 68th Ave. NE Bridge downstream	9/15 - 10-31	Fishery dependent upon ISU (Lock counts) and co-manager agreement. 4 fish limit, Coho only 12” min. size.
South of Hwy 520 Bridge, including Mercer Slough	August - October	Closed to Salmon. Re-opening dependent upon ISU (Lock counts) and co-manager agreement.

Lake Sammamish Recreational

10/1 – 11/30	Fishery dependent upon ISU (lock counts) and co-manager agreement. 4 fish limit, Coho only.12” min size.
12/1 – 5/31	Landlocked salmon rules apply. Hatchery Coho may be retained as part of the trout daily limit. 12-inch minimum size.
All other SOUTH SOUND AREA 10 REGION freshwater: Closed to salmon angling	

3.2 Area 11 Sub region

Area 11 Net

Chinook	All	Closed
Coho	Trty:	Commercial fishery – Closed for Conservation Reasons
	Ntrty:	Closed
Chum		
	Trty:	Commercial fishery – Closed for Conservation Reasons
	Ntrty	Wk 42 (wb 10/11) - 45 (wb 11/1); Fishing will be dependent on results from ACP ISU and co-manager concurrence on fishing. PS Chinook and Coho NR; PS fishing pattern: 1,1,1,2; GN fishing pattern: 1,2,2,2. PS and GN restricted from fishing in modified closure areas 11(2) as described in WAC 220-354-080.

Area 11A Net Treaty Net (Ntrty net closed)

Chinook	Closed
Coho	Closed
Chum	Closed

Puyallup River (Area 81B) Treaty Net (Ntrty net closed)

Chinook	Spring Chinook	Ceremonial and Subsistence
	Summer - Fall	Commercial fishery Wk 33 (wb 8/9) and Wk 34 (wb 8/16) fishing pattern: 6 hours. TBD
Coho	Commercial fishery Wk 37 (wb 9/6) - Wk 42 (wb 10/11) fishing pattern: 1,2,2,2,2,2.	
Chum	Test fishery Wk 43 (wb 10/18) - Wk 45 (wb 11/1) 1 day/wk, drift net only.	

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Winter Chum	Commercial fishery Wk 45 (wb 11/1) – Wk 53 (wb 12/27) 1 to 3 days a week. Opening may be postponed to week 47 depending on in-season information to protect fall chum.	

White River Treaty Net

Coho	Gillnet fishery will open Wk 36 (wb 8/30) – Wk 42 (wb 10/11) with the fishing pattern: 2 to 4 days per week from Puyallup/White River confluence upstream to R St. Bridge.	

Ceremonial and subsistence fisheries.

Area 11 Recreational

5/1-6/30	Closed	
7/1-9/30	2 fish limit (Chinook 22” min. size), release wild Chinook; Commencement Bay (E. of Cliff House Restaurant/Sperry Ocean Dock line) closed to salmon through 7/31.	
10/1-10/31	2 fish limit, release Chinook.	
11/1-4/30	Closed.	
Dash Point Dock, Point Defiance Boathouse Dock, Les Davis Pier, Des Moines Pier and Redondo Pier	Year-Round	2 fish limit, 1 Chinook (Chinook 22" min size).

Puyallup River Recreational

from 11th St. Bridge to E. Main Bridge	8/15 – 9/30	Closed Sundays 8/15-8/31. Closed Sunday – Tuesday 9/1-9/30. 6 fish limit, 2 adults, 12” min size, release Chum and wild adult Chinook.
From E. Main Bridge to Carbon R.	8/15-9/30	6 fish limit, 2 adults, 12” min size, release Chum and wild adult Chinook.

Carbon River Recreational

From mouth to Voight Creek	9/1 – 10/15	6 fish limit, 2 adults, 12” min size, release Chum and wild Chinook.

All other SOUTH SOUND AREA 11 REGION freshwater recreational Closed to salmon angling.

3.3 Area 13 Sub region

Fox Island/Ketron Island (Area 13)

Chinook	Treaty	8/1-9/15, 7 days/wk
	Ntrty	Closed
Coho	Treaty	9/15 – 10/20, 7 days/wk
	Ntrty	Closed
Chum	Treaty	Closed unless opened by Medicine Creek Treaty Tribes' agreement
	Ntrty	Closed

Area 13 Treaty Net (Ntrty net closed)

Chinook	Closed
Coho	Closed
Chum	Closed

Carr Inlet (Area 13A) Treaty Net [1](Ntrty net closed) [1] Based on Medicine Creek Treaty Tribal proposal annual regulations. Individual Tribal regulations may deviate from this schedule.

Chinook	8/1 – 9/19, 7 days/wk, opens in sections.
Coho	9/13 – 10/24, 7 days/wk, opens in sections.
Chum	10/25 – 11/11, 7 days/wk. 11/12 - 12/5, 7 days/wk, Beach seines and shore anchored Set nets only.

Chambers Bay (Area 13C) Treaty Net[1] (Ntrty net closed)

Chinook	7/26 – 10/10; Beach seines Sunday noon to Tuesday noon. Set nets Wednesday noon to Friday noon.
Coho	10/11 – 10/31; Beach seines Sunday noon to Monday noon. Set nets Monday noon to Tuesday noon.
Chum	Closed for conservation.

Area 13D Treaty Net (Ntrty net closed)

Chinook	7/15 - 9/9 or earlier date dependent on in-season management needs; 7 days/wk
Coho	9/10 - 10/31 or earlier date dependent on in-season management needs.
Dana Pass (13D-1)	7 days/wk

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Pickering Pass (13D-2)	7 days/wk
Peale Pass (13D-3)	7 days/wk
Southern Case (13D-4)	7 days/wk
Chum	Open approximately 10/12; 2-4 days per week; managed weekly by updates (~10/12). Due to preseason forecast of Hammersley Inlet Chum abundance being below the escapement goal, chum directed fisheries in 13D will be dependent on in-season escapement management needs.
Area 13E Net	Closed to all fishing
Budd Inlet (Area 13F) Treaty Net (Ntrty net closed)	
Chinook	7/15-9/9 or earlier date dependent on in-season management needs; 7 days/wk 9/10-9/21 open dependent on in-season monitoring to meet hatchery escapement needs.
Coho	Closed
Chum	Open approximately 11/2, 2-4 days per week, managed by weekly in-season updates
Eld Inlet (Area 13G) Treaty Net (Ntrty net closed)	
Chinook	7/15-9/9; opening dependent upon in-season data, outer portion only.
Coho	Closed
Chum	Open approximately 11/9, 2-4 days per week, managed by weekly escapement updates
Totten Inlet (Area 13H) Treaty Net (Ntrty net closed)	
Chinook	8/1-9/9; schedule dependent on in-season data
Coho	Closed
Chum	Open approximately 10/12, 2-4 days per week; managed by weekly escapement updates
Little Skookum Inlet (Area 13I) Treaty Net (Ntrty net closed)	
Chinook	8/1-9/9; schedule dependent upon in-season data
Coho	Closed

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Chum	Open approximately 11/9, 2-4 days per week; managed by weekly escapement updates
Hammersley Inlet (Area 13J) Treaty Net (Ntrty net closed)	
Chinook	8/1-9/9 or earlier date dependent on in-season management needs
Coho	Closed
Chum	Open approximately, 10/5 - 12/31, 2-4 days/wk; managed by weekly escapement updates. Due to preseason forecast of Hammersley Inlet Chum abundance being below the escapement goal, chum directed fisheries in Area 13J will be dependent on in-season escapement management needs.
Northern Case Inlet (Area 13K) Treaty Net (Ntrty net closed)	
Chinook	7/15-9/9
Coho	9/10-10/31 or earlier date dependent on in-season management needs
Chum	Open approximately 10/7 -12/31; 2-4 days/wk; managed by weekly escapement updates
Nisqually River (Area 83D) Treaty Net (Ntrty net closed)	
Chinook	Gill Net - 28 hours wk 32 (wb 8/2) 2 days a week wks 33 – 35, 28 hours wk 36 (wb 8/30). Fishing boundary: Mouth of Nisqually River up to approximate RM 6 at Tom Brown's Log Jam at flagging. Selective gear staff driven testing. 1-7 days/wk, wk 32 (wb 8/2) through wk 46 (wb 11/8) or until 450 adult Chinook are encountered. 2020 Nisqually MSF test fishery would not proceed until agreement with NMFS. Change in Ratio data collection staff driven TN 1-3 days/wk, wk 32 (wb 8/2) through wk 46 (wb 11/8). Release all fish.
Coho	Gill Net - 3 days wk 42 (wb 10/11) through wk 46 (wb 11/8). Fishing boundary: Mouth of Nisqually River up to approximate RM 6 at Tom Brown's Log Jam at flagging wk 42-43. Upper boundary Kalama Creek at flagging wks 44-46.

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Chum	No directed Chum fishery. If Yelm Escapement ISU reaches 340 live count on or before January 2, fishing schedule: 2-3 days/wk through wk 4 (wb 1/17). Fishing boundary: Mouth of Nisqually River up to approximate RM 5 at confluence of Clear Creek and mainstem Nisqually.

McAllister Creek (Area 83F) Treaty Net (Ntrty net closed)

Chinook	Gill Net 3-5 days/wk during the following weeks: wk 31 (wb 7/26) through wk 45 (wb 11/1). Freshwater courses.
Coho	Closed.
Chum	Closed.

Area 13 Recreational

5/1-4/30	2 fish limit, (Chinook 20” min. size), release wild Coho and wild Chinook. 2 pole endorsement. Minter Creek mouth closed 4/16 - 9/15; Lower Budd Inlet closure zone 7/16-10/31.

Fox Island Pier Recreational

Year-Round	2 fish limit, 1 Chinook (Chinook 20" min size).

Chambers Creek Estuary Recreational

downstream of markers 400’ below Boise-Cascade Dam to Burlington Northern Railroad Bridge	7/1 – 11/15	6 fish limit, 4 adults; 12” min size, release wild Coho and Chum.

Deschutes River Recreational

Capitol Lake (from outlet to 400’ below lowest Tumwater Falls (Deschutes River) fish ladder).	7/1 – 10/15	Closed
from Old Hwy 99 Bridge on Capitol Blvd in Tumwater upstream	Year-round	6 fish limit, 2 adults, 12” min size, release Coho.

Kennedy Creek Recreational

mouth to northbound Hwy. 101 Bridge	10/1 – 11/30	6 fish limit, 2 adults, 12” min size, release wild Coho.

McLane Creek Recreational

from a line 50’ north of and parallel to the Mud Bay Rd. Bridge to a line 100’ upstream of and parallel to the south bridge on Hwy.101	Same as Area 13	Same as Area 13.

Minter Creek Recreational

mouth to 50’ downstream of hatchery rack	9/15-12/31	6 fish limit, 4 adults of which 2 are Chinook or Coho, release wild Chinook and wild Coho,12” min size.

Nisqually River Recreational

mouth to the military tank crossing bridge, one mile upstream of the mouth of Muck Creek	7/1 – 11/15	6 fish limit, 2 adults, 12” min. size; release wild Coho, Chum, and wild Chinook. Closed Sunday – Monday, 8/1-8/31, 10/1-10/31
	11/16-1/31	Closed to salmon angling. May open pending Yelm Escapement ISU. If ISU reaches 340 live count on or before January 2nd, open to Chum: 6 fish limit, 2 adults, release Coho and wild Chinook, 12” min size. Special Area Closure: Closed 500’ below and above mouth of Muck Creek at ~RM 11.5.
McAllister Cr. - mouth to Olympia-Steilacoom Rd Bridge	7/1 – 11/15	6 fish limit, 2 adults, 12” min size. Release wild Coho, wild Chinook, and Chum.

All other SOUTH SOUND AREA 13 REGION freshwater recreational closed to salmon angling.

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4.0 Hood Canal Region **(All fisheries modeled in FRAM #3120 (Chinook) & #2032 (Coho))**

Hood Canal Mainstem (Areas 12, 12B, 12C, 12D)

Treaty: 1,000 feet closure around streams that are closed to net fishing. Beach seines and hook and line gear release Chum through 9/30 (through 10/10 if within 500' of western shore of Areas 12B and 12C).

Nontreaty: See WAC 220-47-307 for Nontreaty exclusion zones.

Chinook	Trty	Areas 12, 12B and 12D: Closed
		Area 12C: Gillnets and Beach Seines wb 7/19 - wb 7/26 3 d/wk; Gillnets wb 8/2-8/16 4d/wk; Beach Seines wb 8/2-8/23 4d/wk; Beach Seines wb 8/30-8/31. Beach Seines Release chum 8/1-8/31. And Gillnets restricted to 7" min. mesh starting 8/1 per the SCSI.
		Area 12H: Open wb 7/12 through 9/12; hook and line gear continuous; beach seines and dipnets daylight hours Tues and Thur each week; possible in- season modifications; Chum release.
	Ntrty	Area 12C: Hoodsport Hatchery Zone Only, Wks 31 (wb 7/26) – 36 (wb 8/30); 10,000 Chinook quota. BS fishing pattern: 2,2,2,2,2,2; release all Chum per the SCSCI.
Coho	Trty	Area 12: Open 9/25 through 10/10 for gillnets. Beach seines for Coho only (release all Chinook and Chum through 9/30) may start no earlier than 9/16. Both gear types open 5 days/wk.
		Area 12B: Open 10/1 through 10/17 for gillnets; 500-foot closure along western shore through 10/10; beach seines for Coho only (release all Chinook and Chum through 9/30) may start no earlier than 9/16. Both gear types open 5 days/wk.
		Area 12C: a) Gillnets: 10/1-10/17 5 d/wk. b) Beach Seines: 10/1-10/17 5 d/wk. DAYLIGHT HOURS ONLY. c) 500 foot beach closure from Ayock Pt. to approx. 2,000 feet south of Lilliwaup (at the large house, north of Octopus Hole) through 10/10 for both gear types.

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Coho	Trty	Area 12D (west of Madrona Pt. - local name): Open for gillnets no earlier than 10/1. Weekly schedules identical to Area 12C.
	Ntrty	Closed
Chum	See co-manager agreed-to Hood Canal MOU in appendix.	
	Trty	Area 12: Open 10/11 through 11/20; 7 d/wk
		Area 12B: Open 10/18 through 11/20; 7 d/wk; except north of an East-West line from Zelatched Point to Seal Rock open through 11/27.
		Area 12C: Open 10/18 through 11/27; 7 d/wk.
		Area 12D: Closed.
		Area 12H: Hook and line gear open from 10/11 through 11/21; beach seines open Tuesday and Thursday of each week; possible in-season adjustments to 3 days/wk. Starting 11/1, hatchery escapement control measures will go into effect.
	Ntrty	Areas 12 and 12B: Wks 42 (wb 10/11) - 47 (wb 11/15): PS Chinook and coho NR; PS fishing pattern: 1,1,1,2,1,1; GN fishing pattern: 1,2,2,2,2,2 daylight hours. Hazel Point area Closed.
		Area 12C: Fisheries scheduled Wks 45 (wb 11/1) - 48 (wb 11/22): PS Chinook and coho NR; PS fishing pattern: 2,1,1,1; GN fishing pattern: 2,2,2,2 daylight hours. Fishing is contingent upon the results of the agreed-to ISU.
		Hoodsport Hatchery Zone (12C): Beach seine fishery wks 45-48; fishing pattern: 2,2,2,2. Fishing is contingent upon the results from the agreed-to ISU.
		Area 12D Closed

Port Gamble (Area 9A)

No gillnet may be operated within the boundaries as described: From the head/mouth of Port Gamble Bay along both the eastern and western shores, along the southeastern edge of Pt. Julia and then north of a straight line drawn to west to the southern edge of the old mill site designated by markers (map in appendix).

Chinook	All	Closed

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Coho	Trty	Open wb 8/9 through wb 10/31; 7 days/wk; gillnet only. Ceremonial Harvest of 20 Chinook in August.
Coho	Ntrty	Open Wks 34 (wb 8/16) - 44 (wb 10/25) skiff GN limited to 100 fathoms length and 60 meshes in depth; 7 days/wk; Chinook NR; Chum NR through 9/30; release NR fish by cutting ensnaring meshes. The beach area of the Port Gamble Indian Reservation, between Pt. Julia and the boundary marker at the south end of the reservation - closed to all fishing.
Chum	Trty	Open 11/1 through 11/21; 7 days/wk; gillnet only.
	Ntrty	Closed

Quilcene / Dabob (Area 12A)

Coho	Trty	Open 8/21 through 10/10; Chum and Chinook release from hook and line and beach seine gear through 9/30; beach seines 5 days/wk, daylight hours. Hook and line fisheries for Coho only, open continuously. Gillnets closed until Summer Chum escapement exceeds 1,500, then (1) GN day/wk; when escapement reaches 2,500 (2) GN day/wk; when escapement reaches 3,500 GN will be determined. Beach seine advance notification required prior to fishing.
	Ntrty	Beach seine open wks 34 (wb 8/16) – 40 (wb 9/27); Limited participation; Chinook and Chum NR; fishing pattern 3,5,5,5,5,5; GN closed unless Treaty GN opening. Fishery will be managed consistent with SCSCI.
Chum	Trty	Open to set and drift gillnets wb 10/11 through 11/20, South of an E-W line through Pt. Whitney.
	Ntrty	Closed

Big Quilcene River (Area 82F) Treaty (Ntrty net closed)

Coho	Openings to be determined in-season, for Coho only, from 9/1 through 10/10. Closed below Rogers St. From Rogers St. to U.S. Hwy 101, dipnets, hook and line gear only, release all other salmon. The hatchery area, from U.S. Hwy 101 to the Quilcene Hatchery rack, may be opened for short periods to take surplus Coho. Hand-held gear only (dipnets, hand lines, etc.).
Chum	Closed

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Skokomish River (Area 82G) Treaty (Ntrty net closed) Purdy Creek (Area 82J) Treaty Net (Ntrty net closed)

Note: The Skokomish Tribe will continue to sample all agreed to fisheries in order to provide weekly in-season updates (i.e. CWT, species, mark status, and mark rates). The WDFW will provide weekly in-season updates for Chinook returns to the George Adams Hatchery rack.
Note: Hook and line gear and beach seines release Chum through 10/15 above Hwy 106 Bridge.

Skokomish River – Mouth to HWY 106 Bridge (Area 82G) Treaty

Coho	Open 10/4 – 10/31, 7 days/wk.
Chum	Open wb 11/1 through 11/22, 7 days/wk.

Skokomish River – HWY 106 Bridge to HWY 101 Bridge (Area 82G) Treaty

Chinook	Open wb 8/2 - wb 8/23, 3 days/wk.
Coho	Open wb 10/4 – wb 10/25, 7 days/wk.
Chum	Open wb 11/1 through wb 11/28; 7 days/wk.

Purdy Creek (Area 82J)

Note: Treaty Net 250 feet from the confluence/mouth of Purdy Creek to the HWY 101 Bridge (fishing nets may not be attached to any abutment or railings on the HWY 101 Bridge).

Chinook	Gill Nets only: Open Saturdays only beginning July 18 – August 8. In-season adjustments will occur to ensure weekly broodstock targets are achieved.
Chum	Gill Nets, Dip Nets and Hook & Line: Open 11/15 as necessary to reach tribal share.

Misc. Hood Canal Rivers (Dosewallips, Duckabush, Hamma Hamma, Tahuya, Dewatto, Union)

All species	Closed to commercial harvest.

Area 12 Recreational (Including Quilcene/Dabob Bay)

Note: Release all Chum from 8/1 to 10/15, per the SCSCI. 7/1-10/ 15: All waters within channels created by exposed tidelands including - the free-flowing waters of the Skokomish River downstream (north) of the City of Tacoma PUD overhead transfer powerlines are CLOSED to fishing for finfish. The State and Tribe will meet and resolve issues prior to a fishery occurring in this area. Mouth closures apply to Dosewallips, Duckabush, Dewatto, and Hamma Hamma Rivers.

5/1-6/30	Closed

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7/1-8/31	Closed North of Ayock (except Quilcene Bay fishery below).
7/1-9/30	South of Ayock Pt. – 4 fish limit, (Chinook 20" min size); release Chum and wild Chinook. 2 pole endorsement.
8/1-8/31	Quilcene Bay – 4 fish limit, Coho Only. Fishing allowed in waters north of a true east line from the mouth of Turner Creek to the Toandos Peninsula.
9/1-9/30	North of Ayock Pt. – 4 fish limit, release Chinook and Chum. Closed Tarboo Bay north of Broad Spit 9/16-9/30.
10/1-11/30	Entire Area – 4 fish limit, release Chinook, release Chum through 10/15. Closed in Tarboo Bay N of Broad Spit. 2 pole endorsement 10/1-10/31 South of Ayock.
12/1-4/30	Closed.

Hoodsport Hatchery Zone Recreational, Same as Area 12 (above) except:

7/1-11/30	4 fish limit, no minimum size; Release wild Chinook and release Chum 7/1-10/15. Release all Chinook 10/1-11/30. 2 pole endorsement 7/1-10/31.

Dewatto River Recreational

Closed to salmon.

Tahuya River Recreational

Closed to salmon

Skokomish River Recreational

Closed to salmon

Dosewallips River Recreational

mouth to ONP boundary	11/1 – 12/15	2 fish limit, 12” min size, Chum only.

Duckabush River Recreational

mouth to ONP Boundary	11/1 – 12/15	2 fish limit, 12” min size, Chum only.

Quilcene River Recreational

Rodgers St. to Hwy 101 Bridge	8/16 – 10/31	6 fish limit, 4 adults, 12” min size, Coho only.

All other HOOD CANAL REGION freshwater recreational closed to salmon angling.

AR004651

2020 – 2021 List of Agreed Fisheries Appendix

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AR004653

2.1 Short Term Mortality Estimates of Adult Chinook Salmon released from 6" Drift GN in the freshwater areas of the Nisqually River

2020

Research Timeframe:

Start: 8/1/2020 End: 11/15/2020

Project Description

Purpose: Determine short term mortality estimates of adult Chinook salmon from 6" drift GN in freshwater.

Description: Nisqually River above I-5 bridge. Up to 450 Adult Chinook will be encountered using 6" GN during drifts less than 5 minutes of soak time. Chinook will be held in live bags for 24 hours. Water chemistry and fish condition will be recorded at capture and when fish are released. Each fish will be sampled for binned length, sex, and mark status. Genetics will be taken from unmarked untagged Chinook.

Supplemental Information

Intentional Lethal Take: No intentional take

Anticipated Effects on Animals: Chinook and Coho could potentially be gilled depending on size. No interaction with non-targeted salmonids is anticipated.

Measures to Minimize Effects: When fish are more than tangled, mesh will be cut to minimize mortality. When the water temperature exceeds 20 degrees Celsius the study will be postponed until water temperature is below 20 degrees.

Previously Agreed Modeling Impacts

Release all fish.

Not to exceed 2% ER on Chinook after all other fisheries are modeled at PFMC 2. Model input of 450 total encounters at 100% mortality. Recent 5 year pre-season average of 450 encounters at 100% mortality has been 1.4% ER.

Expected encounter of Coho 200 at 100% mortality modeled as HR based on forecast of terminal run.

2.2 2020 Area 9 (NHC sub-area) Treaty Commercial Chum Fishing Plan

Pre-Season Planning:
The 2020-21 Co-Managers' List of Agreed Fisheries (LOAF) states in *Part 2, Section 2.7* (Admiralty Inlet Area) that "The Area 9 fall Chum fishery north of the HC bridge will open wk 43 (wb 10/18) through wk 45 (wb 11/1); fishing pattern: GN 3,4,3; and PS 4,3,3. Open area restricted to that portion of North Hood Canal bounded to the south by the Hood Canal Bridge and bounded to the north by a line from White Rock due east to landfall. Tribes with adjudicated U&A in the open section of Area 9 may choose to participate. Coho and Chinook model inputs have been modeled during NOF that anticipate the participation levels of 2018. If the fishery reaches a catch threshold of 30,000 Chum salmon before 10/30, there will be a conference call among the participating Tribes to discuss any needed fishery management actions. Participating tribes agree to sample tissue for DNA analysis of their tribe's Chum catch and wild Coho bycatch to the extent practicable."

During the North of Falcon salmon planning process, expected Coho and Chinook impacts for all five tribes with treaty fishing rights in the proposed fishing zone were modeled in pre-season FRAM model runs.

Objective:
The purpose of this management plan is to provide a management framework for this Area 9-NHC treaty commercial Chum fishery to improve coordination, compliance, safety, and management of the fishery.

Eligible Tribes:
Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, Port Gamble S'Klallam Tribe, Skokomish Tribe, and Suquamish Tribe.

Fishery Area:
That portion of Area 9 north of the Hood Canal Bridge and south of a line true east from White Rock to landfall on the Kitsap Peninsula.

Fishery Period:
Management weeks 43 through 45

Proposed Weekly Fishery Schedule:
Week 43 (GN 3, PS 4)

Week 44: (GN 4, PS 3)

Week 45: (GN 3, PS 3)

Gillnets Open –

Week 43: 8:00 am Sunday through 8:00 am Wednesday,

Week 44: 8:00 am Sunday through 8:00 am Thursday,

Week 45: 8:00 am Sunday through 8:00 am Wednesday.

Purse Seines Open – Daylight Hours Only.

Week 43: 8:00 am Wednesday through 8:00 pm Saturday,

Week 44: 8:00 am Thursday through 8:00 pm Saturday,

Week 45: 8:00 am Thursday through 8:00 pm Saturday.

Expected Total Season **Boat-Days**:
Total Season Gillnet Effort* = 153

Total Season Purse Seine Effort* = 10

* As modeled in the 2020 preseason FRAM model runs.

By-catch inputs for Coho and Chinook FRAM modeling:
The by-catch inputs for 2020 FRAM did not incorporate 2019 data due to the relatively low return of Hood Canal Chum and Coho that year. Observed effort in 2019 was also lower. Over the 2017 and 2018 seasons the average gillnet Coho encounter was 0.56 fish per boat-day, this average was rounded up to one Coho encounter per boat-day for estimating potential Coho mortalities. Resulting gillnet retention of 153 was expanded for drop-off mortality (2%), and purse seine retention of 10 Coho was added. Pre-season FRAM modeled input totaled 166 Coho. Chinook have not been encountered in this fishery, thus model input remains at 1 as a placeholder.

Other Restrictions:
Purse seine release of Chinook;

Purse seine opening shall be scheduled to occur on the same days and times for all participating Tribes;

Gillnet openings shall be scheduled to occur on the same days and times for all participating Tribes;

All catch shall be recorded on treaty commercial fish tickets.

Central/South Sound Tribal Agreements:
Estimated interceptions of South/Central Sound origin Chum shall be considered a pre-terminal interception and will be deduct from the South/Central Sound computed Treaty share of harvestable Chum entering Area 10 using weekly stock composition (Table 1). Results from the samples taken in 2018 for genetic analysis have not been provided as of the date of this plan. If

those results are available before the fall fishery starts, they will be incorporated into the weekly stock compositions.

In-Season Coordination, Catch Monitoring, and Conference Calls:
A conference call will be held at (1:00 pm) on (Monday) of each fishing week to report and review the effort and catches to date, as well as anticipated effort and catches, to help ensure a successful fishery for all parties. If the fishery reaches a catch threshold of 30,000 Chum salmon before 10/30, there will be a conference call among the participating Tribes to discuss any needed fishery management actions. Each participating tribe shall monitor the catch and bycatch of its fishers and be prepared to report these numbers on that week's in-season conference call.

Broodstock collection at the Little Boston Hatchery (Port Gamble Bay) shall be monitored to ensure that Fall Chum broodstock collection goals will be met. If the hatchery is not meeting its broodstock collection needs, then harvest management actions will be taken to ensure a sufficient passage of Chum salmon to the hatchery.

Catch Sampling:
The participating tribes plan to continue collecting Chum tissue samples for weekly stock composition data. A sampling design to distribute the collection of 200 weekly samples over the geographic area being fished will be coordinated among the participating tribes.

Enforcement:
Each participating tribe shall maintain an enforcement presence to ensure that its fishers comply with this management plan and their individual tribal fishery regulations.

Region of Origin	**Weekly Portion of Total Catch**		
Data source (GSI 2011, 2013, 2014, 2015, 2016, 2017)	**WK 43**	**WK 44**	**WK 45**
Total catch estimate	TBD	TBD	TBD
Hood Canal (average %/wk	0.881	0.865	0.909
South Sound (average %/wk)	0.113	0.114	0.072
North Sound (average %/wk)	0.000	0.011	0.004
PS Lates (average %/wk)	0.001	0.000	0.008
Other (non-local) (average %/wk**)**	0.006	0.009	0.008

Table 1. Portion of weekly harvest to attribute to Puget Sound regions of origin for the purpose of fulfilling obligations under the Inter-Tribal Allocation Agreement for South/Central Sound stocks; the total weekly harvest will be determined by in-season landings. These values were derived from the gsi data analyzed to date resulting in average regional contribution rate by week. Under the Inter-Tribal Allocation Agreement for South/Central Sound stocks, Area 9 is a pre-terminal fishery and treaty interceptions of South/Central Sound origin fish will be deducted from the treaty share of harvestable Chum entering Area

2.3 2020 Co-Management Agreement for Hood Canal Chum Salmon Fisheries.

The Hood Canal Treaty Tribes (Skokomish Tribe, Port Gamble S'Klallam Tribe, Jamestown S'Klallam Tribe and Lower Elwha Klallam Tribe) and the Washington Department of Fish and Wildlife (WDFW) have reached agreement on application of an in-season abundance estimation (ISU) process for the 2020 season. All parties to this agreement have responsibility for ensuring their fisheries management actions are appropriate to ensure harvest of available shares. Both the treaty Indian and non-Treaty chum salmon fishing schedules are described in the List of Agreed Fisheries (April 2020). For the 2020 Hood Canal chum salmon season, the Hood Canal Tribes and WDFW agree:

1) To exchange information and meet (if necessary) prior to July 1, 2020 to update the dataset to be used in conjunction with the "early" and "extended" ISU methods recommended by Tribal and WDFW biometricians, as described in the memorandum dated July 10, 2012 (2012 memorandum) with the purse seine catch and effort data window periods subsequently modified by co-manager agreement. Any additional analyses to inform/modify the ISU models must be agreed-to by both parties by this date.

2) Those waters of Area 12 east of the Area 12/12B boundary and south of a line projected 94° true from Hazel Point to the light on the opposite shore will be closed to purse seines for the entirety of the season. WDFW managed gillnet fisheries will be authorized in this area during management weeks 43 and 44.

3) Waters within 1,000 ft of fish bearing streams in marine area 9A (Port Gamble Bay) are closed to fishing.

4) That on-water enforcement will be sufficient to ensure compliance with all regulations.

5) To convene a conference call no earlier than 1:00 pm on Friday, November 2, 2020 to discuss results of the "early season" ISU model;

a. During the call co-managers would apply the "early" CCPUE ISU method recommended by Tribal and WDFW biometricians to catch and effort estimates obtained from the Hood Canal non-Treaty Purse Seine fishery operating from October 20 through October 31; the resulting run size would then be the basis for calculating total allowable catch shares of Hood Canal fall chum for managing Treaty and non-Treaty Hood Canal fall chum fisheries through November 7th.

b. The "extended" model using data collected from October 20th through November 7th will be applied only if non-Treaty purse seine data is available after October 31st. The "extended model" will use NT PS cumulative CPUE as the independent predictor variable, and will be used on Monday, November 9th, not before that date, to determine any remaining fishing opportunity.

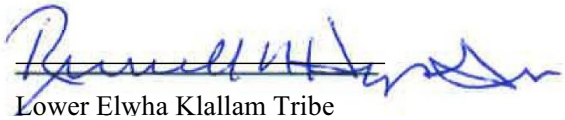
Authorized Signatures:

The following parties agree to the above for the management of the 2020 Hood Canal chum salmon season, and the undersigned persons have authority to enter into this agreement:

Jamestown S'Klallam Tribe

4-10-20

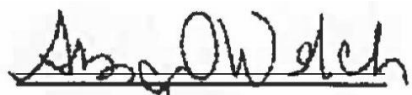
Date



Lower Elwha Klallam Tribe

4-13-2020

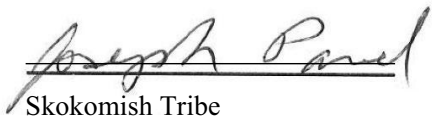
Date



Port Gamble S'Klallam Tribe

4/10/20

Date



Skokomish Tribe

4/13/20

Date

Washington Department of Fish and Wildlife

April 10, 2020

Date

2.4 2020 7/7A Chum Fishing Plan

04/08/2020

Chum salmon fisheries in Areas 7 and 7A will be regulated to comply with a base harvest ceiling of 125,000 Chum salmon, unless a critically low level of abundance is identified for those stocks migrating through Johnstone Strait ("Inside Southern Chum salmon") (PST 2019). Chapter 6 of Annex IV specifies that U.S. commercial fisheries for Chum salmon in Areas 7 and 7A will not occur prior to October 10. Paragraph 9 (a-b) specifies run sizes below 1.0 million as critical (estimated by Canada). For run sizes below the critical threshold, the U.S. catch of Chum salmon in Areas 7 and 7A will be limited to those taken incidentally to other species and in other minor fisheries, and shall not exceed 20,000 pieces. When the Fraser River chum run-size is greater than 1.6 million, the US share shall be 160,000 chum.

Table 1. U.S. 7/7A chum catches, 2009-2019

Year	Non-Tribal catch	Tribal catch	Total U.S. catch	Total U.S. Share[A]	Uncaught share	Overage	Paid Back
2009	16,406	7,667	24,073	20,000[B]	N/A	0	
2010	6,062	17,342	23,404	20,000[B]	N/A	0	
2011	24,084	36,401	60,485	130,000	69,515	0	
2012	32,157	40,709	72,866	130,000	57,134	0	
2013	30,239	49,411	79,650	130,000	50,350	0	
2014	60,135	86,436	146,571	130,000	0	16,571	
2015	59,754	65,303	125,057	130,000	4,943	0	4,943
2016	66,531	51,705	118,236	130,000	11,764	0	11,764
2017	56,830	66,366	123,196	130,000	6,804	0	
2018	37,806	28,605	66,411	N/A[C]	N/A	0	
2019		574	574	N/A[D]	N/A	0	

[A] Between 2009-2018, the base US share was 130,000 chum per year. Starting in 2019, the base US share shall be 125,000 chum per year

[B] In 2009 and 2010, the Inside Southern Chum run size was below the critical threshold of 1.0 million; thus, per Chapter 6 of the PST the harvest ceiling was 20,000 additional chum following the notice from Canada that the run size was below the critical threshold.
[C] In 2018 the inside Southern chum was above the critical threshold, allowing the US to open fisheries. However, Fraser River chum were below the critical threshold of 900,000, which required the US to close 7/7A chum fisheries.
[D] In 2019 the inside Southern chum run was below the critical threshold. The only commercial harvest is attributed to non-tribal reef net between October 1-8.

In 2013, the co-managers enacted a fishing plan intended to result in the full harvest of chum salmon allowed to be caught in Area 7/7A under the existing Chapter 6 of the Pacific Salmon Treaty. Adoption of these annual pre-season chum fishing plans for Area 7/7A has mostly resulted in the full harvest of the U.S. share in recent years (Table 1).

To continue to promote fishing opportunity that allows both the tribal and non-tribal fleets to catch their full shares, the co-managers will use the management approach below for the 2019 season.

- Tribal and non-tribal reef net fisheries will remain open continuously from the end of Fraser management to the end of the chum season or until their respective shares are harvested, whichever comes first. Reef nets will release all chum and unmarked Chinook through September 30. Release all Chinook beginning October 1.

- Tribal purse seine (PS) and gillnet (GN) fisheries will open on Saturday October 10 and remain open continuously until the end of the season or until the treaty share is harvested, whichever comes first.

- Non-tribal PS and GN fisheries will open on Sunday October 11, Monday October 12, Wednesday October 14, and Thursday October 15.

- Non-treaty purse seine and gillnet fisheries will be evaluated relative to the thresholds below based on non-treaty chum catch reported on the in-season co-manager conference call scheduled for Friday, October 16, 2020. Non-treaty fisheries will re-open on the prescribed dates and remain open continuously until the end of the season or until the non-treaty share is harvested, whichever comes first.

Table 2. 2020 Treaty and Non-Treaty chum fishing schedule for Area 7 & 7A

	10-Oct SAT	11-Oct SUN	12-Oct MON	13-Oct Tue	14-Oct Wed	15-Oct Thu	16-Oct Fri	17-Oct Sat
Treaty and Non-Treaty Reef Net								
Treaty Gillnet and Purse Seine								
Non-Treaty Gillnet and Purse Seine								
Co-manager Conference Call								

- If total non-treaty catch is:

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- <29,000; non-treaty fishery will reopen Sunday, October 18.
- >29,000; non-treaty fishery will reopen Monday, October 19.

- The co-managers will exchange data on by-catch throughout the season and take appropriate management actions should levels of by-catch greatly exceed expectations.

- The co-managers will meet by conference call and adjust schedules if needed in response to in-season notification by Canada's Department of Fisheries and Oceans that chum salmon returns are below the critical thresholds identified in Chapter 6, paragraph 9 of the Pacific Salmon Treaty.

- At any time, the tribes and/or WDFW may open limited and closely regulated fisheries in an attempt to collect tissue samples from Area 7 West, Area 7 East and Area 7A for Genetic Stock Identification analysis. US Southern Panel members will notify their Canadian counterparts of this intent in an expeditious manner. As described in PST Chapter 6, paragraph 9(b), catches taken for the purpose of GSI sampling will not count toward the 20,000 catch limit allowed when critical thresholds are not being met.

2.5 The Lummi Nation's Nooksack River Spring Chinook Radio Tag Study

This proposal communicates Lummi's interest in conducting a research fishery in the Nooksack River not to exceed 1% ER, as per section 7 (Research and Monitoring) of the Chinook Management Plan. The Lummi Natural Resources Department has plans to implement a radio tag study to evaluate spatial and temporal distribution as well as post-release mortality of natural and hatchery origin South Fork Nooksack spring Chinook entering the Nooksack River between April and July 31.

Few data currently exist on holding area preferences or Nooksack River-specific thermal preferences of SF Chinook, which has a significant bearing on future broodstock collection efforts and habitat restoration projects. Additionally, it is hypothesized that a seasonal thermal barrier may be creating vulnerability to SF Chinook by affecting entry to the South Fork Nooksack which may be delaying spawn timing and inducing temperature related pre-spawn mortality. A pilot study in 2019 tagged 52 Chinook and found that the 14 tagged individuals that arrived on the spawning grounds traveled 1.4-2.5 miles/day to destinations in the NF/MF and SF.

A secondary benefit of this project may be the ability to demonstrate that removal of surplus adult NF/MF Nooksack Chinook HORs during the spring selective drift fishery does not affect the Chinook recovery programs in the Nooksack basin by inducing significant mortality to released HOR and NOR SF Chinook and NOR NF/MF Chinook.

In this study we intend to gather baseline data that will guide the efforts of the SF Chinook recovery program operated at Skookum Creek Hatchery and habitat restoration projects throughout the Nooksack River. This year we intend to increase efforts of collecting in-river tracking data, which will provide much higher resolution of movement patterns and confidence of post-release mortality estimates. Each day of the selective fishery will be followed by active tracking less than 24 hours after release. Combined with weekly aerial flight data, and data collected in 2019, we aim to significantly improve our understanding of early Chinook upriver migration behavior.

A tangle net (5-inch gill net mesh size) will be used to capture Chinook in the Nooksack River below the Slater Road Bridge. Three boats are used in this process: The primary fishing boat to deploy and manage the net, a tail boat to control the tail board end of the net, and a recovery boat. All natural origin Chinook, all suspected SF hatchery Chinook (CWT only), and some hatchery origin NF/MF Chinook (identified with a mark) will be tagged with radio transmitters and tracked using ground (in-river tracking within 24 hours of release) and aerial (weekly flights) surveys. A portion of the marked hatchery Chinook will be harvested for C&S use.

Up to 80 Lotek MCFT2 radio transmitters will be deployed using esophageal deployment. All released fish will receive a metal jaw tag with a unique identification number, will be tissue sampled for genetic

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stock assignment, be measured for fork length, sampled for scales, and sexed. For evaluating temporal and spatial distribution, weekly ground surveys in road-accessible areas of the main stem and forks will be conducted. Ground surveys will be used for accurately estimating post-release mortality, entry timing to sub-basins, estimating spawn timing, pinpointing preferred holding areas, and recovering tags from mortalities. Weekly aerial surveys will be used to track spatial distribution throughout the entire Nooksack basin.

For 2020, this radio tag study will be limited to no more than 15 natural origin encounters. Applying the co-manager agreed 30% release mortality to these 15 encounters results in less than 5 natural origin mortalities. These mortalities result in an estimated 0.82 ER on natural-origin Nooksack spring Chinook.

2.6 Relative Abundance and Diet of Piscivorous Fishes In the Lake Washington Shipping Canal

4/14/2020

Objective 1: Describe the relative abundance and size structure of piscivorous fishes in different sectors of the Lake Washington Shipping Canal (LWSC) during the juvenile salmon out-migration period.

Objective 2: Assess the stomach contents of piscivorous fishes inhabiting different sectors of the LWSC. Identify sectors of the LWSC where predation on juvenile salmonids is greatest during the out-migration period.

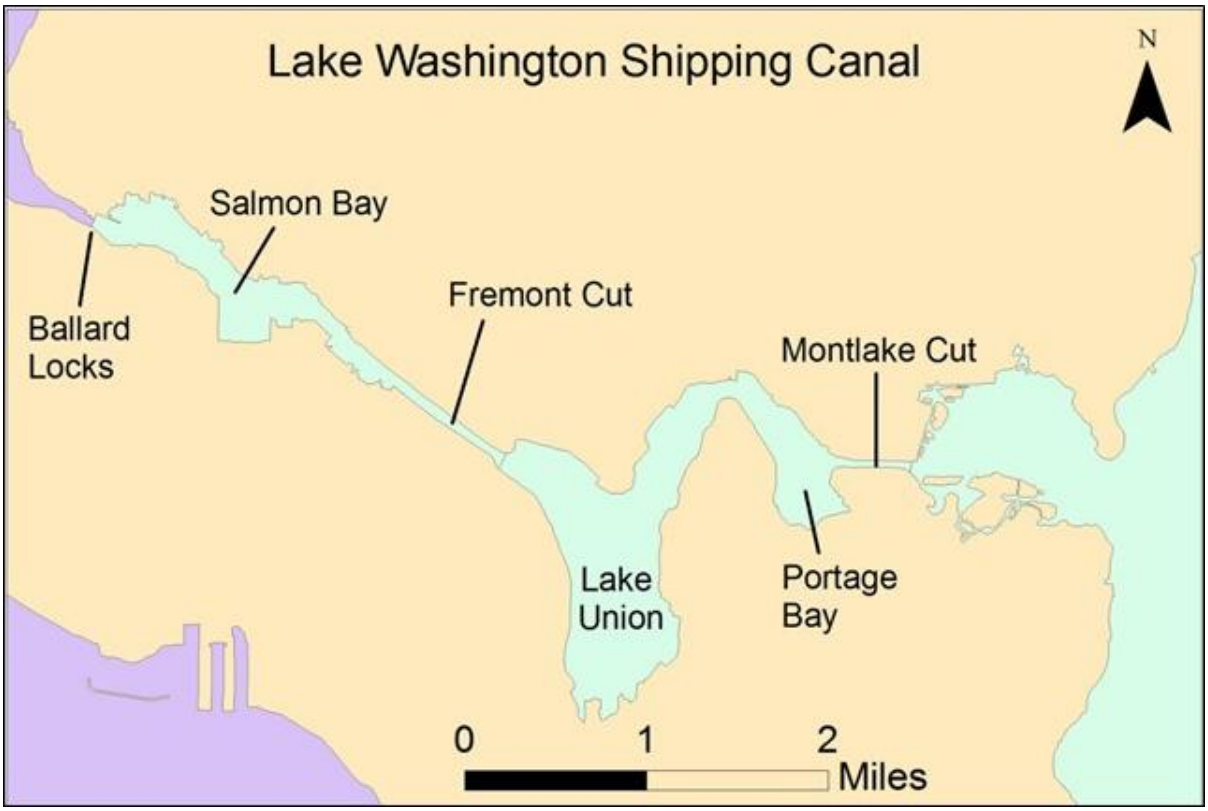

Figure 1. The proposed study area.

Study Area

The study area includes Salmon Bay, Fremont Cut, Lake Union (including Portage Bay), the Montlake Cut (Figure 1), and Union Bay

Methods

Gill netting will occur over multiple sampling days between early-May and late June, 2020. Variable-mesh monofilament gill nets will be set during the salmon smolt out-migration period within the study area (Figure 1). Nets will be deployed at night with 12-16 hour set times. A range of mesh sizes (2-inch stretch to 5-inch stretch) will be used in an effort to capture a broad range of fish species and sizes. All species captured will be measured to the nearest millimeter. Stomach contents of piscivorous fishes will be assessed for evidence of predation on juvenile salmonids.

AR004665

ESA Considerations

The Puget Sound Chinook Harvest Management Plan allows for limited take of listed species during research activities within each Management Unit (MU): "Mortality associated with certain monitoring and research activities (e.g. test fisheries and update fisheries), that primarily inform in-season harvest management decisions, will be accounted with other fishery related mortality under the ER ceilings defined for each MU. Mortality associated with other research and monitoring, which have broader applicability to stock assessment, will not be accounted under the ER ceilings. Mortality in this latter category will not exceed a level equivalent to 1% of the estimated annual abundance (i.e. 1% ER), for any MU." As such, there is limited take for Puget Sound Chinook available to this proposed project under the PSCHMP, in combination with other projects within the MU. Steelhead take for research purposes has historically been covered separately but was written into the NMFS 2016-17 biological opinion for the Puget Sound salmon fisheries, which effectively extend the 2010 PSCHMP.

Similar studies conducted in recent years indicate that this monitoring effort will remove many piscivorous fish from the LWSC that would otherwise prey on juvenile Chinook, and this monitoring project is therefore likely to benefit juvenile salmonids migrating through the area. The study is not likely to result in the take of listed anadromous species (PS Chinook and PS steelhead), and estimated take values are provided below:

1. Steelhead adults: The probability of encountering an adult steelhead is low. Adult steelhead were not encountered during previous sampling efforts (conducted in 2016, 2017, 2018, or 2019) in the LWSC. Spawning ground surveys indicate that few (if any) steelhead spawn in the Lake Washington watershed, and steelhead adults are not expected to be migrating through the LWSC during the proposed sampling period. The take is estimated as zero adult steelhead.

2. Steelhead juveniles: The probability of encountering a juvenile steelhead is low. Juvenile steelhead were not encountered during previous sampling efforts (conducted 2016-2019) in the LWSC. Spawning ground surveys indicate that few (if any) steelhead spawn in the Lake Washington watershed, and the number of steelhead smolts migrating through the LWSC is expected to be low. Any steelhead smolt migrants that may be present will not be affected by the sampling gear as the proposed gillnet mesh size is too large to entangle juveniles (2 to 4 inch stretch mesh). The take is estimated as zero juvenile steelhead.

3. Chinook adults: Chinook adults typically begin migrating through the LWSC in mid-June with the peak migration period occurring in mid to late August (Figure 2). Relatively small numbers of adult Chinook would be migrating through the LWSC while the proposed sampling would occur (May and June), however some adult Chinook may encounter the sampling gear as they migrate through the action area. Chinook adults migrating through the LWSC are likely to use deep-water offshore habitats where sampling gear is less likely to be deployed. Most sampling effort will occur in near-shore or off-channel, weedy habitats where adult Chinook are less likely to migrate. Adult Chinook were not encountered during the past four years of previous sampling efforts (2016 through 2019) in the LWSC. Due to the early timing of the proposed sampling and the off-channel areas where sampling will occur, the number

of adult Chinook encountering sampling gear will likely be small. A combined gear take of 5 Chinook adults (NOR and/or HOR) is estimated.

4. Chinook juveniles: Juvenile Chinook will actively be migrating through the LWSC during the proposed sampling period (May - June). Small numbers of juvenile Chinook smolts may encounter the sampling gear, however the mesh size (2 to 4 inch stretch mesh) is too large to entangle a Chinook juvenile and poses very little threat. Juvenile Chinook were not encountered during previous sampling efforts (2016-2019) in the LWSC. The take is estimated as zero juvenile Chinook.

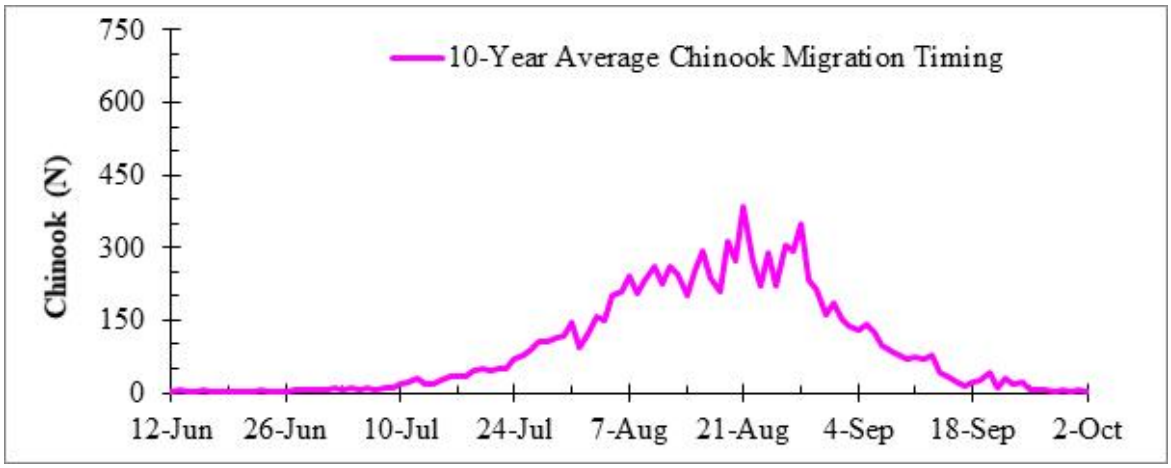

Figure 2. Recent ten-year average adult Chinook migration timing through the Ballard Locks.

As outlined above, the PSCHMP as extended provides coverage allotment for take of both Puget Sound Chinook and steelhead. Expected steelhead take is zero fish (bullets 1 and 2 above). Chinook take (HOR and NOR combined) may not exceed a level equivalent to 1% of the estimated annual abundance (i.e. 1% ER). Annual post-season terminal (10-F Returns) total abundance values for Lake Washington Chinook adults during the past 10-year time period are listed in Table 1. The 2020 pre-season terminal abundance forecast for Lake Washington Chinook is 4,594 fish. The estimated take of 5 adult Chinook represents an exploitation rate of 0.1088% (5/4,592=0.001088), which is well below the 1% ER limit.

Year	Hatchery Abundance	Natural Abundance	Total Abundance	Source
2010	8,131	688	8,819	Co-Manager Forecast Files, Post Season
2011	5,612	829	6,441	Co-Manager Forecast Files, Post Season
2012	10,671	1,116	11,787	Co-Manager Forecast Files, Post Season
2013	5,415	1,729	7,144	Co-Manager Forecast Files, Post Season
2014	2,644	408	3,052	Co-Manager Forecast Files, Post Season
2015	4,791	1,383	6,174	Co-Manager Forecast Files, Post Season
2016	4,184	801	4,985	Co-Manager Forecast Files, Post Season
2017	5,347	1,836	7,183	Co-Manager Forecast Files, Post Season
2018	2,646	789	3,435	Co-Manager Forecast Files, Post Season
2019	2,847	757	3,604	Co-Manager Forecast Files, Post Season
2020	3,787	807	4,594	Co-Manager Forecast Files, Pre Season

Table 1. Annual post-season (2010-19) and pre-season (2020) terminal abundance estimates for Lake Washington Chinook.

AR004667

In summary, project impacts are significantly below the 1% allotment for Chinook annual abundance provided for in the PSCHMP. The estimated take of HOR and NOR combined is 5 adults, and 0 smolts, which is 0.1088% of annual abundance.

AR004668

2.7 2020-2021 Warm Water Test Fishery, Commercial Fishery, and Research

This proposal is put forth to implement a test fishery that will collect additional information on the feasibility and potential impacts of a directed fishery (C&S and commercial) on invasive warm-water fishes in selected portions of the Lake Washington basin, a commercial fishery in the northern portion of Lake Washington, and associated research in Lake Sammamish to estimate population abundance of native and invasive piscivores (Figure 1). The results of this test fishery will inform implementation and management of a full scale commercial fishery directed at warm-water fishes in all areas of the basin that remain off limits to directed commercial fisheries due to concerns over steelhead encounters. To date, the Muckleshoot Indian Tribe (MIT) has collected gillnet catch data from March – April 2015, January 2017 – June 2017, March 2018 – June 2018, and March 2019 – April 2019 and March 2020 to inform potential impacts to listed salmonids which will be used to estimate impacts for the first step toward a commercial fishery.

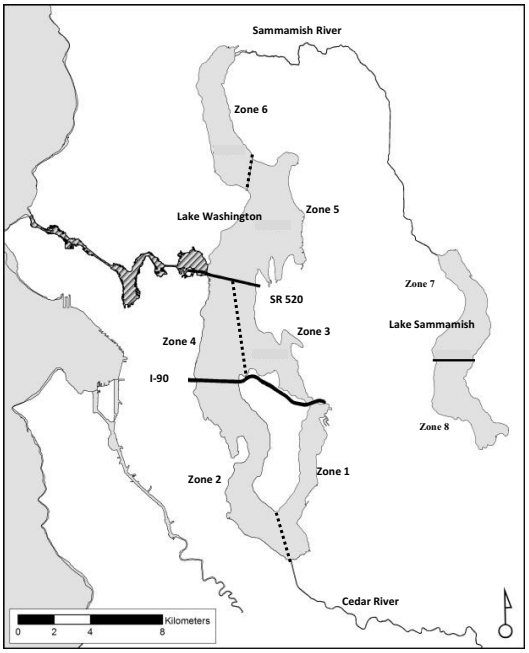

Figure 1. Proposed warmwater fishery zones (1-8) in the Lake Washington basin include zones 1-6 in Lake Washington and zones 7-8 in Lake Sammamish.

The test fishery (and directed commercial fisheries in the future) is scheduled to encompass times and areas that minimize impacts to ESA listed salmonids. Chinook adults start migrating into the basin in mid-June with spawning concluding the first week of November. The timing of the test fishery is proposed from May 1 – June 12, 2020 and January 1 – April 30, 2021. This range of dates will avoid impacts on migrating adult Chinook and steelhead in Lake Washington. Using large mesh gillnets will avoid impacts on age-0 Chinook and steelhead smolts emigrating to sea during the proposed times. The probability of encountering an adult wild steelhead is extremely low. If a steelhead is encountered, it would likely be a stray from a neighboring watershed such as the Green River. Steelhead surveys in the Sammamish River tributaries, including Lake Sammamish, were discontinued at the end of 2003 after five years of surveys in

AR004669

which no steelhead or steelhead redds were observed. Therefore, minimal risk of encounters exists in northern Lake Washington or Lake Sammamish. There are very few remaining steelhead spawning in the Cedar River. From 2009 through 2015, redd-based escapement estimates for the Cedar River have averaged just over two steelhead per year and no steelhead redds were observed during 2017. Further, several of the redds detected prior to 2017 may have been produced by large cutthroat or rainbow trout which are known to overlap distributionally with steelhead.

The Lake Washington test fishing area will be divided into zones (Figure 1) and will focus on central and southern Lake Washington (zones 1-4), with additional effort in northern Lake Washington (zones 5-6) when there is no directed commercial fishery. Up to 24 300-foot gillnets will be deployed within a single zone each night. The gillnet mesh will range from 3.5 - 6 inch stretch mesh and fishing will occur up to four nights per week. Nets will be set on Monday and retrieved no later than Friday. Nets will be checked often to further minimize interactions with steelhead. Any steelhead caught will be released (ancillary to this project, we have successfully tagged and released multiple walleye, suggesting that gill net mortality can be reduced by frequently checking nets). The cold water in the lake during this period will also help to minimize mortality of released fish.

A limited commercial fishery is proposed to begin transitioning from research to implementation in such a way that impacts can be monitored and controlled. Because steelhead encounters have the lowest probability in northern Lake Washington, this initial commercial fishery will occur in Lake Washington zones 5 and 6. In Lake Washington, MIT has fished 446 net nights over five years and encountered only 11 sub-adult Chinook (i.e. blackmouth), and no adult NOR migratory Chinook. Net length and mesh restrictions will be identical to those used during the test fishery and fishers will be limited to 4 nets. This commercial fishery will occur from March 1 – April 30, 2021 and nets will only be deployed from Monday afternoon through Friday morning to minimize conflict with weekend recreational activities. MIT enforcement and biologists will be on-site to inspect all landed catch.

In previous years, the test fishery has produced valuable information to assess the potential impacts of a commercial directed fishery, but has done little to generate data that would inform a long-term management plan for invasive piscivores. To that end, MIT has developed an additional research proposal aimed at assessing the population size of select piscivores in Lake Sammamish. A new electrofishing boat has already been purchased to conduct this research. Lake Sammamish was chosen because of its smaller size and likely smaller piscivore populations (making an intensive mark-recapture study more tractable) as well as the limited number of ESA listed NOR salmonids potentially using its waters as a migratory corridor. Even though abundance of ESA listed salmonids is likely to be low, MIT proposes to use best practices when conducting this research to minimize overall take. As such, protocols for electrofishing will follow those from Bonar et al. (2000) which were developed by WDFW and used in warm water fisheries research projects that received ESA Section 10(a)(1)(A) coverage for incidental impacts to listed salmonids (1345-9A).

Take estimation and reporting

AR004670

There is a very small to zero potential for the test fishery to interact with adult steelhead in Lake Washington and no potential for interaction with adult migratory Chinook. Nevertheless, we have designed this test fishery to minimize these interactions. Should there be an encounter in the test fishery, steelhead or Chinook will be handled carefully by trained professional staff and as much biological data will be collected as possible, including lengths, fin clips for genetic analyses, marks, presence of tags, and capture locations. Further, should staff believe survival upon release is questionable, the steelhead or Chinook will be retained and reported as ceremonial and subsistence treaty catch.

In the commercial fishery, all catch will be landed and then inspected by a fishery biologist. Due to the time and area restrictions, no steelhead or adult NOR Chinook are expected to be encountered. Any sub-adult Chinook landed will have as much biological data taken as possible. MIT expects 10 or fewer participants in this fishery. There will be a maximum of 36 nights of fishing which translates into a maximum of 1,440 net-nights of effort. Based on past test fishery results, this intensity of fishing effort would result in a maximum of 36 sub-adult chinook encounters.

MIT does not expect any adult Chinook or steelhead encounters as part of the Lake Sammamish research, but juvenile Chinook or *O. mykiss* (rainbow trout or steelhead juveniles) encounters are possible. From June-July 2017 in Lake Washington, an electrofishing effort similar to our proposal was implemented to assess the warm water fish community (Garrett 2017). During that work, 65 Chinook ranging from 85-227 mm and 25 rainbow trout ranging from 147-318 mm were encountered. We expect similar encounters of juvenile Chinook due to the close proximity of Issaquah Creek Hatchery but fewer encounters of juvenile rainbow trout due to extirpation of the spawning steelhead population from tributaries of the Sammamish River.

Understanding the potential for interaction with the public, we propose monthly reporting on this test fishery to NOAA. These reports will contain gear used, area fished, and effort. Further, any natural origin adult steelhead or Chinook encountered will be immediately reported. MIT proposes a limit of three natural origin adult steelhead encounters or five natural origin adult Chinook encounters. Should either cap be reached, the test fishery or commercial fishery will be immediately shut down for the remainder of the season. During the research project in Lake Sammamish, effort will be shifted spatially to avoid sampling during hatchery Chinook releases.

References

Bonar, S.A., B.D. Bolding, and M. Divens. 2000. Standard fish sampling guidelines for Washington ponds and lakes. Washington Department of Fish and Wildlife. Olympia, WA.

Garrett, D., C. Jackson, and S. Caromile. 2017. Biological assessment of the warmwater fish community in Lake Washington. Washington Department of Fish and Wildlife. Olympia, WA.

AR004671

2.8 Lake Washington Management Objectives

The Lake Washington management unit is composed of two natural stocks, the Cedar River and the Sammamish River. The 2020 preseason natural origin recruit (NOR) forecast is for a terminal run size of 673 to the Cedar River and 134 to the Sammamish River. For 2020, WDFW, the Suquamish Tribe, and Muckleshoot Tribe will manage the NOR returns to the Lake Washington basin consistent with recent-year average NOR spawner escapements in the Cedar River. The 2020 FRAM/TAMM model run (Chin3120) projects that 808 natural origin recruits (NORs) will escape mixed stock fisheries and return to the Lake Washington basin. NOR spawning escapement is expected to be 571 in the Cedar River, and 114 in the Sammamish River.

AR004672

2.9 Puyallup River Management Objectives

For 2020, WDFW, the Puyallup Tribe, and Muckleshoot Tribe will manage the returns to the Puyallup River for a total of 1,170 adults with at least 750 natural origin adults on the spawning grounds. This management action will occur through a combination of fisheries actions modeled in FRAM/TAMM and transportation of unmarked adult Chinook (excluding double index tagged fish) from hatchery facilities within the Puyallup River basin to the spawning grounds.

Terminal fisheries directed at the Puyallup River stock are managed based upon a pre-season forecast and modeled through the FRAM/TAMM. The 2020 FRAM/TAMM model run (Chin3120) projects that 1,157 natural origin recruits (NORs) will escape fisheries and return to the Puyallup River with an additional 1,476 hatchery origin recruits straying to the spawning grounds for a total natural escapement of 2,633. The co-managers do not expect any NOR adults will need to be transferred to the spawning grounds, but will continue to evaluate escapements through the season and take actions as warranted.

AR004673

2.10 Green River Management Objectives

For 2020, WDFW, the Muckleshoot Tribe, and Suquamish Tribe will manage the unmarked returns to the Green River for 1,200 natural origin adults on the spawning grounds. This management action will occur through a combination of fisheries actions modeled in FRAM/TAMM[i] and transportation of unmarked adult Chinook (excluding double index tagged fish) from hatchery facilities within the Green River basin to the spawning grounds.

Terminal fisheries directed at the Green River stock are managed based upon an in-season update (ISU) with a test fishery during statistical weeks 29-31 in Elliott Bay that updates the terminal run-size (marked and unmarked adult returns). Terminal fisheries are contingent on confirmation of the pre-season forecast. Initial results from this ISU will be available during statistical week 31 (the 1st week of August). The co-managers will make in-season decisions consistent with the projected run size and natural escapement estimates. NOAA Fisheries will be informed of any subsequent management actions taken by the state and tribal co-managers that deviate from the pre-season fishery structure in the 2020 List of Agreed to Fisheries.

The 2020 FRAM/TAMM model run (Chin3120) projects that 1,489 natural origin recruits (NORs) will escape fisheries and return to the Green River. Of these NORs, 1,044 will spawn naturally in the Green River with the remaining 445 trapped at Soos Creek Hatchery weir between week 31-44 (August – late October) with a peak between week 36-42 (early September – mid October). To meet the goal of 1,200 NOR adults on the spawning grounds, the co-managers expect to transfer at least 156 NORs from Soos Creek Hatchery to the Green River. The co-managers are expecting similar numbers of unmarked HOR (Palmer) Chinook to return to the Soos Creek Hatchery, transferring 156 NORs will require transferring approximately 300 unmarked adult Chinook to the Green River. Regardless of the actual transfers, the co-managers will continue to evaluate escapements through the season and take actions as warranted.

AR004674

2.11 2020 Stillaguamish River Sport Gamefish Rules

2020 in-river sport gamefish seasons, while reduced to minimize impacts on Stillaguamish Chinook (forecast at 363 wild and 627 hatchery), openings on the mainstem were advanced two weeks compared to 2019.

2020 gamefish rules are as follows;

- Statewide gamefish rules; open unless closed, Saturday before Memorial Day through Oct 31st, 2 fish limit, 8-inch minimum size.
- Exceptions to statewide gamefish rules;
    - Mainstem Stillaguamish
        - Below Marine Drive,
            - Open year-round, trout minimum size 14", daily limit 2, night closure and anti-snagging rule Aug 1-Nov 30.
        - From Marine Drive to forks,
            - Open Sept 1st, through Nov 15th, catch and release except up to 2 hatchery steelhead may be retained, selective gear rules (no bait), night closure.
            - Open Dec. 1 through Jan 31, 2021, minimum size 14".
            - Closed to fishing from the diversion dam downstream of I-5, downstream 200 feet.
    - Pilchuck Creek,
        - from mouth to Hwy. 9 Bridge,
            - Open Sept. 1stth through Jan 31st, 2020, selective gear rules (no bait) from Sept 16th through Nov. 30th.
    - North Fork Stillaguamish,
        - From mouth to Swede Heaven Bridge,
            - Open Sept. 16th through Nov. 30th, fly-fishing only, catch and release except up to 2 hatchery steelhead may be retained.
            - Open Dec. 1 through Jan 31st, trout minimum size 14".
            - Additional opening in the Whitehorse Hatchery terminal area, from mouth of French Creek to the Swede Heaven Bridge, Feb 1st, through Feb 15th, minimum size 14".
            - Night closure Sept 16th through Nov. 30th.
            - Fishing from a floating device prohibited upstream of the Hwy 530 Bridge, motors prohibited downstream of the Hwy 530 Bridge.
        - From Swede Heaven Bridge to North Fork Falls,

        - Open Sept. 16th through Nov. 30th, catch and release except up to 2 hatchery steelhead may be retained, selective gear rules (no bait).
- North Fork Tributaries,
    - Boulder River from mouth to Boulder Falls,
        - Open September 16th through Oct 31st, catch and release except up to 2 hatchery steelhead may be retained, selective gear rules (no bait).
    - Squire Creek,
        - Open Sept. 16th through Oct 31st, catch and release except up to 2 hatchery steelhead may be retained, selective gear rules (no bait).
- South Fork Stillaguamish,
    - From mouth to 400' below Granite Falls fishway outlet,
        - Open Sept 16th through Jan 31st, minimum size 14".
        - Sept 16th through Nov 30th, night closure and anti-snagging rules.
    - From Mountain Loop Hwy upstream,
        - Open Sat before Memorial Day through Nov 30th.
- South Fork Tributaries,
    - Canyon Creek, Open Sept. 16th through Jan 31st, catch and release except up to 2 hatchery steelhead may be retained, selective gear rules (no bait).

AR004676

2.12 2020 Summer Mark-Selective Sport Fishery Marine Area 5

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 5 during the 2020 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 5 will occur from **July 1, 2020 through August 15, 2020**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason prediction of total legal-sized Chinook salmon encounters in Area 5 is **7,032** (FRAM Chin3120). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above). WDFW will ensure that the fishery does not exceed **8,438** predicted legal-sized Chinook salmon encounters.

Sampling Design and Estimation Methodologies

WDFW will employ the **Reduced Murthy** sampling design to monitor the Area 5 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). WDFW will employ the appropriate number of staff during the Area 5 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning **Friday July 17, 2020.**

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 5 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wired tagged stocks as described in Attachment A.

AR004677

2.13 2020 Summer Mark-Selective Sport Fishery Marine Area 6

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 6 during the 2020 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 6 will occur from **July 1, 2020 through August 15, 2020**, only in the portion of the area west of a true north/south line through buoy #2 near the tip of Ediz Hook. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 6 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 6 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 6 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 6 MSF, in addition to estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wired tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

AR004678

2.14 2020 Summer Mark-Selective Sport Fishery Marine Area 7

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 7 during the 2020 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 7 will occur from **July 1, 2020 through July 31 and August 16-31, 2020**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon.

Fishery Controls

The preseason modeled predicted catch is **1,562** Chinook salmon, **3,224** total predicted unmarked encounters and **2,580** total predicted sublegal encounters in Area 7 (FRAM Chin3120). WDFW will manage this fishery not to exceed the above catch quota, total unmarked encounters or total sublegal encounters.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Area 7 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). Aerial surveys will continue to be conducted in this time and Area in lieu of boat surveys for the Full Murthy. The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing data. To ensure an adequate sample size, WDFW will enhance test fishing trips to either seven days a week or employ a second test fishing boat or both. WDFW will employ the appropriate number of staff during the Area 7 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with weekly in-season catch and effort estimates beginning **Friday July 10, 2020**.

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 7 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double index-tagged and other coded-wire tagged stocks as described in Attachment A.

AR004679

2.15 2020 Summer Mark-Selective Sport Fishery Marine Area 9

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 9 during the 2020 summer season. These fisheries will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of these fisheries on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate these mark-selective fisheries.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 9 will occur from **July 16, 2020 through August 15, 2020.** Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason modeled expected catch is **6,542** Chinook salmon in Area 9 (FRAM Chin3120). WDFW will manage this fishery not to exceed the above catch quota.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Area 9 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 9 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with preliminary weekly estimates of effort and encounters beginning **Friday July 24, 2020.** WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 9 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other CWT stocks as described in Attachment A.

AR004680

2.16 2020 Summer Mark-Selective Sport Fishery Marine Area 10

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 10 during the 2020 summer season. These fisheries will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of these fisheries on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate these mark-selective fisheries.

Fishery Regulations

The summer Chinook salmon MSF in Marine 10 will occur from **July 16, 2020 through August 31, 2020**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason modeled expected catch is **4,159** Chinook salmon in Area 10 (FRAM Chin3120). WDFW will manage this fishery not to exceed the above catch quota.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Areas 10 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area10 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with weekly in-season catch and effort estimates beginning **Friday July 24, 2020**. WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 10 summer MSFs, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A.

AR004681

2.17 2020 Summer Mark-Selective Sport Fishery Marine Area 11

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 11 during the 2020 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 11 will occur from **July 1, 2020 through September 30, 2020.** Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason modeled expected catch is **4,196** Chinook salmon in Area 11 (FRAM Chin3120). WDFW will manage this fishery not to exceed the above catch quota.

Sampling Design and Estimation Methodologies

WDFW will employ the **Reduced Murthy** sampling design to monitor the Area 11 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). WDFW will employ the appropriate number of staff during the Area 11 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning **July 17, 2020**.

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 11 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of double index-tagged (DIT) and other CWT stocks as described in Attachment A.

AR004682

2.18 2020 Summer Selective Sport Fishery Marine Area 12

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 12 during the 2020 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 12 will occur from **July 1, 2020 through September 30, 2020**, only in the portion of the area located south of Ayock Point. Anglers will be allowed a daily limit of up to four salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 12 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 12 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 12 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 12 MSF, in addition to estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other CWT stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

AR004683

2.19 2020 Summer Mark-Selective Sport Fishery Marine Area 13

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 13 during the 2020 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 13 will occur from **May 1, 2020 through September 30, 2020**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 13 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 13 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 13 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 13 MSF, in addition to estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wired tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

AR004684

2.20 2020-21 Winter Mark-Selective Sport Fishery Marine Area 5

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 5 during the 2020-2021 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The winter Chinook salmon MSF in Marine Area 5 will occur from **March 1, 2021 through April 30, 2021**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 5 winter MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 5 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook salmon MSFs conducted in Marine Areas 5-13 by December 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 5 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 5 MSF, in addition to estimates of marked and unmarked mortalities of double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A will be provided at a later date, as estimates from Catch Record Card become available (see Attachment A).

AR004685

2.21 2020-21 Winter Mark-Selective Sport Fishery Marine Area 10

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 10 during the 2020-2021 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The winter Chinook salmon MSF in Marine Area 10 will occur from **January 1, 2021 through March 31, 2021.** Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason prediction of total Chinook salmon encounters in Area 10 is **3,751** (FRAM Chin3120). WDFW plans to manage this fishery to ensure that the fishery does not exceed 120% of 4,501 predicted total Chinook salmon encounters. WDFW will also manage to **579** total unmarked encounters and **3,224** total sublegal encounters.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Area 10 winter MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). Comanagers have agreed to use an additional test fishing boat in this Area in the winter. The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 10 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with weekly in-season catch and effort estimates beginning the week ending **January 8, 2021.**

WDFW will compile a comprehensive post-season report for all winter Chinook salmon MSFs conducted in Marine Areas 5-13 by December 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 10 winter MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A.

AR004686

2.22 2020-21 Winter Mark-Selective Sport Fishery Marine Area 13

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 13 during the 2020-2021 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co--managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The winter Chinook salmon MSF in Marine Area 13 will occur from **October 1, 2020 through April 30, 2021**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2020-21 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 13 winter MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 13 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook salmon MSFs conducted in Marine Areas 5-13 by December 1, 2021. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 13 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 13 MSF, in addition to estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

Appendix B. Proposed Action – 2021-2022 Co-Managers' List of Agreed Fisheries.

2021 – 2022 Co-Managers' List of Agreed Fisheries
(May 1, 2021 – May 14, 2022)

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Part I. Treaty/Non-Treaty OCEAN Fisheries (FRAM #3721 (Chinook) & #2140 (Coho))

Treaty Troll Quota	40,000 Chinook; 26,500 Coho
Non-treaty TAC	58,000 Chinook and 75,000 marked Coho.
NT Troll TAC	30,750 Chinook and 5,000 marked Coho.
Recreational TAC	27,250 Chinook and 70,000 marked Coho.

2.23 Treaty Troll: Areas 2, 3, 4 & 4B

5/1-6/30	Chinook directed fishery with sub quota of 20,000 Chinook. May 1 through June 30 or attainment of 20,000 Chinook sub quota, whichever comes first. All salmon except Coho. If the Chinook quota for the May-June fishery is not fully utilized, the excess fish may be transferred on an impact-neutral basis for limiting stocks into the later all-salmon season. If the Chinook quota is exceeded, the excess will be deducted from the later all-salmon season.
7/1-9/15	All salmon species, with quota of 26,500 Coho and sub quota of 20,000 Chinook plus any portion of uncaught Chinook rolled over from the May 1 through June 30 time period on an impact-neutral basis. Chum release 8/1-9/15. Open from July 1 through September 15, or attainment of either the Coho quota or the Chinook sub quota, whichever comes first.

2.24 Non-Treaty Troll: U.S./Canada border to Cape Falcon

5/1- thru earliest of 6/29 or pre-season Chinook sub-quota of 15,375 (no more than 5,680 of which may be caught in the area between the U.S./Canada border and the Queets River and no more than 4,195 of which may be caught in the area between Leadbetter Pt. and Cape Falcon)	All salmon except Coho with 15,375 Chinook quota; no more than 5,680 of which may be caught in the area between the U.S./Canada border and the Queets River and no more than 4,195 of which may be caught in the area between Leadbetter Pt. and Cape Falcon; Open seven days per week. Landing and possession limit of 75 Chinook per vessel per landing week (Thurs-Wed) is in effect in the area between the U.S./Canada border and the Queets River and in the area between Leadbetter Point and Cape Falcon. An in-season conference call will occur when it is projected that 75% of the overall Chinook quota has been landed or 75% of any sub-area quota has been landed to consider modifying the open period and landing and possession limits. Mandatory Yelloweye Rockfish Conservation Area, Columbia and Cape Flattery Control Zones closed. Trip limits, gear restrictions, and guidelines may be implemented or adjusted in-season. Vessels must land their fish within 24 hours of any closure of this fishery; under state law, vessels must report their catch on a state fish receiving ticket. Vessels in possession of salmon north of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook and halibut catch aboard, and destination. Vessels in possession of salmon south of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook and halibut catch aboard, and destination. Vessels fishing, or in possession of salmon while fishing north of Leadbetter Point must land and deliver all species of fish in a Washington port and must possess a Washington troll and/or salmon delivery license. Vessels may not land fish east of Port Angeles or east of the Megler-Astoria bridge. For delivery to Washington ports east of the Seiku River, vessels must first notify WDFW with area fished, total Chinook and halibut catch aboard, and destination with approximate time of delivery. For delivery to Washington ports south of Leadbetter Point, vessels must first notify WDFW with area fished, total Chinook and halibut catch aboard, and destination with approximate time of delivery. Vessels fishing, or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi. During any single trip, only one side of the Leadbetter Point line may be fished.

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7/1 thru earliest of 9/30 or pre- season Chinook sub-quota of 15,375 or Coho quota of 5,000.	All salmon with 15,375 Chinook quota and no more than 5,000 marked Coho quota. Open seven days per week. A landing and possession limit of 20 coho per vessel per landing week (Thurs-Wed) is in effect in all areas. All retained Coho must be marked with a healed adipose fin clip. No Chum retention north of Cape Alava, Washington beginning August 1. Mandatory Yelloweye Rockfish Conservation Area, Cape Flattery and Columbia Control Zones closed. Grays Harbor Control Zone closed beginning August 12. Trip limits, gear restrictions, and guidelines may be implemented or adjusted in-season. Vessels must land their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels in possession of salmon north of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook, Coho, and halibut catch aboard, and destination. Vessels in possession of salmon south of the Queets River may not cross the Queets River line without first notifying WDFW with area fished, total Chinook, Coho, and halibut catch aboard, and destination. Vessels fishing, or in possession of salmon north of Leadbetter Point must land and deliverall species of fish in a Washington Port and must possess a Washington troll and/or salmon delivery license. Vessels may not land fish east of Port Angeles or east of the Megler-Astoria bridge. For delivery to Washington ports east of the Sekiu River, vessels must first notify WDFW with area fished, total Chinook Coho, and halibut catch aboard, and destination with approximate time of delivery. For delivery to Washington ports, south of Leadbetter Point, vessels must first notify WDFW with area fished, total Chinook, Coho, and halibut catch aboard, and destination with approximate time of delivery. Vessels fishing, or in possession of salmon south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi. During any single trip, only one side of the Leadbetter Point line may be fished.

2.25 Non-Treaty Recreational

Area 1: Leadbetter Point to Cape Falcon (Oregon)

6/19-9/15 (42,400 Mark Selective Fishery Coho sub quota)	June 19 – 26: Open 7 days per week; all salmon except Coho, 1 salmon per day. June 27 – September 15: Open 7 days per week, all salmon, 2 salmon per day, only one of which may be a Chinook; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 22 inches and Coho minimum size 16"; Chinook guideline: 7,200. Closed in Columbia Control Zone. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.

Buoy 10

6/16-7/5	Closed from the Astoria-Megler Bridge downstream. Open from Astoria-Megler Bridge upstream to Rocky Pt./Tongue Pt. line. 7 days/week; 6 fish (min. size 12") per day, up to 2 adults of which no more than 1 sockeye and 1 hatchery steelhead may be retained. Release all salmon other than sockeye and hatchery Chinook.
7/6-7/31	Closed from the Astoria-Megler Bridge downstream. Open from Astoria-Megler Bridge upstream to Rocky Pt./Tongue Pt. line. 7 days/week; 6 fish (min. size 12") per day, up to 2 adults of which no more than 1 sockeye and 1 hatchery steelhead may be retained. Release all salmon other than hatchery jack Chinook and sockeye.
8/1-8/10	Open 7 days/week; 2 fish per day, no more than 1 Chinook. Chinook min. size 24", Coho min. size 16". Release all salmon and steelhead other than hatchery Chinook and hatchery Coho.
8/11-9/6	Open 7 days/week; 2 fish per day, no more than 1 Chinook. Chinook min. size 24", Coho min. size 16". Release all salmon and steelhead other than Chinook and hatchery Coho.
9/7-9/30	Open 7 days/week; 3 fish per day. Coho min. size 16". Release all salmon and steelhead other than hatchery Coho.
10/1-10/31	Open 7 days/week; 6 fish (min. size 12") per day, up to 3 adults. Release all salmon and steelhead other than hatchery Coho.
11/1-12/31	Open 7 days/week; 6 fish (min. size 12") per day, up to 3 adults, of which no more than 2 may be hatchery steelhead. Release all salmon other than hatchery Coho.

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1/1-3/31	Open 7 days/week, 6 fish (min. size 12") per day, up to 2 adults, release all salmon other than hatchery Chinook.
North Jetty	Open 7 days per week when Area 1 or Buoy 10 area is open. When Buoy 10 area and Area 1 are open concurrently, the daily limit and minimum size restrictions follow the most liberal regulations of those areas.

Area 2: Queets River to Leadbetter Point

6/19-9/15 (20,440 Mark Selective Fishery Coho sub quota	June 19 – 26: Open 7 days per week; all salmon except Coho; 1 salmon per day. June 27- September 15: Open 5 days per week (Sun- Thurs); all salmon, 2 salmon per day, only one of which may be a Chinook; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 22 inches and Coho minimum size 16 inches; Chinook guideline: 12,925. Grays Harbor Control Zone closed beginning August 9. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.

Area 2-1 (east of a line from Leadbetter Point to Cape Shoalwater): Willapa Bay

6/19-7/31	Open concurrent with Area 2, when Area 2 is open for salmon. Area 2 rules apply.
8/1-1/31	6 fish limit, 2 adults, 12" min size limit. Release wild Chinook and wild Coho. 2 pole endorsement.

Area 2-2 (east of line between tips of exposed jetties): Grays Harbor

West of Buoy 13 line 6/19-8/21	Open concurrent with Area 2, when Area 2 is open for salmon. Area 2 rules apply.
East of Buoy 13 line, when open	All salmon required to be released may not be totally removed from the water, except anglers fishing from boats 30' or longer as listed on either their State or Coast Guard regulation are exempt. Single-point barbless hooks required.
East of Buoy 13 line 6/19-7/31	Closed.
East of Buoy 13 line 8/1-9/23	1 fish limit, 12" min size limit. Release wild Chinook and wild Coho. Open to salmon angling only in the area described as Humptulips – North Bay (the area conforms to the commercial SMCRA 2C).

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East of Buoy 13 line 10/1-11/30	1 fish limit, 12” min size limit. Release Chinook. Open to salmon angling only in the area described as East Grays Harbor (the area conforms to the commercial SMCRA 2D).

Westport Boat Basin and Ocean Shores Boat Basin

8/16-1/31	6 fish limit, 4 adults; 12” min size limit. Release Chinook.

Area 3: Cape Alava to Queets River

6/19-9/15 (1,430 Mark Selective Fishery Coho sub quota)	June 19 –July 3: Open 7 days per week; all salmon except Coho, 2 salmon per day. July 4 – September 15: Open 7 days per week, all salmon except no Chum retention beginning August 1, 2 salmon per day; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 24 inches and Coho minimum size 16 inches; Chinook guideline: 1,300. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon

Area 4: U.S./Canada border to Cape Alava and east to Sekiu River

6/19-9/15 (5,730 Mark Selective Fishery Coho sub quota)	June 19 –July 3: Open 7 days per week; all salmon except Coho, 1 salmon per day. July 4 – September 15: Open 7 days per week, all salmon except no Chum retention beginning August 1, 2 salmon per day; retained Coho must have a healed adipose fin clip; Chinook minimum size limit 24 inches and Coho minimum size 16 inches; Chinook guideline: 5,825. No Chinook retention east of Bonilla-Tatoosh line beginning August 1. Closed waters: east of a true north-south line running through Sail Rock in July; **Closed to salmon angling** inside the area bounded by a line from Kydaka Point to Shipwreck Point. In-season management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon.

Area 4A: Makah Bay Treaty Evaluation Marine Set Net Fishery

Chinook	Trty	Open 6/15 through 8/31 in Area 4A, except closed inside an area bounded by a line running from Strawberry Rock Point (48º 19’ 07”N, 124º 40’ 00”W) to the group of rocks (48º 19’ 46”N, 124º 40’ 35”W) which are located off Hobuck Beach and a line to the mouth of Hobuck Creek (48º 19’ 94”N, 124º 39’ 66W), to be implemented per agreement between the Makah Tribe and WDFW.

AR004696

Part II. PUGET SOUND including STRAIT of JUAN de FUCA and SAN JUAN ISLANDS fisheries (All fisheries modeled in FRAM #3721 (Chinook) & #2140 (Coho))

2.2 Strait of Juan de Fuca Pre-terminal Areas

Areas 5, 6, 6C Treaty Troll (Ntrty net closed)

NOTE: Area 4B: 5/1-10/31 see Ocean Troll. For 11/1-12/31 & 1/1-4/15 see below.

5/1-6/15	Closed
6/16-9/30	Open for salmon, Chum release; Freshwater Bay closed, south of Angeles Pt./Observatory Pt. line; Pt. Angeles Harbor closed west of line from tip of Ediz Hook to ITT Rayonier Dock; Hoko Bay closed inside the area bounded by a line from Kydaka Point to Shipwreck Point; Area 6 closed east of a line true north from Green Point; 1,000-foot closure around stream mouths. The catch estimates for this fishery modeled in FRAM are statistically-derived predictions, and are the best available pre-season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions.
10/1-10/31	Closed.
11/1-4/15	In Areas 4B, 5, 6, 6C the treaty troll fishery will be open from November 1, 2021 through April 15, 2022, or when the catch reaches the harvest ceiling of 8,500 Chinook, whichever comes first. 1,000-foot closures around stream mouths. Hoko Bay closed inside the area bounded by a line from Kydaka Point to Shipwreck Point for the month of November. The catch estimates for this fishery modeled in FRAM are statistically-derived predictions, and are the best available pre- season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions. The winter troll catch ceiling is 8,500 Chinook.
4/16-4/30	Closed

Areas 4B, 5, & 6C Treaty Net (Ntrty net closed)

Note: The catch estimates for this fishery modeled in FRAM are statistically-derived predictions, and are the best available pre-season estimates of catch in this fishery. In order to have the actual catch reflect run strength, however, these estimates will not be treated as a ceiling when the managers make in-season fishery management decisions.

Chinook	Open for setnet gear only, 6/20 through 8/21; 7 days a week; Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point; Freshwater Bay closed, south of Angeles Pt./Observatory Pt. line; 1,000-ft. closure around stream mouths.
Sockeye/Pink	Start to be determined by Fraser River Panel. The Co-managers have identified the following management actions to control by-catch of Chinook. Estimated by-catches are best estimates and are not quotas or ceilings. The priority for this fishery is to harvest the full Treaty share of Sockeye and pink salmon, while managing the fishery so as to not greatly exceed the projected incidental harvest of Chinook salmon. All Chinook by-catch in this fishery will be promptly reported by each Tribe to the NWIFC TOCAS database and reported to the U.S. section of the Fraser Panel at least weekly, including 'Take Home' and 'Ceremonial & Subsistence' (C&S). If in-season the Chinook by-catch in this fishery exceeds 1,300, the Tribes will consider management actions to limit the Chinook by-catch, such as time or area restrictions, while continuing the priority objective of harvesting Sockeye salmon. If in-season the fishery is projected to result in a total Chinook by-catch exceeding 3,300 Chinook, the Tribes will, effective with that scheduled fishery opening, prohibit any commercial sales of Chinook salmon, and any Chinook salmon landed must be delivered to the fishers' respective Tribe.
Coho	Open for gillnets starting at 6 days per week with in-season adjustments based on cumulative catch. Fishery will target Coho from the end of Fraser Panel control, through 10/9; 1,000 ft. closure around stream mouths. Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point.
Chum	Open for gillnets, starting at 6 days per week (day may be added if effort is low), 10/10 through 11/13; 1,000-foot closure around stream mouths. Hoko Bay closed, inside the area bounded by a line from Kydaka Point to Shipwreck Point.

Area 5 Recreational

Kydaka Point Closure: Waters south of a line from Kydaka Point westerly approximately 4 miles to Shipwreck Point closed to salmon angling 7/1-8/15.

5/1-6/30	Closed
7/1-9/30	2 fish limit, (Chinook 22" min size); release Chum, wild Coho and wild Chinook. Release all Chinook 8/16-9/30.
10/1-2/28	Closed
3/1- 4/30	2 fish limit (Chinook 22" min size), release Coho and wild Chinook.
5/1 – 5/14	Closed

Area 6 Recreational

5/1-6/30	Closed
7/1-9/30	2 fish limit, release Chinook, wild Coho, and Chum; except W. of true N/S line through “2” buoy near tip of Ediz Hook retention of marked Chinook allowed (Chinook 22" min size);. South of Angeles Pt. /Observatory Pt. line – closed to angling. Pt. Angeles Hbr. W. of line from tip of Ediz Hook to ITT Rayonier Dock – closed to salmon angling. Release all Chinook 8/16-9/30.
10/1-5/14	Closed

2.3 Strait of Juan de Fuca Terminal Areas

Area 6D Dungeness Bay Net

Note: The following applies to all 6D Dungeness Bay Coho fisheries (Tribal & WDFW): Co-managers agree to examine the feasibility of creating an in-season runsize update for the 6D coho fishery prior to the start of the 2021 season. If Co-managers agree on the usefulness of the update model, the update will be used in-season to evaluate the likelihood of achieving the hatchery egg take goal and guide subsequent management of the bay and river fisheries. Absent in-season conditions that support the likely achievement of egg take goals, Dungeness Bay fisheries may close early.

Chinook	All	Closed
Pink	Trty	Closed
	Ntrty	Closed
Coho	Trty	Open 9/21 through 10/30; Additional days beyond 10/30 may be considered; 9/21 through 10/10, seven days per week, fishing 7 am to 7 pm only, nets must be attended by fisher, Chinook and Chum release; 10/11 through 10/30 (or 11/6 should conditions allow), seven days per week, 24 hours per day; 1,500 ft closure around mouth of Dungeness River.
	Ntrty	Open Wk 39 (wb 9/19) through Wk 44 (wb 10/24) for skiff gillnet gear; 7AM – 7PM; Wk 39 T-F, Wks 40-44 M-F; Chinook and Chum NR, release by cutting ensnaring meshes; 1,500 ft. (1/4 nautical mile) closure around each river mouth, and 500ft closure around Meadowbrook Cr. mouth. Fishery may close early pending in-season information. Openings possible in Wk 45 (wb 10/31) based on in-season information.
Chum	All	Closed

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Dungeness River (Treaty and Recreational)

Note: The following applies to all Dungeness River Coho fisheries (Tribal & WDFW): Co-managers will meet on, or prior to October 14, 2021 to review current in-season conditions and the results of an in-season runsize update if available. Absent in-season conditions that support the likely achievement of egg take goals, Dungeness River fisheries may remain closed. If flows are precluding coho from moving upriver to the hatchery, the Dungeness River fishery will remain closed until conditions allow coho movement upriver.

Dungeness River Treaty (Ntrty net closed)

Chinook	Trty	Closed
Pink	Trty	Closed
Coho	Trty	Commercial fishing up to 3 days/wk, to be determined in-season, for Coho only, is scheduled to open on 10/16 and will be restricted to areas below the Dungeness hatchery intake using species selective (hand-held) gear. Subsistence fishing using selective gear is scheduled to open on 10/16. Refer to the co-management agreement above for possible emergency closures.
Chum	Trty	Closed

Elwha River Treaty (Ntrty net closed)

Chinook	Trty	Closed except Ceremonial Harvest of 4 fish in July.
Coho	Trty	Closed
Chum	Trty	Closed

Dungeness Bay Recreational

5/1-9/30	Closed to salmon.
10/1-10/31	2 fish limit, hatchery Coho only.
11/1-5/14	Closed to salmon.

Dungeness River Recreational

mouth to the forks at Dungeness Forks Campground	10/16-11/30	4 fish limit, hatchery Coho only; 12” min size.

Elwha River Recreational

Closed to salmon and gamefish

Hoko River Recreational

mouth to cement bridge (mile 7.0) on Hoko/Ozette Hwy.	Closed to salmon

All other STRAIT OF JUAN DE FUCA REGION freshwater recreational closed to salmon angling.

2.3 San Juan Islands/Point Roberts Area

Areas 6, 7, & 7A Net

Chinook	All	Closed
Sockeye	Trty	Schedule to be determined. The Co-managers have identified the following management actions to track and control by-catch of Chinook. Estimated by-catches are best estimates and are not quotas. The priority for this fishery is to harvest the full treaty share of Sockeye salmon, while managing the fishery so as to not greatly exceed the projected incidental harvest of Chinook salmon. All Chinook by-catch in this fishery will be promptly reported by each Tribe to the NWIFC TOCAS database and reported to the U.S. Section of the Fraser Panel at least weekly, including take home and ceremonial and subsistence (C&S). Prior to achieving a by-catch of 4,200 Chinook there will be no restrictions on the retention or sale of Chinook salmon. If, during the season, the Fraser Panel schedules a fishery that is projected to result in a total Chinook by-catch exceeding 4,200 fish, the Tribes will, effective with that scheduled fishery, prohibit any commercial sales of Chinook salmon, and any Chinook salmon landed must be delivered to the fisher's respective Tribe. Reef net wild coho, wild Chinook, and chum NR. Reef net may retain marked Chinook through 9/30. Further policy discussion may occur among the affected parties prior to the season.
	Ntrty	Schedule to be determined. The Co-managers have identified the following management actions to track and control by-catch. Modeled by-catches are best estimates and are not quotas. All vessel operators must complete best fishing practices certification prior to fishing. PS: brailing required. Chinook and Chum NR. Reef net Chum and unmarked Chinook NR. Reef net: fishers may retain hatchery Chinook, with a cap of 300 and unmarked Coho with a cap of 500 for all gears through 9/30. Estimates of by-catch will be shared at least weekly in the U.S. Section of the Fraser River Panel. Purse seine and gillnet fisheries will be managed to ensure that the non-treaty impact does not exceed 3,771 total Chinook (120% of pre-season estimate).

Pink	Trty	Purse seine, gill net, and reef net: schedule dependent upon Fraser Panel. See Chinook and coho bycatch in-season actions description in sockeye section above. Reef net: wild coho, wild Chinook, and chum NR. Reef net may retain marked Chinook through 9/30.
	Ntrty	Schedule to be determined. All vessel operators must complete best fishing practices certification prior to fishing. PS: brailing required. Chinook, Coho, and chum NR. Reef net: Chum, wild Chinook, and wild Coho NR. See Chinook by-catch in-season actions description in Sockeye section above.
Coho	Trty	Reef net: 7 days/wk beginning at end of Fraser Panel management through 11/20; Chinook NR after 9/30; Chum NR through 9/30.
	Ntrty	Reef net: 7 days/wk beginning at end of Fraser Mgmt through Chum mgmt wk 41 (wb 10/3); Chinook NR after 9/30; unmarked Coho retention allowed through 9/30 with a cap of 500, then Coho retention. Chum retention prohibited until after 9/30. All vessel operators must complete best fishing practices certification prior to fishing.
Chum	Trty	The Treaty fishery will open October 10 (dependent on run status updates from CDFO) and remain open. See attached 2021 7/7A Chum Fishing Plan. Reef nets open from end of Fraser Panel management through end of Chum management (11/20), 7 days/wk. Reef net release requirements listed in Coho fishery description, above.
	Ntrty	Dependent on update of run status from CDFO. PS and GN open wk 41 (wb 10/3) through wk 45 (wb 10/31). Open 10/10, 10/11, 10/14, 10/15 and may re-open through the end of the season on 10/19 based on conditions outlined in the attached agreement. Co-managers will meet via conference call on Saturday 10/16 to discuss catch to date. PS: brailing and recovery box required, Chinook and Coho NR. GN: during wk 41, Chinook and Coho NR, recovery box required and limited soak times in effect. Reef nets open from end of Fraser Panel management through wk 45 (wb 10/31), 7 days/wk, must release all Chinook. All vessel operators must complete best fishing practices certification prior to fishing.
Subsistence	Trty	12/1 – 4/30 subsistence troll fishery (Chinook 22” min size). Bellingham Bay closed 4/1 – 4/30.

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Area 7 Recreational

5/1-6/30	Closed to salmon.
7/1-7/31	2 fish limit, 1 hatchery Chinook (Chinook 22” min size); release Chum, wild Coho, and wild Chinook; Bellingham and Samish Bay closed to salmon.
8/1-8/15	2 fish limit, release Chinook, Chum, and wild Coho; Bellingham and Samish Bay closed to salmon..
8/16-8/31	2 fish limit, 1 hatchery Chinook (Chinook 22” min size); Release Chum, wild Coho, and wild Chinook.
9/1-9/30	2 fish limit, release Chinook, Chum, and wild Coho.
10/1-5/14	Closed to salmon

2.4 Nooksack/Samish Terminal Region

Bellingham Bay (Areas 7B, 7C, 7D; 7A On-Reservation) Net

Chinook/Pink	Trty	Area 7D: Weeks 17 – 25, ceremonial and subsistence fishery no more than two days a week targeting hatchery spring Chinook returning to the Lummi Bay salmon hatchery. Effort will be limited and participation is by permit only. Lummi's spring Chinook fisheries in Lummi Bay and the Nooksack River will be managed so as not to exceed 29 Nooksack spring Chinook NOR mortalities.
		Areas 7B, & 7D: August 1 through September 10, open weekly 4 PM Sunday to 4 PM Friday. Fishing pattern: 5,5,5,5,5,5. Area 7C: August 1 through September 17, open weekly 4 PM Sunday to 4 PM Friday. Fishing pattern: 5,5,5,5,5,5,5. Samish Bay is closed southeasterly of a line from Oyster Creek to the fisheries marker on Samish Island, except that hand pull gillnets may fish from a line from Oyster Creek to Fish Point on Samish Island, August 1 through September 15, Sunday 4 PM to Wednesday 4 PM, weekly. Fishing pattern:3,3,3,3,3,3,3. 6 ½" mesh in 7C and off-reservation areas of 7B, except when open for sockeye in Area 7 and 7A.
Chinook /Coho	Ntrty	Areas 7B & 7C: Wks 34 (wb 8/15) – 37 (wb 8/29); PS Coho NR through wk 35. GN fishing pattern: 3,3,5,5 PS fishing pattern 1,2,1,3
Coho	Trty	Area 7A on-reservation fishery: September 5 through October 6. Open weekly 4 PM Sunday to 4 PM Wednesday. Fishing pattern: 3,3,3,3,3.
		Areas 7B and 7D: September 12 through October 23, open Sunday 4 PM to Saturday 4 PM. Fishing pattern: 6,6,6,6,6,6.
		7C: On September 27, a Co-manager conference call will be held to determine the status of Samish Chinook escapement. If the escapement goal appears to be attainable, and through development of a Co-manager agreed in-season update methodology it is determined that there is a harvestable surplus of Samish Coho, then a Coho fishery will open September 29 to October 16, Sunday 4 PM to Wednesday 4 PM, weekly. Fishing pattern: 3,3,3.

AR004705

	Ntrty	Area 7B: Wks 38 (wb 9/12) - 43 (wb 10/17); GN fishing pattern: 5,7,7,7,7,7 (24 hrs for all days); PS fishing pattern: 3,7,7,7,7,7.
Chum	Trty	Areas 7B & 7D: Oct. 24 – Dec.7; open weekly Monday and Tuesday, daylight hours only; Fishing pattern: 2,2,2,2,2,2,2,2.
	Ntrty	Area 7B: Wks 44 (wb 10/24) - 49 (wb 11/28); PS fishing pattern: 1,1,1,1,1,1 and GN fishing pattern: 3,3,3,3,3,3. Whatcom Creek Zone (east of line from Post Point to flashing red light at west entrance of Squalicum Harbor) closed.

Nooksack River Tribal Net (Non-Tribal net closed)

Note: On a weekly basis, Nooksack Tribe commercial fisheries on the Nooksack River will open at 12:01 AM Sun, except that portion of the river between Marine Drive Bridge and the first turn ("Big Bend") in the river upstream of the Slater Road Bridge (approximately ¼ mile upriver from the Slater Road Bridge), which will open at 4:00 PM Sunday. On a weekly basis the Nooksack Tribe's commercial Chinook fisheries will close 4:00 PM Friday; Coho fisheries will close 4:00 PM Saturday and Chum fisheries will close 10:00 AM Tuesday.

Chinook/ Pink	4/5-6/15	April to June 30: limited ceremonial and subsistence fishery will be managed for a total mortality of 39 NOR Chinook. The Nooksack Tribe's ceremonial and subsistence fisheries may occur from Slater Road Bridge up to 500 feet upriver of the Highway 9 Bridge in the lower North Fork through May 28. Any openings from May 29 through June 30 will be limited to the area downstream of the BNSF railroad bridge that is below the Highway 9 Bridge. This will avoid overlap with the lower portion of the WDFW recreational fishery. A total of 286 Chinook are projected in the Nooksack Tribe's fishery with an anticipated 10 NORs among the 286. This fishery is by permit only. The Lummi Nation's fishery will occur in the lower Nooksack River between the Slater Road bridge and the river mouth (between RM 0.0 and 3.5). Lummi's spring Chinook fisheries in Lummi Bay and the Nooksack River will be managed so as not to exceed 29 NOR chinook mortalities. Tribal fisheries in the river may be selective and/or non-selective and the selective fishery will release NOR Chinook and apply a release mortality rate of 30% to these fish. Based on in-season harvests and fishing conditions, the Nooksack Tribe and Lummi Nation may discuss alternate sharing arrangements of the allowable 39 NOR mortalities.

	8/1 - 9/11	Open weekly 4 PM Sunday to 4 PM Saturday, August 1 through 4 PM September 11. Fishing pattern: 6,6,6,6,6,6. The river is divided into five zones during this period. These zones open in subsequent weeks, proceeding upriver, to protect migrating spring Chinook. **Zone 1** is from Marine Drive Bridge to Slater Bridge. **Zone 2** is from Slater Bridge to Hannegan Bridge In Lynden. **Zone 3** is from Hannegan Bridge to Nugent's Corner Bridge. **Zone 4** is from Nugent's Corner Bridge to the confluence of the north and south forks. The area in Zone 4, 1.3 miles downstream of the confluence (down to Nooksack Tribe blue colored automotive shop) will remain closed to protect holding Spring Chinook. **Zone 5** is upriver of the confluence of the north and south forks, and is closed.
Coho	9/12 – 10/23	Open weekly 4 PM Sunday through 4 PM Saturday. Fishing pattern: 6,6,6,6,6,6. The area in Zone 4, 1.3 miles downstream of the north and south Fork confluence (down to Nooksack Tribe blue colored automotive shop) will remain closed through 4 PM September 23 to protect holding Spring Chinook.
Chum	10/25 – 12/14	Commercial. Open weekly Monday and Tuesday. Fishing pattern: 2,2,2,2,2,2,2,2. The Nooksack Tribe will fish 12:01 am to 10 am daily. The Lummi Nation will fish daylight hours daily (10 hours per day)
	11/1 - 11/22	Subsistence harvest only. The Lummi Nation and Nooksack Tribe will each schedule one day of subsistence fishing between November 1 and November 22. The subsistence fishery will be scheduled on a day with no commercial fishing.
	11/8 – 11/30	Nooksack Tribe and Lummi Nation will conduct a test fishery to assess the Nooksack chum run size. Nooksack will fish between Nugents Corner and the Everson Bridge. Lummi will fish downriver of the Slater Road Bridge. A single fisher from each tribe will make 4 drifts each, per fishing day. All fish captured during this fishery will be used by the tribes for ceremonial and subsistence purposes. Fishing Pattern: 1,1,1,1. Fishing days will be determined by tides and river flow. Catch and effort data from this fishery will be shared with the co-managers and used to inform discussion on run strength. The co-managers will stay in regular communication throughout the chum season sharing information and observations on catch, hatchery rack returns and fish on the spawning grounds. Commercial fishing schedules may be adjusted based on these discussions.

Bellingham Bay Terminal Area Recreational

5/1-8/15	Closed to Salmon
8/16-9/30	4 fish limit, 2 Chinook (Chinook 22" min size); Samish Bay closed.
10/1-5/14	Closed to Salmon.

Nooksack River Recreational; mainstem and North Fork

from Lummi Indian Reservation boundary to yellow marker at the FFA high school barn in Deming	8/1 – 9/30	2 fish limit, plus 2 additional Pink salmon or hatchery Coho; 12” min size. Release wild Chinook and Chum. Night closure and anti-snagging rules in effect.
	10/1 – 12/31	2 fish limit, plus 2 additional Pink salmon or hatchery Coho; 12” min size. Release wild Chinook and Chum. Night closure and anti-snagging rules in effect.
from yellow marker at the FFA high school barn to confluence of North and South forks	10/1 – 12/31	2 fish limit, plus 2 additional Pink salmon or hatchery Coho; 12” min size. Night closure and anti-snagging rules in effect.

Nooksack River Recreational, South Fork

from mouth to Skookum Creek	10/1 – 12/31	2 fish limit, plus 4 additional hatchery Coho; 12” min size. Release wild Chinook 10/1 – 10/15. Night closure and only one single point hook allowed.

Nooksack River Recreational, North Fork

from the Hwy. 9 Bridge to the yellow marker at the upstream side of Kendall Hatchery.	5/29 – 6/30	2 fish limit, hatchery Chinook only, 12” min. size; release all other salmon. Night closure and anti-snagging rules in effect.
Hwy 9 bridge to Maple Creek	10/1 – 12/31	2 fish limit, plus 2 additional hatchery Coho; 12” min size. Night closure and anti-snagging rules in effect.

Samish River Recreational		
from mouth to I-5 Bridge	8/1 – 9/13	2 fish limit, 12" min size. Release wild Coho, Chum, and Pink salmon.
Dakota Creek Recreational		
mouth to Giles Road Bridge	5/1 – 5/14/2022	Closed
Whatcom Creek Recreational		
mouth to yellow markers below foot bridge below Dupont St. in Bellingham	TBD	To be determined.

All other NOOKSACK/SAMISH TERMINAL REGION freshwater recreational: Closed to salmon angling.

2.5 Skagit Terminal Region

Terminal area fisheries will be managed so as not to exceed total projected incidental fishery mortalities of Skagit wild summer/fall Chinook. Treaty schedules may be changed in-season as necessary to meet management objectives and harvestable shares and to address river and weather conditions. Swinomish, Sauk-Suiattle, and Upper Skagit Tribes' fisheries will be managed so as not to exceed their individual shares based on the preseason forecast and any in-season update that becomes available. The modeled inter-tribal catch distributions are forecasts only and do not set a precedent for future years.

The Sauk-Suiattle, Upper Skagit and Swinomish Tribes reserve the opportunity to take C&S reserved Chinook across the entire duration of this LOAF agreement, May 1, 2021 through May 14, 2022. The Upper Skagit, Sauk-Suiattle, and Swinomish Tribes reserve the right to reallocate catch between commercial and C&S as needed and in response to changes in goals and ISUs. Further, Upper Skagit, Sauk-Suiattle, and Swinomish Tribes reserve the right to adjust fishery dates and the logistics of modeled fisheries due to water conditions or allocative reasons throughout their Usual & Accustomed fishing areas.

The Sauk-Suiattle, Upper Skagit and Swinomish Indian Tribes may propose spring Chinook fisheries to begin in April of 2022 and extending into May 2022. Opening of these fisheries would be dependent on the co-managers submission of a supplemental Skagit spring Chinook fishery plan for the spring Chinook management period, for NMFS' review and concurrence. The plan would detail the following: the forecasted Skagit spring Chinook MU run size for 2022; the

management objectives that would be in place for that run-year; an estimate of allowable impacts and those estimated to be taken during the spring Chinook management period; plans for monitoring this period, and a description of how this fishery would operate within any limits in place for other ESA-listed species incidentally encountered during this fishery. The parameters of this fishery would be subject to modification by the co-managers on submission to NMFS of a revised plan, independently or as part of the 2022-2023 LOAF.

The Skagit co-managers will utilize the same update models for Sockeye (river/lake Trap method), Coho (Blakes/Spudhouse test fishery method), and Chum ISU (Bay/Jetty/Blakes test fishery method) consideration (with data from 2020 added) that have been used in recent years. Other models may be considered with co-manager agreement should they become available before or during the fishery.

NOTE: WDFW will share creel sampling and enforcement reports in-season as fisheries progress. The Skagit River recreational fisheries will follow sampling plans provided in past years. Communication: Co-managers will share available information from the Areas 4, 5, and 6 recreational fisheries (species, mark, size, catch, encounter) the second week of August. This information will be evaluated against pre-season expectation and provide co-managers with additional information which may be useful in management considerations.

Skagit Bay (Area 8) Net

Note: Fishing schedules for Skagit Bay, Skagit River, and Baker River are pre-season projections. Schedules may be changed in-season as necessary to meet management objectives and harvestable shares.

Chinook	Area 8 – Trty	Swinomish Tribe may elect to take some or all of their C&S reserved Chinook in Area 8.
Spring Chinook	Area 8 – Trty	Swinomish Tribe fishing pattern: wk 18 (wb 4/25) thru wk 19 (wb 5/2); 4,4. Additionally, Swinomish will open fisheries in April and May of 2022 during the timeframe of this LOAF in accordance with the stipulations in the Skagit preamble section above. Once a 2022 spring Chinook forecast is available, Chinook impacts for these April-May 2022 fishing days will be modeled during the 2022-23 NOF/PFMC process such that they are applied to the correct biological return year. Upper Skagit Tribe fishing pattern: No scheduled fishery.
Sockeye	Area 8 – Trty	Swinomish fishery will be managed so as not to exceed their individual Sockeye share based on the preseason forecast and any in-season update that becomes available. Additional fishing dependent on ISU. Swinomish Tribe fishing pattern: wk 27 (wb 6/27) thru wk 28 (wb 7/4); 2,2. Upper Skagit Tribe fishing pattern: No scheduled fishery.
	Ntrty	Closed
Pink	Area 8 – Trty	Swinomish Tribe fishing pattern: wk 35 (wb 8/22) thru wk 37 (wb 9/5); 1,5,2. Upper Skagit Tribe fishing pattern: No scheduled fishery.
	Area 8 - Ntrty	Closed. May open pending co-manager agreement on ISU that indicates harvestable run size.
Coho	Trty	If ISU changes abundance status, treaty shares may be modified following co- manager discussions.
	Area 8 – Trty	Swinomish Tribe fishing pattern: wk 39 (wb 9/19) thru wk 40 (wb 9/26); 1.5,1.5. Upper Skagit Tribe fishing pattern: No scheduled fishery.

	Ntrty	Closed
Chum	Area 8 – Trty	Swinomish Tribe fishing pattern: No preseason harvestable. Upper Skagit Tribe fishing pattern: No preseason harvestable.
	Ntrty	Closed. May open pending co-manager agreement on ISU that indicates harvestable runsize.
Chum Test	Area 8	1 boat at Jetty 1 day/wk 44 (wb 10/24) & 45 (wb 10/31) and 1 boat in Bay 1 day/wk 44 (wb 10/24) & 45 (wb 10/31).
	Ntrty	Closed. May open pending co-manager agreement on ISU that indicates harvestable runsize.

Skagit River Treaty Net (Ntrty net closed)

Chinook	Ceremonial and Subsistence – 200 summer/fall and 34 spring Chinook total: Swinomish (17 spring), Sauk-Suiattle (200 summer/fall), and Upper Skagit (17 spring) Tribes.	
Spring Chinook	Area 78C	Swinomish Tribe fishing pattern: wk 18 (wb 4/25) thru wk 19 (wb 5/2): 4,4. Additionally, Swinomish will open fisheries in April and May of 2022 during the timeframe of this LOAF, in accordance with the stipulations in the Skagit preamble section above. Once a 2022 spring Chinook forecast is available, Chinook impacts for these April-May 2020 fishing days will be modeled during the 2022-23 NOF/PFMC process such that they are applied to the correct biological return year. Upper Skagit Tribe fishing pattern: wk 19 (wb 5/2) thru wk 20 (wb 5/9):1.25, 1.5.. Additionally, Upper Skagit will fish the following schedule in 2022 during the timeframe of the 2021-2022 LOAF: wk 17 (wb 4/17/2022) thru wk 18 (wb 4/24/2022): 2,2. Once a 2022 spring Chinook forecast is available, realized Chinook impacts for these April 2022 fishing days will be modeled during the 2022-23 NOF/PFMC process such that they are applied to the correct biological return year.

	Area 78D	Upper Skagit Tribe fishing pattern: wk 19 (wb 5/2) thru wk 20 (wb 5/9):1.25, 1.5. Additionally, Upper Skagit will fish the following schedule in 2022 during the timeframe of the 2021-2022 LOAF: wk 17 (wb 4/17/2022) thru wk 18 (wb 4/24/2022): 2,2. Once a 2022 spring Chinook forecast is available, realized Chinook impacts for these April 2022 fishing days will be modeled during the 2022-23 NOF/PFMC process such that they are applied to the correct biological return year.
	Area 78P Cascade R.	Sauk-Suiattle Tribe fishing pattern: wk 21 (wb 5/16) thru wk 22 (wb 5/23); 7,7. And wk 23 (wb 5/30) thru wk 30 (wb 7/18); 2,2,2,2,2,2,2,2. Fishery managed to a 300 spring Chinook quota. Release natural Chinook.
Sockeye	Ceremonial and Subsistence: 100 fish Upper Skagit Tribe. [350 sockeye Sauk-Suiattle -- Swinomish and Upper Skagit object unless Sauk takes these within its U&A as set forth in *United States v. Washington*, 384 F. Supp. 312, 376 (FF 131) (W.D. Wash. 1974)].	
	Area 78C	Swinomish and Upper Skagit Tribes' fisheries will be managed so as not to exceed their individual Sockeye shares based on the preseason forecast and any in-season update that becomes available. Swinomish Tribe fishing pattern: wk 27 (wb 6/27) thru wk 28 (wb 7/4): 2,2. Additional fishing dependent on ISU. Upper Skagit Tribe fishing pattern: wk 28 (wb 7/4) thru wk 29 (wb 7/11): 0.208,0.208. Additional fishing dependent on ISU.
Sockeye	Area 78D Area 78O	Swinomish and Upper Skagit Tribes' fisheries will be managed so as to not exceed their individual Sockeye shares based on the preseason forecast and any in-season update that becomes available. Swinomish Tribe fishing pattern (Area 78D-4 and Baker River): Wk 28 (wb 7/4) thru wk 29 (wb7/11): 1,1; Additional fishing dependent on ISU; Upper Skagit Tribe fishing pattern: Areas 78D-2, 78D-3, 78D-4, and 78O (Baker River): wk 28 (wb 7/4) thru wk 29 (wb7/11): 0.208. 0.208; Additional fishing dependent on ISU.

Pink	Area 78C	Swinomish Tribe fishing pattern: wk 35 (wb 8/22) thru wk 37 (wb 9/5); 1,5,2. Upper Skagit Tribe fishing pattern: Wk 36 (wb 8/29) thru wk 38 (wb 9/12): 1.5, 2.167, 2.167. Additional fishing dependent on ISU.Additional fishing dependent on ISU.
	Area 78D	Upper Skagit Tribe fishing pattern: Wk 36 (wb 8/29) thru wk 38 (wb 9/12): 1.5, 2.167, 2.167. Additional fishing dependent on ISU.
	Area 78P Cascade R.	Sauk-Suiattle Tribe fishing pattern: wk 34 (wb 8/15) thru wk 38 (wb 9/12):2,2,2,2.
	Area 78B Sauk R.	Sauk-Suiattle Tribe fishing pattern: wk 34 (wb 8/15) thru wk 38 (wb 9/12); 7,7,7,7.
Coho	If ISU changes abundance status, treaty shares may be modified following co-manager discussions.	
	Area 78C:	Swinomish Tribe fishing pattern: Wk 39 (wb 9/19) thru wk 40 (wb 9/26): 1.5, 1.5. Upper Skagit Tribe fishing pattern: Wk 41 (wb 10/3) thru wk 43 (wb10/17): 0.333, 0.333, 0.333.
	Area 78D	Upper Skagit Tribe fishing pattern: Wk 41 (wb 10/3) thru wk 43 (wb10/17): 0.333, 0.333, 0.333.
	Area 78P Cascade R.	Sauk-Suiattle Tribe fishing pattern: wk 39 (wb 9/19) thru wk 45 (wb 10/31); 2,2,2,2,2,2,2. Fishery managed to a 2000 coho quota.
	Area 78B Sauk R.	Sauk-Suiattle Tribe fishing pattern: wk 45 (wb 10/31) thru wk 48 (wb 11/21); 7,7,7,7. Fishery managed to a 1000 coho quota.
Chum	Area 78C	Swinomish fishing pattern: No pre-season harvestable. Upper Skagit Tribe fishing pattern: No pre-season harvestable.
	Area 78D	Upper Skagit Tribe fishing pattern: No pre-season harvestable.
River Test	Chinook	Area 78C - Blakes wk 19 (wb 5/2) thru wk 35 (wb 8/22);1 boat, 6 hours/wk.
	Sockeye	Area 78C – Blakes wk 24 (wb 6/6) thru wk 29 (wb 7/11); 1 boat, 12 hours/wk; Area 78D-3 - Upper Skagit - wk 23 (wb 5/30) thru wk 30 (wb 7/18);1 boat, 4 hrs/wk.

	Coho	Area 78C - Blakes Drift wk 38 (wb 9/12) thru wk 42 (wb 10/10), 12 hours/wk; Area 78C – Spudhouse Drift, Upper Skagit, wk 34 (wb 8/15) thru wk 42 (wb wb 10/10);1 boat, 12 hours/wk; Area 78D-3 Wk 35 (wb 8/22) thru wk 44 (wb 10/24);1 boat, 4 hours/wk.
	Chum	Area 78C - Blakes Drift wk 44 (wb 10/24) and wk 45 (wb 10/31);1 boat, 12 hours/wk.
	Steelhead (tangle net)	Area 78D-3 Wk 5 (wb 1/23/22) thru wk 17 (wb 4/17/22). Steelhead tagged and released..

Swinomish Channel Treaty Net (Ntrty net closed)

Coho	No separate openings. Area opens during Area 8 openings.

Area 8-1 Recreational

5/1-7/31	Closed to salmon.
8/1 – 9/19	2 fish limit, release Chinook and chum.
9/20-5/14	Closed to salmon.

Baker River/Lake Recreational

mouth to Dam	Closed to salmon.	
Baker Lake	TBD	To be determined.

Cascade River Recreational

mouth to Rockport-Cascade Road Bridge	6/1 – 7/15	4 fish limit, only 2 may be adults, hatchery Chinook only, 12” min. size. Closed on Sundays and Mondays to avoid gear conflict with treaty fisheries.
	9/16 – 10/15	4 fish limit, Coho only, 12” min. size. Closed on Sundays and Mondays to avoid gear conflict with treaty fisheries.

Skagit River Recreational

Specific gear conflict closure dates have not been identified but recreational fishing for all species will close two days per week from the mouth to highway 530 bridge in Rockport during weeks 26-29 for Sockeye and weeks 39-41 for Coho.

Mouth to Hwy 536 at Mt. Vernon (Memorial HWY Bridge)	8/14 – 8/31	4 fish limit, only Pink salmon, release Chinook and Chum. 12” min size.
	9/1 – 10/15	2 fish limit plus 2 additional Pink salmon, release Chinook and Chum.
from Memorial Hwy Bridge to Gilligan Creek	5/1-5/31	2 fish limit, hatchery Chinook only, (12” min. size).
	8/14-8/31	4 fish limit, Pink salmon only, (12” min size).
	9/1 – 10/15	2 fish limit plus 2 additional Pink salmon, (12” min size). Release Chinook and Chum.
Mouth of Gilligan creek to Dalles Bridge at Concrete	9/1 – 10/15	2 fish limit plus 2 additional Pink salmon, (12” min size). Release Chinook and Chum.
Dalles Bridge at Concrete to Hwy 530 Bridge at Rockport	9/1 – 10/15	2 fish limit plus 2 additional Pink salmon, (12” min size). Release Chinook and Chum.
Hwy 530 Bridge at Rockport to Cascade River Rd	6/1 – 7/15	4 fish limit, (12” min size). Only 2 may be adults, Release all salmon other than hatchery Chinook.
	9/1 – 10/15	2 fish limit plus 2 additional Pink salmon, (12” min size). Release Chinook and Chum.

All other SKAGIT TERMINAL REGION freshwater recreational closed to salmon angling.

2.7 Stillaguamish/Snohomish Terminal Region

Area 8A Net

Chinook	Trty	Closed (Ceremonial set-aside of up to 100 Chinook, July-September period).
	Ntrty	Closed
Pink	Trty	(8/02 – 9/03): 5 days per week
	Ntrty	Closed
Coho	Trty	Tulalip Tribes: (9/06 – 9/24) 3 days per week; (9/27 – 10/15) 1 day per week. Manage for 55,000 escapement to the Snohomish River (see Snohomish River Natural Coho Rebuilding Plan), with ISU at weeks 38 and 39.
	Test	Closed
	Ntrty	Closed
Chum	Trty	Closed
	Test	Closed
	Ntrty	Closed

Area 8D Net

Chinook	Trty	BS, RH, GN gear outside Tulalip Bay may be open during the following periods: (5/03 – 5/29) 5 days per week (5/31 – 8/06) 4 ½ days per week: Mon – 11:59 AM Fri (8/09 - 9/10) 5 days per week Setnets inside Tulalip Bay may be open during the following period: (5/03 – 9/10) 5 days per week
	Ntrty	Closed
Coho	Trty	(9/12 – 10/29) BS, RH, GN gear outside Tulalip Bay may be open 5 days per week to target Tulalip hatchery Coho. Setnet may be open 5 days per week.
	Ntrty	Closed

Chum	Trty	(11/01 – 12/03) Open to target Tulalip hatchery Chum. Managed to allow for hatchery egg take needs based on Tulalip hatchery escapement updates and projections. All Area 8D fisheries will close concurrently as agreed to by Tulalip and WDFW to ensure egg take requirements are met.
	Ntrty	Closed

Stillaguamish River Treaty Net (Ntrty net closed)

Chinook	Ceremonial fishery only; Open 5/15 – 8/15; Up to 7 days per week; maximum catch of 21 Chinook; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).
Pink	C&S fishery only; Open 8/1 – 8/31; Maximum catch of 400 Pink. Up to 7 days per week; Open from mouth of Hatt Slough (RM 0) to
Coho	Commercial fishery; Open 9/1 – 10/31; Up to 5 days per week; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).
Chum	C&S fishery only; Open 11/1 – 12/5; Up to 3 days per week; max catch of 300 Chum; Open from mouth of Hatt Slough (RM 0) to Danielson Hole (RM 14).

Snohomish River Treaty Net (Ntrty net closed)

Chinook, Pink, Coho, Chum	Closed
Coho Test	Closed

Area 8-2 Recreational

5/1-8/13	Closed
8/14-9/19	2 fish limit, release Chinook, Chum, and wild Coho. Open south of a line from Clinton to Mukilteo fishing pier.
9/20-5/14	Closed

Tulalip Special Area Recreational Fishery

Same as Area 8-2 Recreational, except during the period 5/28-9/26:	5/28-9/7	Open 12:01 AM Friday – 11:59 AM Monday each week. Closed June 5. Open within Tulalip Special Area boundaries only. Closed to all angling east of the line from Mission Point to Hermosa Point. 2 fish limit salmon, 2 pole endorsement (Chinook 22" min. size); 7/1-8/15 intermittent closures may be needed to ensure hatchery broodstock goals.
	9/11-9/26	Open Saturday and Sunday each week. Open within Tulalip Special Area boundaries only. Closed to all angling east of the line from Mission Point to Hermosa Point. 2 fish limit salmon, 2 pole endorsement (Chinook 22" min. size).

Snohomish River Recreational

WDFW and the Tulalip Tribes commit to developing and implementing a freshwater monitoring plan to assess encounter rates of target and non-target salmonids in 2021.

mouth to confluence of the Skykomish and Snoqualmie rivers	8/23 – 9/19	4 fish limit, Pink salmon and hatchery Coho only, 12" min. size. Continuation of fishery dependent on ISU.

Snoqualmie River Recreational

mouth to Snoqualmie Falls	5/1 – 5/14/2022	Closed to salmon

Skykomish River Recreational

WDFW and the Tulalip Tribes commit to developing and implementing a freshwater monitoring plan to assess encounter rates of target and non-target salmonids in 2021.

from mouth to Wallace River	5/29–7/31	4 fish limit, only 2 may be adults, hatchery Chinook only,12" min. size.
mouth to confluence of North and South forks	8/30-9/19	4 fish limit, Pink salmon and hatchery Coho only, 12" min. size. Continuation of fishery dependent on ISU.

Wallace River Recreational

mouth to 200' upstream of water intake of salmon hatchery	10/1 – 11/31	2 fish limit, hatchery Coho only, 12" min. size. Continuation of fishery dependent on ISU.

Stillaguamish River Recreational

mouth to forks	5/1 – 5/14/2022	Closed to salmon.

See appendix for gamefish season regulations.

All other STILLAGUAMISH/SNOHOMISH TERMINAL REGION freshwater recreational closed to salmon angling.

2.8 Admiralty Inlet Area

The co-managers have agreed to develop a comprehensive chum management plan over the course of the next three years. It is the intent of co-managers to address catches of Hood Canal Origin fall chum, including catches in marine areas 9, 10, and 11 in this comprehensive chum plan. Co-managers have agreed to review the balance of pre-terminal impacts to Hood Canal Origin chum between tribal and non-tribal fisheries beginning with the 2019 season. This information will identify any overly imbalanced condition that would require further co-manager discussion for future seasons in the interim period.

Area 9 Net

Chinook	Trty	Ceremonial and Subsistence – Up to 500 Chinook as agreed upon by those Tribes with U&A in Area 9, (PS and Hook & Line, release all Chum 6/1 – 9/30).
	Ntrty	Closed
Chum	Research	Wk 43 (wb 10/24) – 46 (wb 11/14) research fishery to develop stock composition/timing information. Research catch quota of up to 2,400 Chum. 2021 Area 9 Chum Salmon Research Fishery Plan to be developed by NWIFC and tribal staff prior to beginning this research.

	Trty	The Area 9 fall chum fishery north of the HC bridge will open wk 43 (wb 10/17) through wk 45 (wb 10/31); fishing pattern: GN 3,4,3; and PS 4,3,3. Open area restricted to that portion of North Hood Canal bounded to the south by the Hood Canal Bridge and bounded to the north by a line from White Rock due east to landfall. Tribes with adjudicated U&A in the open section of Area 9 may choose to participate. Coho and Chinook model inputs have been modeled during NOF that anticipate the participation levels of 2020. If the fishery reaches a catch threshold of 30,000 chum salmon before 10/30, there will be a conference call among the participating Tribes to discuss any needed fishery management actions. Participating tribes agree to sample tissue for DNA analysis of their tribe's chum catch and wild coho bycatch to the extent practicable.
	Ntrty	Closed

Area 9 Recreational

5/1 – 7/15	Closed to salmon.
7/16 – 8/15	2 fish limit, 1 hatchery Chinook (Chinook 22" min size); release wild Coho, Chum and wild Chinook. Closed south and west of a line from Foulweather Bluff to Olele Point.
8/16 – 9/30	2 fish limit; release wild Coho, Chum and Chinook.
10/1 – 5/14	Closed to salmon.

Edmonds Pier Recreational

Year-Round	2 fish limit, 1 Chinook (Chinook 22" min size), release Chum 8/1-9/30.

3.0 South Sound Region

3.4 Area 10 Sub region

Area 10 Net

Chinook	Closed	
Sockeye	Trty	Fishery dependent upon ISU (Ballard lock counts)
	Ntrty	Closed

Pink	Trty	All waters within 1,800 feet of shoreline closed; Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983). Suquamish – Wk 31 (wb 7/25) – wk 35 (wb 8/22), Maximum of 5 days/wk, 1 PS, 1GN; Tulalip – Wk 34 (wb 8/15) – wk 35 (wb 8/22), anticipated effort: 3 GN, 1 RH, East portion of Area 10 closed.
	Ntrty	Purse Seine: Wk 34 (wb 8/15) – Wk 36 (wb 8/29) 2,2,2. Gill Net Wk 34 (wb 8/15) – Wk 36 (wb/29) 2,2,2.
Coho	Test	Gillnet: Wk 37 (wb 9/5) - wk 39 (wb 9/19); 3 boats, 3 sites; fishing pattern: 2,2,2.
	Trty	On-Reservation only; wk 38 (wb 9/12) – wk 43 (wb 10/17); gillnet/beach seine; 7 days/wk. Off Reservation: Wk 37 (wb 9/5) – wk 40 (wb 9/26). Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983).
	Ntrty	Closed

<table>
<tr><td>Chum</td><td colspan="2">Given the recent decline in South Sound fall chum stocks, a conservative methodology was used for the pre-season forecast that was agreed to by all parties. This resulted in a historically low pre-season forecast for South Sound chum, which along with Nisqually winter chum, are projected to be below escapement in 2021. Due to the forecast and concerns for incidental impacts to Nisqually winter chum stock, the co-managers (State and Tribal) are planning to forgo preterminal directed fisheries in Marine Areas 10 and 11, as well as recreational fisheries directed at any of the South Sound chum stocks for the 2021 fishery. Through continued engagement and collaboration by co-manager technical staff, appropriate levels of escapement will be explored as targets for the 2021 Chum season. The co-managers will meet after the completion of 2021 PFMC/NOF to discuss establishing ISU triggers for Area 10/11 fisheries that would allow for preterminal fisheries in 2021 if the Apple Cove Test Fishery demonstrates a significantly larger run size than the pre-season forecast. All preterminal fisheries should prioritize co-managers access to their respective shares. Fishing cannot continue past week 45 by State or tribal comanagers in 2021 to protect Late Chum. The co-managers support continuation and improvement of the Apple Cove Point test fishery to inform in-season adjustments to pre-season forecasts and will inform discussion around harvest levels to meet agreed to escapement levels. The co-managers also support continued efforts to improve the ISU methodology and model performance.</td></tr>
<tr><td></td><td>Test</td><td>Purse Seine: Wk 41 (wb 10/10) - wk 46 (wb 11/14); 1 site, fishing pattern: 1,1,1,1,1,1.</td></tr>
<tr><td></td><td>Trty</td><td>Treaty allocation based on intertribal sharing agreement; wk 42 (wb 10/10) – wk 45 (wb 10/31) fishing pattern and opening dependent on ISU; Fishing schedule for Area 10 shall be set consistent with the MST agreement (1983).
<u>Suquamish</u> – On-reservation only (set net gear only): wk 42 (wb 10/10) – wk 50 (wb 12/5) up to 7 days per week dependent upon Chum return to the Grovers Creek Hatchery.</td></tr>
<tr><td></td><td>Ntrty</td><td>Closed; fishing dependent on South Sound Chum Management Agreement above.</td></tr>
</table>

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Area 10A Treaty Net (Ntrty net closed): That portion of Elliott Bay east of the line from Pier 91 to the light at Duwamish Head.

Chinook	Trty Test	Gillnet: Wk 30 (wb 7/18th) – Wk 32 (wb 8/1th); 7/21, 7/28 & 8/4 (Wednesday nights); 5 fishing sites (one boat per site). 8 PM to 8 AM. One night per week; 8 PM to 8 AM.
	Trty	Gillnet: Wk 33 (wb 8/8) Based on ISU one 12 hour opening 8 PM to 8 AM (Wednesday night targeted). Wk 34 (wb 8/15) based on ISU one 12 hour opening 8 PM to 8 AM (Wednesday night targeted). Starting Wk 35 (wb 8/22) any additional openings will be discussed & agreed by co-managers.
	Trty	Ceremonial and subsistence fisheries
Pink	Trty	Gillnet: Wk 336 (wb 8/29); with the fishing pattern Sunday thru Friday.
Coho	Trty	Gillnet: Fishery will open Wk 37 (wb 9/5) – Wk 42 (wb 10/13th) with the fishing pattern Sunday thru Friday. (Fishery will close if the Duwamish/Green River ISU is executed and does not show harvestable coho. If the ISU shows harvestable coho the fishing pattern will be as stated above).
	Trty	Ceremonial and subsistence fisheries
Chum	Trty	Gillnet: Wk 44 (wb 10/24) - Wk 49 (wb 11/28); with the fishing pattern Sunday thru Friday.
	Trty	Ceremonial and subsistence fisheries

Duwamish/Green River (Area 80B) Treaty Net (Ntrty net closed)

Chinook	Trty	Gillnet: Wk 33 (wb 8/8) Based on ISU one 12 hour opening 8 PM to 8 AM (Wednesday night targeted). Wk 34 (wb 8/15) Based on ISU one 12 hour opening 8 PM to 8 AM (Wednesday night targeted). Starting Wk 35 (wb 8/22)any additional openings will be discussed & agreed by the co-managers.
	Trty	Ceremonial and subsistence fisheries
Pink	Trty	Gillnet: Wk 36 (wb 8/29); with the fishing pattern Sunday thru Friday.

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Coho	Trty Test	Wk 37 (wb 9/5) Coho ISU test fishery on the river (from the mouth of the East and West waterways up to 16th Ave. Bridge). The 6 sites are as follows: East Waterway, West Waterway, Old Riverside Marina, Kellogg Island, 1st Ave Bridge and 16th Ave Bridge.
Coho	Trty	Gillnet: Fishery will open Wk 38 (wb 9/12) up to the Boeing Street bridge. Starting on Wk 39 (wb 9/19) the fishery will open up to the Hwy 99 Bridge. Fishing pattern will be Sunday thru Friday. (Fishery will closed if the treaty test ISU is executed and does not show harvestable coho. If the ISU shows harvestable coho the fishing pattern will be as stated above).
	Trty	Ceremonial and subsistence fisheries
Chum	Trty	Gillnet: Wk 45 (wb 10/31) – Wk 50 (wb 12/5) with the fishing pattern Sunday thru Friday
	Trty	Ceremonial and subsistence fisheries

Area 10E Treaty Net (Ntrty net closed; see below for recreational SAF)

Chinook	Trty	Wk 30 (wb 7/18) - wk 38 (wb 9/12); fishing pattern: 7 days/wk. Possible extension for Sinclair Inlet.
Coho	Trty	On-Reservation only; wk 38 (wb 9/12) - wk 43 (wb 10/17); gillnet/beach seine; 7 days/wk.
Chum	Trty	Wk 43 (wb 10/17) - wk 50 (wb 12/5); schedule dependent upon ISU.

Lake Washington System (includes Lake, Lake Union, Ship Canal, & Lake Sammamish)

Areas 10F, 10G, 10C, 10D Treaty Net (Ntrty net closed)

Sockeye	Wk 24 (wb 6/6) – Wk 32 (wb 8/8) Based on ISU (lock counts).
	Wk 24 (wb 6/6) – Wk 33 (wb 8/15) Bio-sample program
	Wk 26 (wb 6/20) PSC test fishery
Chinook	Closed.
	Ceremonial and subsistence fisheries

Coho	Coho fisheries in the four following areas are dependent upon the ISU (if lock counts project run size < 10,000 coho entering the lake), then the coho fishery will remain closed in all four areas including Lake Sammamish):	
	Ceremonial and subsistence fisheries	
	Lower ship canal (below Ballard Locks)	If the ISU is > than 10,000 the fishery could open as early as Wk 38 (wb 9/12) – Wk 45 (wb 10/31) with the fishing pattern up to 7 days per week (Sun – Sat).
	Upper ship canal (above Ballard Locks):	If the ISU is > than 10,000 the fishery could open as early as Wk 38 (wb 9/12) – Wk 45 (wb 10/31) with the fishing pattern Sunday thru Friday.
	North end Lake Washington (North of Hwy. 520 bridge):	If the ISU is > than 10,000 the fishery could open Wk 39 (wb 9/19) – Wk 46 (wb 11/7) with the fishing pattern Sunday thru Friday.

Lake Sammamish Treaty Net

Chinook	Based on ISU – hatchery surplus.
	Ceremonial and subsistence fisheries
Coho	If the ISU is > than 10,000 the fishery could open Wk 41 (wb 10/3) – Wk 47 (wb 11/14) with the fishing pattern Sunday thru Friday.
	Ceremonial and subsistence fisheries

Area 10 Recreational

5/1-6/15	Closed to salmon.
6/16-7/15	2 fish limit, release Chinook and Chum.
7/16-8/31	2 fish limit, 1 hatchery Chinook (Chinook 22” min size), release wild Chinook and release Chum.
9/1-10/31	2 fish limit, release Chinook and Chum.
11/1-12/31	Closed
1/1-3/31	2 fish limit, (Chinook 22” min size), release wild Chinook..
4/1-5/14	Closed.

Shilshole Bay (East of Meadow Point/West Point line) closed to salmon 7/1-8/31.

Outer Elliott Bay (E of West Pt. /Alki Pt line to Pier 91/Duwamish Head line) closed to salmon 7/1-8/19.

Inner Elliott Bay (E of Pier 91/Duwamish Head line) closed to salmon 7/1-8/5 and 8/9-8/19.

Area 10 Piers Recreational

Seacrest Pier, Pier 86, Waterman Pier, Bremerton Boardwalk, Illahee State Park Pier	Year-Round	2 fish limit, 1 Chinook (22" min size), release Chum.

Elliott Bay Recreational SAF

5/1- 6/30	Same as Area 10.
7/1- 8/5	Closed to salmon.
8/6 – 8/9 (noon)	2 fish limit, release Chum. Inner Elliot bay waters open east of a line from Pier 91 to Duwamish head. Additional openings contingent upon ISU model results.
8/10 – 8/19	Closed
8/20- 8/31	2 fish limit, release Chinook and Chum.
9/1-5/14	Same as Area 10.

Sinclair Inlet Recreational SAF

5/1-7/15	Same regulations as Area 10.
7/16-9/30	Open S of Manette Bridge, S of line drawn true W from Battle Point, and W of line drawn true S from Point White; 3 fish limit, (Chinook 22" min size), release wild Chinook and Chum, 2 pole endorsement.
10/1-5/14	Same regulations as Area 10.

Green River Recreational

WDFW commits to implementing a creel survey to assess Chinook encounter rates in both directed and non-directed Chinook fisheries within the river.

From an east-west line extending through the southernmost tip of Harbor Island to Tukwila International Boulevard/Old Hwy. 99	8/20 – 12/31	Daily limit 6. No more than 3 adults may be Coho and Chum, 12” min size, release Chinook.
Tukwila International Boulevard/Old Hwy. 99 to the South 212nd Street Bridge	8/20 – 12/31	Daily limit 6. No more than 3 adults may be Coho, Chum, or Chinook, 12” min size. No more than 2 Chinook may be retained as part of the daily limit; anglers must keep the first 2 Chinook that are landed.
South 212th Street Bridge to Auburn-Black Diamond Road Bridge	9/16 – 12/31	Daily limit 6. No more than 3 adults may be Coho and Chum, 12” min size, release Chinook. Closed within 150’ of the mouth of Big Soos Creek (from the eastbound Bridge of highway 18 to Auburn Black Diamond Road Bridge).
from Auburn-Black Diamond Rd Bridge to Tacoma Headworks Dam	11/1 – 12/31	Daily limit 6. No more than 3 adults may be Coho and Chum, 12” min size, release Chinook, Closed waters - within 150’ of the mouth of Keta (Crisp) Creek. Keta Creek closure includes both banks of the river and extends 150 feet upstream and downstream from a point directly across the river from the mouth of Keta Creek. Also closed upstream of the Tacoma Municipal Watershed Boundary Marker (1.3 miles downstream of the Tacoma Headworks Dam).

Chinook fishery is dependent upon ISU and co-manager agreement.

The 2021/2022 WDFW sport pamphlet will reflect the following season end dates for trout and other game fish fall/winter season.

Mouth to Tacoma Headworks Dam: Dec. 31

Soos Creek Recreational
Closed to salmon.

Lake Washington Recreational

August-October	Closed to salmon. Re-opening dependent upon ISU (lock counts) and co-manager agreement. Potential fishery starting date to be determined: Coho: 12” min. size. 4 fish limit, Coho only.

Lake Sammamish Recreational

10/1 – 11/30	Fishery dependent upon ISU (lock counts) and co-manager agreement. 4 fish limit, Coho only.12” min size.
12/1 – 5/31	Landlocked salmon rules apply. Hatchery Coho may be retained as part of the trout daily limit. 12-inch minimum size.

All other SOUTH SOUND AREA 10 REGION freshwater: Closed to salmon angling

3.5 Area 11 Sub region

Area 11 Net

Chinook	All	Closed
Pink	Trty	Wk 32 (wb 8/1) - Wk 35 (wb 8/22) 3 days per week. Drift Gillnet Only and fishery could close early if Chinook impacts are reached.
	Ntrty	Closed
Coho	Trty:	Wk 37 (wb 9/5) - Wk 42 (wb 10/10) 7 days a week. Drift Gillnet 24 hrs a day. Beach Seines daylight hours only.
	Ntrty:	Closed

Chum	Given the recent decline in South Sound fall chum stocks, a conservative methodology was used for the pre-season forecast that was agreed to by all parties. This resulted in a historically low pre-season forecast for South Sound chum, which along with Nisqually winter chum, are projected to be below escapement in 2021. Due to the forecast and concerns for incidental impacts to Nisqually winter chum stock, the co-managers (State and Tribal) are planning to forgo preterminal directed fisheries in Marine Areas 10 and 11, as well as recreational fisheries directed at any of the South Sound chum stocks for the 2021 fishery. Through continued engagement and collaboration by co-manager technical staff, appropriate levels of escapement will be explored as targets for the 2021 Chum season. The co-managers will meet after the completion of 2021 PFMC/NOF to discuss establishing ISU triggers for Area 10/11 fisheries that would allow for preterminal fisheries in 2021 if the Apple Cove Test Fishery demonstrates a significantly larger run size than the pre-season forecast. All preterminal fisheries should prioritize co-managers access to their respective shares. Fishing cannot continue past week 45 by State or tribal comanagers in 2021 to protect Late Chum. The co-managers support continuation and improvement of the Apple Cove Point test fishery to inform in-season adjustments to pre-season forecasts and will inform discussion around harvest levels to meet agreed to escapement levels. The co-managers also support continued efforts to improve the ISU methodology and model performance.	
	Trty:	Closed for Conservation Reasons.
	Ntrty	Closed; fishing dependent on South Sound Chum Management Agreement above.

Area 11A Net Treaty Net (Ntrty net closed)

Chinook	Closed
Coho	Wk 37 (wb 9/5) - Wk 42 (wb 10/10) 3 nights a week.
Chum	Closed

Puyallup River (Area 81B) Treaty Net (Ntrty net closed)

<table>
<tr><td>Chinook</td><td colspan="2">The Muckleshoot Indian Tribe and Puyallup Tribe of Indians may propose spring Chinook fishery to begin in May 2022. Opening of these fisheries would be dependent on the Co-managers' submission of a suppliemental White River spring Chinook fishery plan for the spring Chinook management period, for NMFS' review and concurrence. The plan would detail the following: the forecasted White River spring Chinook MU run size for 2022; the management objectives that would be in place for that run-year; an estimate of allowable impacts and those estimated to be taken during the spring Chinook management period; plans for monitoring this period, and a description of how this fishery would operate within any limits in place for other ESA-listed species incidentally encountered during this fishery. The parameters of this fishery would be subject to modification by the co-managers on submission to NMFS of a revised plan, independently or as part of the 2022-2023 LOAF.</td></tr>
<tr><td></td><td>Spring Chinook</td><td>Ceremonial and Subsistence</td></tr>
<tr><td></td><td>Summer – Fall</td><td>Commercial fishery Wk 33 (wb 8/8) and Wk 34 (wb 8/15) fishing pattern: 6 hours.</td></tr>
<tr><td>Coho</td><td colspan="2">Commercial fishery Wk 37 (wb 9/5) - Wk 42 (wb 10/10) fishing pattern: 1,2,2,2,2,2,2.</td></tr>
<tr><td>Chum</td><td colspan="2">Test fishery Wk 43 (wb 10/17) - Wk 46 (wb 11/7) 1 day/wk, drift net only.</td></tr>
<tr><td>Winter Chum</td><td colspan="2">Commercial fishery Wk 46 (wb 11/7) – Wk 53 (wb 12/26) 1 to 3 days a week. Opening may be postponed to week 47 depending on In Season Information to protect fall chum.</td></tr>
</table>

White River Treaty Net

Spring Chinook	The Muckleshoot Indian Tribe and Puyallup Tribe of Indians may propose spring Chinook fishery to begin in May 2022. Opening of these fisheries would be dependent on the Co-managers' submission of a suppliemental White River spring Chinook fishery plan for the spring Chinook management period, for NMFS' review and concurrence. The plan would detail the following: the forecasted White River spring Chinook MU run size for 2022; the management objectives that would be in place for that run-year; an estimate of allowable impacts and those estimated to be taken during the spring Chinook management period; plans for monitoring this period, and a description of how this fishery would operate within any limits in place for other ESA-listed species incidentally encountered during this fishery. The parameters of this fishery would be subject to modification by the co-managers on submission to NMFS of a revised plan, independently or as part of the 2022-2023 LOAF.
Coho	Gillnet fishery will open Wk 37 (wb 9/5) – wk 42 (wb 10/10) with the fishing pattern: Sunday thru Friday from Puyallup/White River confluence upstream to R St. Bridge.
Ceremonial and subsistence fisheries open up to 7 days/wk.	

Area 11 Recreational

5/1-6/15	Closed to salmon.	
6/16-9/30	2 fish limit (Chinook 22" min. size), 1 hatchery Chinook, release Chum and wild Chinook; Commencement Bay (E. of Cliff House Restaurant/Sperry Ocean Dock line) closed to salmon through 7/31.	
10/1 – 10/31	2 fish limit, release Chinook and Chum.	
11/1-12/31	2 fish limit, 1 hatchery Chinook (Chinook 22"min. size), release wild Chinook, Chum, and Coho.	
1/1-5/14	Closed to salmon.	
Dash Point Dock, Point Defiance Boathouse Dock, Les Davis Pier, Des Moines Pier and Redondo Pier	Year-Round	2 fish limit, 1 Chinook (Chinook 22" min size); release Chum.

Puyallup River Recreational

WDFW, PIT, and MIT commit to developing and executing a freshwater monitoring plan for 2021. Technical staff will develop a study design and work through the details for the freshwater monitoring plan.

from 11th St. Bridge to E. Main Bridge	8/16 – 11/30	Closed Sundays 8/15-8/31. Closed Sunday – Tuesday 9/1-9/31. 6 fish limit, 4 adults of which only 2 adults may be Chinook or Coho, 12" min size, release Chum and wild Chinook.
from E. Main Bridge to Carbon R.	8/16 – 11/30	6 fish limit, 4 adults of which only 2 adults may be Chinook or Coho, 12"min size, release chum and wild Chinook.

Carbon River Recreational

from mouth to Voight Creek	9/1 – 11/30	6 fish limit, 2 adults, 12" min size, release Chum and wild Chinook.

All other SOUTH SOUND AREA 11 REGION freshwater recreational Closed to salmon angling.

3.6 Area 13 Sub region

Fox Island/Ketron Island (Area 13)

Chinook	Treaty	8/1-9/15, 7 days/wk
	Ntrty	Closed
Coho	Treaty	9/15 – 10/20, 7 days/wk
	Ntrty	Closed
Chum	Treaty	Closed unless opened by Medicine Creek Treaty Tribes' agreement
	Ntrty	Closed

Area 13 Treaty Net (Ntrty net closed)

Chinook	Closed
Pink	Closed
Coho	Closed
Chum	Closed

Carr Inlet (Area 13A) Treaty Net [1](Ntrty net closed) [1] Based on Medicine Creek Treaty Tribal proposed annual regulations. Individual Tribal regulations may deviate from this schedule.

Chinook	8/1 – 9/18, 7 days/wk, opens in sections.
Coho	9/12 – 10/23, 7 days/wk, opens in sections.
Chum	10/24 – 11/27, 7 days/wk, opens in sections.

Chambers Bay (Area 13C) Treaty Net[1] (Ntrty net closed)

Chinook	7/25 – 10/9; Beach seines Sunday noon to Tuesday noon. Set nets Wednesday noon to Friday noon.
Coho	10/10 – 10/30; Beach seines Sunday noon to Monday noon. Set nets Monday noon to Tuesday noon.
Chum	Closed for conservation.

Area 13D Treaty Net (Ntrty net closed)

Chinook	7/15 - 9/9 or earlier date dependent on in-season management needs; 7 days/wk
Coho	9/10 - 10/31 or earlier date dependent on in-season management needs.
Dana Pass (13D-1)	7 days/wk
Pickering Pass (13D-2)	7 days/wk
Peale Pass (13D-3)	7 days/wk
Southern Case (13D-4)	7 days/wk
Chum	Open approximately 10/5 2-4 days per week; managed by weekly escapement updates (~10/5).
Area 13E Net	Closed to all fishing

Budd Inlet (Area 13F) Treaty Net (Ntrty net closed)

Chinook	7/15-9/9 or earlier date dependent on in-season management needs; 7 days/wk 9/10-9/24 extended opening dependent on in-season monitoring to meet hatchery escapement needs.
Coho	Closed
Chum	Open approximately 11/7, 2-4 days per week, managed by weekly in-season updates

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Eld Inlet (Area 13G) Treaty Net (Ntrty net closed)

Chinook	7/15-9/9; opening dependent upon in-season data, outer portion only.
Coho	Closed
Chum	Open approximately 11/7, 2-4 days per week, managed by weekly escapement updates

Totten Inlet (Area 13H) Treaty Net (Ntrty net closed)

Chinook	8/1-9/9; schedule dependent on in-season data
Coho	Closed
Chum	Open approximately 10/10, 2-4 days per week; managed by weekly escapement updates

Little Skookum Inlet (Area 13I) Treaty Net (Ntrty net closed)

Chinook	8/1-9/9; schedule dependent upon in-season data
Coho	Closed
Chum	Open approximately 11/7, 2-4 days per week; managed by weekly escapement updates

Hammersley Inlet (Area 13J) Treaty Net (Ntrty net closed)

Chinook	8/1-9/9 or earlier date dependent on in-season management needs
Coho	Closed
Chum	Open approximately, 10/10 - 12/31, 2-4 days/wk; managed by weekly escapement updates

Northern Case Inlet (Area 13K) Treaty Net (Ntrty net closed)

Chinook	7/15-9/9
Coho	9/10-10/31 or earlier date dependent on in-season management needs
Chum	Open approximately 10/10 -12/31; 2-4 days/wk; managed by weekly escapement updates

Nisqually River (Area 83D) Treaty Net (Ntrty net closed)

Chinook/Pink	Gill Net - 2 days a week wk wks 35 – 37. Fishing boundary: Mouth of Nisqually River up to approximate RM 5 at flagging. Selective gear staff driven testing. 1-5 days/wk, wk 32 (wb 8/1) through wk 40 (wb 9/26) or until 150 adult Chinook are encountered. Change In Ratio data collection staff driven TN 1-3 days/wk, wk 32 (wb 8/1) through wk 46 (wb 11/7). Release all fish.
Coho	Gill Net – 12 hour wk 41 (wb 10/3) and then 3 days wk 42 (wb 10/10) through wk 46 (wb 11/7). Fishing boundary: Mouth of Nisqually River up to approximate RM 6 at Tom Brown's Log Jam at flagging wk 42-43. Upper boundary Kalama Creek at flagging wks 44-46.
Chum	No directed chum fishery. If Yelm Escapement ISU reaches 312 live count on or before January 1, fishing schedule: 2-3 days/wk through wk 4 (wb 1/16). Fishing boundary: Mouth of Nisqually River up to approximate RM 5 at flagging.

McAllister Creek (Area 83F) Treaty Net (Ntrty net closed)

Chinook/Pink	Gill Net – 3-5 days/wk during the following weeks: wk 31 (wb 7/25) through wk 45 (wb 10/31). Freshwater courses.
Coho	Closed.
Chum	Closed.

Area 13 Recreational

5/1-5/14/2022	2 fish limit (Chinook 22" min. size, 20" min. size 7/1-9/30), release wild Coho, Chum, and wild Chinook. 2 pole endorsement. Minter Creek mouth closed 4/16 - 9/15; Lower Budd Inlet closure zone 7/16-10/31.

Fox Island Pier Recreational

Year-Round	2 fish limit, 1 Chinook (Chinook 22" min size, 20" min. size 7/1-9/30), release Chum, wild Coho, and wild Chinook.

Chambers Creek Estuary Recreational

downstream of markers 400' below Boise- Cascade Dam to Burlington Northern Railroad Bridge	7/1 – 11/15	6 fish limit, 4 adults; 12" min size, release wild Chinook, wild Coho, and Chum.

Deschutes River Recreational

Capitol Lake (from outlet to 400' below lowest Tumwater Falls (Deschutes River) fish ladder).	5/1-5/14/2022	Closed
from Old Hwy 99 Bridge on Capitol Blvd in Tumwater upstream	Year round	6 fish limit, 2 adults, 12" min size, release Coho.

Kennedy Creek Recreational

mouth to northbound Hwy. 101 Bridge		Closed to salmon.

McLane Creek Recreational

from a line 50' north of and parallel to the Mud Bay Rd. Bridge to a line 100' upstream of and parallel to the south bridge on Hwy.101		Closed to salmon.

Minter Creek Recreational

mouth to 50' downstream of hatchery rack	9/1 – 12/31	6 fish limit, 4 adults of which only 2 adults may be Chinook or Coho, release wild Coho,12" min size.

Nisqually River Recreational

WDFW and NIT commit to developing and executing a freshwater monitoring plan for 2021. Technical staff will develop a study design and work through the details for the freshwater monitoring plan.

mouth to the military tank crossing bridge, one mile upstream of the mouth of Muck Creek	7/1 – 11/15	6 fish limit, 2 adults, 12" min. size; release Chum, wild Coho, and wild Chinook. Closed Sundays and Mondays 8/22-9/6 and 10/1-11/15.
	11/16-1/31	Closed to salmon angling. May open pending Yelm Escapement ISU. Open to Chum: 6 fish limit, 2 adults, release wild Coho and wild Chinook, 12" min size.
McAllister Cr. - mouth to Olympia-Steilacoom Rd Bridge	7/1 – 11/30	6 fish limit, 2 adults, 12" min size. Release wild Chinook, wild Coho, and Chum.

All other SOUTH SOUND AREA 13 REGION freshwater recreational closed to salmon angling.

4.0 Hood Canal Region (All fisheries modeled in FRAM #3721 (Chinook) & #2140 (Coho))

Hood Canal Mainstem (Areas 12, 12B, 12C, 12D)

Treaty: 1,000 feet closure around streams that are closed to net fishing. Beach seines and hook and line gear release Chum through 9/30 (through 10/10 if within 500' of western shore of Areas 12B and 12C).

Nontreaty: See WAC 220-47-307 for Nontreaty exclusion zones.

Chinook/Pink	Trty	Areas 12, 12B and 12D: Closed to net gear per the Summer Chum Salmon Conservation Initiative (SCSCI).
		Area 12C: Gillnets and Beach Seines wb 7/18 - wb 7/25 3 d/wk; Gillnets wb 8/1-8/22 4 d/wk; Beach Seines wb 8/1-8/22 4 d/wk; Beach Seines wb 8/29 - 8/31 3d/wk. Beach Seines Release chum 8/1-8/31 And Gillnets Restricted to 7" min. mesh starting 8/1 per the SCSCI.
		Area 12H: Open wb 7/18 through 9/12; hook and line gear continuous; beach seines and dipnets daylight hours only Monday each week; possible in-season modifications; Chum release.
	Ntrty	Area 12H (12C): Hoodsport Hatchery Zone Only, Wks 30 (wb 7/18) – 36 (wb 8/29); Pink retention Wk 30 – 36. 5,000 Chinook quota. BS fishing pattern: Thursdays: 1,1,1,1,1,1; Tuesday, second day per week triggered pending in-season agreements with Co-managers. Weekly in-season calls. Release all Chum per the SCSCI.
Coho	Trty	Area 12: Open 9/25 through 10/09 for gillnets. Beach seines for Coho only (release all Chinook and Chum through 9/30) may start no earlier than 9/16. Both gear types open 5 days/wk.
		Area 12B: Open 10/1 through 10/16 for gillnets; 500-foot closure along western shore through 10/10; beach seines for Coho only (release all Chinook and Chum through 9/30) may start no earlier than 9/16. Both gear types open 5 days/wk.

		Area 12C: d) Gillnets: 10/1-10/16 5 d/wk. e) Beach Seines: 10/1-10/16 5 d/wk. DAYLIGHT HOURS ONLY. f) 500 foot beach closure from Ayock Pt. to approx. 2,000 feet south of Lilliwaup (at the large house, north of Octopus Hole) through 10/10 for both gear types.
Coho	Trty	Area 12D (west of Madrona Pt. - local name): Open for gillnets no earlier than 10/1. Weekly schedules identical to Area 12C.
	Ntrty	Closed
Chum	See comanager agreed-to Hood Canal MOU in appendix.	
	Trty	Area 12: Open 10/10 through 11/20; 7 d/wk
		Area 12B: Open 10/17 through 11/20; 7 d/wk; except north of an East-West line from Zelatched Point to Seal Rock open through 11/27.
		Area 12C: Open 10/17 through 11/27; 7 d/wk.
		Area 12D: Closed.
		Area 12H: Hook and line gear open from 10/17 through 11/20; beach seines open Monday of each week; possible in-season adjustments to 2 days/wk. Starting 11/7, hatchery escapement control measures will go into effect, if necessary.
	Ntrty	Areas 12 and 12B: Wks 43 (wb 10/17) - 45 (wb 10/31): PS Chinook NR; PS fishing pattern: 1,1,1; GN fishing pattern: 2,2,2 daylight hours. Fishing in wks 44 and 45 contingent upon remaining available pre-season share or results from the agreed-to ISU.
		Area 12C: Fisheries scheduled Wks 45 (wb 10/31) -: PS Chinook NR; PS fishing pattern: 1; GN fishing pattern: 2,2,2 daylight hours. Fishing is contingent upon the results of the agreed-to ISU.
		Hoodsport Hatchery Zone (12C): Beach seine fishery wks 46-48; fishing pattern: 2,2,2,2. Fishing is contingent upon the results from the agreed-to ISU.
		Area 12D Closed

Areas 12, 12B Treaty Hook and Line (Troll and Handline)

NOTE: Expected fishing effort from the Port Gamble and Jamestown S'Klallam Tribes and the Lower Elwha Klallam Tribe.

5/1 – 7/10	Closed
7/11 – 9/4	Open for salmon wb 7/11 through wb 8/29 with quota of 1,500 Chinook, release Chum and Steelhead; Fishery shall close upon attainment of Chinook quota; Open 7 days/week, daylight hours only; Chinook salmon measuring less than 22" must be released; Coho salmon measuring less than 16" must be released; Participating tribes shall sample landed catch and report the catch numbers and sampling results on in-season conference calls. Closed within 1000 ft. radius around all waters within channels created by exposed tidelands of the Dosewallips, Duckabush, and Hamma Hamma rivers; Closed within 1,000 radius around all stream mouths that are not open to fishing. The coho catch estimates by time-step modeled in FRAM for this fishery are calculated predictions and are the best available pre-season estimate of coho catch in this fishery. In order to collect data on actual coho interceptions the estimates will not be treated as a ceiling when managers make in-season fishery management decisions.
9/5 - 4/30	Closed

Port Gamble (Area 9A)

Note: No gillnet may be operated within the boundaries as described: From the head/mouth of Port Gamble Bay along both the eastern and western shores, along the southeastern edge of Pt. Julia and then north of a straight line drawn to west to the southern edge of the old mill site designated by markers (map in appendix).

Chinook	All	Closed
Coho	Trty	Open wb 8/08 through wb 10/24; 7 days/wk; gillnet only. Ceremonial Harvest of 20 Chinook in August.

Coho	Ntrty	Open Wks 34 (wb 8/15) - 44 (wb 10/24) skiff GN limited to 100 fathoms length and 60 meshes in depth; 7 days/wk; Chinook NR; Chum NR through 9/30; release NR fish by cutting ensnaring meshes. The beach area of the Port Gamble Indian Reservation, between Pt. Julia and the boundary marker at the south end of the reservation - closed to all fishing.
Chum	Trty	Open 10/31 through 11/27; 7 days/wk; gillnet only.
	Ntrty	Closed

Quilcene / Dabob (Area 12A)

Coho	Trty	Open 8/21 through 10/09; Chum and Chinook release from hook and line and beach seine gear through 9/30; beach seines 5 days/wk, daylight hours. Hook and line fisheries for Coho only, open continuously. Gillnets closed until Summer Chum escapement exceeds 1,500, then (1) GN day/wk; when escapement reaches 2,500 (2) GN day/wk; when escapement reaches 3,500 GN will be determined. Beach seine advance notification required prior to fishing.
	Ntrty	Beach seine open wks 34 (wb 8/15) – 40 (wb 9/26); Limited participation; Chinook and Chum NR; fishing pattern 1,5,5,5,5,5; GN closed unless Treaty GN opening. Fishery will be managed consistent with SCSCI.
Chum	Trty	Open to set and drift gillnets wb 10/10 through 11/20, South of an E-W line through Pt. Whitney.
	Ntrty	Closed

Big Quilcene River (Area 82F) Treaty (Ntrty net closed)

Coho	Openings to be determined in-season, for Coho only, from 9/1 through 10/09. Closed below Rogers St. From Rogers St. to U.S. Hwy 101, dipnets, hook and line gear only, release all other salmon. The hatchery area, from U.S. Hwy 101 to the Quilcene Hatchery rack, may be opened for short periods to take surplus Coho. Hand held gear only (dipnets, hand lines, etc.).
Chum	Closed

Skokomish River (Area 82G) Treaty (Ntrty net closed) Purdy Creek (Area 82J) Treaty Net (Ntrty net closed)

Note: The Skokomish Tribe will continue to sample all agreed to fisheries in order to provide weekly in-season updates (i.e. CWT, species, mark status, and mark rates). The WDFW will provide weekly in-season updates for Chinook returns to the George Adams Hatchery rack. Note: Hook and line gear and beach seines release Chum through 10/15 above Hwy 106 Bridge.

Skokomish River – Mouth to HWY 106 Bridge (Area 82G) Treaty

Coho	Open wb 10/03 – wb 10/24, 7 days/wk.
Chum	Open wb 10/31 through 11/21, 7 days/wk.

Skokomish River – HWY 106 Bridge to HWY 101 Bridge (Area 82G) Treaty

Chinook	Open wb 8/01 - wb 8/22, 3 days/wk.
Coho	Open wb 10/03 – wb 10/24, 7 days/wk.
Chum	Open wb 10/31 through wb 11/21; 7 days/wk.

Purdy Creek (Area 82J)

Note: Treaty Net 250 feet from the confluence/mouth of Purdy Creek to the HWY 101 Bridge (fishing nets may not be attached to any abutment or railings on the HWY 101 Bridge).

Chinook	Gill Nets only: Open Saturdays only beginning July 11 – August 07. In-season adjustments will occur to ensure weekly broodstock targets are achieved.
Chum	Gill Nets, Dip Nets and Hook & Line: Open 11/07 as necessary to reach tribal share.

Misc. Hood Canal Rivers (Dosewallips, Duckabush, Hamma Hamma, Tahuya, Dewatto, Union)

All species	Closed to commercial harvest.

Area 12 Recreational

Note: Release all Chum from 8/1 to 10/15, per the SCSCI. 7/1-10/15: All waters within channels created by exposed tidelands including - the free flowing waters of the Skokomish River downstream (north) of the City of Tacoma PUD overhead transfer powerlines are CLOSED to fishing for finfish; the State and Tribe will meet and resolve issues prior to a fishery occurring in this area. Mouth closures apply to Dosewallips, Duckabush, Dewatto, and Hamma Hamma Rivers.

5/1-6/30	Closed

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7/1-7/10	Closed North of Ayock.
7/1-9/30	South of Ayock Pt. – 4 fish limit, (Chinook 20" min size); release Chum and wild Chinook. 2 pole endorsement.
7/11-9/30	North of Ayock Pt. – 4 fish limit, release Chinook and Chum.
10/1-11/30	4 fish limit, 2 hatchery Chinook (Chinook 22" min size). Release wild Chinook, release Chum through 10/15.
12/1-5/14	Closed.

Quilcene/Dabob Bay Recreational

5/1-7/31	Same as Area 12.
8/1-8/30	4 fish limit, Coho only.
9/1-5/14	Same as Area 12.

Hoodsport Hatchery Zone Recreational, Same as Area 12 (above) except:

7/1-11/30	4 fish limit, no minimum size; Release wild Chinook and release Chum 7/1-10/15. 2 pole endorsement 7/1-10/31.

Dewatto River Recreational

mouth to Dewatto-Holly Rd. Bridge	Closed to salmon.

Dosewallips River Recreational

mouth to ONP boundary	11/1 – 12/15	2 fish limit, 12” min size, Chum only.

Duckabush River Recreational

mouth to ONP Boundary	11/1 – 12/15	2 fish limit, 12” min size, Chum only.

Quilcene River Recreational

Rodgers St. to Hwy 101 Bridge	8/16 – 10/31	6 fish limit, 4 adults, 12” min size, Coho only. Night closure.

Skokomish River Recreational

Closed to salmon.

Tahuya River Recreational

Closed to salmon.

All other HOOD CANAL REGION freshwater recreational closed to salmon angling

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2021 – 2022 List Of Agreed Fisheries Appendix

Contents

AR004747

2.1 2021 7/7A Chum Fishing Plan

04/14/21

Chum salmon fisheries in Areas 7 and 7A will be regulated to comply with a base harvest ceiling of 125,000 Chum salmon, unless a critically low level of abundance is identified for those stocks migrating through Johnstone Strait ("Inside Southern Chum salmon") (PST 2019). Chapter 6 of Annex IV specifies that U.S. commercial fisheries for Chum salmon in Areas 7 and 7A will not occur prior to October 10. Paragraph 9 (a-b) specifies run sizes below 1.0 million as critical (estimated by Canada). For run sizes below the critical threshold, the U.S. catch of Chum salmon in Areas 7 and 7A will be limited to those taken incidentally to other species and in other minor fisheries, and shall not exceed 20,000 pieces. When the Fraser River chum run-size is greater than 1.6 million, the US share shall be 160,000 chum.

Table 1. U.S. 7/7A chum catches, 2009-2020

Year	Non-Tribal catch	Tribal catch	Total U.S. catch	Total U.S. Share[A]	Uncaught share	Overage	Paid Back
2009	16,406	7,667	24,073	20,000[B]	N/A	0	
2010	6,062	17,342	23,404	20,000[B]	N/A	0	
2011	24,084	36,401	60,485	130,000	69,515	0	
2012	32,157	40,709	72,866	130,000	57,134	0	
2013	30,239	49,411	79,650	130,000	50,350	0	
2014	60,135	86,436	146,571	130,000	0	16,571	
2015	59,754	65,303	125,057	130,000	4,943	0	4,943
2016	66,531	51,705	118,236	130,000	11,764	0	11,764
2017	56,830	66,366	123,196	130,000	6,804	0	
2018	37,806	28,605	66,411	N/A[C]	N/A	0	
2019	574		574	N/A[D]	N/A	0	

2020	47,270	40,281	87,551	125,000	37,449		

[A] Between 2009-2018, the base US share was 130,000 chum per year. Starting in 2019, the base US share shall be 125,000 chum per year

[B] In 2009 and 2010, the Inside Southern Chum run size was below the critical threshold of 1.0 million; thus, per Chapter 6 of the PST the harvest ceiling was 20,000 additional chum following the notice from Canada that the run size was below the critical threshold.

[C] In 2018 the inside Southern chum was above the critical threshold, allowing the US to open fisheries. However, Fraser River chum were below the critical threshold of 900,000, which required the US to close 7/7A chum fisheries.

[D] In 2019 the inside Southern chum run was below the critical threshold. The only commercial harvest is attributed to non-tribal reef net between October 1-8.

In 2013, the co-managers enacted a fishing plan intended to result in the full harvest of chum salmon allowed to be caught in Area 7/7A under the existing Chapter 6 of the Pacific Salmon Treaty. Adoption of these annual pre-season chum fishing plans for Area 7/7A has mostly resulted in the full harvest of the U.S. share in recent years (Table 1).

To continue to promote fishing opportunity that allows both the tribal and non-tribal fleets to catch their full shares, the co-managers will use the management approach below for the 2021 season.

- Tribal and non-tribal reef net fisheries will remain open continuously from the end of Fraser management to the end of the chum season or until their respective shares are harvested, whichever comes first. Reef nets will release all chum and unmarked Chinook through September 30. Release all Chinook beginning October 1.

- Tribal purse seine (PS) and gillnet (GN) fisheries will open on Sunday October 10 and remain open continuously until the end of the season or until the treaty share is harvested, whichever comes first.

- Non-tribal PS and GN fisheries will open on Sunday October 10, Monday October 11, Thursday October 14 and Friday October 15.

- Non-treaty purse seine and gillnet fisheries will be evaluated relative to the thresholds below based on non-treaty chum catch reported on the in-season co-

manager conference call scheduled for Saturday, October 16, 2021. Non-treaty fisheries will re-open on the prescribed dates and remain open continuously until the end of the season or until the non-treaty share is harvested, whichever comes first.

Table 2. 2021 Tribal and Non-Tribal chum fishing schedule for Area 7 & 7A

	10-Oct SUN	11-Oct MON	12-Oct TUE	13-Oct WED	14-Oct THU	15-Oct FRI	16-Oct SAT	17-Oct SUN
Treaty and Non-Treaty Reef Net								
Treaty Gillnet and Purse Seine								
Non-Treaty Gillnet and Purse Seine								
Co-manager Conference Call								

- If total non-treaty catch is:
  - <29,000; non-treaty fishery will reopen Monday, October 18.
  - >=29,000; non-treaty fishery will reopen Tuesday, October 19.

- The co-managers will exchange data on by-catch throughout the season and take appropriate management actions should levels of by-catch greatly exceed expectations.

- The co-managers will meet by conference call and adjust schedules if needed in response to in-season notification by Canada's Department of Fisheries and Oceans that chum salmon returns are below the critical thresholds identified in Chapter 6, paragraph 9 of the Pacific Salmon Treaty.

  At any time, the tribes and/or WDFW may open limited and closely regulated fisheries in an attempt to collect tissue samples from Area 7 West, Area 7 East and Area 7A for Genetic Stock Identification analysis. US Southern Panel members will notify their Canadian counterparts of this intent in an expeditious manner. As described in PST Chapter 6, paragraph 9(b), catches taken for the purpose of GSI sampling will not count toward the 20,000 catch limit allowed when critical thresholds are not being met.

2.2 Skagit Pink and Coho Creel Census and Monitoring Plan

To assess angler effort, catch and impacts to other stocks and species, WDFW will conduct a creel survey on the Skagit River during the sport pink and coho fisheries. The sampling design for this creel with be designed by WDFW with input from the Skagit regional comanagers. The core design structure will be similar to the Skagit lower area hatchery spring Chinook and sockeye fisheries but will incorporate advancements from the steelhead sport catch and release fishery creel methodology.

During the creel survey, two pieces of information will be collected, angler effort and catch data. Effort index counts will be made by counting the number of boat trailers and cars at the known access sites within the fishery boundary. Total effort counts will cover the entire fishery areas and be conducted so all anglers can be enumerated, either by boat or by air. Information collected from angler interviews will include the number of anglers in the fishing party, angler type (i.e., boat or shore), whether or not anglers have completed their trip, start and stop time, number of trailers and cars associated with the fishing party, and the number of fish kept and released by species and mark.

Total catches and impacts will be calculated. If catch or impact levels are expected to be exceeded, in-season management actions will occur as quickly as possible and comanagers will be notified without delay. In-season management actions could include adjusting daily catch limits, changing the time of the fishery or the area of the fishery, or emergency closure of the fishery. Catch data from the creel will be shared with the other Skagit comanagers during the Skagit weekly comanager meetings.

The method developed for this creel will be written up for replication in future creels. The methods used in previous creels to estimate total effort and harvest are outlined in WDFW Methods Manual-Creel Information from Sport Fisheries (Hahn 2000).

AR004751

2.3 Lower Skagit River Spring Chinook Selective Fishery Proposal

Proposal

The proposal is to conduct a spring Chinook mark selective sport fishery in the Skagit River from the Memorial Highway Bridge located in Mt. Vernon at river mile 11.4 to Gilligan Creek located at river mile 28.9. The fishery will open May 1, and close May 31, unless the wild Chinook or steelhead impact limits are met prior to the scheduled end date. The daily limit will be two ad-clipped Chinooks only per day per angler, no retention of any other species allowed consistent with current gamefish regulations. Fishing will be closed at night.

Fishery Guidelines

Spring Chinook:
The fishery will be creeled by WDFW staff. The hooking mortality rate of 10% will be used for freshwater sport fisheries on fish encountered. The fishery will be closed when maximum impacts are expected to be met or are met. The Skagit River recreational fisheries will follow sampling plans provided in past years.

Skagit Creel Census and Monitoring Plan

To assess angler effort, catch, total harvest and impacts to other stocks and species WDFW will conduct a creel survey on the Skagit River during the selective Chinook fishery. A two-stage sampling design will be used to conduct the creel survey. Days of the month will be divided into two strata, weekdays and weekends. Each stratum has a fishing day length of approximately 16 hours that will be divided into two substrata, an early and late period. On weekend days, creel surveyors will sample both days and both the early and late periods. On weekdays, sampling will occur also both time periods, on three randomly selected days per week.

During the creel survey two pieces of information will be collected, angler effort and catch data. Effort counts will be made by counting the number of boat trailers and/or cars at the known access sites within the fishery boundary twice a day. In addition tie in counts will be conducted twice a week via jet sled to estimate/verify total effort. Information collected from angler interviews include number in party, angler type (i.e., boat or shore), whether or not anglers have completed their trip, start and stop time, number of trailers and cars associated with the party, and the number of fish kept and released by species and mark.

Methods used to expand effort and angler catch data to estimate total effort and harvest are outlined in WDFW Methods Manual-Creel Information from Sport Fisheries (Hahn 2000). Total catches and impacts to wild stocks will be calculated on a weekly basis. Impacts to stocks of concern nearing maximum impact levels will be immediately communicated to concerned parties and an emergency closure of the fishery will occur to avoid further impacts.

2.4 Pacific Salmon Commission Chum Technical Committee 2021 Juan de Fuca Strait Chum Salmon Sampling Program

The Pacific Salmon Commission Southern Panel has again identified the establishment of a chum sampling program for the Strait of Juan de Fuca as a top research priority for proposals through the Southern Endowment Fund for 2021. The Chum Technical Committee submitted a proposal to continue the Strait of Juan de Fuca GSI sampling program which was begun in 2016, and this proposal was once again selected for funding. The sampling program will follow the same methodology since 2016. Therefore, the analysis of potential impacts to ESA-listed Puget Sound steelhead and Puget Sound Chinook, described below, remains unchanged from previous years.

Sampling Program Objectives:

For stock reconstruction for Southern BC and Washington Chum salmon, one significant data gap is the diversion of chum populations through the Southern Route via Juan de Fuca Strait. This project will work towards addressing that data gap by sampling this migration route in both U.S. and Canadian waters to determine:

- Spatial & temporal stock composition of chum salmon migrating through the Southern Diversion route,
- Provide sampling platform for stock identification, migration rate studies etc.
- Develop time series of Catch per Unit effort data to pair with the Johnstone Strait Test Fishery to determine the diversion rates of various chum populations.

This multi-year program is a structured sampling program in Juan de Fuca Strait (Canadian Area 20 and U.S. Area 5). This research involves chartering a Purse Seine vessel to fish 4 days/week starting the 1st week of October for 5 weeks (2 vessel-days on each side of the international boundary). Catch per Unit Effort information is collected as well as biological samples for stock identification purposes. All fish are released except for the 400 samples/week (a total of 2,000 chum) that are collected during the program.

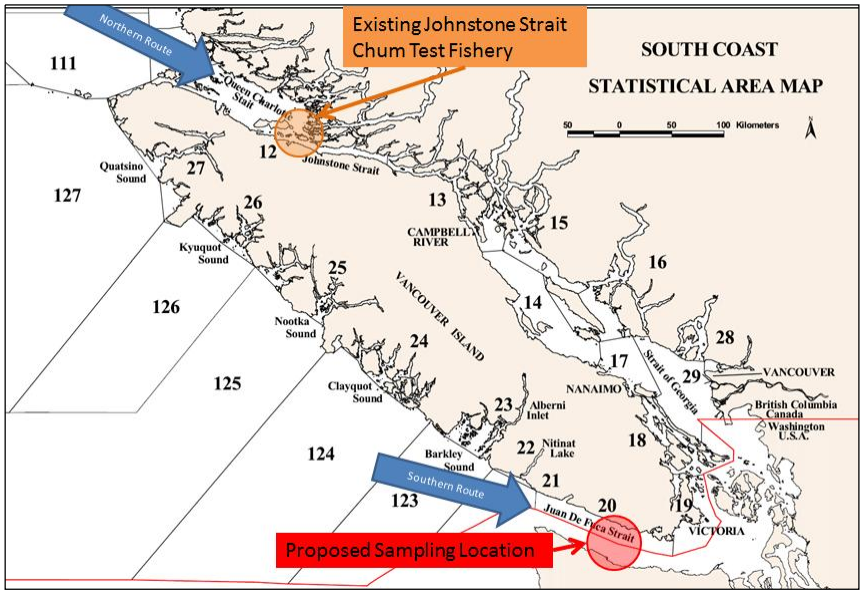

Figure 1. Map of Vancouver Island with migration pathways and proposed sampling location.

Sampling Program Methodology:

Gear: In order to reduce selectivity, a Purse Seine vessel will be chartered to conduct the sampling following a typical Test Fishery pattern (Fig 2). The vessel will fish using a standard WCVI Seine net (300 fathom 6 ½ Strips) that will be constructed for this program.

Timing: The sampling program will cover the main fall chum migration time period through the month of October. The vessel will fish a total of 4 days per week (2 days in Canadian waters and 2 days in U.S. waters) over a 5 week period starting the first week of October.

Location: The 2 days per week of fishing in U.S. waters will occur entirely within Catch Area 5. The charter vessel will complete a minimum of 6 sets/day fishing along a North-South line perpendicular to the coast of Vancouver Island across to Washington State. Set locations will be established along that line based on past sockeye samplings conducted by the Pacific Salmon Commission. There will be flexibility in the set location especially during this pilot phase of the program to determine optimum set locations (i.e. the fish may be predominantly shore-oriented so most of the effective fishing effort would be near shore).

Monitoring: An observer trained by DFO will be onboard at all times during fishing operations. The observers' duties will include collection and recording of all catch data, such as date, time, set location, number of sets, and catch by set and species. Data collected will be recorded on paper set logs and entered into an electronic logbook for real-time data transmission using a satellite system. This satellite system will also provide the Vessel Monitoring System (VMS) for real time monitoring of vessel positioning to a predetermined frequency. Enumeration procedures:

- Once the bunt is dried up alongside or at the stern of the vessel fish will be sampled by dip-netting a portion of the catch out of the net.
- The remaining fish will be counted by species as they swim out of the bunt over the breast line.
- Lowering and raising the breast line controls the speed with which the fish swim out of the net.

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- The observer will count all chum salmon while crew members will count any salmon and steelhead by-catch.
- All fish will be released except those being sampled.
- All catch data including biological samples will be entered and stored and accessible over the web through the Fishery Operating System (FOS).

Sampling: A total of 400 chum will be sampled for biological information in each week (200/week on the Canadian side and 200/week on the U.S. side). Sampling will be done across sets attempting to sample proportionate to the CPUE. Information collected will be:

- Scale samples for age determination
- Length samples (Post Orbital Fork)
- Sex composition
- Tissue samples for DNA extraction: DNA tissue samples will be collected as adipose tissue and mounted on Whatman paper. Alternatively, samples can be collected and preserved in 95% ethanol.

If required, other species may also be sampled following similar protocols.

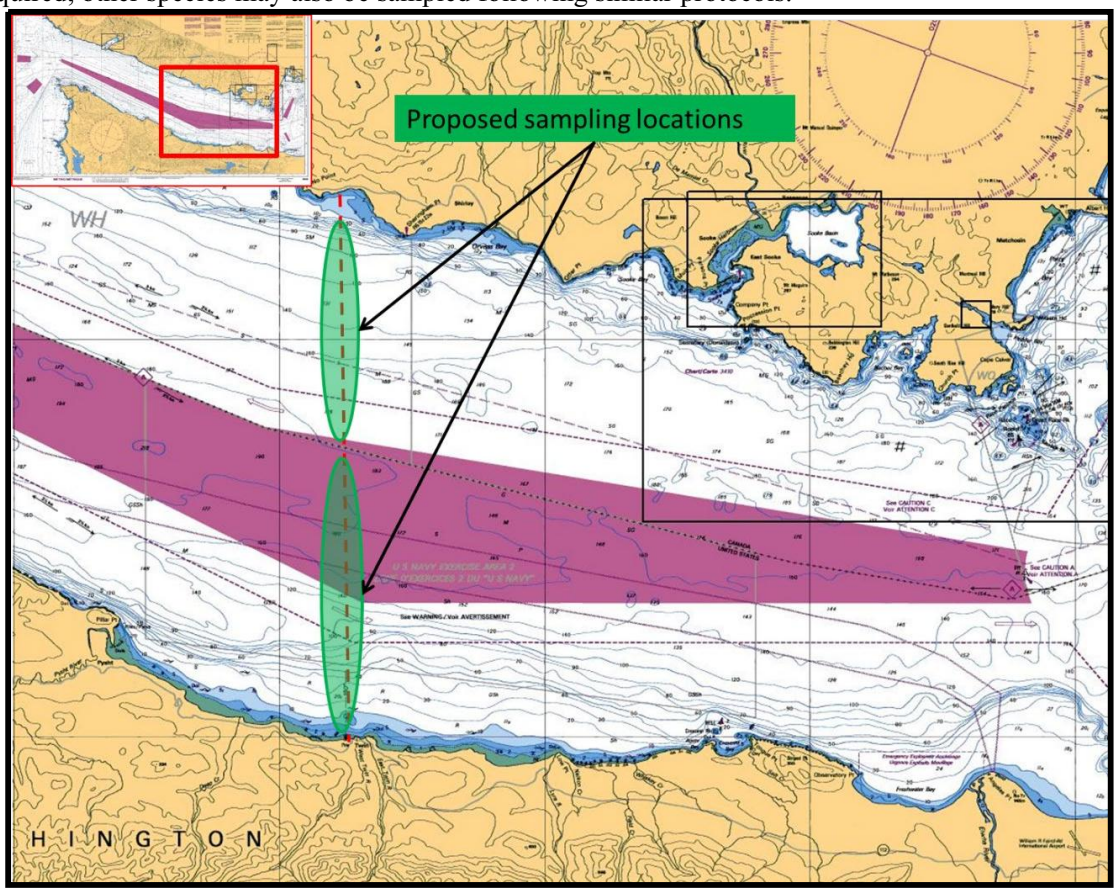

Figure 2. Proposed initial sampling locations for program initiation following similar pattern to past sampling programs for sockeye by the Pacific Salmon Commission. Fishing in US waters will be limited to Catch Area 5.

Mitigation Measures to Minimize the Potential for Take:
Sampled chum will be dip-netted out of the seine. The remainder of the fish in the seine (including any potential listed fish) will not be brought aboard the vessel, but rather released directly from the seine while still in the water, by submerging the cork line.

Take Estimation and Reporting:
Table 1 shows the number of observed encounters with potentially ESA-listed salmonids during years 2016 – 2019 of this research, which were below the anticipated take analysis presented here. The same fishing protocols will be used during the 2021 operations. Therefore, the following take estimates (developed in 2016) represent very conservative impact expectations for the 2021 research.

Table 1. Observed encounters of potentially ESA-listed salmonids in the Juan de Fuca Strait Chum Salmon Sampling Program during 2016, 2017 and 2018.

	Observed Ecounters (all released)		
	Adult Chinook	Immature Chinook	Steelhead
2016	0	21	1
2017	3	27	0
2018	0	69	0
2019	0	2	0
2020	0	0	2

Puget Sound Steelhead: Based on fish tickets from 5 recent years (2011-2015), October and November steelhead catches in all commercial fisheries within Areas 4B and 5 ranged from zero (in 2013, 2014 & 2015), to one (in the 2012 troll fishery), to three (in 2011 gillnet fisheries). Therefore, we would conservatively expect our research activities to encounter less than 10 adult steelhead in total, with all being released alive with minimal actual handling. Since all steelhead will be released without being brought aboard the vessel, a 20% release mortality will be assumed. This mortality rate is higher than the 10% rate assumed for recreational hook & line fisheries, but lower than the release mortality rates assumed for adult Chinook (33%) or Coho (26%) assumed for purse seine fisheries where the fish are brought aboard the vessel prior to being released. A 20% assumed release mortality rate suggests that this sampling program could potentially result in 2 dead steelhead of unknown production origin and listing status during 2021 operations. Steelhead that are potentially encountered in Area 5 may not be part of the listed Puget Sound ESU.

Puget Sound Chinook: Typically, only immature "blackmouth" Chinook should be present in Area 5 during October and November. Based on WDFW estimates of Chinook encounters in October mark-selective fisheries in Area 5, we anticipate encountering less than 200 immature Chinook in the course of this research during 2021. Should any immature Chinook become entrained in the seine, smaller ones would likely escape through the mesh. Any entrained Chinook will be released over the cork line along with the excess chum. As with steelhead, no Chinook are expected to be brought aboard the vessel. Therefore, a lower release mortality rate than the rate that is usually assumed for immature Chinook that are hauled aboard purse seiners (45%) is appropriate. Assuming a release mortality rate of 30% suggests that this research might result in a total of 60 incidental mortalities of immature Chinook in Area 5 during October and early November. Based on FRAM modeling of those impacts, total adult equivalent (AEQ) mortalities

expected in this research sampling program during 2021, by stock, are shown in Table 2, along with the expected resulting net increases to the total exploitation rates for those same natural stocks.

Table 2. Total Adult Equivalent (AEQ) incidental release mortalities, rounded to the nearest one-tenth of a fish, of all Chinook stocks estimated (by the FRAM model) to occur incidentally in the Juan de Fuca Strait Chum Salmon Sampling Program during 2021, and the FRAM-derived estimates of the increases in total 2021 Exploitation Rates (over those occurring in fisheries) of Puget Sound Chinook stocks anticipated to result from those AEQ mortalities, rounded to the nearest one-hundredth of one percent.

Natural Chinook Stock	AEQ Mortalities	Increase to Total ER
Nooksack Earlies	0.0	0.00%
Skagit Springs	0.1	0.00%
White Spring Fing	0.0	0.00%
Dungeness Spring	0.1	0.02%
Skagit SF	0.1	0.00%
Stillaguamish	0.0	0.00%
Skykomish	0.2	0.01%
Lake Washingon	0.2	0.01%
Green	1.4	0.01%
Puyallup	0.3	0.01%
Nisqually	0.3	0.01%
Hoko	0.0	0.00%
Elwha	0.9	0.02%
Mid-HC	0.0	0.01%
Skokomish	0.0	0.01%

These low exploitation rates, when combined with the other research fishing activities consulted under the 2021 Chinook Harvest Management Plan (to our knowledge), still fall well below the level reserved for this type of research activity, as described in the 2010 Co-manager Comprehensive Management Plan for Puget Sound Chinook:

> *Mortality associated with certain monitoring and research activities (e.g., test fisheries and update fisheries), that primarily inform in-season harvest management decisions, will be accounted with other fishery related mortality under the ER ceilings defined for each MU.* ***Mortality associated with other research and monitoring, which have broader applicability to stock assessment, will not be accounted under the ER ceilings, Mortality in this latter category will not exceed a level equivalent to 1% of the estimated annual abundance (i.e., 1% ER), for any MU.***

2.5 2021 Area 9 (NHC sub-area) Treaty Commercial Chum Fishing Plan

Pre-Season Planning:
The 2021-22 Co-Managers' List of Agreed Fisheries (LOAF) states in *Part x, Section x.x* (Admiralty Inlet Area) that "The Area 9 fall Chum fishery north of the HC bridge will open wk 43 (wb 10/17) through wk 45 (wb 10/31); fishing pattern: GN 3,4,3; and PS 4,3,3. Open area restricted to that portion of North Hood Canal bounded to the south by the Hood Canal Bridge and bounded to the north by a line from White Rock due east to landfall. Tribes with adjudicated U&A in the open section of Area 9 may choose to participate. Coho and Chinook model inputs have been modeled during NOF that anticipate the participation levels of 2021. If the fishery reaches a catch threshold of 30,000 Chum salmon before 10/30, there will be a conference call among the participating Tribes to discuss any needed fishery management actions. Participating tribes agree to sample tissue for DNA analysis of their tribe's Chum catch and wild Coho bycatch to the extent practicable."

During the North of Falcon salmon planning process, expected Coho and Chinook impacts for all five tribes with treaty fishing rights in the proposed fishing zone were modeled in pre-season FRAM model runs.

Objective:
The purpose of this management plan is to provide a management framework for this Area 9-NHC treaty commercial Chum fishery to improve coordination, compliance, safety, and management of the fishery.

Eligible Tribes:
Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, Port Gamble S'Klallam Tribe, Skokomish Tribe, and Suquamish Tribe.

Fishery Area:
That portion of Area 9 north of the Hood Canal Bridge and south of a line true east from White Rock to landfall on the Kitsap Peninsula.

Fishery Period: Management weeks 43 through 45

Proposed Weekly Fishery Schedule:
Week 43 (GN 3, PS 4)
Week 44: (GN 4, PS 3)
Week 45: (GN 3, PS 3)

Gillnets Open –

Week 43: 8:00 am Sunday through 8:00 am Wednesday,

Week 44: 8:00 am Sunday through 8:00 am Thursday,

Week 45: 8:00 am Sunday through 8:00 am Wednesday.

Purse Seines Open – Daylight Hours Only.

Week 43: 8:00 am Wednesday through 8:00 pm Saturday,

Week 44: 8:00 am Thursday through 8:00 pm Saturday,

Week 45: 8:00 am Thursday through 8:00 pm Saturday.

Expected Total Season **Boat-Days**:

Total Season Gillnet Effort* = 90
Total Season Purse Seine Effort* = 2
* As modeled in the 2021 preseason FRAM model runs.

By-catch inputs for Coho and Chinook FRAM modeling:
The by-catch inputs of Coho and Chinook for 2021 FRAM modelling utilized effort and encounters from the previous 2020 season. Effort in 2019 and 2020 was lower than previous years (2017, 2018) largely resulting from low run-sizes. Current year effort and encounters are modelled using 2020 data due to the projected low run-sizes this year. Over the 2020 season the average gillnet Coho encounter was 0.09 fish per boat-day, this average was rounded up to one Coho encounter per boat-day for estimating potential Coho mortalities. Resulting gillnet retention of 89 was expanded for drop-off mortality (2%), and purse seine retention of 2 Coho was added. Pre-season FRAM modeled input totaled 91 Coho. Chinook have not been encountered in this fishery, thus model input remains at 1 as a placeholder.

Other Restrictions:
Purse seine release of Chinook;
Purse seine opening shall be scheduled to occur on the same days and times for all participating Tribes;
Gillnet openings shall be scheduled to occur on the same days and times for all participating Tribes;
All catch shall be recorded on treaty commercial fish tickets.

Central/South Sound Tribal Agreements:
Estimated interceptions of South/Central Sound origin Chum shall be considered a pre-terminal interception and will be deducted from the South/Central Sound computed Treaty share of

harvestable Chum entering Area 10 using weekly stock composition as outlined in the table below. Results from the samples taken more recently for genetic analysis have not been provided as of the date of this plan. If those results are available before the fall fishery starts, they will be incorporated into the weekly stock compositions.

In-Season Coordination, Catch Monitoring, and Conference Calls:
A conference call will be held at (1:00 pm) on (Monday) of each fishing week to report and review the effort and catches to date, as well as anticipated effort and catches, to help ensure a successful fishery for all parties. If the fishery reaches a catch threshold of 30,000 Chum salmon before 10/30, there will be a conference call among the participating Tribes to discuss any needed fishery management actions. Each participating tribe shall monitor the catch and bycatch of its fishers and be prepared to report these numbers on that week's in-season conference call.

Broodstock collection at the Little Boston Hatchery (Port Gamble Bay) shall be monitored to ensure that Fall Chum broodstock collection goals will be met. If the hatchery is not meeting its broodstock collection needs, then harvest management actions will be taken to ensure a sufficient passage of Chum salmon to the hatchery.

Catch Sampling:
The participating tribes plan to continue collecting Chum tissue samples for weekly stock composition data. A sampling design to distribute the collection of 200 weekly samples over the geographic area being fished will be coordinated among the participating tribes.

Enforcement:
Each participating tribe shall maintain an enforcement presence to ensure that its fishers comply with this management plan and their individual tribal fishery regulations.

Region of Origin	**Weekly Portion of Total Catch**		
Data source (GSI 2011, 2013, 2014, 2015, 2016, 2017)	**WK 43**	**WK 44**	**WK 45**
Total catch estimate	TBD	TBD	TBD
Hood Canal (average %/wk	0.881	0.865	0.909
South Sound (average %/wk)	0.113	0.114	0.072

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North Sound (average %/wk)	0.000	0.011	0.004
PS Lates (average %/wk)	0.001	0.000	0.008
Other (non-local) (average %/wk**)**	0.006	0.009	0.008

2.6 Green River Management Objectives

For 2021, WDFW, the Muckleshoot Tribe, and Suquamish Tribe will manage the unmarked returns to the Green River for 1,200 natural origin adults on the spawning grounds and returning to Soos Creek Hatchery. This management action will occur through a combination of fisheries actions modeled in FRAM/TAMM and transportation of unmarked adult Chinook (excluding double index tagged fish) from hatchery facilities within the Green River basin to the spawning grounds.

Terminal fisheries directed at the Green River stock are managed based upon an in-season update (ISU) with a test fishery during statistical weeks 30-32 in Elliott Bay that updates the terminal run-size (marked and unmarked adult returns). Terminal fisheries are contingent on confirmation of the pre-season forecast. Initial results from this ISU will be available during statistical week 32 (the 1st week of August). The co-managers will make in-season decisions consistent with the projected run size and natural escapement estimates. NOAA Fisheries will be informed of any subsequent management actions taken by the state and tribal co-managers that deviate from the pre-season fishery structure in the 2021 List of Agreed to Fisheries.

The 2021 FRAM/TAMM model run (Chin3621) projects that 2,257 natural origin recruits (NORs) will escape fisheries and return to the Green River. Of these NORs, 1,669 will spawn naturally in the Green River with the remaining 588 trapped at Soos Creek Hatchery weir between week 32-44 (August – late October) with a peak between week 37-42 (early September – mid October). The co-managers are expecting to meet the goal of 1,200 NOR adults on the spawning grounds without the need to transfer unmarked (NOR) adults to the spawning grounds. Regardless of the pre-season projections, the co-managers will continue to evaluate escapements through the season and take actions as warranted.

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2.7 Green/Duwamish coho salmon in-season update model

The Muckleshoot Indian Tribe conducted a coho test fishery during statistical week 36 from 2003-2010, 2016, 2018, and 2020. This test fishery was revived in 2016 due to the unprecedentedly low run sizes projections for many stocks in Puget Sound, including the Green River stock. This test fishery uses gill net catches from six sites in the lower Duwamish River between the mouth in the East and West Waterway and the 16th Avenue Bridge. One net (300 feet of 5 inch mesh webbing) is fished at each site from 7 PM to 7 AM. Coho from each net are enumerated and combined with the terminal run size to project returns for the current year.

This in-season update methodology models escapement as a function of test fishery catches. Initial modeling examined multiple metrics to predict escapement. These metrics included the maximum catch among the six sites and the geometric mean of the n (n = 2, 3, 4, and 6) largest catches (Table 1). These models were fit in R using a general linear model with a Poisson distribution. The model with the lowest Akaike's Information Criteria value was used to project the in-season run size.

Table 1. Available data for the Green River in-season update model. TRS is the terminal run size and projected is the projection from the model.

Year	Max	2	3	4	All	TRS	Projected
2003	71	70.5	69.3	62.9	29.4	80,414	64,220
2004	709	543.7	327.7	248.9	154.2	168,411	169,680
2005	44	37.5	28.2	24.1	17.0	75,060	60,017
2006	69	59.9	45.4	37.4	24.1	85,494	62,838
2007	98	77.3	69.4	59.3	37.4	52,101	65,126
2008	88	46.9	32.8	27.4	19.5	65,951	61,184
2009	52	39.5	32.0	28.8	22.5	43,021	60,260
2010	34	33.5	33.3	29.3	23.5	32,396	59,522
2016	182	96.3	53.0	37.3	25.5	52,146	65,893
2018	43	35.9	33.4	28.6	17.8	78,089	70,648
2020	147	120.6	71.4	49.1	26.8	61,789	67,774

Over the eleven years of available data, the average projection was 9.3% greater than the observed terminal run size (Table 1).

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2.8 Lake Washington Management Objective

The Lake Washington management unit is composed of two natural stocks, the Cedar River and the Sammamish River. The 2021 preseason natural origin recruit (NOR) forecast is for a terminal run size of 646 to the Cedar River and 100 to the Sammamish River. For 2021, WDFW, the Suquamish Tribe, and Muckleshoot Tribe will manage the NOR returns to the Lake Washington basin consistent with recent-year average NOR spawner escapements in the Cedar River. The 2021 FRAM/TAMM model run (Chin3621) projects that 620 natural origin recruits (NORs) will escape mixed stock fisheries and return to the Lake Washington basin. NOR spawning escapement is expected to be 536 in the Cedar River, and 84 in the Sammamish River.

AR004765

2.9 Puyallup River Management Objectives

For 2021, WDFW, the Puyallup Tribe, and Muckleshoot Tribe will manage the returns to the Puyallup River for a total of 1,170 adults with at least 750 natural origin adults on the spawning grounds. This management action will occur through a combination of fisheries actions modeled in FRAM/TAMM and transportation of unmarked adult Chinook from hatchery facilities within the Puyallup River basin to the spawning grounds.

Terminal fisheries directed at the Puyallup River stock are managed based upon a pre-season forecast and modeled through the FRAM/TAMM. The 2021 FRAM/TAMM model run (Chin3621) projects that 929 natural origin recruits (NORs) will escape fisheries and return to the Puyallup River with an additional 1,607 hatchery origin recruits straying to the spawning grounds for a total natural escapement of 2,536. The co-managers do not expect any NOR adults will need to be transferred to the spawning grounds, but will continue to evaluate escapements through the season and take actions as warranted.

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2.10 2021-2022 Warm Water Test Fishery

This proposal is put forth to implement a test fishery that will collect additional information on the feasibility and potential impacts of a directed fishery (C&S and commercial) on invasive warm-water fishes in selected portions of the Lake Washington basin, a commercial fishery in the northern portion of Lake Washington, and associated research in Lake Sammamish to estimate population abundance of native and invasive piscivores (Figure 1). The results of this test fishery will inform implementation and management of a full scale commercial fishery directed at warm-water fishes in all areas of the basin that remain off limits to directed commercial fisheries due to concerns over steelhead encounters. To date, the Muckleshoot Indian Tribe (MIT) has collected gillnet catch data from March – April 2015, January 2017 – June 2017, March 2018 – June 2018, and March 2019 – April 2019, March 2020, and March 2021 to inform potential impacts to listed salmonids which will be used to estimate impacts for the first step toward a commercial fishery.

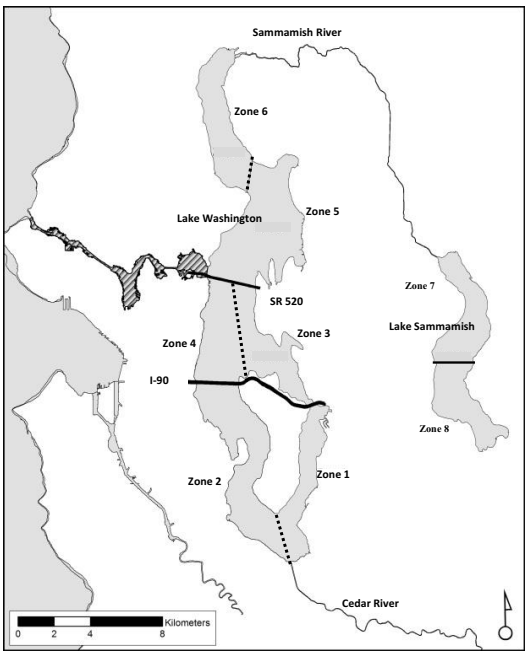

Figure 1. Proposed warmwater fishery zones (1-8) in the Lake Washington basin include zones 1-6 in Lake Washington and zones 7-8 in Lake Sammamish.

The test fishery (and directed commercial fisheries in the future) is scheduled to encompass times and areas that minimize impacts to ESA listed salmonids. Chinook adults start migrating into the basin in mid-June with spawning concluding the first week of November. The timing of the test fishery is proposed from May 1 – June 11, 2021 and January 1 – April 30, 2022. This range of dates will avoid impacts on migrating adult Chinook and steelhead in Lake Washington. Using large mesh gillnets will avoid impacts on age-0 Chinook and steelhead smolts emigrating to sea during the proposed times. The probability of encountering an adult wild steelhead is extremely low. If a steelhead is encountered, it would likely be a stray from a neighboring

watershed such as the Green River. Steelhead surveys in the Sammamish River tributaries, including Lake Sammamish, were discontinued at the end of 2003 after five years of surveys in which no steelhead or steelhead redds were observed. Therefore, minimal risk of encounters exists in northern Lake Washington or Lake Sammamish. There are very few remaining steelhead spawning in the Cedar River. From 2009 through 2015, redd-based escapement estimates for the Cedar River have averaged just over two steelhead per year and no steelhead redds were observed during 2017. Further, several of the redds detected prior to 2017 may have been produced by large cutthroat or rainbow trout which are known to overlap with steelhead in both space and time.

The Lake Washington test fishing area will be divided into zones (Figure 1) and will focus on central and southern Lake Washington (zones 1-4), with additional effort in northern Lake Washington (zones 5-6) when there is no directed commercial fishery. Up to 24 300-foot gillnets will be deployed within a single zone each night. The gillnet mesh will range from 2.5 - 6 inch stretch mesh. This is a 1.0 inch stretch mesh wider interval (previously 3.5 - 6 inch) than previous years. This wider range will only be used during the test fishery. Fishing will occur up to four nights per week and nets will be set on Monday and retrieved no later than Friday. Nets will be checked often to further minimize interactions with steelhead. Any steelhead caught will be released (ancillary to this project, we have successfully tagged and released multiple walleye, suggesting that gill net mortality can be reduced by frequently checking nets). The cold water in the lake during this period minimizes mortality of released fish.

A limited commercial fishery is proposed to begin transitioning from research to implementation in such a way that impacts can be monitored and controlled. Because steelhead encounters have the lowest probability in northern Lake Washington, this initial commercial fishery will occur in Lake Washington zones 5 and 6. In Lake Washington, MIT has fished 446 net nights over five years and encountered only 11 sub-adult Chinook (i.e. blackmouth), and no adult NOR migratory Chinook. Net length restrictions will be identical to those used during the test fishery and fishers will be limited to 4 nets. The commercial fishery will be restricted to the use of 3.5 - 6 inch stretch mesh gill nets which have been previously used in the test fishery. This commercial fishery will occur from March 1 – April 30, 2022 and nets will only be deployed from Monday afternoon through Friday morning to minimize conflict with weekend recreational activities. MIT enforcement and biologists will be on-site to inspect all landed catch.

In previous years, the test fishery has produced valuable information to assess the potential impacts of a commercial directed fishery, but has done little to generate data that would inform a long-term management plan for invasive piscivores. To that end, MIT has developed an additional research proposal aimed at assessing the population size of select piscivores in Lake Sammamish. A new electrofishing boat has already been purchased to conduct this research. Lake Sammamish was chosen because of its smaller size and likely smaller piscivore populations (making an intensive mark-recapture study more tractable) as well as the limited number of ESA listed NOR salmonids potentially using its waters as a migratory corridor. Even though abundance of ESA listed salmonids is likely to be low, MIT proposes to use best practices when conducting this research to minimize overall take. As such, protocols for electrofishing will

follow those from Bonar et al. (2000) which were developed by WDFW and used in warm water fisheries research projects that received ESA Section 10(a)(1)(A) coverage for incidental impacts to listed salmonids (1345-9A).

Take estimation and reporting

There is a very small to zero potential for the test fishery to interact with adult steelhead in Lake Washington and no potential for interaction with adult migratory Chinook. Nevertheless, we have designed this test fishery to minimize these interactions. Should there be an encounter in the test fishery, steelhead or Chinook will be handled carefully by trained professional staff and as much biological data will be collected as possible, including lengths, fin clips for genetic analyses, marks, presence of tags, and capture locations. Further, should staff believe survival upon release is questionable, the steelhead or Chinook will be retained and reported as ceremonial and subsistence treaty catch.

In the commercial fishery, all catch will be landed and then inspected by a fishery biologist. Due to the time and area restrictions, no steelhead or adult NOR Chinook are expected to be encountered. Any sub-adult Chinook landed will have as much biological data taken as possible. MIT expects 10 or fewer participants in this fishery. There will be a maximum of 36 nights of fishing which translates into a maximum of 1,440 net-nights of effort. Based on past test fishery results, this intensity of fishing effort would result in a maximum of 36 sub-adult chinook encounters.

MIT does not expect any adult Chinook or steelhead encounters as part of the Lake Sammamish research, but juvenile Chinook or *O. mykiss* (rainbow trout or steelhead juveniles) encounters are possible. From June-July 2017 in Lake Washington, an electrofishing effort similar to our proposal was implemented to assess the warm water fish community (Garrett 2017). During that work, 65 Chinook ranging from 85-227 mm and 25 rainbow trout ranging from 147-318 mm were encountered. We expect similar encounters of juvenile Chinook due to the close proximity of Issaquah Creek Hatchery but fewer encounters of juvenile rainbow trout due to extirpation of the spawning steelhead population from tributaries of the Sammamish River.

Understanding the potential for interaction with the public, we propose monthly reporting on these fishery activities to NOAA. These reports will contain gear used, area fished, and effort. Further, any natural origin adult steelhead or Chinook encountered will be immediately reported. MIT proposes a limit of three natural origin adult steelhead encounters or five natural origin adult Chinook encounters (Table 1). Should either cap be reached, the test fishery or commercial fishery will be immediately shut down for the remainder of the season. During the research project in Lake Sammamish, effort will be shifted spatially and temporally to avoid sampling during hatchery Chinook releases.

Table 1. Expected maximum levels of incidental mortality of ESA-listed Lake WA Chinook and steelhead, by life stage, associated with the 2021-2022 MIT Warm water predator evaluation studies.

Activity	UM Chinook smolts	UM Chinook sub-adults	UM Chinook adults	UM steelhead smolts	UM steelhead adults
Lake Wa. test fishery	0	6	5	0	3
Pilot Comm. Fishery	0	8		0	
Lake Samm. research (electrofishing)	7	0	0	3	0
Total	7	14	0	3	3

References

Bonar, S.A., B.D. Bolding, and M. Divens. 2000. Standard fish sampling guidelines for Washington ponds and lakes. Washington Department of Fish and Wildlife. Olympia, WA.

Garrett, D., C. Jackson, and S. Caromile. 2017. Biological assessment of the warmwater fish community in Lake Washington. Washington Department of Fish and Wildlife. Olympia, WA.

2.11 Relative Abundance and Diet of Piscivorous Fishes In the Lake Washington Shipping Canal During Late Spring and Early Summer

04/13/2021

Objective 1: Describe the relative abundance and size structure of piscivorous fishes in different sectors of the Lake Washington Shipping Canal (LWSC) and in Lake Washington during the juvenile salmon out-migration period.

Objective 2: Assess the stomach contents of piscivorous fishes inhabiting different sectors of the LWSC and Lake Washington. Identify sectors of the LWSC and Lake Washington where predation on juvenile salmonids is greatest during the out-migration period.

Objective 3: Assess the effectiveness of Merwin Traps as a tool for capturing and removing non-native piscivorous fishes (perch) in Lake Sammamish, Lake Washington, and the LWSC.

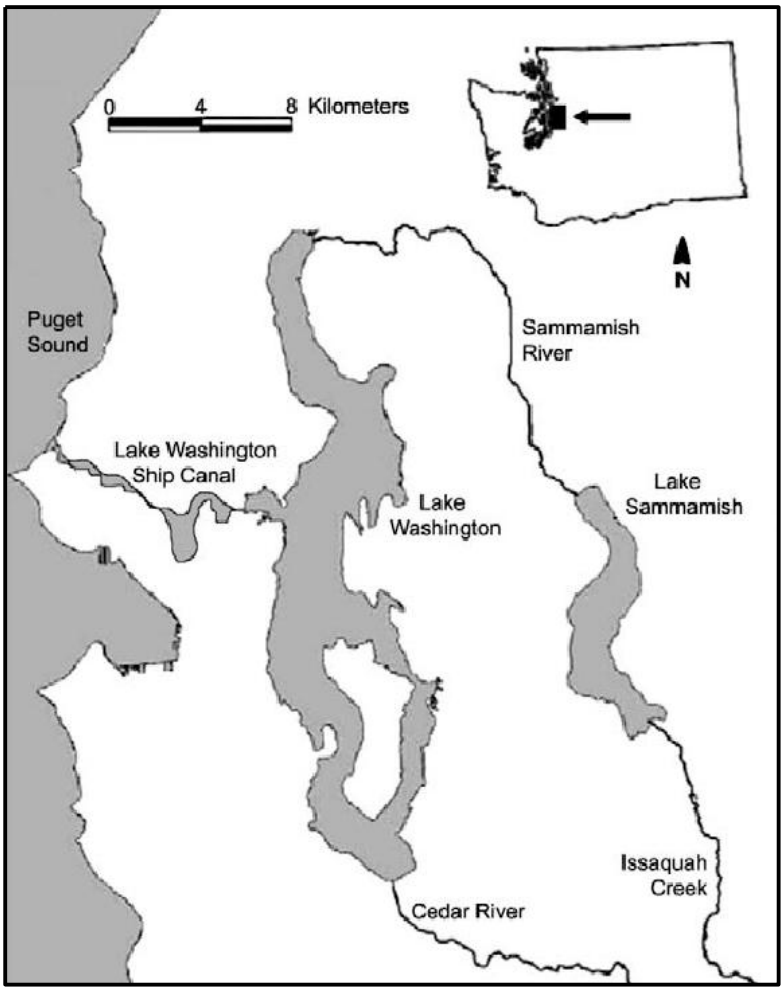

Figure 1. The proposed study area, the LWSC, Lake Washington, and Lake Sammamish.

Study Area

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The study area includes the LWSC, Lake Washington, and Lake Sammamish.

Methods

Gill netting will occur over multiple sampling days between early-May and late June, 2021 and between mid-April and late-June 2022. Variable-mesh monofilament gill nets will be set during the salmon smolt out-migration period within the study area (Figure 1). Netting effort will be concentrated within the LWSC, but may also occur in selected areas of Lake Washington and Lake Sammamish. Nets will be deployed at night with 12-16 hour set times. A range of mesh sizes (2-inch stretch to 5-inch stretch) will be used in an effort to capture a broad range of fish species and sizes. However, much of the netting effort will utilize smaller mesh sizes (2.5-inch to 3-inch stretch mesh) to target yellow perch, a non-native piscivore known to prey on Chinook smolts during the out-migration period. All species captured will be measured to the nearest millimeter. Stomach contents of some piscivorous fishes caught at selected locations will be assessed for evidence of predation on juvenile salmonids.

Merwin Traps (1 to 2 traps total) may be deployed in Lake Sammamish or Lake Washington between early-March and late June of 2022. It is likely that only one trap will be deployed in Lake Sammamish near the outlet of Issaquah Creek, however a second trap may be deployed in the same general area or in Lake Washington. Traps will be fished continuously and will be checked daily with all species caught being recorded. Any Chinook or steelhead that are captured will be released unharmed.

ESA Considerations

The Puget Sound Chinook Harvest Management Plan allows for limited take of listed species during research activities within each Management Unit (MU): "Mortality associated with certain monitoring and research activities (e.g. test fisheries and update fisheries), that primarily inform in-season harvest management decisions, will be accounted with other fishery related mortality under the ER ceilings defined for each MU. Mortality associated with other research and monitoring, which have broader applicability to stock assessment, will not be accounted under the ER ceilings. Mortality in this latter category will not exceed a level equivalent to 1% of the estimated annual abundance (i.e. 1% ER), for any MU." As such, there is limited take for Puget Sound Chinook available to this proposed project under the PSCHMP, in combination with other projects within the MU. Incidental impacts to listed Puget Sound steelhead from this research proposal are extremely unlikely as addressed below.

Similar studies conducted in recent years indicate that this monitoring effort will remove many piscivorous fish from the LWSC and other areas of the Lake Washington watershed that would otherwise prey on juvenile Chinook, and this monitoring project is therefore likely to benefit juvenile salmonids migrating through the area. The study is not likely to result in the take of listed anadromous species (PS Chinook and PS steelhead), and estimated take values are provided below:

1. Steelhead adults: The probability of encountering an adult steelhead is low. Adult steelhead were not encountered during previous sampling efforts (conducted in 2016, 2017, 2018, or 2019) in the LWSC. Likewise, Tribal test fisheries using gill nets in Lakes Sammamish and Washington in recent years have not encountered adult steelhead. Spawning ground surveys indicate that few (if any) steelhead spawn in the Lake Washington watershed, and steelhead adults are not expected to be migrating through the LWSC during the proposed sampling period. The take is estimated as zero adult steelhead.

2. Steelhead juveniles: The probability of encountering a juvenile steelhead is low. Juvenile steelhead were not encountered during previous sampling efforts (conducted 2016-2019) in the LWSC. Spawning ground surveys indicate that few (if any) steelhead spawn in the Lake Washington watershed, and the number of steelhead smolts migrating through the LWSC is expected to be low. Any steelhead smolt

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migrants that may be present will not be affected by the sampling gear as the proposed gillnet mesh size is too large to entangle juveniles (2 to 4 inch stretch mesh). The take is estimated as zero juvenile steelhead.

3. Chinook adults: Chinook adults typically begin migrating through the LWSC in mid-June with the peak migration period occurring in mid to late August (Figure 2). Relatively small numbers of adult Chinook would be migrating through the LWSC while the proposed sampling would occur (May and June), however some adult Chinook may encounter the sampling gear as they migrate through the action area. Chinook adults migrating through the LWSC are likely to use deep-water offshore habitats where sampling gear is less likely to be deployed. Most sampling effort will occur in near-shore or off-channel, weedy habitats where adult Chinook are less likely to migrate. Adult Chinook were not encountered during the past four years of previous sampling efforts (2016 through 2019) in the LWSC. Due to the early timing of the proposed sampling and the off-channel areas where sampling will occur, the number of adult Chinook encountering sampling gear will likely be small. A combined gear take of 5 Chinook adults (NOR and/or HOR) is estimated.

4. Chinook juveniles: Juvenile Chinook will actively be migrating through the LWSC during the proposed sampling period (March - June). Small numbers of juvenile Chinook smolts may encounter the sampling gear, however the mesh size (2 to 4 inch stretch mesh) is too large to entangle a Chinook juvenile and poses very little threat. Juvenile Chinook were not encountered during previous sampling efforts (2016-2019) in the LWSC. The take is estimated as zero juvenile Chinook.

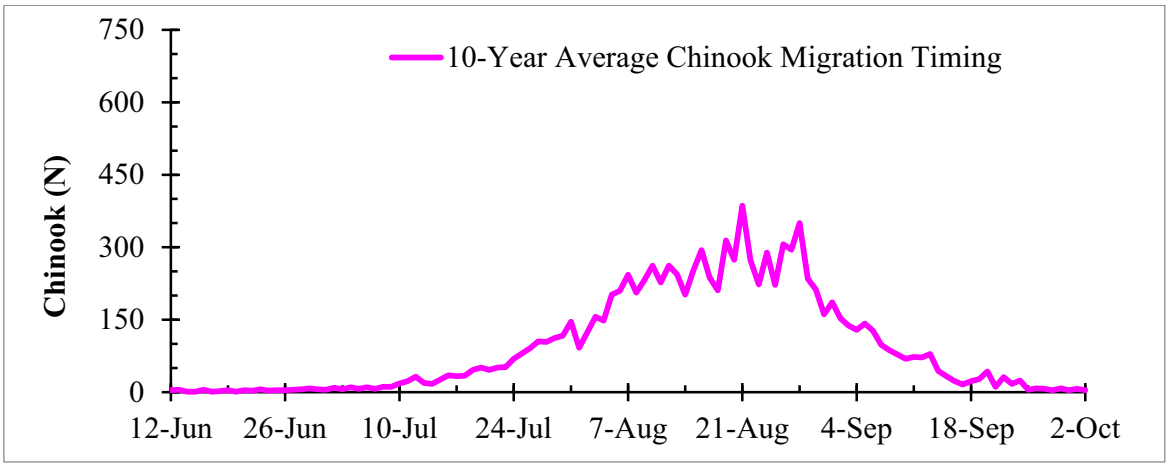

Figure 2. Recent ten-year average adult Chinook migration timing through the Ballard Locks.

As outlined above, this proposal, as part of the PSCHMP seeks incidental take coverage for both Puget Sound Chinook and steelhead. Expected steelhead take is zero fish (bullets 1 and 2 above). Chinook take (HOR and NOR combined) may not exceed a level equivalent to 1% of the estimated annual abundance (i.e. 1% ER). Annual post-season terminal (10-F Returns) total abundance values for Lake Washington Chinook adults during the past 10-year time period are listed in Table 1. The 2021 pre-season terminal abundance forecast for Lake Washington Chinook is 4,410 fish. The estimated take of 5 adult Chinook represents an exploitation rate of 0.1134% (5/4,410=0.001134), which is well below the 1% ER limit.

Year	Hatchery Abundance	Natural Abundance	Total Abundance	Source
2010	8,131	688	8,819	Co-Manager Forecast Files, Post Season
2011	5,612	829	6,441	Co-Manager Forecast Files, Post Season
2012	10,671	1,116	11,787	Co-Manager Forecast Files, Post Season
2013	5,415	1,729	7,144	Co-Manager Forecast Files, Post Season
2014	2,644	408	3,052	Co-Manager Forecast Files, Post Season
2015	4,791	1,383	6,174	Co-Manager Forecast Files, Post Season
2016	4,184	801	4,985	Co-Manager Forecast Files, Post Season
2017	5,347	1,836	7,183	Co-Manager Forecast Files, Post Season
2018	2,646	789	3,435	Co-Manager Forecast Files, Post Season
2019	2,847	757	3,604	Co-Manager Forecast Files, Post Season
2020	4,319	346	4,665	Co-Manager Forecast Files, Post Season
2021	3,664	746	4,410	Co-Manager Forecast Files, Pre Season

Table 1. Annual post-season (2010-20) and pre-season (2021) terminal abundance estimates for Lake Washington Chinook.

In summary, project impacts are significantly below the 1% allotment for Chinook annual abundance provided for in the PSCHMP. The estimated take of HOR and NOR combined is 5 adults, and 0 smolts, which is 0.1134% of annual abundance.

2.12 2021 Stillaguamish River Sport Gamefish Rules

2021 gamefish rules are as follows;

- Statewide gamefish rules; open unless closed, Saturday before Memorial Day through Oct 31st, 2 fish limit, 8 inch minimum size.

- Exceptions to statewide gamefish rules;

  - Mainstem Stillaguamish
    - Below Marine Drive,
      - Open year-round, trout minimum size 14", daily limit 2, night closure and anti-snagging rule Aug 1-Nov 30.
    - From Marine Drive to forks,
      - Closed May 1st through Sept. 15th
      - Open Sept 16th through Nov 15th, catch and release except up to 2 hatchery steelhead may be retained, selective gear rules (no bait), night closure.
      - Open Dec. 1 through Jan 31, 2020, minimum size 14".
      - Closed to fishing from the diversion dam downstream of I-5, downstream 200 feet.
  - Pilchuck Creek,
    - from mouth to Hwy. 9 Bridge,
      - Closed May 1-Sept. 15th
      - Open Sept. 16th through Jan 31st 2020, selective gear rules (no bait) from Sept 16th through Nov. 30th.
  - North Fork Stillaguamish,
    - From mouth to Swede Heaven Bridge,
      - Closed May 1-Sept 15th
      - Open Sept. 16th through Nov. 30th, fly-fishing only, catch and release except up to 2 hatchery steelhead may be retained.
      - Open Dec. 1 through Jan 31st, trout minimum size 14".
      - Additional opening in the Whitehorse Hatchery terminal area, from mouth of French Creek to the Swede Heaven Bridge, Feb 1st through Feb 15th, minimum size 14".
      - Night closure Sept 16th through Nov. 30th.
      - Fishing from a floating device prohibited upstream of the Hwy 530 Bridge, motors prohibited downstream of the Hwy 530 Bridge.
    - From Swede Heaven Bridge to North Fork Falls,
      - Closed May 1 through Sept 15th
      - Open Sept. 16th through Nov. 30th, catch and release except up to 2 hatchery steelhead may be retained, selective gear rules (no bait).

  - North Fork Tributaries,
    - Boulder River from mouth to Boulder Falls,
      - Closed May 1 through Sept 15th

        - Open September 16th through Oct 31st, catch and release, selective gear rules (no bait).
    - Squire Creek,
        - Closed May 1 through Sept 15th
        - Open Sept. 16th through Oct 31st, catch and release, selective gear rules (no bait).
- South Fork Stillaguamish,
    - From mouth to 400' below Granite Falls fishway outlet,
        - Closed May 1 through Sept. 15th
        - Open Sept 16th through Jan 31st, minimum size 14".
        - Sept 16th through Nov 30th, night closure and anti-snagging rules.
    - From Mountain Loop Hwy upstream,
        - Open Sat before Memorial Day through Nov 30th.
- South Fork Tributaries,
    - Canyon Creek,
        - Closed May 1 through Sept. 15th

Open Sept. 16th through Jan 31st, catch and release, selective gear rules (no bait).

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2.13 2021 Co-Management Agreement for Hood Canal Chum Salmon Fisheries.

The 2021 forecasted run size of Hood Canal fall chum is 273,396; this is the lowest projected return in over two decades. This historically low forecasted return is expected to curtail chum salmon fisheries in Hood Canal and disrupt the co-managers' ability to use the 'agreed-to' Hood Canal fall chum ISU model this season. Considering this circumstance, the Hood Canal Treaty Tribes (Skokomish Tribe, Port Gamble S'Klallam Tribe, Jamestown S'Klallam Tribe and Lower Elwha Klallam Tribe) and the Washington Department of Fish and Wildlife (WDFW) agree to manage their respective Hood Canal chum fisheries to the preseason forecasted harvestable shares, unless prior to the chum fishing season, the co-managers develop an 'agreed-to' alternative method to estimate the Hood Canal fall chum run size in-season: one that would be expected to work under the expected conditions of low chum run size and/or reduced purse seine fishery days/hours. The Hood Canal co-managers further agree:

1) To exchange information and meet (if necessary) prior to August 1, 2021 to update and agree to the data necessary to explore alternative ISU methods or develop a new or modified version of the current ISU model. Any ISU models or methods developed must be agreed-to by all parties before being implemented in-season.

2) Those waters of Area 12 east of the Area 12/12B boundary and south of a line projected 94° true from Hazel Point to the light on the opposite shore will be closed to purse seines for the entirety of the season. WDFW managed gillnet fisheries will be authorized in this area during management weeks 43 and 44.

3) 1,000 ft closure around the mouth of all fish bearing streams not open to net fishing in Hood Canal and within Area 9A (Port Gamble Bay) around Port Gamble Creek and Martha John Creek.

4) That on-water enforcement will be sufficient to ensure compliance with all regulations.

5) If an alternative ISU method is developed, to convene a conference call on the day of (or day following) the availability of the results to discuss management of the remainder of the season.

Authorized Signatures:

The following parties agree to the above for the management of the 2021 Hood Canal chum salmon season, and the undersigned persons have authority to enter into this agreement:

Jamestown S'Klallam Tribe — Date: 4/21/21

Lower Elwha Klallam Tribe — Date: 4-21-2021

Port Gamble S'Klallam Tribe — Date: 4/21/21

Skokomish Tribe — Date: 4/21/21

Washington Department of Fish and Wildlife — Date: 4/21/2021

2.14 Comprehensive Chum Management Plan Components and Objectives

Stock Assessment

- Update Forecasts – the forecast methodologies need to be updated in each management area or for each river system to accurately predict the management unit.
    - *Management-unit-specific forecasts will require management-unit-specific age data from multiple return years. For those systems where age data is lacking, scales samples will need to be collected from terminal fisheries and/or spawning escapements for a number of years. Also, full reconstruction of all recruits will require estimates of stock composition in all pre-terminal mixed-stock chum fisheries. Sampling plans for can be developed prior to the 2019 management period. Run reconstructions going back to the mid-1990s will be corrected using GSI data this year. Existing mean stock composition data can be implemented now, and additional GSI analyses can be incorporated as they become available.*
- Update Escapement Goals – Many river systems in Puget Sound have escapement goals that have not been updated since the 60s or 70s. Contemporary estimates of MSH for each river system should be calculated to update escapement goals where possible. This can be done after run reconstructions going back to the mid-90s are corrected using GSI data (i.e. enough years of data to parameterize stock-recruit functions).
    - *Like forecasts, spawner-recruit functions will require system specific time series of age compositions spanning multiple years as well as multiple years of GSI-corrected reconstructed runs. The process for updating escapement goals will be developed during 2019, and a timeline for completing escapement goal updates for each management unit will be determined. Spawner-recruit functions, as well as habitat-based or production-goal-based approaches to establishing escapement objectives should be considered.*

Fisheries Management

- Refine Management Units – Individual populations in North Puget Sound and South Puget Sound have failed to make their escapement goals consistently over the past decade. Management units should be established at the finest resolution possible based on existing GSI data from commercial and test fisheries, run reconstruction rules, run timing, etc. to protect weak stocks to allow for escapements to achieve MSH.
    - *The resolution of GSI analyses are dependent on the degree to which populations are genetically discernable, which is a factor of both intrinsic population genetics as well as the completeness of the GSI baseline. Prior to the 2019 chum management period, an evaluation of WDFW SNPs chum baseline will be made, and a plan for collecting additional genetic samples from terminal populations will be developed, with a focus on un-sampled and under-sampled populations.*

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- Develop Abundance-Based Breakpoints – Fisheries will be managed to pass more fish to the terminal areas in years of low abundance. In years of higher abundance larger pre-terminal opportunities will be provided for. Appropriate breakpoints for the refined management units should be based on past observations of returns as well as reasonable predictions of future runsizes.
    - *Establishing appropriate abundance-based fishery management breakpoints will require the same GSI-corrected run reconstructions that are needed for revising forecasts and updating escapement goals. Such breakpoints will also be dependent upon the revised forecasts and the updated escapement goals, so completion of this task must follow development of those tools.*
- Conservation Measures to Protect Weak Stocks – Thresholds will be defined for each management unit below which critical harvest measures will apply. Harvest rates or other measures to minimize impacts will be applied fairly and consistently across preterminal areas consistent with the intent to pass more fish to terminal area fisheries and escapement during years of low abundance.
    - *Policy meetings will need to be conducted in the first year to establish harvestable objectives and maximum allowable impacts for critical stocks that are designed to achieve rebuilding. Existing management plans and agreements as well as GSI-corrected run reconstructions will need to be reviewed for equitability of impacts across fisheries.*

Monitoring and Research

- Fisheries should be sampled for GSI data. Samples should be representative of the fishery to allow accurate estimation of stock composition in the fishery.
    - *Sampling plans will be developed prior to 2019 chum returns.*
- Hatchery programs should also be sampled for GSI to understand the impacts of fisheries on supplementation programs.
    - *Sampling plans will be developed prior to 2019 chum returns.*
- Test fisheries should continue to be conducted for inseason management (i.e. estimating runsizes) and GSI collection. Additional test fisheries should be considered where they may improve the understanding of stock composition in a management area or where a refined management unit may warrant a new inseason estimation. These may include mark-recapture experiments in addition to GSI sampling.
    - *A technical evaluation of potential new test fisheries will be undertaken prior to 2019 in-season chum management.*
- Genetic samples should be collected from terminal areas to improve the resolution of genetic stock identification. Emphasis should be placed on unsampled river systems. Note: this is likely a lower priority as GSI is unlikely to be able to resolve stocks at the individual watershed level.

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- *Prior to the 2019 chum management period, an evaluation of WDFW SNPs chum baseline will be made, and a plan for collecting additional genetic samples from terminal populations will be developed.*

Habitat and Hatcheries

- Habitat plans for each river system will provide recommendations for protecting existing fish habitats and projects to restore functioning habitats. Emphasis will be placed on habitat protections and restoration that will increase MSH for a population.
  - *Co-manager habitat biologists will be consulted to begin development of habitat plans.*
- Co-Managers will review existing hatchery production and develop plans for increased production using existing capacity as well as funding proposals to increase hatchery capacity and production. Increased production is designed to meet the needs for treaty tribal harvest and non-tribal fisheries.
  - *Co-manager hatchery biologists will be consulted to begin development of increased hatchery production plans.*

2.15 2021 Skokomish Fall Chinook Late-Timed Performance Report and Program Plan

Introduction

In 2020, the Washington Department of Fish and Wildlife and the Skokomish Tribe continued to implement a program at George Adams Hatchery to evaluate the development of a late spawning mode from the extant hatchery Chinook population, as part of a strategy to recover fall Chinook in the Skokomish River. We hypothesize that the river entry and sexual maturity timing of this later mode would be more conducive to environmental conditions in the Skokomish River than the current hatchery stock. The late-timed fall Chinook hatchery program currently provides for 330,000 eggs to be taken after October 1 with the peak of the late egg take being approximately five weeks later than the current peak, which is the third week of September. The current release goal is 200,000 fingerlings in May at a size of 70 fish per pound, consistent with release body size and timing of the regular program. In addition, two releases of 50,000 fish in April at 90 fpp are planned into the North Fork Skokomish and Vance Creek.

The success of this program will be predicated on achieving Objective 1 of the 2015 Addendum to the 2014 Fall Chinook Management Plan in the Skokomish River, to develop the late-timed mode through consistent hatchery returns. To that end, WDFW made the first release of progeny of late-timed spawners in 2015, have successfully made egg take through the 2019 BY, and secured the program egg take goal of 330,000 for the upcoming BY 2020 release. However, the low overall return of Chinook to Hood Canal resulted in very few fish on the late tail of the return. Thus, a small portion of the late-time program was backfilled from the latest egg take from September. The co-managers expect to continue with this program through the 2021 spawning cycle, at which point two complete brood cycles will have been released.

The contribution of this program to the ultimate goal of recovery will depend on Objective 2, the ability of these fish to colonize natural spawning habitat and produce natural-origin returns at sustainable levels. Importantly, in order to achieve success in the long term, naturally spawning late-timed fish must exhibit population productivity rates that exceed replacement. A detailed discussion of appropriate program size and various strategies for achieving a minimum of 10% natural spawners from the late-timed program are given in the 2015 addendum. The purpose of this document is to describe a plan for putting late-timed returns and their progeny on the natural spawning grounds. Supplementation with both adult and smolt releases provides the most efficient means providing natural spawners from the late-timed program while maintaining a manageable program size.

Production

Reliance on passive colonization through straying would require a program size as high as 550 to 750 thousand eggs (see Task 1-4 of the 2015 Addendum late-timed fall Chinook Program Plan). Such a

program would result in large surplus returns of adults to the hatchery with no role in the broodstock program. Moreover, passive colonization would be likely to occur on a timescale inconsistent with objectives for the numerical expansion of the late-timed stock.

The co-Managers adopted a more efficient approach through active supplementation, with a program size of 330,000. This program bolsters hatchery program strays with active seeding of key habitats through a combination of off-station juvenile releases and transport of adult hatchery returns to the spawning grounds (Table 1). The program return to the hatchery continues to be supported with the original 200,000 release. Additionally, both adult and juvenile releases are used to recruit more adults to the natural spawning grounds. Adult release groups (ARG) are derived from excess unripened broodstock at the hatchery.

Table 7-1. Skokomish late Fall Chinook Program plan.

Program Component	Release location	Supplementation strategy	Release number	Release size	Timing	Mark
Hatchery Late	Purdy Creek	Fingerling (SRG)	200,000	70 fpp	May	Unclipped, GA Late cwt
Natural Late	North Fork (RM 13.3)	Fingerling (SRG)	50,000	80 fpp	April	Unclipped, NF Late cwt
	South Fork (RM 2.2)	Adult (ARG) [a/]	200	0.1 fpp	Oct	Site-specific Floy
	Vance Creek (RM 3.0)[b/]	Fingerling (SRG)	50,000	80 fpp	April	Unclipped, Vance Late cwt
		Adult (ARG) [a/]	200	0.1 fpp	Oct	Site-specific Floy
		Total release	**300,000**			
		Egg take goal	**330,000**			

[a/] Adult releases are planned from hatchery adult surpluses from late maturing fish and will be dependent on availability

[b/] Up to three locations have been identified for ARG and SRG releases in Vance Creek below RM 3.0 to distribute spawners

The hatchery late-timed Chinook program goal for release location, timing and size is the same as for the regular timed release into Purdy Creek, at 70fpp in May. Given the volatility of the south fork Skokomish and mainstem, the co-managers had originally identified Vance Creek and the North Fork as the best locations for both adult and smolt releases. However, further consideration of other reintroduction and supplementation programs currently underway in the North Fork led to a decision to focus all adult releases of late-timed fall Chinook into Vance Creek and the South Fork (Figure 1).

Two smolt release groups (SRG) of 50,000 each are produced for two locations in the Skokomish River basin where environmental conditions are most conducive to successful natural production. These groups would be reared at McKernan on well water in order to reduce their imprinting to Purdy Creek, and maximize imprinting to release sites. These groups are released just prior to smolting in order to

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allow some degree of acclimation and imprinting to potential spawning locations. These releases therefore occur slightly earlier and potentially at smaller size due to their stage of development, which is currently expected to be in April, at approximately 90fpp. All three juvenile release groups are unclipped and uniquely coded wire tagged.

Program goals must be achieved in the following order. The 200k egg take for the hatchery portion of the program must be met before and adults are surplused and transported to release sites. Moreover, the 220k egg take must also be met before eggs can be set aside for smolt releases. As surplus adults and eggs in excess of those needed to produce the 220k are acquired, release sites would be prioritized, 1) South Fork, 2) Vance Creek, 3) North Fork, up to the total program size outlined in Table 1.

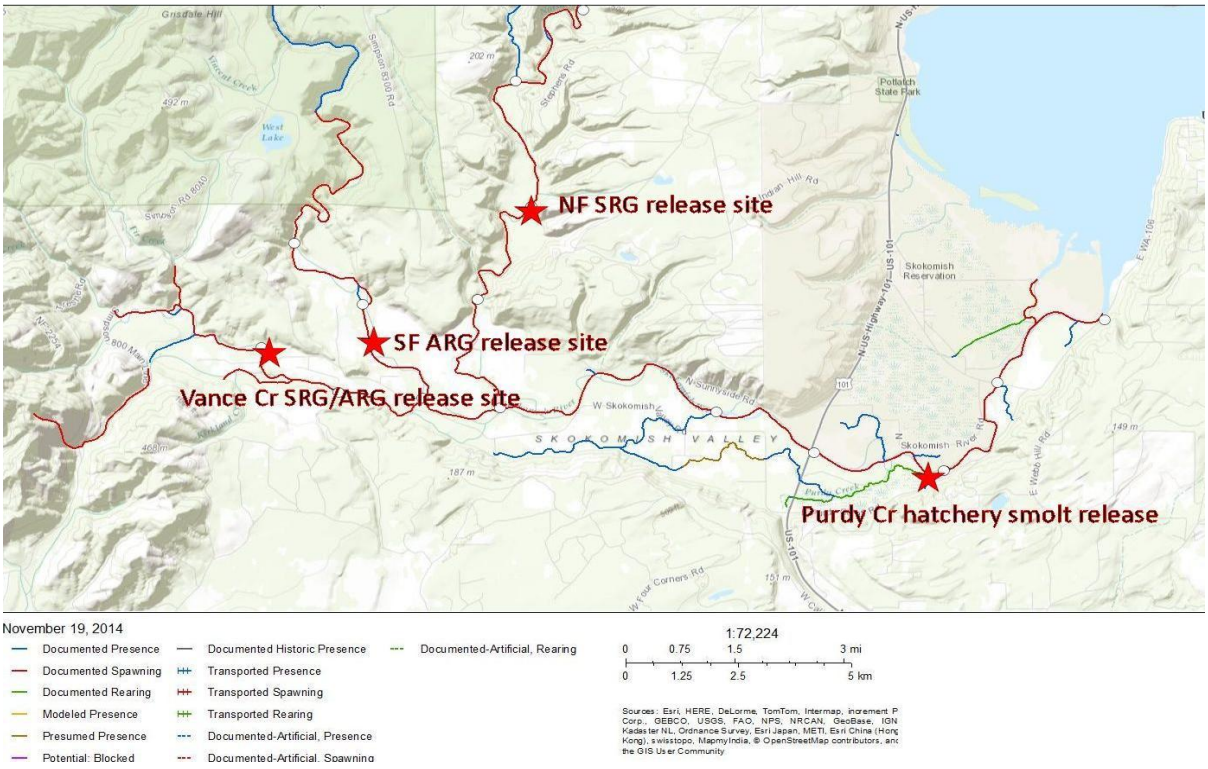

Figure 2. Proposed locations for off-station releases of late-timed fall Chinook in the Skokomish Basin.

Marking and Monitoring

In order to assess the success of late-timed Chinook program returns to George Adams hatchery, WDFW currently coded wire tags (CWT) the 200k hatchery release with a unique code. Assessments of off-station smolt release groups (SRG's) is also be contingent on unique CWT codes. Each of these three groups, in addition to the regular double index tag (DIT) groups, will be recovered at the hatchery, on the spawning grounds, and in fisheries providing critical information on survival, fidelity, and

susceptibility to fisheries. In fall of 2015 WDFW added staff to continue spawning surveys in October in the mainstem and south fork and increase the frequency of carcass surveys. However, we recommend doubling the survey frequency to provide a more thorough schedule for maximizing recoveries.

In order to monitor behavior and distribution of adult releases, an external mark will be necessary; adult releases should be marked with floy tags, color-coded based on release site and uniquely numbered for each individual. Observations of live fish and carcass recoveries will be used to assess the effectiveness of this release strategy. However, existing resources can only provide a cursory assessment.

Additional Resources

In order to implement this program, the co-managers will require additional resources (Table 3). While some of this work can be accomplished with existing staff, additional time and resources will be needed. This budget includes minimal resources outlined in the 2015 Plan, plus additional costs of rearing, marking, and transporting smolt release groups, as well as monitoring adult returns of off-station supplementation fish outlined in this plan. It does not include any of the monitoring costs identified for monitoring productivity for natural spawning fish or for genetic analysis.

An additional two months of hatchery specialist 2 time will be needed in order to conduct broodstocking, sampling and spawning of the late-timed fall Chinook hatchery program and to mark and transport adult release groups (ARG) and smolt release groups (SRG) to release sites. Four months of field technician time and 5,500 in equipment and transportation will be needed to conduct the October/November spawning and carcass surveys. Five months of Biologist 3 time will provide for supervision, analysis, and reporting on the performance of this program. A significant portion of the anticipated budget will be incurred through the cost of coded wire tagging, with $40,500 needed each year to tag 300,000 Chinook.

Table 7-2. Budget for the 2020/21 implementation of late-timed Chinook program in the Skokomish River.

	Unit cost	Units	Total
Fish Culture			
Hatchery specialist 2	$5,000	2	$10,000
Rearing	$1,000	3	$3,000

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	Tagging	$125/1000	300,000	$40,500
	Transport			$2,000
Field Assessment				
	Scientific technician 2	$5,000	4	$20,000
	Sampling equipment and supplies			$2,500
	Vehicle mileage / motor pool			$3,559
Field support, Analysis and Reporting				
	Biologist 3	$7,000	5	$35,000
	Total			**$114,759**

References

2015 Addendum to the 2014 Fall Chinook Management Plan in the Skokomish River. Washington Department of Fish and Wildlife and Skokomish Tribe. Olympia, Washington. October 2015.

2.16 Area 9A Setnet Closure Area

2.17 Puget Sound Chinook Mark-Selective Sport Fisheries Sampling and Monitoring Plan Attachment A

Based on agreements between the State of Washington and the Northwest Treaty Tribes, the Washington Department of Fish and Wildlife (WDFW) has been conducting recreational mark-selective Chinook salmon fisheries (MSFs) in the marine catch areas of Puget Sound since 2003. This attachment outlines the general intent, data needs, sampling and monitoring plans, estimation methodologies, and reporting schedules associated with these fisheries.

Fishery Intent

Agreed-to Chinook salmon MSFs will be conducted in Marine Areas 5-13 during the summer and winter seasons to provide recreational fishing opportunity directed at hatchery Chinook salmon, while limiting impacts on wild stocks of conservation concern, particularly Endangered Species Act (ESA)-listed Puget Sound Chinook salmon. Sampling and monitoring programs will be implemented along with these fisheries in order to provide the information necessary to evaluate and plan potential future Chinook salmon MSFs. Prior to next fishing season, WDFW and the tribes will jointly review and analyze results of the sampling and monitoring programs for these fisheries to evaluate the effectiveness at achieving the intended objectives.

Data Needs for Evaluating the Fishery

Monitoring, sampling and reporting programs will be implemented by WDFW for the purpose of providing the data necessary to estimate the impact of these MSFs on unmarked Chinook salmon and to support the evaluation of future MSFs.

These monitoring and sampling programs are designed to provide data to estimate the following parameters:

- Mark rate in the fishery – marked and unmarked encounters will be estimated using test fishing, salmon trip reports (STR) or dockside sampling programs.
- Number of marked Chinook salmon retained – estimated using dockside sampling programs
- Number of unmarked Chinook salmon retained – estimated using dockside sampling programs
- Number of marked Chinook salmon released – estimated using dockside sampling and test fishing or STR programs
- Number of unmarked Chinook salmon released – estimated using dockside sampling and test fishing or VTR programs
- Number of Chinook salmon encounters of sublegal size - estimated using dockside sampling and test fishing or STR programs
- Stock composition of mortalities – estimated using coded-wire tag (CWT) data collected during dockside sampling
- Mortalities of marked and unmarked double-index tagged (DIT) and other CWT stocks

The co-managers agree to implement these fisheries with the understanding that the capability to estimate stock-specific unmarked fish mortalities is preserved. Methods for estimating unmarked mortalities of

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DIT-CWT stocks within these MSFs have been determined jointly by the co-managers, considering recommendations of the Selective Fisheries Evaluation Committee of the Pacific Salmon Commission.

WDFW will be responsible for reporting the necessary fishery information and data to the Pacific States Marine Fishery Commission that allows these estimates to be generated.

Estimates of total fishery related mortalities, including the total exploitation rate or the Southern US exploitation rate, that represents the management objective for Puget Sound Chinook salmon management units under the co-managers' Harvest Management Plan, will be made by combining the mortality estimate for each Marine Area's mark-selective fishery with mortality estimates in other selective and non-selective fisheries. To ensure that all information necessary to make these estimates is collected, plans for sampling and monitoring of all fisheries will be included as a component of the co- managers' annual pre-season agreement.

Sampling Components

Dockside Sampling

WDFW samplers collect biological data and information regarding effort and catch by conducting angler interviews at assigned access sites. During interviews, samplers acquire data on the number of anglers fishing in each boat, the Marine Catch Area(s) fished, trip duration, trip intent (targeted species) and fish encounter composition (kept and/or released by species). When an interviewed party possesses Chinook or Coho salmon, samplers inspect the fish for CWTs using wand detectors and collect snouts from CWT-positive individuals for later lab processing. Samplers also take length measurements and collect scale samples from landed Chinook salmon. Lastly, samplers attempt to obtain information on fishing method in order to inform test-fishing methodologies.

Effort Surveys

On-the-Water Boat Surveys

On-the-water interviews, Boat Surveys, are conducted to provide information on the proportion of effort in a fishery originating from certain access sites. During these surveys, samplers attempt to intercept all anglers on the water in a given fishery and determine where they intend to tie up or exit the fishery upon completing their trip. This provides us with a list of sites, boat ramps and launches, used to access the fishery as well as information on the relative amount of use (number of anglers) each site receives. Based on this information we designate a "sample-frame" of 5-6 of the highest use access sites for each fishery, from which we select sample sites for dockside creel sampling. Information from the boat surveys also allows us to estimate the total effort that originates from non-sampled sites and include it in our estimates.

Aerial Surveys

Aerial effort surveys are conducted in fisheries where Boat Surveys are unfeasible due to large survey areas and unsafe boating conditions. During these surveys, flights are conducted to count the total number of boats on the water in a fishery. The sample-frame (sites where we station samplers) consists of the three to four access sites expected to be of highest use in the fishery.

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Paired with interviews conducted at these sites, the aerial surveys provide information on the proportion of total fishery effort that originates from non-sampled sites, enabling expansion of observed dockside counts to fishery-wide totals.

Size/Mark-status Composition Estimates

Test Fishing

Test fishing is used to obtain accurate estimates of the size and mark-status composition of the Chinook salmon population being targeted by a fishery. When included in the sampling design for a given fishery, it is conducted for the duration of the fishery. Test fishers spend approximately five days per week on the water attempting to mimic the behavior of the recreational fishing fleet. Fishing method information from dockside interviews is used to inform the methods used by test fishers and efforts are focused at locations that mirror choices made by the at-large private fleet. For each salmon brought to the boat, test fishers record the encounter number, time sampled, species and mark-status. For all Chinook salmon, test fishers record the fork length and total length and collect DNA and scale samples.

Voluntary Salmon Trip Reports

Voluntary Salmon Trip Reports (STRs) are completed and returned by a subset of private and charter fleet anglers to obtain additional information on Chinook salmon encounter rates by size class and mark-status. Anglers are asked to record the date, number of anglers, target species, Marine Catch Area, and for each Chinook or Coho salmon hooked, whether the fish was kept or released, legal or sublegal sized, and marked (adipose clipped) or unmarked.

Sampling and Monitoring Plans

For complete details regarding the following sampling plans and associated assumptions, see the WDFW Methods Report (WDFW 2012).

Full Murthy

The Full Murthy sampling design is the most intensive of the four sampling plans. It utilizes intensive dockside sampling, on-the-water effort surveys and test fishing data to provide precise estimates of Chinook salmon catch and effort, along with total encounters and associated mortalities. STRs are also collected to be used as supplements to test fishing data, if necessary.

Dockside sampling is conducted on five days during each week. Sampling strata are divided into weekday (Monday through Thursday) and weekend (Friday, Saturday and Sunday) strata. During each week, n=2 out of N=4 days are randomly selected for sampling from the Monday through Thursday stratum. In addition, every Friday, Saturday, and Sunday is sampled. Samplers are stationed at two ramps on each of the selected sampling days. Samplers achieve 100% sampling coverage at the assigned ramps from approximately dawn until dark in order to intercept all boats. All anglers and fish exiting the fishery through the sampled sites will be counted. Any boats that are missed at the sampled sites will be counted and recorded on the sampling forms.

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Sites from the sample frame for a given fishery are selected for sampling via a weighted-random site selection process (probability proportional to size). Initially, site selection is based on site size measures calculated from on-the-water survey data obtained during the previous year's fishery. Once the initial surveys are completed during the current year, updated size measures of sites in our sample frame are calculated based on the current year's data.

Reduced Murthy

The Reduced Murthy sampling design is a scaled-back version of the Full Murthy sampling design. It utilizes intensive dockside sampling, on-the-water effort surveys and test fishery or STR data, depending on the fishery.The main difference between the Reduced Murthy and Full Murthy is a reduced dockside sampling frequency. Dockside sampling is conducted on n=6 out of N=14 days during each two-week period. Sampling strata are divided into weekday (Monday through Thursday) and weekend (Friday, Saturday and Sunday) strata. During each two-week period, n=2 out of N=8 days are randomly selected for weekday sampling. In addition, n=2 out of N=3 days are randomly selected for sampling during each weekend. Samplers are stationed at two ramps on each of the selected sampling days. Samplers achieve 100% sampling coverage at the assigned ramps from approximately dawn until dark in order to intercept all boats. All anglers and fish exiting the fishery through the sampled sites will be counted. Any boats that are missed at the sampled sites will be counted and recorded on the sampling forms.

Sites from the sample frame for a given fishery are selected for sampling via a weighted-random site selection process (probability proportional to size). Initially, site selection is based on site size measures calculated from on-the-water survey data obtained during the previous year's fishery. Once the initial surveys are completed during the current year, updated size measures of sites in our sample frame are calculated based on the current and previous year's data.

Unlike the Full Murthy sampling design, where test fishing is a mandatory component, some fisheries sampled with the Reduced Murthy sampling design will utilize a test fishery while others will use STR data to estimate the size and mark-status composition of the targeted Chinook salmon population. For details regarding a specific fishery.

Aerial Access

The Aerial Access sampling design is a modified version of the Reduced Murthy sampling design that uses aerial effort surveys in place of on-the-water effort surveys. Dockside sampling frequencies are the same as those for the Reduced Murthy, however, instead of sampling at two sites (selected from the sampling-frame) on each sample day; samplers are stationed at all sites designated in the sample-frame (three to four sites of moderate to high effort). For each flight, the sample fraction is estimated by pairing the aerial total boat counts with the sample-frame total for boats active during the flight period (determined from dockside interviews). This allows for an expansion of estimates to account for out-of- frame effort.

As with the Reduced Murthy, fisheries monitored using the Aerial Access design may or may not include a test fishery. Those with no test fishery will use STRs to provide an estimate of the size and mark-status composition of the targeted Chinook salmon population.

Baseline

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The Baseline sampling design is a less intensive monitoring program that includes dockside sampling and interviews and the collection of STR data. Baseline sampling is opportunistic in nature, with overall sampling effort allocated across space and time in a manner that maximizes the number of angler interviews obtained per sample effort. While dockside sampling procedures remain the same as in other sampling designs, the frequency of sample days may be slightly reduced. The main difference between Baseline and other, more intensive, sampling designs is the absence of effort surveys. Due to this, Baseline sampling data cannot be used to produce in-season or immediate post-season estimates absolute catch and effort. These estimates become available at a later date through the WDFW Catch Record Card system, allowing further fishery evaluation including total Chinook salmon encounters and associated mortalities by size and mark-status.

Estimation Methods

For fisheries monitored using the Full Murthy, Reduced Murthy and Aerial Access sampling designs, WDFW will produce periodic in-season and post-season estimates of catch and effort. To estimate total Chinook salmon encounters and associated mortalities by size and mark-status category, WDFW will use the agreed-to 'bias-corrected M2' methodology (Conrad & McHugh 2008, WDFW 2012).

Fishery-total catch and effort estimates for fisheries monitored using the Baseline sampling design will be available approximately one to one and half years after the close of the fishery, via the WDFW Catch Record Card system. For fisheries with adequate sample sizes of STR encounters, this involves the 'bias-corrected M2' approach, as mentioned above. In situations where STR sample sizes are insufficient, total encounters and mortalities will be estimated using an 'Dockside Encounter' approach, where the size and mark-status composition of the Chinook salmon population is estimated using dockside sampling data (see WDFW & NWIFC 2020 for details).

Reporting

For some fisheries, WDFW will provide the co-managers with in-season updates of fishery performance.

Following each summer and winter season, WDFW will compile a comprehensive post-season report for all Chinook MSFs conducted in Marine Areas 5-13. These reports will include a summary of the information collected as part of each fishery's sampling and monitoring program. In addition, for fisheries sampled using the Full Murthy, Reduced Murthy and Aerial Access sampling designs, the reports will also include:

- **Weekly estimates of effort and number of Chinook salmon caught and released, by mark-status**
- Estimates of total Chinook salmon encounters and associated mortalities by size and mark-status
- Comparisons of total encounters with pre-season FRAM modeled projections
- Comparisons of mortalities with pre-season FRAM modeled projections
- Estimated fishery-total mortalities of marked and unmarked DIT Chinook salmon, by stock and age

AR004792

References

Conrad R and McHugh P. 2008. Assessment of Two Methods for Estimating Total Chinook Salmon Encounters in Puget Sound/Strait of Juan de Fuca Mark-Selective Chinook Fisheries. Northwest Fishery Resource Bulletin, Manuscript Series Report No 2. http://wdfw.wa.gov/publications/00492

Washington Department of Fish and Wildlife (WDFW). 2012. Methods Report: Monitoring Mark- Selective Recreational Chinook Fisheries in the Marine Catch Areas of Puget Sound (Areas 5 through 13). Revised Draft Report: January 30, 2012. Olympia, Washington. http://wdfw.wa.gov/publications/01357/

Washington Department of Fish and Wildlife (WDFW) and Northwest Indian Fisheries Commission (NWIFC). 2013. Estimating Total Chinook Encounters using Catch Record Card-Based Estimates of Harvest. Draft Report: November 26, 2013. Olympia, Washington.

Washington Department of Fish and Wildlife (WDFW) and Northwest Indian Fisheries Commission (NWIFC). 2020. Early Season Encounter Composition. Draft Report: September 25, 2020. Olympia, Washington.

2.18 2021 Summer Mark-Selective Sport Fishery Marine Area 5

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook and Coho salmon mark-selective fishery (MSF) in Marine Area 5 during the 2021 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 5 will occur from **July 1, 2021 through August 15, 2021** and the Coho salmon MSF will occur from **July 1, 2021 through September 30, 2021**. Anglers will be allowed a daily limit of up to two hatchery Chinook or Coho salmon through August 15 and two hatchery Coho salmon through September 30. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason prediction of total legal-sized Chinook salmon encounters in Area 5 is **7,565** (FRAMChin3721). WDFW will ensure that the fishery does not exceed **7,565** predicted legal-sized Chinook salmon encounters.

Sampling Design and Estimation Methodologies

WDFW will employ the **Reduced Murthy** sampling design to monitor the Area 5 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). WDFW will employ the appropriate number of staff during the Area 5 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning **Friday July 16, 2021.**

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2022. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 5 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wired tagged stocks as described in Attachment A.

Coho Salmon

In the summer of 2021, WDFW will continue to employ a **Reduced Muthy** for the mark-selective Coho salmon fishery from July 1 through September 30, with the same bi-weekly reporting schedule.

2.19 2021 Summer Mark-Selective Sport Fishery Marine Area 6

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook and Coho salmon mark-selective fishery (MSF) in Marine Area 6 during the 2021 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 6 will occur from **July 1, 2021 through August 15, 2021**, only in the portion of the area west of a true north/south line through buoy #2 near the tip of Ediz Hook. The Coho salmon MFS will occur from **July 1 through September 30, 2021**. Anglers will be allowed a daily limit of up to two hatchery Chinook or Coho salmon through August 15 and two hatchery Coho salmon through September 30. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason prediction of total legal-sized Chinook salmon encounters in Area 6 is **6,843** (FRAM Chin3721). WDFW plans to manage this fishery as a season, beginning and ending on the agreed-to dates (above). WDFW will ensure that the fishery does not exceed **6,843** predicted legal-sized Chinook salmon encounters.

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Reduced Murthy, Aerial Design,** (see Attachment A). The size and mark-status of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 6 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 6 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2022. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 6 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 6 MSF, in addition to estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wired tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

Coho Salmon

In the summer of 2021, WDFW will continue to employ a Reduced Muthy, Aerial design, for the duration of the mark-selective Coho salmon fishery from July 1 through September 30, with the same bi-weekly reporting schedule.

AR004795

2.20 2021 Summer Mark-Selective Sport Fishery Marine Area 7

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook and Coho salmon mark-selective fishery (MSF) in Marine Area 7 during the 2021 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 7 will occur from **July 1, 2021 through July 31 and August 16-31, 2021**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. The Coho salmon MSF will occur from **July 1, 2021 through September 30, 2021**.

Fishery Controls

The preseason modeled predicted catch is **1,382** Chinook salmon, **2,466** total predicted unmarked encounters and **1,899** total predicted sublegal encounters in Area 7 (FRAM Chin**3721**). WDFW will manage this fishery not to exceed the above catch quota, total unmarked encounters or total sublegal encounters.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Area 7 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). **Aerial surveys** will continue to be conducted in this time and Area in lieu of boat surveys for the Full Murthy. The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 7 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with weekly in-season catch and effort estimates beginning **Friday July 9, 2021**.

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2022. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 7 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double index-tagged and other coded-wire tagged stocks as described in Attachment A.

Coho Salmon

In the summer of 2021, WDFW will continue to employ a the Full Murthy, Aerial design, throughout the Coho salmon fishery. Coho salmon is a MSF July 1 through August 31 and non-selective September 1 through September 30.

AR004796

2.21 2021 Summer Non-Selective Sport Fishery Marine Area 8.1

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement Coho salmon non-selective fishery in Marine Area 8.1 during the 2021 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this fishery.

Coho Salmon

In the summer of 2021, WDFW will employ a **Baseline Sampling Design** during the non-selective Coho salmon fishery from **August 1, 2021 through September 19, 2021**.

2.22 2021 Summer Mark-Selective Sport Fishery Marine Area 8.2

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Coho salmon mark-selective fishery (MSF) in Marine Area 8-2 during the 2021 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Coho Salmon

In the summer of 2021, WDFW will employ a **Reduced Murthy** sampling method for the mark-selective Coho salmon fishery from **August 14, 2021 through September 19, 2021**, utilitizing on-the-water boat surveys. This fishery is open only South and West from the Clinton/Mukilteo Line.

AR004798

2.23 2021 Summer Mark-Selective Sport Fishery Marine Area 9

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook and Coho salmon mark-selective fishery (MSF) in Marine Area 9 during the 2021 summer season. These fisheries will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of these fisheries on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate these mark-selective fisheries.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 9 will occur from **July 16, 2021 through August 15, 2021** and the Coho salmon MSF will occur from **July 16, 2021 through September 30, 2021**. Anglers will be allowed a daily limit of up to two salmon, hatchery Chinook or Coho salmon, only one Chinook, through August 15 and two hatchery Coho salmon through September 30. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason modeled expected catch is **4,700** Chinook salmon in Area 9 (FRAM Chin**3721**). WDFW will manage this fishery not to exceed the above catch quota.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Area 9 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 9 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with preliminary weekly estimates of effort and encounters beginning **Friday July 23, 2021.** WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2022. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 9 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other CWT stocks as described in Attachment A.

Coho Salmon

In the summer of 2021, WDFW will employ a Full Murthy from July 16 through through September 30, for the mark-selective Coho salmon fishery, utilitizing on the water boat surveys.

2.24 2021 Summer Mark-Selective Sport Fishery Marine Area 10

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 10 during the 2021 summer season. These fisheries will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of these fisheries on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate these mark-selective fisheries.

Fishery Regulations

The summer Chinook salmon MSF in Marine 10 will occur from **July 16, 2021 through August 31, 2021** and the Coho salmon MSF will occur from **July 16 through September 30, 2021**. Anglers will be allowed a daily limit of up to two hatchery Chinook or Coho salmon through **August 31**, only one Chinook, and two hatchery Coho salmon through **September 30**. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason modeled expected catch is **3,718** Chinook salmon in Area 10 (FRAM Chin**3721**). WDFW will manage this fishery not to exceed the above catch quota or **6,592** total sublegal encounters.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Areas 10 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area10 summer MSF to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with weekly in-season catch and effort estimates beginning **Friday July 23, 2021**. WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2022. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 10 summer MSFs, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A.

Coho Salmon

In the summer of 2021, WDFW will employ a Full Murthy from June 16 through September 30, utilitizing on the water boat surveys.

AR004800

2.25 2021 Summer Mark-Selective Sport Fishery Marine Area 11

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 11 during the 2021 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF and non-selective Coho salmon fishery in Marine 11 will occur from **June 16, 2021 through September 30, 2021**. Anglers will be allowed a daily limit of up to two hatchery Chinook or Coho salmon through September 30. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason modeled expected catch is **3,084** Chinook salmon in Area 11 (FRAM Chin**3721**). WDFW will manage this fishery not to exceed the above catch quota or total sublegal encounters **4,233.**

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Area 11 summer MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing and Salmon Trip Reports (STRs). WDFW will employ the appropriate number of staff during the Area 11 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with bi-weekly in-season catch and effort estimates beginning Friday **June 25, 2021**.

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2022. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 11 summer MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of double index-tagged (DIT) and other CWT stocks as described in Attachment A.

Coho Salmon

In the summer of 2021, WDFW will employ a **Full Murthy** sampling method for the non-selective Coho salmon fishery from June 16 through September 30, utilitizing on the water boat surveys.

AR004801

2.26 2021 Summer Selective Sport Fishery Marine Area 12

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 12 during the 2021 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 12 will occur from **July 1, 2021 through September 30, 2021**, only in the portion of the area located south of Ayock Point. Anglers will be allowed a daily limit of up to four salmon. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 12 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 12 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2022. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 12 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 12 MSF, in addition to estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other CWT stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

Coho Salmon

In the summer of 2021, WDFW will employ a **Baseline Sampling Design** for the non-selective Coho salmon fishery from July 1 through September 30, both north and south of Ayock Point.

2.27 2021 Summer Mark-Selective Sport Fishery Marine Area 13

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook and Coho salmon mark-selective fishery (MSF) in Marine Area 13 during the 2021 summer season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The summer Chinook salmon MSF in Marine Area 13 will occur from **May 1, 2021 through September 30, 2021**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 13 summer MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 13 summer MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all summer Chinook salmon MSFs conducted in Marine Areas 5-13 by February 1, 2022. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 13 summer MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 13 MSF, in addition to estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wired tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

Coho Salmon

In the summer of 2021, WDFW will employ a **Baseline Sampling Design** for the mark-selective Coho salmon fishery from July 1 through September 30.

AR004803

2.28 2021-22 Winter Mark-Selective Sport Fishery Marine Area 5

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 5 during the 2021-2022 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The winter Chinook salmon MSF in Marine Area 5 will occur from **March 1, 2022 through April 30, 2022**. Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 5 winter MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 5 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook salmon MSFs conducted in Marine Areas 5-13 by December 1, 2023. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 5 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 5 MSF, in addition to estimates of marked and unmarked mortalities of double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A will be provided at a later date, as estimates from Catch Record Card become available (see Attachment A).

(Area 5 is closed for Coho salmon retention in the winter)

2.29 2021-22 Winter Mark-Selective Sport Fishery Marine Areas 10

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 10 during the 2021-2022 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The winter Chinook salmon MSF in Marine Area 10 will occur from **January 1, 2022 through March 31, 2022.** Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2021-22Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason prediction of total Chinook salmon encounters in Area 10 is **8,475** (FRAM Chin3721). WDFW plans to manage this fishery to ensure that the fishery does not exceed 120% of **8,475** predicted total Chinook salmon encounters. WDFW will also manage to **1,105** total unmarked encounters and **7,319** total sublegal encounters.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Area 10 winter MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). Comanagers have agreed to use an additional test fishing boat in this Area in the winter. The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing data. WDFW will employ the appropriate number of staff during the Area 10 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with weekly in-season catch and effort estimates beginning the week ending **January 7, 2022.**

WDFW will compile a comprehensive post-season report for all winter Chinook salmon MSFs conducted in Marine Areas 5-13 by December 1, 2023. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 10 winter MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A.

Coho Salmon

In the winter of 2021-22, WDFW will employ a **Reduced Murthy** sampling method for the non-selective Coho salmon fishery September 1 through October 31, 2021 when there is no Chinook salmon retention, and a **Full Murphy** from January 1 through March 31, 2022, when there is also a Chinook MSF.

AR004805

2.30 2021-22 Winter Mark-Selective Sport Fishery Marine Area 11

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 10 during the 2021-2022 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The winter Chinook salmon MSF in Marine Area 11 will occur from **November 1, 2021 through December 31, 2021.** Anglers will be allowed a daily limit of up to two hatchery Chinook salmon. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

The preseason prediction of total Chinook salmon encounters in Area 10 is 1,001 (FRAM Chin**3721**). WDFW plans to manage this fishery to ensure that the fishery does not exceed 120% of 1,001 predicted total Chinook salmon encounters. WDFW will also manage to 239 total unmarked encounters and **637** total sublegal encounters.

Sampling Design and Estimation Methodologies

WDFW will employ the **Full Murthy** sampling design to monitor the Area 11winter MSF and estimate total encounters and associated mortalities of legal, sublegal, marked and unmarked Chinook salmon (see Attachment A). Comanagers have agreed to use an additional testfishing boat in the Area in the winter. The size and mark-status composition of the targeted Chinook salmon population will be estimated using test fishing and Salmon Trip Reports (STRs). WDFW will employ the appropriate number of staff during the Area 11 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will provide the co-managers with weekly in-season catch and effort estimates beginning the week ending **November 12, 2021.**

WDFW will compile a comprehensive post-season report for all winter Chinook salmon MSFs conducted in Marine Areas 5-13 by December 1, 2023. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 11 winter MSF, a full analysis of impact estimates (total encounters and mortalities by size and mark-status), and estimates of marked and unmarked mortalities of double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A.

Coho Salmon

In the winter of 2021-22, WDFW will employ a **Reduced Murthy** sampling method for the non-selective Coho salmon fishery **October 1 through October 31, 2021**. There is no Coho salmon retention during the November 1 through December 31, 2021 timeframe.

AR004806

2.31 2021-22 Winter Mark-Selective Sport Fishery Marine Area 12

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Coho salmon non-selective fishery in Marine Area 12 during the 2021 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Coho Salmon

In the winter of 2021-22, WDFW will employ **Baseline Sampling Design** for the non-selective Coho salmon fishery **October 1 through October 31, 2021**, North and South of Ayock Point.

2.32 2021-22 Winter Mark-Selective Sport Fishery Marine Area 13

The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) have reached agreement to implement a Chinook salmon mark-selective fishery (MSF) in Marine Area 13 during the 2021-2022 winter season. This fishery will be implemented consistent with management objectives defined by the co-managers' Puget Sound Chinook Harvest Management Plan, the WDFW-Tulalip management plan for hatchery origin fish, and established principles concerning the allocation of harvestable salmon and the exercise of treaty rights. The co-managers will seek to minimize or eliminate any unintended effects of this fishery on individual treaty fisheries, including dislocation and/or disruption. Therefore, treaty fisheries will not be modified in order to accommodate this mark-selective fishery.

Fishery Regulations

The winter Chinook and Coho salmon MSFs in Marine Area 13 will occur from **October 1, 2021 through May 14, 2022**. Anglers will be allowed a daily limit of up to two hatchery Chinook or Coho salmon. All sub-area closures included in the 2021-22 Co-Managers' List of Agreed Fisheries will remain in effect for the agreed-to dates.

Fishery Controls

WDFW will manage this fishery as a season, beginning and ending on the agreed-to dates (above).

Sampling Design and Estimation Methodologies

Sampling efforts will be conducted consistent with the **Baseline Sampling Design** (see Attachment A). The size and mark-status composition of the targeted Chinook salmon population will be estimated using Salmon Trip Reports (STRs). Total Chinook salmon encounters and associated mortalities resulting from the Area 13 winter MSF will be estimated using the 'CRC for Encounters' methodology, described in Attachment A. WDFW will employ the appropriate number of staff during the Area 13 winter MSF in an effort to meet or exceed the sampling rate goal of 20%.

Reporting Schedule

WDFW will compile a comprehensive post-season report for all winter Chinook salmon MSFs conducted in Marine Areas 5-13 by December 1, 2023. This report will include a summary of the information collected as part of our sampling and monitoring program during the Area 13 winter MSF. A full analysis of impact estimates (total encounters and mortalities by size and mark-status) resulting from the Area 13 MSF, in addition to estimates of marked and unmarked mortalities of Double index-tagged (DIT) and other coded-wire tagged stocks as described in Attachment A will be provided at a later date, as Catch Record Card estimates become available (see Attachment A).

AR004808

Appendix C. Socioeconomics Methods

This appendix describes the methods and data used to develop baseline conditions in Section 3.7 (Affected Environment) and to analyze socioeconomic effects in Section 4.7 (Environmental Consequences). The analysis of socioeconomic impacts is based on baseline catch and effort conditions associated with 2020-21 conditions of catch and effort estimated by the Fishery Regulation Assessment Model (FRAM), as described in more detail in Chapter 2 of this EA. The socioeconomic effects of changes in catch and effort under the No Action, Proposed Action, No Fishing, and Treaty Tribal Fishery-Only Alternatives are evaluated relative to these baseline conditions.

Overview of Assessment Methods

The estimates of socioeconomic impacts from changes in predicted catch and fishing effort associated with salmon and steelhead in Puget Sound commercial and recreational fisheries are expressed in terms of value to commercial and recreational fishers and in changes in economic activity within defined regional areas (county or multi-county regions). Economic activity is measured in terms of employment and personal income, which are considered key indicators of economic activity, and are used in economic analysis to evaluate distributional effects on local and regional economies. Estimates of personal income, which the Pacific Fishery Management Council (PFMC) also derives in its annual assessment of potential economic effects of its salmon allocation decisions, reflect the total wages and profits associated with expenditures made by commercial fishers and processors, and by sport anglers.

For this analysis, the quantified impacts associated with affected salmon and steelhead fisheries include both income and employment effects attributable to commercial landings and primary processing, and to recreational effort (angler trips) in affected marine and freshwater fisheries. Lastly, net economic values (net profits to commercial fishers and net benefits to anglers) associated with the estimated catch and fishing effort under the alternatives are estimated.

The following analytical steps were followed in conducting the socioeconomic analysis of commercial and recreational salmon fisheries under existing conditions and the alternatives. The description of these analytical steps is followed by a list of key assumptions that were used in the analyses.

Step 1: Compile Catch and Effort Data

Estimates of Puget Sound commercial harvest, in numbers of fish caught by species, and recreational effort in both marine and freshwater by catch area were developed by NWIFC and WDFW for existing conditions and under each alternative, and were provided to the economic analysis team. For purposes of the economic analysis, these estimates of catch and effort were then assigned to counties within one of three subregions in the Puget Sound area (North Puget Sound, South Puget Sound, and Strait of Juan de Fuca).

Step 2. Allocate Catch and Effort to Economic (County) Regions

Step 2a. Allocate Commercial Catch

AR004809

Estimated commercial catch was allocated to the economic regions based on percentages of the harvest in each catch area landed by persons residing in each region using data from the Washington Department of Fish and Wildlife's License and Fish Ticket (LIFT) database. For non-tribal marine landings, these percentages were derived using harvest data on the distribution of commercial harvests (in pounds landed) by catch area and region where commercial fishing permit holders reside. For marine tribal landings, percentages were derived using harvest data on the distribution of the tribal landings by catch area. The percentages were calculated by dividing the landings in each catch area for each region by the total landings in each catch area.

Table C-1 shows the distribution of catch between marine and freshwater areas in each region by salmon species and Puget sound catch area under existing conditions as provided in Section 3.7.

Table C-1. Percentage distributions between marine and freshwater for tribal and non-tribal commercial catch in each catch area under Existing Conditions.

	Catch Area 5, 6		Catch Area 7		Catch Area 8, 9		Catch Area 10, 11, 13		Catch Area 12	
Species	Marine	Fresh	Marine	Fresh	Marine	Fresh	Marine	Fresh	Marine	Fresh
Chinook	100%	0%	95.4%	4.6%	79.3%	20.7%	39.5%	60.5%	81.2%	18.8%
Coho	100%	0%	59.8%	40.2%	73.1%	26.9%	56.9%	43.1%	87.5%	12.5%
Sockeye	-	-	-	-	10.1%	89.9%	-	-	-	-
Pink	-	-	-	-	-	-	-	-	-	-
Chum	100%	0%	98.9%	1.1%	100%	0%	78.5%	21.5%	89.8%	10.2%
Steelhead	100%	0%	4.8%	95.2%	100%	0%	-	-	-	-

Note: "-" indicates harvest of that species in that catch area is zero under Existing Conditions.

The percentages shown in Table C-2 associate total catch for each species within each catch area to the landings areas (counties).

Table C-2. Percentages used to allocate estimated tribal and non-tribal marine harvest in catch areas to economic regions (counties).

Catch Areas/County	Chinook	Coho	Sockeye	Pink	Chum	Steelhead
Areas 5, 6						
Whatcom						
Skagit						
Snohomish						
Island						
San Juan						
King		4.4%			1.3%	
Pierce						
Thurston						
Mason						
Kitsap						
Clallam	99.9%	95.6%	98.8%	100.0%	98.7%	100.0%
Jefferson	0.1%		1.2%			
Total	100%	100%	100%	100%	100%	100%
Area 7						

AR004810

Catch Areas/County	Chinook	Coho	Sockeye	Pink	Chum	Steelhead
Whatcom	49.3%	95.1%	72.2%	71.2%	87.1%	100.0%
Skagit	47.2%	3.2%	13.7%	17.9%	6.5%	
Snohomish	0.4%		6.0%	0.8%	2.5%	
Island	0.4%		0.3%			
San Juan	0.9%	1.2%	0.8%	0.2%	0.1%	
King	1.5%	0.5%	5.4%	8.2%	2.9%	
Pierce			0.1%	1.4%	0.6%	
Thurston					0.3%	
Mason						
Kitsap			0.1%			
Clallam			1.0%			
Jefferson	0.3%		0.3%	0.3%		
Total	100%	100%	100%	100%	100%	100%
Areas 8,9						
Whatcom	2.6%	25.3%		33.9%	26.2%	100.0%
Skagit	13.0%	21.1%		54.9%	14.0%	
Snohomish	15.7%	20.1%	100.0%	3.4%	12.1%	
Island		0.7%			0.7%	
San Juan	3.3%				0.1%	
King	63.4%	22.0%		7.8%	35.6%	
Pierce	1.5%	0.4%			9.1%	
Thurston					1.1%	
Mason	0.3%	4.0%			0.3%	
Kitsap		0.1%				
Clallam		0.4%			0.5%	
Jefferson	0.2%	5.9%			0.2%	
Total	100%	100%	100%	100%	100%	100%
Areas 10, 11, 13						
Whatcom	0.2%	21.2%		0.7%	33.0%	
Skagit	0.4%	1.7%			9.5%	
Snohomish		0.8%		0.4%	9.6%	
Island					0.1%	
San Juan					0.1%	
King	37.8%	13.2%	87.6%	98.5%	40.7%	
Pierce	20.9%	9.6%	5.5%		3.6%	100.0%
Thurston	9.6%	7.1%		0.4%	1.1%	
Mason	14.4%	37.3%	0.1%		1.9%	
Kitsap	16.4%	0.2%	6.1%			
Clallam	0.3%	9.0%	0.6%		0.2%	
Jefferson			0.1%		0.1%	
Total	100%	100%	100%	100%	100%	100%
Area 12						
Whatcom		5.7%	34.9%	34.9%	34.9%	
Skagit		1.3%	8.0%	8.0%	8.0%	
Snohomish	3.9%	0.7%	4.7%	4.7%	4.7%	
Island			0.1%	0.1%	0.1%	
San Juan	0.7%					

Catch Areas/County	Chinook	Coho	Sockeye	Pink	Chum	Steelhead
King	0.2%	5.5%	37.0%	37.0%	37.0%	
Pierce			0.6%	0.6%	0.6%	
Thurston	3.4%		0.5%	0.5%	0.5%	
Mason	77.8%	75.0%	12.8%	12.8%	12.8%	
Kitsap						
Clallam						
Jefferson	14.0%	11.7%	1.3%	1.3%	1.3%	
Total	100%	100%	100%	100%	100%	0%

For assessing commercial tribal catch in freshwater areas, percentages were derived based on where the streams and rivers were located. In cases where catch area data included fishing activity in more than one region (e.g., area 12 and areas 8 and 9), the harvest was associated with regions based on the proportion of harvest estimated to occur in the rivers and streams in each region. These percentages are shown in Table C-3.

Table C-3. Percentages used to allocate estimated tribal freshwater commercial harvest in catch areas to economic regions (counties).

Catch Areas	County	Existing Conditions			No Action			Action Alternatives		
		Chinook	Coho	Other	Chinook	Coho	Other	Chinook	Coho	Other
5, 6	Clallam	65.5%	65.5%	65.5%	50.8%	50.8%	50.8%	65.6%	65.6%	65.6%
	Jefferson	34.5%	34.5%	34.5%	49.2%	49.2%	49.2%	34.4%	34.4%	34.4%
7	Whatcom	100%	100%	100%	100%	100%	100%	100%	100%	100%
8, 9	Skagit	93.6%	93.6%	93.6%	93.8%	93.8%	93.8%	93.6%	93.6%	93.6%
	Snohomish	6.4%	6.4%	6.4%	6.2%	6.2%	6.2%	6.4%	6.4%	6.4%
10, 11, 13	King	27.2%	80.9%	64.0%	33.0%	83.4%	69.0%	25.4%	82.6%	69.0%
	Pierce	10.3%	18.6%	16.0%	13.5%	16.1%	15.4%	9.6%	16.7%	15.0%
	Thurston	62.5%	0.5%	20.1%	53.5%	0.5%	15.6%	65.1%	0.7%	15.9%
12	Mason	100%	100%	100%	100%	100%	100%	100%	100%	100%

Step 2b. Allocate Recreational Effort

Estimated sport fishing trips were associated with economic regions based on angler catch record information from the Washington Department of Fish and Wildlife on the percentage of the 2001 sport salmon harvest in each catch area that was caught by persons residing in each Puget Sound-area county as shown in Table C-4.

Table C-4. Allocation of sport fishing trips (marine and freshwater) to each economic subregion (county).

Catch Areas/County	Percent (All Species)
Areas 5, 6	
Whatcom	1.2%
Skagit	1.4%

Catch Areas/County	Percent (All Species)
Snohomish	8.6%
Island	2.5%
San Juan	0.0%
King	22.9%
Pierce	17.3%
Thurston	6.2%
Mason	2.8%
Kitsap	8.0%
Clallam	26.1%
Jefferson	3.0%
Total	100%
Area 7	
Whatcom	28.6%
Skagit	25.1%
Snohomish	11.2%
Island	3.8%
San Juan	15.9%
King	11.8%
Pierce	1.0%
Thurston	0.2%
Mason	0.0%
Kitsap	0.4%
Clallam	1.1%
Jefferson	0.9%
Total	100%
Areas 8,9	
Whatcom	0.8%
Skagit	2.6%
Snohomish	42.3%
Island	23.8%
San Juan	0.1%
King	17.2%
Pierce	1.2%
Thurston	0.6%
Mason	0.1%
Kitsap	7.7%
Clallam	0.4%
Jefferson	3.1%
Total	100%
Areas 10, 11, 13	
Whatcom	0.1%
Skagit	0.1%
Snohomish	8.5%
Island	0.1%
San Juan	0.0%
King	41.6%

Catch Areas/County	Percent (All Species)
Pierce	29.3%
Thurston	6.6%
Mason	3.5%
Kitsap	9.7%
Clallam	0.1%
Jefferson	0.3%
Total	100%
Area 12	
Whatcom	0.0%
Skagit	0.9%
Snohomish	5.4%
Island	0.1%
San Juan	0.1%
King	15.1%
Pierce	9.5%
Thurston	12.6%
Mason	15.3%
Kitsap	19.5%
Clallam	8.2%
Jefferson	13.5%
Total	100%

Step 3. Convert commercial catch to harvested weights and ex-vessel values, and recreational trips to trip-related expenditures

3a. Calculating Commercial Landings Weights and Ex-vessel Value

Total harvested weight was calculated by multiplying estimated marine and freshwater landings by average weights for each species. Average weights, which are shown in Table C-5, were based on historical 2010-2016 averages derived from the Washington Department of Fish and Wildlife's LIFT data base.

Table C-5. Average weights per-fish (in pounds) used to convert estimated landings to ex-vessel weights.

Region	Chinook	Coho	Sockeye	Pink	Chum	Steelhead
North Puget Sound	13.4	6.4	5.8	4.1	9.5	7.9
South Puget Sound	11.8	6.4	6.1	3.9	8.6	7.7
Strait of Juan de Fuca	7.4	7.7	5.8	4.1	8.7	5.5

North Puget Sound = Whatcom, Skagit, Snohomish, Island, and San Juan counties
South Puget Sound = King, Pierce, Thurston, Mason, and Kitsap counties
Strait of Juan de Fuca = Clallam and Jefferson counties.

Once the harvested weights were calculated, the ex-vessel value of the harvest in each region was estimated by multiplying harvested poundage by average prices per pound for each species. Average prices, which are shown in Table C-6, were based on 2015-2020 PacFIN average inflation-adjusted ex-vessel revenue for Puget Sound area salmon landings. Ex-vessel values are inflation-adjusted to 2020

dollars using the BEA's GDP implicit price deflator series. See: https://apps.bea.gov/iTable/index_nipa.cfm.

Table C-6. Average prices (per pound) used to convert estimated harvested poundage to ex-vessel values (inflation-adjusted 2020 dollars).

Region	Chinook	Coho	Sockeye	Pink	Chum	Steelhead
North Puget Sound	$2.99	$1.89	$1.96	$0.31	$0.87	$1.22
South Puget Sound	$3.09	$2.11	$2.33	$0.23	$0.87	$1.49
Strait of Juan de Fuca	$3.33	$2.10	$2.09	$0.28	$0.90	$2.75

North Puget Sound = Whatcom, Skagit, Snohomish, Island, and San Juan counties
South Puget Sound = King, Pierce, Thurston, Mason, and Kitsap counties
Strait of Juan de Fuca = Clallam and Jefferson counties.

Step 3b: Convert Sport Fishing Trips to Trip-Related Spending

Information from the Northwest Fisheries Science Center's IOPAC model used for analyzing economic impacts of West Coast recreational fisheries indicates average spending of $190.45 per angler-trip for marine trips and $139.01 per angler-trip for freshwater trips in the Puget Sound region in inflation-adjusted 2020 dollars. These per-trip spending estimates were multiplied by the number of salmon sport fishing trips under existing conditions (0.144 million marine trips and 0.334 million freshwater trips) to estimate total trip-related expenditures under existing conditions of $73.8 million by recreational anglers targeting salmon and steelhead in the Puget Sound region.

Step 4: Estimate Regional Economic Impacts (Personal Income and Employment) of Commercial Landings and Sport Fishing Effort

Regional economic impacts (REI), as measured in terms of personal income and employment (full-time equivalents, or FTEs) were estimated using factors developed for analyzing economic impacts of West Coast commercial and recreational fisheries by the IOPAC model. The commercial and recreational fisheries REI factors used in the analysis reflect the total (direct, indirect and induced) income impacts for commercial salmon landings and recreational angler trips estimated by Northwest Fisheries Science Center's IOPAC model, which incorporate updated IMPLAN models, commercial landings data, survey-based industry cost data, and survey-based angler expenditure data. A description of IOPAC fisheries economic impact model can be found at: https://www.nwfsc.noaa.gov/assets/25/1620_08012011_142237_InputOutputModelTM111WebFinal.pdf

For estimating income impacts attributable to tribal and non-tribal commercial salmon fisheries, the most recent estimate of average total REI (combined contributions from harvesting and primary processing) per dollar of Puget Sound commercial ex-vessel salmon value of $1.81 income per dollar ex-vessel value was used. Multiplying this value by estimated total ex-vessel salmon value under existing conditions of $11.3 million results in an estimated total personal income impact attributable to Puget Sound commercial (tribal and non-tribal) salmon fisheries of approximately $20.4 million under existing conditions.

For computing the regional economic effects of the recreational salmon fisheries, the most recent average REI factors were applied to the estimated number of angler trips to estimate estimated regional economic income impacts. These REI factors are $172.85 total income per angler-trip for marine trips and $104.15 total income per angler-trip for freshwater trips in the Puget Sound region. Application of the recreational impact factors to the estimated number of angler trips under existing conditions (0.144 million marine trips and 0.334 million freshwater trips) results in an estimate of $59.6 million in regional personal income impacts attributable to Puget Sound recreational salmon fisheries under existing conditions.

After calculating the income impacts under each alternative, employment attributable to commercial (tribal and non-tribal) harvest and processing and recreational salmon angling in Puget Sound area counties was estimated by dividing the corresponding total income impact estimated for each region (county) by the average earnings per job in each corresponding county. Average earnings per job were derived from 2018 U.S. Department of Commerce, Bureau of Economic Analysis data (Tables CAINC5N and CAEMP25N) and inflation-adjusted to 2020 dollars using the BEA's GDP implicit price deflator. See:
https://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=6#reqid=70&step=1&isuri=1&acrdn=6

Table C-7. Average Earnings per Job for counties in the Puget Sound Region (inflation-adjusted 2020 dollars).

Region/County	Average Earnings per Job
North Puget Sound	**$62,875**
Whatcom	$55,611
Skagit	$59,264
Snohomish	$67,300
Island	$54,368
San Juan	$37,557
South Puget Sound	**$85,477**
King	$95,141
Pierce	$63,382
Thurston	$60,354
Mason	$48,269
Kitsap	$63,364
Strait of Juan de Fuca	**$45,381**
Clallam	$46,654
Jefferson	$42,506

Application of these earnings factors to the estimated income impacts results in an estimated 345 jobs and 899 jobs attributable to Puget Sound commercial and recreational salmon fisheries, respectively, under existing conditions.

Step 5. Estimate Net Economic Values Associated with Commercial and Recreational Salmon Fisheries in Puget Sound

Step 5a. Commercial Salmon Fisheries Net Economic Value

Net economic values (NEV) associated with the Puget Sound tribal and non-tribal commercial salmon fisheries can be measured in terms of monetary value to producers and consumers. For this analysis, only net income to producers is evaluated because it is assumed that changes in the supply of salmon under the alternatives would not measurably affect the price that consumers pay for salmon. Producers in this case are the tribal and non-tribal commercial fishers, including operators (or permit holders), crewmembers, and fish processors.

NEV to salmon fishers is measured as the difference between the amount of total revenues that vessel operators receive less the costs of production including wages and operational expenses such as for fuel, bait and equipment. For this analysis the values shown in Table C-8 were used. These values were adapted from the Mitchel Act DEIS and inflation-adjusted to 2020 dollars using the BEA's GDP implicit price deflator series.

Table C-8. Average Net Economic Value (NEV) factors (per fish) applied to estimated tribal and non-tribal commercial harvest (inflation-adjusted 2020 dollars).

Species	NEV per fish
Chinook	$21.57
Chum	$4.55
Coho	$7.92
Pink	$0.65
Sockeye	$7.00
Steelhead	$9.02

Application of these per fish NEV factors to the numbers of salmon caught in tribal and non-tribal commercial Puget Sound salmon fisheries generates a total estimated NEV of the Puget Sound tribal and non-tribal commercial salmon fishery under existing conditions of approximately $6.6 million.

Step 5b. Recreational Salmon Fisheries Net Economic Value

NEVs associated with sport fishing are a measure of the dollar value that anglers would be willing to pay over and above what they actually pay for their sport fishing experience. For this analysis, only NEVs to sport anglers are included. NEV to producers (e.g., charter boat operators, guides, and other sport fishing-related businesses), which is measured by the net income (or profit) generated by sales to recreational anglers, is assumed to be offset by change in net income to producers of other goods and services.

The NEV to Puget Sound salmon and steelhead sport anglers is estimated at $72.44 per angler trip (based on estimates in Boyle et al 1998 for recreational fishing for anadromous species in the Pacific region, inflation-adjusted to 2020 dollars using the BEA's GDP implicit price deflator). This per-trip factor was multiplied by the estimated number of sport fishing trips (0.477 million) to estimate total net economic values associated with sport fishing by recreational anglers for Puget Sound salmon under existing conditions of approximately $34.6 million.

Key Assumptions

The following key assumptions were incorporated into the economic assessment of commercial and recreational salmon fisheries.

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- The allocation of freshwater tribal landings among economic regions was based on the assumption that harvests from rivers are made by tribes in the regions in which the rivers are located.
- Historical multi-year 2010-2016 average fish weights and 2015-2020 average commercial ex-vessel price factors were assumed in the analysis.
- Labor requirements per commercially harvested fish were assumed not to vary across the three Puget Sound regions.
- Average personal income, as a percentage of gross income, was assumed not to vary for commercial fishing operations across the three Puget Sound regions.
- A single direct income multiplier was used in all regions to estimate the personal income effects of commercial salmon fisheries. This implicitly assumes that, on average, direct income per dollar of gross revenue does not vary across the three Puget Sound regions.
- Reductions in net income to sport fishing-related businesses resulting from reduced angler spending are assumed to be offset by increases in spending on other non-sport fishing-related goods and services and resulting increases in net income to producers of those goods and services (and vice versa).

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