PRESEASON REPORT I

STOCK ABUNDANCE ANALYSIS AND ENVIRONMENTAL ASSESSMENT PART 1 FOR 2024 OCEAN SALMON FISHERY REGULATIONS

REGULATION IDENTIFIER NUMBER 0648-BM47

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LIST OF ACRONYMS AND ABBREVIATIONS

ABC	acceptable biological catch
ACL	annual catch limit
BY	brood year
CCC	central California coast (coho)
CDFW	California Department of Fish and Wildlife
CoTC	Coho Technical Committee (of the PSC)
Council	Pacific Fishery Management Council
CRFMP	Columbia River Fishery Management Plan
CWT	coded-wire tag
EA	Environmental Assessment
EEZ	exclusive economic zone (from 3-200 miles from shore)
EIS	Environmental Impact Statement
EMAP	Environmental Monitoring and Assessment Program
ESA	Endangered Species Act
ESU	evolutionarily significant unit
F_{ABC}	exploitation rate associated with ABC
F_{ACL}	exploitation rate associated with ACL (= F_{ABC})
FMP	fishery management plan
F_{MSY}	maximum sustainable yield exploitation rate
FNMC	Far-North-Migrating Coastal
F_{OFL}	exploitation rate associated with the overfishing limit (= F_{MSY}, MFMT)
FONSI	Finding of No Significant Impacts
FRAM	Fishery Regulatory Assessment Model
GAM	generalized additive models
ISBM	individual stock-based management
JA3	January age-3 coho
Jack CR	Columbia River jacks (coho)
Jack OC	Oregon coastal and Klamath River Basin jacks (coho)
Jack OPI	Jack CR + Jack OC (coho)
KMZ	Klamath management zone (ocean zone between Humbug Mountain and Horse Mountain where management emphasis is on Klamath River fall Chinook)
KOHM	Klamath Ocean Harvest Model
KRFC	Klamath River fall Chinook
KRTT	Klamath River Technical Team
LCN	lower Columbia River natural (coho)
LCR	lower Columbia River (natural tule Chinook)
LRB	lower Columbia River bright (Chinook)
LRH	lower Columbia River hatchery (tule fall Chinook returning to hatcheries below Bonneville Dam)
LRW	lower Columbia River wild (bright fall Chinook spawning naturally in tributaries below Bonneville Dam)
MCB	Mid-Columbia River bright (bright hatchery fall Chinook released below McNary Dam)
MFMT	maximum fishing mortality threshold
MOC	mid-Oregon coast
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSM	mixed stock model
MSST	minimum stock size threshold
MSY	maximum sustainable yield
NA	not available
NEPA	National Environmental Policy Act

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

NMFS	National Marine Fisheries Service
NOC	north Oregon coast
NPGO	North Pacific Gyre Oscillation
NS1G	National Standard 1 Guidelines
OA3	ocean age-3 coho
OCN	Oregon coast natural (coho)
OCNL	Oregon coast natural lake (coho)
OCNR	Oregon coast natural river (coho)
ODFW	Oregon Department of Fish and Wildlife
OFL	overfishing limit
OPI	Oregon Production Index (coho salmon stock index south of Leadbetter Point)
OPIH	Oregon Production Index public hatchery
OPITT	Oregon Production Index Technical Team
OY	Optimum Yield
PDO	Pacific Decadal Oscillation
PFMC	Pacific Fishery Management Council (Council)
PRIH	Private hatchery
PSC	Pacific Salmon Commission
PST	Pacific Salmon Treaty
RER	rebuilding exploitation rate
RK	Rogue/Klamath (coho)
RMP	Resource Management Plan (for exemption from ESA section 9 take prohibitions under limit 6 of the 4(d) rule)
ROPI	Rogue Ocean Production Index (Chinook)
SAB	Select Area brights (bright fall Chinook destined for Select Area sites on the lower Columbia River)
S_{ABC}	spawning escapement associated with ABC
S_{ACL}	spawning escapement associated with ACL (= S_{ABC})
SCH	Spring Creek Hatchery (tule fall Chinook returning to SCH)
SHM	Sacramento Harvest Model
SI	Sacramento Index
SJF	Strait of Juan de Fuca
S_{MSY}	MSY spawning escapement
S_{OFL}	spawning escapement associated with the overfishing limit (= S_{MSY})
SOC	south Oregon Coast
SONC	southern Oregon/northern California (Chinook)
SONCC	southern Oregon/northern California coast (coho)
SRFC	Sacramento River fall Chinook
SRS	Stratified Random Sampling
SRWC	Sacramento River winter Chinook
STEP	Salmon Trout Enhancement Program
STT	Salmon Technical Team (formerly the Salmon Plan Development Team)
TAC	Technical Advisory Committee (*U.S. v. Oregon*)
TAC	total allowable catch
URB	Upriver bright (naturally spawning bright fall Chinook primarily migrating past McNary Dam)
VSI	visual stock identification
WCVI	West Coast Vancouver Island
WDFW	Washington Department of Fish and Wildlife

INTRODUCTION

This is the second report in an annual series of four reports prepared by the Salmon Technical Team (STT) of the Pacific Fishery Management Council (Council) to document and help guide ocean salmon fishery management off the coasts of Washington, Oregon, and California. This report focuses on Chinook, coho, and pink salmon stocks that have been important in determining Council fisheries in recent years, and on stocks listed under the Endangered Species Act (ESA) with established National Marine Fisheries Service (NMFS) ESA consultation standards. This report will be formally reviewed at the Council's March 2024 meeting. This report provides 2024 salmon stock abundance forecasts, and an analysis of the impact of 2023 management measures or regulatory procedures on the projected 2024 abundance. This analysis is intended to give perspective in developing 2024 management measures.

This report constitutes the first part of an Environmental Assessment (EA) to comply with National Environmental Policy Act (NEPA) requirements for the 2024 ocean salmon management measures. An EA is used to determine whether an action being considered by a Federal agency has significant impacts. This part of the EA includes a statement of the purpose and need, a summary description of the affected environment, a description of the No-Action Alternative, and an analysis of the No-Action Alternative effects on the salmon stocks included in the Council's Salmon Fishery Management Plan (FMP).

The STT will provide two additional reports prior to the beginning of the ocean salmon season to help guide the Council's selection of annual fishery management measures. These reports (Preseason Report II and Preseason Report III) will analyze the impact of the Council's proposed alternatives and adopted fishery management recommendations, respectively. Preseason Report II will constitute the second part of the EA and will include additional description of the affected environment relevant to the alternative management measures considered for 2024 ocean salmon fisheries, a description of the alternatives, and an analysis of the environmental consequences of the alternatives. Preseason Report II will also analyze the potential impacts of a reasonable range of alternatives, which will inform the final fishery management measures included in Preseason Report III. Preseason Report III will describe and analyze the effects of the Council's final proposed action, including cumulative effects. Together, these parts of the EA will provide the necessary components to determine if a finding of no significant impact (FONSI) or Environmental Impact Statement (EIS) is warranted.

Chapter I provides a summary of stock abundance forecasts. Chapters II and III provide detailed stock-by-stock analyses of abundance, a description of prediction methodologies, and accuracy of past abundance forecasts for Chinook and coho salmon, respectively. Chapter IV summarizes abundance and forecast information for pink salmon. Chapter V provides an assessment of 2023 regulations applied to 2024 abundance forecasts. Appendices provide supplementary information as follows: Appendix A provides a summary of Council stocks and their management objectives; Appendix B contains the Council's current harvest allocation schedules; and Appendix C contains pertinent data for Oregon Production Index (OPI) area coho. For NEPA purposes, Chapters I-IV of this document describe the affected environment, and Chapter V provides a description and analysis of the No-Action Alternative.

PURPOSE AND NEED

The purpose of this action, development, and implementation of ocean salmon fishery management measures for the 2024,[1] is to allow fisheries to harvest surplus production of healthy natural and hatchery salmon stocks within the constraints specified under the Salmon FMP, the Pacific Salmon Treaty (PST), and requirements developed by NMFS under ESA sections 4 and 7 for ESA-listed species (referred to in

[1] Annual management measures are effective beginning 16 May of the year they are implemented and generally continue through 15 May of the following year when they are replaced with the next year's measures. For ease of reference, we refer to the measures being developed for the 16 May 2024 -- 15 May 2025 fishing season as the 2024 management measures.

the FMP as “consultation standards”). In achieving this purpose, management measures must take into account the allocation of harvest among different user groups and port areas. Without this action, the 2023 management measures would remain in effect, which do not consider changes in abundance of stocks in the mixed stock ocean salmon fisheries or new or modified consultation standards. Therefore, this action is needed to ensure constraining stocks are not overharvested, and that harvest of abundant stocks can be optimized and achieve the most overall benefit to the nation.

The Salmon FMP also establishes nine more general harvest-related objectives:

1. Establish ocean exploitation rates for commercial and recreational salmon fisheries that are consistent with requirements for stock conservation objectives and annual catch limits (ACLs), specified ESA consultation standards, or Council-adopted rebuilding plans.

2. Fulfill obligations to provide opportunity for tribal Indian harvest of salmon as provided in treaties with the United States, as mandated by applicable decisions of the Federal courts, and as specified in the October 4, 1993 opinion of the Solicitor, Department of Interior, with regard to federally-recognized Indian fishing rights of Klamath River Tribes.

3. Maintain ocean salmon fishing seasons supporting the continuance of established recreational and commercial fisheries, while meeting salmon harvest allocation objectives among ocean and inside recreational and commercial fisheries that are fair and equitable, and in which fishing interests shall equitably share the obligations of fulfilling any treaty or other legal requirements for harvest opportunities.

4. Minimize fishery mortalities for those fish not landed from all ocean salmon fisheries as consistent with achieving optimum yield (OY) and bycatch management specifications.

5. Manage and regulate fisheries so that the OY encompasses the quantity and value of food produced, the recreational value, and the social and economic values of the fisheries.

6. Develop fair and creative approaches to managing fishing effort; and evaluate and apply effort management systems as appropriate to achieve these management objectives.

7. Support the enhancement of salmon stock abundance in conjunction with fishing effort management programs to facilitate economically viable and socially acceptable commercial, recreational, and tribal seasons.

8. Achieve long-term coordination with the member states of the Council, Indian tribes with federally-recognized fishing rights, Canada, the North Pacific Fishery Management Council, Alaska, and other management entities which are responsible for salmon habitat or production. Manage consistent with the PST and other international treaty obligations.

9. In recommending seasons, to the extent practicable, promote the safety of human life at sea.

These objectives, along with the consultation standards established under the ESA, provide "sideboards" for setting management measures necessary to implement the Salmon FMP, which conforms to the terms and requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the 10 National Standards set forth in the MSA.

Implementation of 2024 management measures will allow fisheries to harvest surplus production of healthy natural and hatchery salmon stocks within the constraints specified under the Salmon FMP and consultation standards established for ESA-listed salmon stocks and consistent with the MSA.

The MSA includes requirements to end and prevent overfishing through specification of overfishing limits (OFL), acceptable biological catch (ABC), ACLs and accountability measures (AMs). Because OFLs, ABCs, and ACLs are based on annual abundance forecasts, Preseason Report I also specifies OFLs, ABCs, and ACLs for 2024 fisheries.

CHAPTER I: DESCRIPTION OF THE AFFECTED ENVIRONMENT

The action area for this proposed action is the exclusive economic zone (EEZ) of the United States, 3 to 200 nautical miles, off the West Coast of the U.S. (California, Oregon, and Washington).

The affected environment relevant to establishing the 2024 ocean salmon fishery management measures consists of the following components:

- Target Species – Non-ESA-listed Chinook, coho, and pink salmon
- ESA-listed salmon species that are incidentally caught in the ocean salmon fisheries
- Socioeconomic aspects of coastal communities, federally-recognized Tribes, and states
- Other non-target fish species – Pacific Halibut, groundfish
- Marine mammals – pinnipeds, killer whales
- Seabirds
- Biodiversity and ecosystem function
- Ocean and coastal habitats, ESA critical habitat, and Essential Fish Habitat (EFH)
- Public health or safety
- Unique characteristics of the geographic area
- Cultural, scientific, or historical resources such as those eligible for listing in the National Register of Historic Places

A description of the historical baseline for the components of the affected environment is presented in the Review of 2023 Ocean Salmon Fisheries (PFMC 2024). The current status (2024 ocean abundance forecasts) of the environmental components expected to be affected by the 2024 ocean salmon fisheries regulation alternatives (FMP salmon stocks, including those listed under the ESA) are described in this report (Part 1 of the 2024 salmon EA). The *Review of 2023 Ocean Salmon Fisheries* (PFMC 2024) provides an historical description of the salmon fishery-affected environment, including stock status and socioeconomic impacts, and represents the current status of the socioeconomic component of the affected environment.

The No-Action Alternative was assessed in the 2023 NEPA process for ocean salmon regulations (Preseason Reports II and III; PFMC 2023b and 2023c). In those analyses, proposed management measures were determined to have no significant impacts the affected environment.

The 2024 No-Action Alternative is the same as the 2023 action, therefore it is expected to have no significant impacts in the absence of large changes to the affected environment. This document, therefore, does not reanalyze the No-Action Alternative's impact on most components of the affected environment. This document does, however, include analysis of the impacts of the No-Action Alternative on salmon stocks identified in the FMP, the component of the environment for which conditions have changed such that the effects in 2024 are different.

The component of the affected environment that is described in this document consists only of the salmon stocks identified in the FMP (Appendix A). The 2024 forecast abundance of the FMP salmon stocks represents this component of the affected environment. The surviving stock after fishery-related mortality is generally referred to as spawning escapement (S), and the proportion of the stock that succumbs to fishing-related mortality is generally referred to as the exploitation rate (F). These are the metrics that constitute conservation objectives for FMP stocks, and by which effects of the alternatives to this part of the affected environment are evaluated. Thus, application of management measures (alternatives) to the abundance forecasts (affected environment) results in projected exploitation rates and spawning escapements (effects).

A description of the other components of the affected environment considered for 2024 ocean salmon fishery regulation alternatives, including socioeconomic components, and updated additional information on the biological components of the environment, will be presented in Preseason Report II, to be issued after the March Council meeting.

1.1 ABUNDANCE FORECASTS

Abundance forecasts for 2024 are summarized for key Chinook and coho salmon stocks in Tables I-1 and I-2, respectively. A cursory comparison of preseason forecast and postseason abundance estimates for selected stocks is presented in Figures II-2, 3, 4 and III-1. More detailed analyses of this subject are covered in Chapters II (Chinook) and III (coho). Information on pink salmon abundance and forecasts is contained in Chapter IV. Council Salmon FMP conservation objectives are presented in Appendix A; allocation objectives are presented in Appendix B.

In addition to the key stocks with abundance forecasts listed in Tables I-1 and I-2, Council management decisions for the 2024 ocean salmon fishing seasons may be constrained by other stocks, such as those listed under the ESA or subject to Pacific Salmon Commission (PSC) agreements, which may not have abundance forecasts made, or do not have abundance forecasts available in time for inclusion in this report. These include the following Evolutionarily Significant Units (ESUs): Central Valley Spring Chinook, California Coastal Chinook, Lower Columbia River (LCR) natural Chinook (tule component), Snake River Fall Chinook; Central California Coast coho, Southern Oregon/Northern California Coast coho, and Interior Fraser (including Thompson River) coho.

1.2 ACCEPTABLE BIOLOGICAL CATCH, ANNUAL CATCH LIMITS, AND OVERFISHING LIMITS

The Salmon FMP includes specification of ABC, ACLs, OFLs, and Scientific and Statistical Committee (SSC) recommendations for ABC.

Currently, ABC and ACLs specifications are required for three salmon stocks; Sacramento River fall Chinook (SRFC), which serve as an indicator stock for the Central Valley Fall Chinook complex, Klamath River fall Chinook (KRFC), which serve as an indicator stock for the Southern Oregon/Northern California Chinook complex, and Willapa Bay natural coho. Other stocks in the FMP are not required to have ACLs either because they were components of these two stock complexes, were ESA-listed, were hatchery stocks, or were managed under an international agreement.

ABCs and ACLs are not specified for stocks that are managed under an international agreement as there is a statutory exception in the MSA to the requirement for ACLs, and the National Standard 1 Guidelines (NS1Gs) state that ABCs are not required if stocks meet this international exception. The NS1Gs allow the flexibility to consider alternative approaches for specifying ACLs for stocks with unusual life history characteristics like Pacific salmon, and particularly for species listed under the ESA and hatchery stocks. For hatchery stocks, broodstock goals serve as conservation objectives rather than specifying ACLs. For ESA-listed stocks, biological opinions and associated consultation standards describe necessary controls to ensure their long-term conservation.

Preseason OFLs are determined for all non-ESA-listed and non-hatchery stocks with an estimate of F_{MSY} (or Maximum Fishing Mortality Threshold, MFMT) and sufficient information available to make abundance forecasts.

1.2.1 Acceptable Biological Catch

For salmon, ABC is defined in terms of spawner escapement (S_{ABC}), which is determined annually based on stock abundance in spawner equivalent units (N) and the exploitation rate F_{ABC}.

S_{ABC}=N x (1 - F_{ABC})

The ABC control rule defines F_{ABC} as a fixed exploitation rate reduced from F_{MSY} to account for scientific uncertainty. The degree of the reduction in F between F_{ABC} and F_{MSY} depends on whether F_{MSY} is directly estimated (tier 1 stock) or a proxy value is used (tier 2 stock). For tier 1 stocks, F_{ABC} equals F_{MSY} reduced by five percent. For tier 2 stocks, F_{ABC} equals F_{MSY} reduced by ten percent.

Tier-1: $F_{ABC} = F_{MSY} \times 0.95$.
Tier-2: $F_{ABC} = F_{MSY} \times 0.90$.

1.2.2 Annual Catch Limit

ACLs are also defined in terms of spawner escapement (S_{ACL}) based on N and the corresponding exploitation rate (F_{ACL}), where the exploitation rate is a fixed value that does not change on an annual basis.

F_{ACL} is equivalent to F_{ABC} and

S_{ACL} = N x (1-F_{ACL}),

which results in $S_{ACL} = S_{ABC}$ for each management year.

During the annual preseason salmon management process, S_{ACL} is estimated using the fixed F_{ACL} exploitation rate and the preseason forecast of N. Thus, fishery management measures must result in an expected spawning escapement greater than or equal to this preseason estimate of S_{ACL}.

1.2.3 Overfishing Limit

For salmon, OFL is defined in terms of spawner escapement (S_{OFL}), which is consistent with the common practice of using spawner escapement to assess stock status for salmon. S_{OFL} is determined annually based on stock abundance, in spawner equivalent units (N) and the exploitation rate F_{OFL}.

F_{OFL} is defined as being equal to F_{MSY} (or MFMT) and

S_{OFL} = N x (1 - F_{MSY}).

1.3 STATUS DETERMINATION CRITERIA

The FMP includes status determination criteria (SDC) for overfishing, approaching an overfished condition, overfished, not overfished/rebuilding, and rebuilt. These criteria are:

- Overfishing occurs when a single year exploitation rate exceeds the MFMT, which is based on the maximum sustainable yield exploitation rate (F_{MSY});
- Approaching an overfished condition occurs when the geometric mean of the two most recent postseason estimates of spawning escapement, and the current preseason forecast of spawning escapement, is less than the minimum stock size threshold (MSST);
- Overfished status occurs when the most recent 3-year geometric mean spawning escapement is less than the MSST;
- Not overfished/rebuilding status occurs when a stock has been classified as overfished and has not yet been rebuilt, and the most recent 3-year geometric mean spawning escapement is greater than the MSST but less than S_{MSY};

- A stock is rebuilt when the most recent 3-year geometric mean spawning escapement exceeds S_{MSY}.

Comparison of stock status to criteria for overfishing, overfished, not overfished/rebuilding, and rebuilt were reported in the annual SAFE document, Review of 2023 Ocean Salmon Fisheries (PFMC 2024). Approaching an overfished condition relies on current year preseason forecasts and Council adopted fishing regulations for the upcoming season in order to calculate projected spawning escapement. In this report, because the actual regulations for the upcoming season are not yet known, the calculations are based on preseason forecasts and Council-adopted regulations from the year prior. Thus, the stock status in this report is described as being *at risk* of approaching an overfished condition. Once the regulations for the upcoming season are adopted and spawning escapement is projected, the status description will be updated and provided in the Preseason-III report. All SDC rely on the most recent estimates available, which in some cases may be a year or more in the past because of incomplete broods or data availability; however, some status descriptions reported in the SAFE document may be updated if more recent spawning escapement or exploitation rate estimates become available between the time the SAFE document and this document are published.

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 1 of 3)

Production Source and Stock or Stock Group	2019	2020	2021	2022	2023	2024	Methodology for 2024 Prediction and Source
Sacramento River							
Fall (Sacramento Index)	379.6	473.2	271.0	396.5	169.8	213.6	Log-log regression of the Sacramento Index on jack escapement from the previous year, accounting for lag-1 autocorrelated errors. STT.
Winter (age-3 absent fishing)	1.9	3.1	9.1	6.0	4.5	1.1	Gaussian process model applied to a time series of the SRWC age-3 escapement absent fishing. NMFS.
Klamath River (Ocean Abundance)							
Fall	274.2	186.6	181.5	200.1	103.8	180.7	Linear regression analysis of age-specific ocean abundance estimates on river runs of same cohort. STT.
Oregon Coast							
North and South/Local Migrating	--	--	--	--	--	--	None.
Columbia River (Ocean Escapement)							
Cowlitz Spring	1.3	1.4	1.8	4.1	9.0	4.7	Cowlitz, Kalama, and Lewis: Age-specific linear regressions of cohort returns in previous run years. WDFW.
Kalama Spring	1.4	1.0	2.2	2.0	2.4	1.9	
Lewis Spring	1.5	1.4	2.4	2.4	4.7	3.4	
Sandy Spring	5.5	5.2	5.3	5.6	7.8	7.7	Recent 3-year average. ODFW.
Willamette Spring	40.2	40.8	50.1	51.2	71.0	48.7	Age-specific linear regressions of cohort returns in previous run years. ODFW. Forecast includes adult fish only.
Upriver Spring [a/]	99.3	81.7	75.2	122.9	198.6	121.0	Columbia River Upriver Spring and Summer Chinook: RMSE-weighted average of age-specific cohort ratios and sibling regression models. Columbia River TAC subgroup and WDFW.
Upriver Summer[b/]	35.9	38.3	77.6	57.5	84.8	53.0	
LRW Fall	13.7	19.7	20.0	10.8	8.6	10.5	Columbia River Fall Chinook: Root Mean Squared Error (RMSE)-weighted average of age-specific cohort ratios and sibling regression models. Columbia River TAC subgroup and WDFW.
LRH Fall	54.5	51.0	73.1	73.0	77.1	85.5	
SCH Fall	46.0	46.2	46.8	91.2	136.1	129.8	
MCB Fall	64.7	79.7	86.2	78.9	52.6	63.4	
URB Fall	158.4	233.4	354.2	230.4	272.4	258.3	

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 2 of 3)

Production Source and Stock or Stock Group		2019	2020	2021	2022	2023	2024	Methodology for 2024 Prediction and Source
Washington Coast								
Willapa Bay Fall	Natural	4.3	2.9	3.9	3.1	2.8	3.5	Total recruit/spawner predictor
	Hatchery	23.6	28.3	30.5	30.1	27.5	27.3	Total recruit/spawner predictor
Grays Harbor Fall	Natural	18.0	15.0	15.5	17.9	15.0	14.3	Combination of geometric mean of recent year returns and linear relationships of sibling recruits per spawner.
	Hatchery	7.7	6.9	7.6	8.6	5.9	5.3	Combination of recent year smolt return rates and log linear regressions of sibling returns per smolt.
Quinault Spring/Summer	Natural	NA	NA	NA	NA	NA	NA	
	Hatchery	NA	NA	NA	NA	NA	NA	
Quinault Fall	Natural	5.3	4.2	6.0	3.2	4.0	4.3	Recent 5-year mean return rates, applied to brood year natural spawning escapements of age 3-6 returns.
	Hatchery	2.7	4.5	4.9	5.6	7.6	3.4	Recent 5-year mean terminal return rates (return/smolt release) for age 3-6 adult returns.
Queets Spring/Sum	Natural	0.6	0.6	0.6	0.6	0.4	0.4	Recent 5-year (2019-2023) mean terminal run size.
Queets Fall	Natural	3.4	4.1	4.3	5.3	4.3	2.6	Recent return/spawner rates; 10-yr mean for age 3, 5-yr mean for age 4+.
	Hatchery	0.8	0.7	0.6	0.5	0.8	0.4	Recent year return/smolt release adjusted by brood performance.
Hoh Spring/Summer	Natural	1.0	0.8	1.0	0.7	1.0	1.1	Spring/Summer: 5-year mean recruit/spawner adjusted by previous
Hoh Fall	Natural	2.5	2.6	2.6	3.4	2.6	3.5	Fall: Recent 3-year mean recruit/spawner adjusted by previous performance.
Quillayute Spring	Hatchery	2.1	2.4	2.6	3.0	2.8	2.5	Recent 2-year mean returns per smolt for age 3-4 and adjusted mean for age 5-6.
Quillayute Sum/Fall	Natural	7.9	9.8	9.6	8.8	11.3	10.1	Summer: Recent 5-year mean adjusted by previous brood performance. Fall: Recent 3-year mean return/spawner adjusted by previous brood performance.
Hoko[c/]	Natural	2.8	2.6	1.3	0.9	2.8	3.9	Escapement without fishing, includes supplemental. Sibling regressions using data from return years 1989-2022.
North Coast Totals								
Spring/Summer	*Natural*	*1.7*	*1.4*	*1.5*	*1.3*	*1.4*	*1.5*	
Fall	*Natural*	*19.2*	*20.6*	*22.5*	*20.7*	*22.1*	*20.5*	
Spring/Summer	*Hatchery*	*2.1*	*2.4*	*2.6*	*3.0*	*2.8*	*2.5*	
Fall	*Hatchery*	*3.5*	*5.2*	*5.5*	*6.1*	*8.4*	*3.8*	

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 3 of 3)

Production Source and Stock or Stock Group		2019	2020	2021	2022	2023	2024	Methodology for 2024 Prediction and Source
Puget Sound summer/fall[d/]								
Nooksack/Samish	Hatchery	21.3	18.2	18.9	28.1	41.2	40.9	Three year average return rate
East Sound Bay	Hatchery	0.3	0.3	0.6	0.4	0.2	0.2	Three year average return rate
Skagit	Natural	13.6	12.9	10.5	12.5	12.2	10.4	Natural: Hierarchical Bayesian model to estimate the spawner-recruit dynamics. Hatchery: One year ahead forecasts generated using Chinook run sizes and GAM and ARIMA models.
	Hatchery	0.3	0.5	0.5	0.5	0.5	0.6	
Stillaguamish	Natural	0.9	0.9	0.9	0.9	1.2	0.9	Natural plus hatchery. Multiple regression environmental model (Environmental Model to Predict Adult Returns, EMPAR).
Snohomish[e/]	Natural	3.2	3.0	2.9	2.4	3.4	2.7	Natural fingerling and yearling age-specific return rates predicted with multiple regression environmental models (EMPAR).
	Hatchery	7.0	6.8	6.1	6.0	7.5	8.4	Average return rates by age and life history type of the three most recent completed brood returns (BYs 2016-2018) applied to hatchery releases of age 2-5 fish (BYs 2019-2022) expected to return in 2024.
Tulalip[e/]	Hatchery	12.5	6.0	5.8	7.7	5.5	5.9	Age-specific return rates predicted with multiple regression environmental model (EMPAR).
South Puget Sound	Natural	8.4	5.8	7.0	6.9	7.0	7.3	Natural: Lake Washington; 4-yr avg recruit per spawner for age 3, 3-yr avg sibling ratios for ages 4 & 5. Green; 3-yr average return rates. Puyallup; climate relationship for age 3, sibling relationship for age 4, 5-yr average return per spawner for age 5. Nisqually; smolt to adult return average since 2015 (5-yr avg for age 3, 4-yr avg for age 4, 3-yr avg for age 5). Hatchery: Variety of recent year average return rates or sibling relationships.
	Hatchery	99.9	100.7	78.8	90.3	90.4	90.5	
Hood Canal	Natural	1.2	4.6	5.7	5.4	3.2	4.3	Includes hatchery strays to spawning grounds in Skokomish River. Proportioned using Hood Canal terminal run reconstruction-based relative contribution of the individual management units for 2019-2023 return years. Area 12B returns derived by applying an average proportion of natural origin recruits returning to area 12B for 2019-2023.
	Hatchery	66.0	67.6	64.1	51.9	53.6	56.3	Brood 2019 fingerling lbs released from WDFW facilities in 2020, multiplied by the average of post-season estimated terminal area return rates for the last 5 years (2019-2023).
Strait of Juan de Fuca Including Dungeness spring run	Natural	8.3	5.0	5.5	5.0	3.7	4.3	Natural and hatchery. Elwha estimated by all year average smolt to adult return rate, natural component based on 13-yr average hatchery/wild proportion. Dungeness natural and hatchery estimated using all-year and 3-yr average smolt to adult return rates.

a/ Since 2005, the upriver spring Chinook run includes Snake River summer Chinook.
b/ Since 2005, the upriver summer Chinook run includes only upper Columbia summer Chinook, and not Snake River summer Chinook.
c/ Expected spawning escapement without fishing.
d/ Unless otherwise noted, Puget Sounds forecasts are in units of terminal run size.
e/ Includes a mixture of runsize types including escapement without fishing and terminal run. 2024 values are terminal runsize.

TABLE I-2. Preseason adult coho salmon stock forecasts in thousands of fish. (Page 1 of 2)

Production Source and Stock or Stock Group		2019	2020	2021	2022	2023	2024	Methodology for 2024 Prediction and Source
OPI Area Total Abundance (California, Oregon Coasts, and Columbia River)		1,009.6	268.7	1,732.9	1,225.9	1,135.7	636.3	Abundance of all OPI components based on post-season coho FRAM runs; prior to 2008 only fishery impacts south of Leadbetter Point were used (traditional OPI accounting). OPITT, see Chapter III for details.
OPI Public	Hatchery	933.5	185.7	1607.9	1003.5	896.9	403.1	OPIH: ARIMA-based MAPE weigthed ensemble forecast. Columbia early/late and Coastal proportions based on jacks; Coastal N/S proportions based on smolts.
Columbia River Early		545.0	130.7	1014.0	592.5	481.8	227.5	
Columbia River Late		360.6	50.3	576.0	404.7	404.3	173.6	
Coastal N. of Cape Blanco		12.0	2.4	6.4	1.9	3.0	0.6	
Coastal S. of Cape Blanco		15.9	2.3	11.5	4.4	7.8	1.4	
Lower Columbia River (LCN)	Natural	36.9	24.8	39.2	65.7	45.5	87.8	Oregon: recent three year average return; Washingtion: natural smolt production multiplied by 2021 brood marine survival rate. Abundance is subset of early/late hatchery abundance above.
Oregon Coast (OCN)	Natural	76.1	83.0	125.0	222.4	238.8	233.2	Rivers: Generalized additive model (GAM) relating ocean recruits to parental spawners and marine environmental variables. See text in Chapter III for details. Lakes: recent three year average abundance.
Washington Coast								
Willapa	Natural	63.4	17.9	19.0	35.8	42.7	29.5	Washington Coast stocks: A variety of methods were used, primarily based on smolt production and survival. See text in Chapter III for details.
	Hatchery	94.0	51.8	61.6	74.7	111.0	91.5	
Grays Harbor	Natural	71.5	50.0	44.8	120.4	102.8	74.9	
	Hatchery	64.3	42.3	31.7	78.3	111.4	68.2	
Quinault	Natural	13.9	17.5	15.0	19.4	23.6	25.3	
	Hatchery	26.9	27.0	24.6	42.7	30.6	34.7	
Queets	Natural	11.1	7.8	3.9	18.2	12.4	12.8	
	Hatchery	13.2	10.9	11.8	22.2	14.9	18.9	
Hoh	Natural	7.0	4.2	3.0	4.7	6.5	4.9	

TABLE I-2. Preseason adult coho salmon stock forecasts in thousands of fish. (Page 2 of 2)

Production Source and Stock or Stock Group		2019	2020	2021	2022	2023	2024	Methodology for 2024 Prediction and Source
Quillayute Fall	Natural	14.7	9.2	7.5	12.5	13.5	10.2	For all Washington Coast stocks: A variety of methods w ere used, primarily based on smolt production and survival. See text in Chapter III for details.
	Hatchery	17.0	13.0	15.1	20.3	19.1	10.3	
Quillayute Summer	Natural	1.2	0.8	0.3	0.9	1.6	0.4	
	Hatchery	3.4	3.4	3.4	4.6	3.9	2.3	
North Coast Independent Tributaries	Natural	8.1	5.1	4.7	18.0	13.5	4.9	
	Hatchery	12.5	1.3	0.1	0.1	11.8	9.0	
WA Coast Total	*Natural*	*191.0*	*112.4*	*98.4*	*229.8*	*216.6*	*162.8*	
	Hatchery	*231.3*	*149.6*	*148.2*	*243.0*	*302.7*	*234.9*	
Puget Sound								
Strait of Juan de Fuca	Natural	8.8	7.5	6.7	7.3	15.6	19.7	For all Puget Sound stocks: A variety of methods w ere used, primarily based on smolt production and survival. See text in Chapter III and Joint WDFW and tribal annual reports on Puget Sound Coho Salmon Forecast Methodology for details.
	Hatchery	16.8	20.6	12.5	12.7	21.8	22.6	
Nooksack-Samish	Natural	25.1	15.4	35.3	36.0	29.5	35.1	
	Hatchery	59.8	42.5	54.6	73.8	66.6	72.3	
Skagit	Natural	57.9	31.0	58.4	80.4	43.1	63.4	
	Hatchery	9.9	18.2	22.0	21.3	21.1	27.3	
Stillaguamish	Natural	23.8	19.5	26.8	24.9	30.2	30.8	
	Hatchery	2.2	2.3	4.0	1.9	1.7	0.9	
Snohomish	Natural	62.6	39.0	60.0	64.2	76.5	71.6	
	Hatchery	43.7	26.6	29.9	22.6	64.0	34.7	
South Sound	Natural	30.4	7.3	27.5	31.0	58.3	38.1	
	Hatchery	180.4	164.0	192.7	208.5	218.8	201.9	
Hood Canal	Natural	40.1	35.0	28.8	20.2	37.9	36.5	
	Hatchery	87.9	72.2	55.7	61.4	74.8	67.2	
Puget Sound Total	*Natural*	*248.8*	*154.6*	*243.5*	*264.0*	*291.2*	*295.3*	
	Hatchery	*400.7*	*346.3*	*371.4*	*402.3*	*468.8*	*426.9*	

CHAPTER II: AFFECTED ENVIRONMENT - CHINOOK SALMON ASSESSMENT

2.1 CHINOOK STOCKS SOUTH OF CAPE FALCON

2.1.1 Sacramento River Fall Chinook

The SRFC stock comprises a large proportion of the Chinook spawners returning to Central Valley streams and hatcheries. SRFC is designated as the indicator stock for the Central Valley fall Chinook stock complex, which was established under FMP Amendment 16 to facilitate setting and assessing compliance with ABC and ACLs, as required by the 2006 revision of the MSA. The Sacramento Index (SI) is the aggregate-age index of adult SRFC ocean abundance.

Predictor Description

The SI is the sum of (1) adult SRFC ocean fishery harvest south of Cape Falcon, OR between September 1 and August 31, (2) adult SRFC impacts from non-retention ocean fisheries when they occur, (3) the recreational harvest of adult SRFC in the Sacramento River Basin, and (4) the SRFC adult spawner escapement (Table II-1, Figure II-1).

The SI forecasting approach uses jack escapement estimates to predict the SI and accounts for autocorrelated errors. In practice, this means that if, in the previous year, the modeled SI value was larger than the SI postseason estimate for that year, the current year forecast is adjusted downward to account for that error. Conversely, if the modeled SI value in the previous year was less than the postseason estimate of the SI for that year, the current year SI forecast would be adjusted upward to compensate for that error.

The forecast of the log-transformed SI was made using the model

$$\log \mathrm{SI}_t = \beta_0 + \beta_1 \log \mathrm{J}_{t-1} + \rho\varepsilon_{t-1} ,$$

where $\log \mathrm{SI}_t$ and $\log \mathrm{J}_{t-1}$ are log-transformed SI and jack escapement values, respectively; t is the year for which the SI is being forecast; β_0 is the intercept; β_1 is the slope; ρ is the autocorrelation coefficient; and ε_{t-1} is the difference between the modeled value of the $\log \mathrm{SI}$ for year t-1 and the postseason estimate of $\log \mathrm{SI}$ in year t-1. The $\log \mathrm{SI}_t$ is then back-transformed to the arithmetic scale

$$\mathrm{SI}_t = \mathrm{e}^{\log \mathrm{SI}_t}.$$

A more detailed description of the general forecast approach can be found in Appendix E of the 2014 Preseason Report I (PFMC 2014).

Predictor Performance

The performance of past SI forecasts is displayed graphically in Figure II-4. For 2023, the preseason forecast of the SI (169,767) was 122 percent of the postseason estimate (139,487).

A control rule, adopted as part of Amendment 16 to the salmon FMP, is used annually to specify the maximum allowable exploitation rate on SRFC (Appendix A, Figure A-1). The allowable exploitation rate is determined by the predicted number of potential adult spawners in the absence of fisheries, which is defined for SRFC as the forecast SI. The FMP allows for any ocean and river harvest allocation that meets the exploitation rate constraints defined by the control rule. The regulations adopted in 2023 were expected to result in 164,964 hatchery and natural area adult spawners and an exploitation rate of 2.8 percent.

Postseason estimates of these quantities were 133,638 hatchery and natural area adult spawners and an exploitation rate of 4.2 percent (Table II-1).

Stock Forecast and Status

Sacramento Index forecast model parameters were estimated from SI data for years 1983-2023 and jack escapement data for years 1982-2022. A total of 11,933 SRFC jacks were estimated to have escaped to Sacramento River basin hatcheries and natural spawning areas in 2023. This jack escapement and the estimated parameters

$\beta_o = 7.31706$,
$\beta_1 = 0.5671007$,
$\rho = 0.755479$,
$\epsilon_{t-1} = -0.4877792$,
$\sigma^2 = 0.1376952$,

result in a 2024 SI forecast of 213,622.

Figure II-2 graphically displays the SI forecast. The model fit (line in Figure II-2) was higher than the 2023 postseason estimate of the SI. As a result, the 2024 SI forecast value is adjusted downward from the fitted model.

The forecast SI applied to the SRFC control rule (Appendix A, Figure A-1) results in an allowable exploitation rate of 42.9 percent which produces, in expectation, 122,000 hatchery and natural area adult spawners. Therefore, fisheries impacting SRFC must be crafted to achieve, in expectation, a minimum of 122,000 adult spawners in 2024.

OFL, ABC, and ACL

The OFL, ABC, and ACL are defined in terms of spawner escapement (S_{OFL}, S_{ABC}, and S_{ACL}), and are calculated using potential spawner abundance forecasts and established exploitation rates. For SRFC, F_{MSY} = 0.78, the proxy value for Tier-2 Chinook stocks that do not have estimates of this rate derived from a stock-specific spawner-recruit analysis. The OFL for SRFC is S_{OFL} = 213,622 × (1-0.78) = 46,997. Because SRFC is a Tier-2 stock, $F_{ABC} = F_{MSY} \times 0.90 = 0.70$, and $F_{ACL} = F_{ABC}$. The ABC for SRFC is S_{ABC} = 213,622 × (1-0.70) = 64,087, with $S_{ACL} = S_{ABC}$. These preseason estimates will be recalculated with postseason abundance estimates (when available) to assess ACL and OFL compliance.

2.1.2 Sacramento River Winter Chinook

ESA-listed endangered Sacramento River winter Chinook salmon (SRWC) are harvested incidentally in ocean fisheries, primarily off the central California coast. A two-part consultation standard for endangered SRWC was first implemented in 2012, and later updated in 2018.

The first component of the consultation standard is the season and size limit provisions that have been in place since the 2004 Biological Opinion. These provisions state that the recreational salmon fishery between Point Arena and Pigeon Point shall open no earlier than the first Saturday in April and close no later than the second Sunday in November. The recreational salmon fishery between Pigeon Point and the U.S.– Mexico Border shall open no earlier than the first Saturday in April and close no later than the first Sunday in October. The minimum size limit shall be at least 20 inches total length. The commercial salmon fishery between Point Arena and the U.S.–Mexico border shall open no earlier than May 1 and close no later than September 30, with the exception of an October fishery conducted Monday through Friday between Point Reyes and Point San Pedro, which shall end no later than October 15. The minimum size limit shall be at least 26 inches total length.

The second component of the consultation standard is specified by a control rule that limits the maximum age-3 impact rate (allowable as a preseason forecast) for the area south of Point Arena, California (Appendix A, Figure A-3). The control rule specifies the maximum allowable age-3 impact rate on the basis of a forecast of the SRWC age-3 escapement in the absence of fisheries.

Predictor Description

From 2018-2023 the forecast of the age-3 escapement absent fishing (abundance) was made using a stochastic SRWC life cycle model that is stratified by age, sex, and origin (hatchery and natural). Beginning in 2024, the forecast of SRWC age-3 escapement absent fishing was made using a Gaussian process model, which is a form of nonparametric regression. The model relates covariates directly to postseason estimates of the SRWC age-3 escapement absent fishing. This approach was reviewed at the 2023 Salmon Methodology Review and documentation of the approach can be found in the reports prepared for the Methodology Review, including: https://www.pcouncil.org/documents/2023/10/2023-salmon-methodology-review-material.pdf/ and https://www.pcouncil.org/documents/2023/10/d-3-supplemental-attachment-3-final-additional-material-requested-at-the-2023-salmon-methodology-review-meeting.pdf/. In November 2023, the Council adopted the Gaussian process model referred to as GP-1. The GP-1 model forecasts the age-3 escapement absent fishing using two predictors: the number of parental female spawners in the river (natural and hatchery origin) and a river temperature covariate (degree days above 12°C from May 15–October 31 at Clear Creek Gage). Predictors were for the brood year three years prior to the return year to be forecasted.

Predictor Performance

Forecasts of the SRWC age-3 escapement absent fishing, and postseason-estimated values, can be found in Table II-2.

Stock Forecast and Status

The forecast of SRWC age-3 escapement absent fishing is 1,081. Application of the control rule results in a maximum age-3 impact rate of 12.3 percent for the area south of Point Arena in 2024 (Table II-2).

2.1.3 Klamath River Fall Chinook

Predictor Description

For KRFC, linear regressions are used to relate September 1 ocean abundance estimates of age-3, age-4, and age-5 fish to that year's river run size estimates of age-2, age-3, and age-4 fish, respectively (Table II-3). Historical abundance estimates were derived from a cohort analysis of coded wire tag (CWT) information. The y-intercept of the regressions is constrained to zero, which gives the biologically reasonable expectation that a river run size of zero predicts an ocean abundance remainder of zero for the same cohort. The abundance of age-2 fish is not forecasted because no precursor to age-2 fish of that brood is available. Ocean fisheries harvest nominal numbers of age-2 KRFC.

The KRFC age-specific abundance forecasts have been made using all complete (or nearly complete) brood years since the 1979 brood. However, recent work suggests that using a more contemporary set of brood years to inform abundance forecasts resulted in better forecast performance. In particular, a recent investigation of this issue found that limiting data to a moving window of the 10 most recent complete (or nearly complete) brood years resulted in the best performance among the alternatives considered. The 2023 and 2024 forecasts were therefore based on the 10 brood year moving window data range.

Predictor Performance

The performance of past KRFC forecasts is displayed in Table II-4 and in Figure II-4. For 2023, the preseason forecast of the KRFC total adult abundance (103,800) was 59 percent of the postseason estimate (175,119).

Management of KRFC harvest since 1986 has attempted to achieve specific harvest rates on fully-vulnerable age-4 and age-5 fish in ocean and river fisheries (Table II-5). The Council has used a combination of quotas and time/area restrictions in ocean fisheries in an attempt to meet the harvest rate objective set each year. Since 1992, fisheries have been managed to achieve 50/50 allocation between tribal and non-tribal fisheries. Tribal and recreational river fisheries have been managed on the basis of adult Chinook quotas.

The FMP describes a control rule used annually to specify the maximum allowable exploitation rate on KRFC (Appendix A, Figure A-2). The allowable exploitation rate is determined by the predicted number of potential spawners, which is defined as the natural area adult escapement expected in the absence of fisheries. The FMP allows for any ocean and river harvest allocation that meets the exploitation rate constraints defined by the control rule.

The 2023 salmon fishery regulations were expected to result in 23,614 natural-area spawning adults and an age-4 ocean harvest rate of 0.3 percent. Postseason estimates of these quantities were 41,624 natural-area adult spawners and an age-4 ocean harvest rate of less than one percent (Table II-5 and Table II-6).

Stock Forecast and Status

The 2024 forecast for the ocean abundance of KRFC as of September 1, 2023 (preseason) is 138,741 age-3 fish, 39,531 age-4 fish, and 2,409 age-5 fish.

Late-season commercial ocean fisheries in 2023 (September through November) were estimated to have harvested zero KRFC. Late-season recreational fisheries were estimated to have harvested 33 KRFC, of which 64 percent were age-4 and 36 percent were age-5. This fall harvest equates to a 0.1 percent age-4 ocean harvest rate, which will be deducted from the ocean fishery's allocation in determining the 2024 allowable ocean harvest.

The forecast of potential spawner abundance is derived from the ocean abundance forecasts, ocean natural mortality rates, age-specific maturation rates, stray rates, and the proportion of escapement expected to spawn in natural areas. The 2024 KRFC potential spawner abundance forecast is 45,639 natural-area adults. This potential spawner abundance forecast applied to the KRFC control rule results in an allowable exploitation rate of 25 percent, which produces, in expectation, 34,229 natural-area adult spawners. Therefore, fisheries impacting KRFC must be crafted to achieve, in expectation, a minimum of 34,229 natural-area adult spawners in 2024.

OFL, ABC, and ACL

The OFL, ABC, and ACL are defined in terms of spawner escapement (S_{OFL}, S_{ABC}, and S_{ACL}), and are calculated using potential spawner abundance forecasts and established exploitation rates. For KRFC, F_{MSY} = 0.71, the value estimated from a stock-specific spawner-recruit analysis (STT 2005). The OFL for KRFC is = 45,639 × (1-0.71) = 13,235. Because KRFC is a Tier-1 stock, $F_{ABC} = F_{MSY} \times 0.95 = 0.68$, and $F_{ACL} = F_{ABC}$. The ABC for KRFC is S_{ABC} = 45,639 × (1-0.68) = 14,605, with $S_{ACL} = S_{ABC}$. These preseason estimates will be recalculated with postseason abundance estimates (when available) to assess ACL and OFL compliance.

2.1.4 Other California Coastal Chinook Stocks

Other California coastal streams that support fall Chinook stocks which contribute to ocean fisheries off Oregon and California include the Smith, Mad, Eel, Mattole, and Russian Rivers, and Redwood Creek. Except for the Smith River, these populations are included in the California coastal Chinook ESU, which is listed as threatened under the ESA. Current information is insufficient to forecast the ocean abundance of these stocks; however, the NMFS ESA consultation standard restricts the KRFC age-4 ocean harvest rate to no more than 16.0 percent, as estimated postseason, to limit impacts on these stocks. In 2023, the age-4 ocean harvest rate was estimated to be less than one percent. The Klamath River spring, Smith River, Rogue River, Umpqua River, and other Oregon Chinook stocks south of the Elk River are components of the Southern Oregon/Northern California (SONC) Chinook complex, and as such, specification of ACLs is deferred to KRFC, the indicator stock for the SONC Chinook complex.

2.1.5 Oregon Coast Chinook Stocks

Oregon coast Chinook stocks are categorized into three major subgroups based on ocean migration patterns: the North Oregon Coast (NOC) Chinook aggregate, the Mid Oregon Coast (MOC) Chinook aggregate, and the South Oregon Coast (SOC) Chinook aggregate. Although their ocean harvest distributions overlap somewhat, they have been labeled as far-north, north, or south/local migrating, respectively.

Far-North and North Migrating Chinook (NOC and MOC groups)

Far-north and north migrating Chinook stocks include spring and fall stocks north of and including the Elk River, with the exception of Umpqua River spring Chinook. Based on CWT analysis, the populations from ten major NOC river systems from the Nehalem through the Siuslaw Rivers are harvested primarily in ocean fisheries off British Columbia and Southeast Alaska, and to a much lesser degree in Council area and terminal area (state waters) fisheries off Washington and Oregon. CWT analysis indicates populations from five major MOC systems, from the Coos through the Elk Rivers, are harvested primarily in ocean fisheries off British Columbia, Washington, Oregon, and in terminal area fisheries. Minor catches occur in California fisheries, and variable catches have been observed in southeast Alaska troll fisheries.

NOC and MOC Chinook stocks are components of the Far-North-Migrating Coastal (FNMC) Chinook complex, which is an exception to the ACL requirements of the MSA because they are managed under an international agreement (the PST); therefore, specification of ACLs is not necessary for stocks in the FNMC complex.

Predictor Description

Quantitative abundance predictions are made for all three of the coastal Chinook groups (NOC, MOC, and SOC). Once available, forecast data for the NOC and MOC are incorporated into Chinook FRAM and used in the annual development of Council area fishery regulations. These forecasts are also used in the PSC management process and to inform terminal area management actions. Quantitative forecasts of abundance are based on sibling regression analyses from individual basins' escapement assessment data and scale sampling, which occur coastwide.

Natural spawner escapement is assessed yearly from the Nehalem through Sixes Rivers. Peak spawning counts of adults are obtained from standard index areas on these rivers and monitored to assess stock trends and reported in the annual Review of Ocean Salmon Fisheries (PFMC 2023, Chapter II, Table II-5, and Figure II-3). Natural fall Chinook stocks from both the NOC and MOC dominate production from this subgroup. Also present in lesser numbers are naturally-produced spring Chinook stocks from several rivers, and hatchery fall and/or spring Chinook released in the Trask, Nestucca, Salmon, and Elk rivers.

Basin-specific forecasts contribute an additive total to the overall aggregate forecasts and are derived in conjunction with annual PSC Chinook model input and calibration activities; however, they were not available at publication time.

Predictor Performance

Predictors for NOC and MOC stocks are evaluated annually by the PSC's Chinook Technical Committee.

Stock Forecast and Status

2.1.5.1.1 North Oregon Coast

Since 1977, the Salmon River Hatchery production has been tagged for use primarily as a PSC indicator stock for the NOC stock component. Because these fish are primarily harvested in fisheries north of the Council management area, the STT has not reviewed the procedure by which this indicator stock is used in estimating annual stock status. The 2023 NOC density from standard survey areas (Nehalem R. through the Siuslaw R.) was an increase from 2022 (PFMC 2022, Appendix B, Table B-11).

Based on the density index of total spawners, the generalized expectation for NOC stocks in 2024 is above the recent five years' average density of 111 spawners per mile. Specifically, the 2023 spawner density in standard survey areas for the NOC averaged 121 spawners per mile, the second highest since 2017.

2.1.5.1.2 Mid Oregon Coast

Since 1977, the Elk River Hatchery production has been tagged for potential use as a PSC indicator stock for the MOC stock aggregate. Beginning in 2019, Elk River Hatchery production was included as a PSC indicator stock. Age-specific Ocean abundance forecasts for 2024 are not currently available but are being developed. The STT has not undertaken a review of the methods used by Oregon Department of Fish and Wildlife (ODFW) staff in developing these abundance forecasts; however, the PSC has, and those findings and recommendations are published in the PSC Technical Report No. 35.

The 2023 MOC density from standard survey areas (Coos and Coquille basins) averaged 84 adult spawners per mile, a decrease from 2022 (PFMC 2023, Appendix B, Table B-11). Fall Chinook escapement goals are currently under development for the South Umpqua and Coquille basins of the MOC.

South/Local Migrating Chinook (SOC group)

South/local migrating Chinook stocks include Rogue River spring and fall Chinook, fall Chinook from smaller rivers south of the Elk River, and Umpqua River spring Chinook. These stocks are important contributors to ocean fisheries off Oregon and northern California. Umpqua River spring Chinook contribute to a lesser degree to fisheries off Washington, British Columbia, and southeast Alaska.

SOC stocks are components of the Southern Oregon/Northern California (SONC) Chinook complex, and as such, specification of ACLs is deferred to KRFC, the indicator stock for the SONC complex.

2.1.5.1.3 Rogue River Fall Chinook

Rogue River fall Chinook contribute to ocean fisheries principally as age-3 through age-5 fish. Mature fish enter the river each year from mid-July through October, with the peak of the run occurring during August and September.

Predictor Description

Carcass recoveries in Rogue River index surveys covering a large proportion of the total spawning area were available for 1977-2004. Using Klamath Ocean Harvest Model (KOHM) methodology, these carcass numbers, allocated into age-classes from scale data, were used to estimate the Rogue Ocean Population Index (ROPI) for age-3 to age-5 fish. A linear regression was developed using the escapement estimates (all ages) in year *t* based on seining at Huntley Park (1976-2004) to predict the ROPI in year *t*+1 (1977-2005).

Beginning in 2015, a revised predictor was used which relies on the Huntley Park escapement estimate and dispenses with the use of the carcass counts. Linear regressions are used to relate May 1 ocean abundance estimates of age-3, age-4, age-5, and age-6 Rogue fall Chinook to the previous year's river run size estimates of age-2, age-3, age-4, and age-5 fish, respectively. Historical May 1 ocean abundance estimates were derived from a cohort analysis of 1988-2006 brood years. May 1 (t) ocean abundances were converted to September 1 (t-1) forecasts by dividing the May (t) number by the assumed September 1 (t-1) through May 1 (t) survival rate of 0.5 age-3, 0.8 age-4, 0.8 age-5, and 0.8 age-6. River run size estimates are derived from a flow-based expansion of standardized seine catches of fall Chinook at Huntley Park (RM 8). The y-intercept of the regressions is constrained to zero.

The 2023 Huntley Park escapement estimate and the resulting 2024 ROPI forecast of 201,900 consists of age-3 (155,200), age-4 (35,700) and age-5-6 (11,100) fish.

Predictor Performance

The ROPI is based on cohort reconstruction methods with index values predicted from regression equations. Because postseason estimates of the ROPI are not available, it is not possible to assess predictor performance.

Stock Forecast and Status

The 2024 ROPI is the smallest value since 2016 (Table II-7).

Other SOC Stocks

Umpqua and Rogue spring Chinook contribute to ocean fisheries primarily as age-3 fish. Mature Chinook enter the rivers primarily during April and May and generally prior to annual ocean fisheries.

Natural fall Chinook stocks from river systems south of the Elk River and spring Chinook stocks from the Rogue and Umpqua rivers dominate production from this subgroup. Substantial releases of hatchery spring Chinook occur in both the Rogue and Umpqua rivers, although also present in lesser numbers are hatchery fall Chinook, primarily from the Chetco River.

These stocks are minor contributors to general season mixed-stock ocean fisheries. Standard fall Chinook spawning index escapement data were available for the smaller SOC rivers (Winchuck, Chetco, and Pistol rivers). These had been used for assessment of the conservation objective for the SOC stocks prior to 2015. The 2023 average density from standard survey areas was 29 adult spawners per mile, a decrease from the 2022 average of 43 adult spawners per mile (PFMC 2024 Appendix B, Table B-8). Beginning in 2015, for the SOC Chinook stock complex, the conservation objective is assessed using the escapement estimate of naturally produced fall Chinook at Huntley Park on the Rogue River (PFMC 2024, Appendix B, Table B-10, Chapter II, Table II-5, and Figure II-3).

2.2 CHINOOK STOCKS NORTH OF CAPE FALCON

2.2.1 Columbia River Chinook

Columbia River fall Chinook stocks form the largest contributing stock group to Council Chinook fisheries north of Cape Falcon. Abundance of these stocks is a major factor in determining impacts of fisheries on weak natural stocks critical to Council area management, particularly the natural tule component of the ESA-listed LCR Chinook ESU. Abundance predictions are made for five major fall stock units characterized as being hatchery or natural production and originating above or below Bonneville Dam. The upriver brights (URB) and lower river wild (LRW) are primarily naturally-produced stocks, although the upriver brights do have a substantial hatchery component. The lower river hatchery (LRH) tule, Spring Creek Hatchery (SCH) tule, and Mid-Columbia Bright (MCB) are primarily hatchery-produced stocks. The MCB include the Lower River Bright (LRB) stock as a small naturally-produced component. LRB spawn in the mainstem Columbia River near Beacon Rock and are believed to have originated from MCB hatchery strays. The tule populations generally mature at an earlier age than the bright fall populations and do not migrate as far north. Minor fall populations include the Select Area Bright (SAB), a population originally from the Rogue River.

Upper Columbia River summer Chinook also contribute to Council area fisheries, although like URB and LRW, most ocean impacts occur in British Columbia (B.C.) and Southeast Alaska (SEAK) fisheries. Upper Columbia River summer Chinook have both natural and hatchery components and originate in areas upstream from Rock Island Dam.

URB and upper Columbia summer Chinook are exempt from the ACL requirements of the MSA because they are managed under an international agreement (the PST); therefore, specification of ACLs is not necessary for these two stocks. ESA consultation standards serve the purpose of ACLs for ESA-listed stocks like LRW Chinook. Broodstock goals serve the purpose of ACLs for hatchery-origin stocks like LRH, SCH, and MCB.

Predictor Description

Preseason forecasts of Columbia River fall and summer Chinook stock abundance, used by the STT to assess the Council's adopted fishery regulations, are based on age-specific and stock-specific forecasts of annual ocean escapement (returns to the Columbia River). These forecasts are developed by WDFW and a subgroup of the *U.S. v Oregon* Technical Advisory Committee (TAC). Columbia River return forecast methodologies used for Council management are identical to those used for planning Columbia River fall season fisheries, although minor updates to Council estimates of inriver run size may occur prior to finalization of the inriver fishery plans, based on the results of planned ocean fisheries.

The 2024 return of summer and each fall Chinook stock group is forecasted using relationships between successive age groups within a cohort. The database for these relationships was constructed by combining age-specific estimates of escapement and inriver fishery catches for years since 1964 (except for MCB, which started in the 1980s). Fall Chinook stock identification in the Columbia River mixed-stock fisheries is determined by sampling catch and escapement for CWTs and visual stock identification (VSI). Age composition estimates are based on CWT data and scale reading of fishery and escapement samples, where available. These stock and age data for Columbia River fall Chinook are the basis for the return data presented in the *Review of 2023 Ocean Salmon Fisheries* (Appendix B, Tables B-15 through B-20). The 2023 returns for summer Chinook and the five fall Chinook stocks listed in this report may differ somewhat from those provided in the *Review of 2023 Ocean Salmon Fisheries* (PFMC 2024), since ocean escapement estimates may have been updated after that report was printed.

Summer and fall Chinook ocean escapement forecasts developed for the March Council meeting do not take into account variations in marine harvest. The STT combines the initial inriver run size (ocean escapement; Table II-8) with expected Council area fishery harvest levels and stock distribution patterns to produce adjusted ocean escapement forecasts based on the proposed ocean fishing regulations. These revised forecasts are available at the end of the Council preseason planning process in April and are used for preseason fishery modeling in the Columbia River.

Predictor Performance

Performance of the preliminary inriver run size estimation methodology can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table II-8; Figure II-4). In 2023, the March preliminary preseason forecasts as a percentage of the postseason estimates were 80 percent for URB, 75 percent for LRW, 89 percent for LRH, 68 percent for SCH, 64 percent for MCB, and 155 percent for upper Columbia summer Chinook.

Stock Forecasts and Status

LRW fall Chinook: The preliminary forecast for 2024 ocean escapement of LRW fall Chinook is 10,500 adults, about 59 percent of the recent 10-year average return of 17,700. The forecast is about 92 percent of last year's actual return of 11,415. The spawning escapement goal of 5,700 in the North Fork Lewis River is expected to be achieved this year.

LRH fall Chinook: The 2024 preliminary forecast for ocean escapement of LRH fall Chinook is 85,500 adults, about 98 percent of last year's return of 87,119 and 106 percent of the recent 10-year average return of 80,400. Based on this abundance forecast, the total allowable LCR natural tule exploitation rate for 2024 fisheries is no greater than 41.0 percent under the matrix developed by the Tule Chinook Workgroup in 2011, which is used by NMFS in developing ESA guidance for this stock (Appendix A Table A-6).

SCH fall Chinook: The 2024 preliminary forecast for ocean escapement of SCH fall Chinook is 129,800 adults, about 65 percent of last year's return of 198,861 and 127 percent of the 10-year average of 102,400.

MCB fall Chinook: The 2024 preliminary forecast for ocean escapement of MCB fall Chinook is 63,400 adults, about 77 percent of last year's return of 82,098 and about 66 percent of the recent 10-year average of 96,400.

Summer Chinook: The 2024 preliminary forecast for ocean escapement of summer Chinook is 53,000 adults, about 97 percent of last year's return of 54,722 and about 76 percent of the recent 10-year average of 69,700. This ocean escapement forecast should provide opportunity for both ocean and in-river fisheries while exceeding the FMP S_{MSY} conservation objective of 12,143 escapement above Rock Island Dam.

URB fall Chinook: The 2024 preliminary forecast for ocean escapement of URB fall Chinook is 258,300 adults, about 76 percent of last year's return of 338,991 and about 70 percent of the recent 10-year average of 367,800. This forecasted ocean escapement should allow for moderate ocean and in-river fisheries while achieving the FMP S_{MSY} conservation objective of 39,625 natural area spawners in the Hanford Reach, Yakima River, and areas above Priest Rapids Dam.

Snake River wild fall Chinook: The 2024 preliminary forecast for ocean escapement of ESA-listed Snake River wild fall Chinook is 9,300 wild adults. The 2024 preliminary forecast for ocean escapement of Snake River hatchery fall Chinook is 27,300 hatchery adults.

2.2.2 Washington Coast Chinook

Washington Coast Chinook consist of spring, summer, and fall stocks from Willapa Bay through the Hoko River. Based on limited CWT analysis, these populations are harvested primarily in ocean fisheries off British Columbia and Southeast Alaska, and to a lesser degree in Council-area fisheries off Washington and Oregon.

Washington Coast Chinook stocks are components of the FNMC Chinook complex, which is an exception to the ACL requirements of the MSA because it is managed under an international agreement (the PST); therefore, specification of ACLs is not necessary for stocks in the FNMC complex.

Predictor Description and Past Performance

Council fisheries have negligible impacts on Washington Coast Chinook stocks and information to assess past performance is unavailable. However, abundance estimates are provided for Washington Coastal fall stocks in subsequent preseason fishery impact assessment reports prepared by the STT (e.g., Preseason Report III).

Stock Forecasts and Status

The 2024 Willapa Bay natural fall Chinook terminal runsize forecast is 3,519, which is above the FMP S_{MSY} conservation objective of 3,393. The hatchery fall Chinook terminal runsize forecast is 27,327.

The 2024 Grays Harbor spring Chinook forecast was not available at the time of this report. The Grays Harbor natural fall Chinook terminal runsize forecast is 14,329, which is above the FMP S_{MSY} conservation objective of 13,326. The fall hatchery terminal runsize forecast is 5,313.

The 2024 Quinault River natural fall Chinook terminal runsize forecast is 4,301. The fall hatchery terminal runsize forecast is 3,372.

The 2024 Queets River spring Chinook terminal runsize forecast is 367. The FMP S_{MSY} conservation objective is 700. The natural fall Chinook terminal runsize forecast is 2,583, which is close to the FMP S_{MSY} conservation objective of 2,500. The fall hatchery terminal runsize forecast is 425.

The 2024 Hoh River natural spring/summer Chinook spawning escapement forecast is 1,146, which is above the FMP S_{MSY} conservation objective of 900. The natural fall Chinook forecast is 3,460, which is above the FMP S_{MSY} conservation objective of 1,200.

The 2024 Quillayute River hatchery spring Chinook ocean escapement forecast is 2,489. The natural summer Chinook forecast is 1,560, which is above the FMP S_{MSY} conservation objective of 1,200 summer Chinook. The fall Chinook forecast is 8,552, which is above the FMP S_{MSY} conservation objective of 3,000 fall Chinook.

The 2024 Hoko River forecast is for an escapement without fishing of 3,853, which is above the FMP S_{MSY} conservation objective of 850.

2.2.3 Puget Sound Chinook

Puget Sound Chinook stocks include all fall, summer, and spring stocks originating from U.S. tributaries in Puget Sound and the eastern Strait of Juan de Fuca (east of Salt Creek, inclusive). Puget Sound consists of numerous natural Chinook stocks of small to medium-sized populations and substantial hatchery production. The Puget Sound ESU was listed under the ESA as threatened in March 1999.

Council-area fishery impacts to Puget Sound Chinook stocks are generally very low, on the order of five percent or less. NMFS issued a biological opinion in 2004 concluding that Council-area fisheries were not likely to jeopardize listed Puget Sound Chinook and exempting these fisheries from the ESA section 9 take prohibition as long as they are consistent with the terms and conditions in the opinion's incidental take statement. This opinion does not cover the state-managed Puget Sound fisheries. In recent years, the comanagers have developed annual fishery management plans for Puget Sound and NMFS has issued one-year biological opinions for these plans exempting them from ESA section 9 take prohibitions. These opinions take into account the combined impacts of ocean and Puget Sound fisheries. Puget Sound stocks contribute to fisheries off B.C., are present to a lesser degree off SEAK, and are impacted to a minor degree by Council-area ocean fisheries. Because Council-area fishery impacts to Puget Sound Chinook stocks are minor, ocean regulations are not generally used to manage these stocks.

Predictor Description

Methodologies for estimates are described in the annual Puget Sound management reports (starting in 1993, reports are available by Puget Sound management unit, not by individual species). Forecasts for Puget Sound stocks generally assume production is dominated by age-4 adults. The STT has not undertaken a review of the methods employed by state and tribal staffs in preparing these abundance forecasts. Run-size expectations for various Puget Sound stock management units are listed in Table I-1.

Predictor Performance

Performance of the preliminary inriver run size estimation methodology can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates. Table II-9 compares preseason forecasts and postseason estimates of Puget Sound run size for summer/fall Chinook.

Stock Forecasts and Status

ACLs are undefined in the FMP for ESA-listed stocks like Puget Sound Chinook and are deferred to ESA consultation standards.

Spring Chinook

Puget Sound Spring Chinook abundances remain depressed.

Summer/Fall Chinook

The 2024 preliminary natural Chinook return forecast for Puget Sound is 29,800 (includes supplemental hatchery forecasts) and the preliminary hatchery Chinook return forecast for Puget Sound is 202,900. The 2023 preseason natural Chinook return forecast was 30,700 (includes supplemental hatchery forecasts) and the hatchery Chinook return forecast was 198,900.

Since ESA listing and development of the Resource Management Plan (RMP), fishery management for Puget Sound Chinook has changed from an escapement goal basis to the use of stock-specific exploitation rates and "critical abundance thresholds." This new approach is evaluated on an annual basis through the RMP.

2.3 STOCK STATUS DETERMINATION UPDATES

Sacramento River fall Chinook and Klamath River fall Chinook were found to meet the criteria for being classified as overfished in the PFMC *Review of 2017 Ocean Salmon Fisheries*, released in February 2018. NMFS subsequently published an overfished designation for both stocks in June 2018, and rebuilding plans were developed for both and adopted by the Council in 2019. Queets River spring/summer Chinook were found to meet the criteria for being classified as overfished in the PFMC *Review of 2022 Ocean Salmon Fisheries*, released in February 2023.

Sacramento River fall Chinook was determined to be rebuilt in 2021. Based on the most recent three-year geometric mean escapements published in the PFMC *Review of 2023 Ocean Salmon Fisheries*, Klamath River fall Chinook (2021 – 2023) and Queets spring/summer Chinook (2020 – 2022) continue to meet the criteria for overfished status.

2.4 SELECTIVE FISHERY CONSIDERATIONS FOR CHINOOK

As the North of Falcon region has moved forward with mass marking of hatchery Chinook salmon stocks, the first mark-selective fishery for Chinook salmon in Council waters was implemented in June 2010 in the recreational fishery north of Cape Falcon. In 2011 and 2012, the mark-selective fishery in June was 8 and 15 days, respectively. In 2013 and 2014, the North of Falcon mark-selective recreational fishery started in mid-May in Neah Bay and La Push subareas, then opened in all areas in late May or June. In 2015, the mark selective Chinook quota was 10,000 fish in the mid-May to mid-June fishery. Since 2015, no mark-selective fisheries for Chinook in Council waters have occurred. For 2024 preseason planning, selective fishing options for non-Indian fisheries may be under consideration in the ocean area from Cape Falcon, Oregon to the U.S./Canada border. Observed mark rates in previous mark-selective fisheries north of Cape Falcon ranged from 53 to 71 percent. Similar mark rates are expected in this area for 2024.

TABLE II-1. Harvest and abundance indices for adult Sacramento River fall Chinook (SRFC) in thousands of fish. (Page 1 of 2)

	SRFC Ocean Harvest South of Cape Falcon[a/]				River	Spawning Escapement			Sacramento	Exploitation
Year	Troll	Sport	Non-Ret[b/]	Total	Harvest	Natural	Hatchery	Total	Index (SI)[c/]	Rate (%)[d/]
1983	246.6	86.3	0.0	332.9	18.0	91.7	18.6	110.2	461.1	76
1984	266.2	87.0	0.0	353.1	25.9	120.2	38.7	159.0	538.1	70
1985	355.5	158.9	0.0	514.4	39.1	210.1	29.3	239.3	792.8	70
1986	619.0	137.5	0.0	756.4	39.2	218.3	21.8	240.1	1,035.7	77
1987	686.1	173.1	0.0	859.2	31.8	175.2	19.8	195.1	1,086.1	82
1988	1,163.2	188.3	0.0	1,351.5	37.1	200.7	26.8	227.5	1,616.1	86
1989	602.8	157.1	0.0	759.9	24.9	127.6	24.9	152.6	937.3	84
1990	507.3	150.4	0.0	657.8	17.2	83.3	21.7	105.1	780.0	87
1991	300.1	89.6	0.0	389.7	26.0 [e/]	92.8	26.0	118.9	534.6	78
1992	233.3	69.4	0.0	302.8	13.3 [e/]	59.9	21.7	81.5	397.6	79
1993	342.8	115.3	0.0	458.1	27.7 [e/]	112.8	24.6	137.4	623.2	78
1994	303.5	168.8	0.0	472.3	28.9 [e/]	135.0	30.6	165.6	666.7	75
1995	730.7	390.4	0.0	1,121.0	48.2	253.8	41.5	295.3	1,464.6	80
1996	426.8	157.0	0.0	583.8	49.2	269.1	32.5	301.6	934.7	68
1997	579.7	210.3	0.0	790.0	56.3	281.6	63.3	344.8	1,191.1	71
1998	292.3	114.0	0.0	406.3	69.8 [e/]	176.0	69.9	245.9	722.1	66
1999	289.1	76.2	0.0	365.3	68.9 [e/]	357.6	42.2	399.8	834.0	52
2000	421.8	152.8	0.0	574.6	59.5 [e/]	370.0	47.6	417.5	1,051.6	60
2001	284.4	93.4	0.0	377.9	97.4	539.4	57.4	596.8	1,072.0	44
2002	447.7	184.0	0.0	631.7	89.2 [e/]	684.2	85.6	769.9	1,490.8	48
2003	501.6	106.4	0.0	608.0	85.4	414.6	108.4	523.0	1,216.3	57
2004	621.8	212.6	0.0	834.5	46.8	206.2	80.7	286.9	1,168.2	75
2005	367.9	127.0	0.0	494.9	64.6	214.9	181.1	396.0	955.5	59
2006	149.9	107.7	0.0	257.7	44.9	196.5	78.5	275.0	577.6	52
2007	119.9	32.0	0.0	152.0	14.3 [e/]	70.1	21.3	91.4	257.7	65
2008	3.2	0.9	0.0	4.1	0.1 [e/]	47.3	18.0	65.4	69.6	6
2009	0.0	0.2	0.1	0.3	0.0 [e/]	24.9	15.9	40.9	41.1	1
2010	11.2	11.4	0.3	22.8	2.7 [e/]	91.1	33.2	124.3	149.8	17

TABLE II-1. Harvest and abundance indices for adult Sacramento River fall Chinook (SRFC) in thousands of fish. (Page 2 of 2)

Year	SRFC Ocean Harvest South of Cape Falcon[a/] Troll	Sport	Non-Ret[b/]	Total	River Harvest	Spawning Escapement Natural	Hatchery	Total	Sacramento Index (SI)[c/]	Exploitation Rate (%)[d/]
2011	46.7	22.8	0.0	69.5	18.2 [e/]	77.9	41.5	119.3	207.0	42
2012	183.1	93.4	0.3	276.7	65.8 [e/]	166.2	119.2	285.4	627.9	55
2013	290.7	114.3	0.0	404.9	57.5 [e/]	305.6	101.2	406.8	869.3	53
2014	240.6	62.4	0.0	303.0	35.7 [e/]	168.7	43.8	212.5	551.2	61
2015	100.1	24.5	0.0	124.6	16.9 [e/]	74.5	39.0	113.5	254.9	55
2016	62.9	28.9	0.0	91.8	23.9 [e/]	56.3	33.4	89.7	205.3	56
2017	38.7	31.9	0.0	70.7	22.1 [e/]	17.9	26.5	44.3	137.1	68
2018	53.7	45.0	0.0	98.6	16.3 [e/]	71.7	33.8	105.5	220.4	52
2019	248.6	74.4	0.0	323.0	20.3 [e/]	121.6	42.1	163.8	507.1	68
2020	154.9	44.6	0.0	199.5	14.9 [e/]	100.2	37.9	138.1	352.5	61
2021	165.6	41.6	0.0	207.3	10.8 [e/]	72.8	32.8	105.6	322.5	68
2022	135.8	50.5	0.0	186.3	4.9 [e/]	32.7	29.2	61.9	253.0	76
2023[f/]	3.9	1.9	0.0	5.8	0.0 [e/]	105.6	28.0	133.6	139.5	4

a/ Ocean harvest for the period September 1 (t-1) through August 31 (t).

b/ Mortalities estimated from non-retention ocean fisheries (e.g., coho-only fisheries, non-retention GSI sampling). In 2008, there were 37 estimated mortalities as a result of non-retention fisheries that have been rounded to 0 in this table.

c/ The SI is the sum of (1) SRFC ocean fishery harvest south of Cape Falcon between September 1 and August 31, (2) SRFC impacts from non-retention ocean fisheries when they occur, (3) the recreational harvest of SRFC in the Sacramento River Basin, and (4) the SRFC spawner escapement.

d/ Total ocean harvest, non-retention ocean fishery mortalities, and river harvest of SRFC as a percentage of the SI.

e/ Estimates derived from CDFW Sacramento River Basin angler survey. Estimates not marked with a footnote are inferred from escapement data and the mean river harvest rate estimate.

f/ Preliminary.

TABLE II-2. Sacramento River winter Chinook abundance forecasts, allowable age-3 impact rates, and management performance.

				Age-3 impact rate south of Point Arena, CA		
Year[a/]	3-Year Geo. Mean[b]	Abundance Forecast [c/]	Postseason Abundance[d/]	Maximum Allow able (%)[e/]	Preseason Forecast (%)	Postseason Estimate (%)
2000		-		-	-	21.4
2001		-	8,508	-	-	23.3
2002		-	9,092	-	-	21.8
2003		-	5,976	-	-	10.3
2004		-	18,090	-	-	24.8
2005		-	18,907	-	-	17.2
2006		-	2,619	-	-	15.1
2007		-	2,954	-	-	17.8
2008		-	4,152	-	-	0.0
2009		-	1,439	-	-	0.0
2010		-	696	-	-	e/
2011		-	3,263	-	-	28.3
2012	1,797	-	5,960	13.7	13.7	12.6
2013	1,521	-	3,067	12.9	12.9	18.8
2014	2,380	-	3,718	15.4	15.4	15.8
2015	3,659	-	867	19.0	17.5	e/
2016	3,981	-	508	19.9	12.8	10.7
2017	2,521	-	2,117	15.8	12.2	17.6
2018		1,594	8,139	14.4	8.5	13.9
2019		1,924	6,935	15.7	14.8	10.0
2020		3,077	10,854	20.0	16.2	12.6
2021		9,063	6,346	20.0	14.7	18.8
2022		5,971	3,071	20.0	15.2	26.2[g/]
2023		4,540	f/	20.0	0.0	NA[h/]
2024		1,081	f/	12.3	NA	NA

a/ Year indicates the management year in w hich age-3 SRWC are exposed to ocean fisheries.

b/ Allow able impact rates from 2012-2017 w ere determined by an abundance-based control rule, w here abundance w as defined as the most recent three-year geometric mean of escapement.

c/ Since 2018 the abundance forecast has been defined as the predicted age-3 escapement in the

d/ Postseason estimates of the age-3 escapement in the absence of fisheries.

e/ Beginning in 2018, allow able impact rates w ere determined by a new control rule utilizing forecasts of the age-3 escapement in the absence of fisheries.

f/ Insufficient data for postseason estimate.

g/ Preliminary. Incomplete cohort data (age-4 escapement unavailable).

h/ Not estimated. Incomplete cohort data (age-3 and age-4 escapement unavailable).

TABLE II-3. Klamath River fall Chinook ocean abundance (thousands), harvest rate, and river run size estimates (thousands) by age. (Page 1 of 2).

	Ocean Abundance Sept. 1 (t-1)			Annual Ocean Harvest Rate Sept. 1 (t-1) - Aug. 31 (t)		Klamath Basin River Run (t)				
Year (t)	Age-3	Age-4	Total	Age-3	Age-4	Age-2	Age-3	Age-4	Age-5	Total Adults
1981	493.2	57.0	550.2	0.21	0.53	28.2	64.1	14.4	1.8	80.3
1982	561.1	133.4	694.5	0.30	0.52	39.4	30.1	33.9	2.6	66.6
1983	313.3	114.2	427.5	0.19	0.60	3.8	35.9	20.7	0.9	57.5
1984	157.3	82.8	240.1	0.08	0.38	8.3	21.7	24.4	1.1	47.2
1985	374.8	56.9	431.7	0.11	0.24	69.4	32.9	25.7	5.8	64.4
1986	1,304.4	140.8	1,445.2	0.18	0.46	44.6	162.9	29.8	2.3	195.0
1987	781.1	341.9	1,123.0	0.16	0.43	19.1	89.7	112.6	6.8	209.1
1988	756.3	234.8	991.0	0.20	0.39	24.1	101.2	86.5	3.9	191.6
1989	369.8	177.2	547.1	0.15	0.36	9.1	50.4	69.6	4.3	124.3
1990	176.1	104.0	280.1	0.30	0.55	4.4	11.6	22.9	1.3	35.9
1991	69.4	37.2	106.6	0.03	0.18	1.8	10.0	21.6	1.1	32.7
1992	39.5	28.2	67.7	0.02	0.07	13.7	6.9	18.8	1.0	26.7
1993	168.5	15.0	183.5	0.05	0.16	7.6	48.3	8.2	0.7	57.2
1994	119.9	41.7	161.7	0.03	0.09	14.4	37.0	26.0	1.0	64.0
1995	787.3	28.7	816.0	0.04	0.14	22.8	201.9	18.3	2.6	222.8
1996	192.3	226.3	418.6	0.05	0.16	9.5	38.8	136.7	0.3	175.8
1997	140.2	62.8	203.0	0.01	0.06	8.0	35.0	44.2	4.6	83.7
1998	154.8	44.7	199.5	0.00	0.09	4.6	59.2	29.7	1.7	90.6
1999	129.1	30.5	159.5	0.02	0.09	19.2	29.2	20.5	1.3	51.0
2000	617.1	44.2	661.3	0.06	0.10	10.2	187.1	30.5	0.5	218.1
2001	356.1	133.8	489.9	0.03	0.09	11.3	99.1	88.2	0.1	187.3
2002	513.6	98.9	612.5	0.02	0.15	9.2	94.6	62.5	3.7	160.8
2003	401.1	192.2	593.3	0.08	0.21	3.8	94.3	96.8	0.9	191.9
2004	159.4	105.2	264.7	0.12	0.35	9.6	33.1	40.5	5.3	78.9
2005	190.0	38.1	228.1	0.02	0.20	2.3	43.8	17.5	3.9	65.2
2006	90.7	63.4	154.1	0.01	0.10	26.9	18.5	41.6	1.3	61.4
2007	376.9	33.7	410.6	0.06	0.21	1.7	113.7	16.8	1.6	132.1
2008	68.0	81.4	149.4	0.00	0.10	25.2	18.6	50.2	1.7	70.6
2009	240.8	21.1	261.9	0.00	0.00	11.9	78.6	16.4	5.6	100.6
2010	192.8	62.1	254.8	0.01	0.04	16.6	46.1	44.3	0.4	90.9

TABLE II-3. Klamath River fall Chinook ocean abundance (thousands), harvest rate, and river run size estimates (thousands) by age. (Page 2 of 2).

	Ocean Abundance Sept. 1 (t-1)			Annual Ocean Harvest Rate Sept. 1 (t-1) - Aug. 31 (t)		Klamath Basin River Run (t)				
Year (t)	Age-3	Age-4	Total	Age-3	Age-4	Age-2	Age-3	Age-4	Age-5	Total Adults
2011	240.2	64.6	304.8	0.03	0.08	84.9	59.0	41.0	2.0	102.0
2012	799.4	74.3	873.7	0.03	0.08	21.4	243.9	49.3	2.1	295.3
2013	438.4	194.4	632.9	0.04	0.20	14.4	55.2	108.8	1.1	165.0
2014	216.5	180.7	397.2	0.03	0.17	22.3	57.8	98.7	3.9	160.4
2015	110.5	61.0	171.5	0.02	0.22	6.1	36.7	34.0	7.1	77.8
2016	32.7	24.8	57.4	0.01	0.09	2.8	8.6	15.5	0.5	24.6
2017	63.2	9.8	73.1	0.02	0.04	20.3	24.4	7.3	1.6	33.2
2018	193.7	10.5	204.2	0.06	0.24	10.9	85.5	5.6	0.0	91.1
2019	81.8	15.7	97.5	0.04	0.36	10.0	30.2	6.8	0.1	37.1
2020	128.7	14.2	143.0	0.01	0.23	9.1	37.8	7.6	0.0	45.4
2021	142.5	35.5	178.1	0.05	0.28	10.4	36.3	17.7	0.2	54.2
2022	131.3[a/]	38.2	169.6	0.06[a/]	0.39	7.5	32.1	14.3	0.2	46.6
2023	138.4[b/]	35.6[a/]	174.0	----[c/]	0.00[a/]	11.7	39.6	25.5	0.9	65.9

a/ Preliminary: incomplete cohort data (age-5 unavailable).

b/ Preliminary: incomplete cohort data (age-4 and age-5 unavailable).

c/ Not estimated: incomplete cohort data (age-4 and age-5 unavailable).

TABLE II-4. Comparisons of preseason forecast and postseason estimates for ocean abundance of adult Klamath River fall Chinook. (Page 1 of 4)

Year (t)	Preseason Forecast[a/] Sept. 1 (t-1)	Postseason Estimate Sept. 1 (t-1)	Pre/Postseason
	Age-3		
1985	113,000	374,822	0.30
1986	426,000[b/]	1,304,409	0.33
1987	511,800	781,122	0.66
1988	370,800	756,261	0.49
1989	450,600	369,828	1.22
1990	479,000	176,122	2.72
1991	176,200	69,424	2.54
1992	50,000	39,502	1.27
1993	294,400	168,473	1.75
1994	138,000	119,915	1.15
1995	269,000	787,309	0.34
1996	479,800	192,272	2.50
1997	224,600	140,153	1.60
1998	176,000	154,799	1.14
1999	84,800	129,066	0.66
2000	349,600	617,097	0.57
2001	187,200	356,128	0.53
2002	209,000	513,604	0.41
2003	171,300	401,112	0.43
2004	72,100	159,446	0.45
2005	185,700	189,977	0.98
2006	44,100	90,666	0.49
2007	515,400	376,940	1.37
2008	31,600	68,015	0.46
2009	474,900	240,787	1.97
2010	223,400	192,750	1.16
2011	304,600	240,222	1.27
2012	1,567,600	799,446	1.96
2013	390,700	438,443	0.89
2014	219,800	216,493	1.02
2015	342,200	110,506	3.10
2016	93,400	32,670	2.86
2017	42,000	63,235	0.66
2018	330,000	193,685	1.70
2019	167,500	81,821	2.05
2020	149,600	128,719	1.16
2021	135,600	142,529	0.95
2022	155,000	131,349	1.18
2023[c/]	75,300	138,441	0.54
2024	138,700	--	--

TABLE II-4. Comparisons of preseason forecasts and postseason estimates for ocean abundance of adult Klamath River fall Chinook. (Page 2 of 4)

Year (t)	Preseason Forecast[a/] Sept. 1 (t-1)	Postseason Estimate Sept. 1 (t-1)	Pre/Postseason
	Age-4		
1985	56,900	56,908	1.00
1986	66,300	140,823	0.47
1987	206,100	341,875	0.60
1988	186,400	234,751	0.79
1989	215,500	177,245	1.22
1990	50,100	103,951	0.48
1991	44,600	37,171	1.20
1992	44,800	28,169	1.59
1993	39,100	15,037	2.60
1994	86,100	41,736	2.06
1995	47,000	28,726	1.64
1996	268,500	226,282	1.19
1997	53,900	62,820	0.86
1998	46,000	44,733	1.03
1999	78,800	30,456	2.59
2000	38,900	44,176	0.88
2001	247,000	133,801	1.85
2002	143,800	98,927	1.45
2003	132,400	192,180	0.69
2004	134,500	105,246	1.28
2005	48,900	38,079	1.28
2006	63,700	63,384	1.00
2007	26,100	33,650	0.78
2008	157,200	81,411	1.93
2009	25,200	21,131	1.19
2010	106,300	62,089	1.71
2011	61,600	64,570	0.95
2012	79,600	74,300	1.07
2013	331,200	194,407	1.70
2014	67,400	180,669	0.37
2015	71,100	60,979	1.17
2016	45,100	24,777	1.82
2017	10,600	9,821	1.08
2018	28,400	10,531	2.70
2019	106,100	15,660	6.78
2020	36,200	14,238	2.54
2021	45,100	35,522	1.27
2022	43,200	38,219	1.13
2023[c/]	27,200	35,570	0.76
2024	39,500	--	--

TABLE II-4. Comparisons of preseason forecasts and postseason estimates for ocean abundance of adult Klamath River fall Chinook. (Page 3 of 4)

Year (t)	Preseason Forecast[a/] Sept. 1 (t-1)	Postseason Estimate Sept. 1 (t-1)	Pre/Postseason
		Age-5	
1985	NA	11,113	NA
1986	NA	6,376	NA
1987	5,300	19,414	0.27
1988	13,300	14,632	0.91
1989	10,100	9,612	1.05
1990	7,600	7,767	0.98
1991	1,500	2,774	0.54
1992	1,300	1,444	0.90
1993	1,100	1,759	0.63
1994	500	1,468	0.34
1995	2,000	3,805	0.53
1996	1,100	788	1.40
1997	7,900	9,004	0.88
1998	3,300	2,382	1.39
1999	2,000	2,106	0.95
2000	1,400	1,051	1.33
2001	1,300	258	5.04
2002	9,700	6,933	1.40
2003	6,500	1,915	3.39
2004	9,700	17,184	0.56
2005	5,200	6,859	0.76
2006	2,200	5,236	0.42
2007	4,700	2,911	1.61
2008	1,900	2,900	0.66
2009	5,600	7,059	0.79
2010	1,800	517	3.48
2011	5,000	2,753	1.82
2012	4,600	5,110	0.90
2013	5,700	3,945	1.44
2014	12,100	7,625	1.59
2015	10,400	13,283	0.78
2016	3,700	1,142	3.24
2017	1,700	2,024	0.84
2018	800	50	16.00
2019	600	220	2.73
2020	700	24	29.17
2021	800	402	1.99
2022	1,900	546	3.50
2023[c/]	1,300	1,108	1.17
2024	2,400	--	--

TABLE II-4. Comparisons of preseason forecasts and postseason estimates for ocean abundance of adult Klamath River fall Chinook. (Page 4 of 4)

Year (t)	Preseason Forecast[a/] Sept. 1 (t-1)	Postseason Estimate Sept. 1 (t-1)	Pre/Postseason
	Total Adults		
1985	169,900[d/]	442,843	0.38
1986	492,300[d/]	1,451,608	0.34
1987	723,200	1,142,411	0.63
1988	570,500	1,005,644	0.57
1989	676,200	556,685	1.21
1990	536,700	287,840	1.86
1991	222,300	109,369	2.03
1992	96,100	69,115	1.39
1993	334,600	185,269	1.81
1994	224,600	163,119	1.38
1995	318,000	819,840	0.39
1996	749,400	419,342	1.79
1997	286,400	211,977	1.35
1998	225,300	201,914	1.12
1999	165,600	161,628	1.02
2000	389,900	662,324	0.59
2001	435,500	490,187	0.89
2002	362,500	619,464	0.59
2003	310,200	595,207	0.52
2004	216,300	281,876	0.77
2005	239,800	234,915	1.02
2006	110,000	159,286	0.69
2007	546,200	413,501	1.32
2008	190,700	152,326	1.25
2009	505,700	268,977	1.88
2010	331,500	255,356	1.30
2011	371,100	307,545	1.21
2012	1,651,800	878,856	1.88
2013	727,700	636,795	1.14
2014	299,300	404,787	0.74
2015	423,800	184,768	2.29
2016	142,200	58,589	2.43
2017	54,200	75,080	0.72
2018	359,200	204,266	1.76
2019	274,200	97,701	2.81
2020	186,600	142,981	1.30
2021	181,500	178,453	1.02
2022	200,100	170,114	1.17
2023[c/]	103,800	175,119	0.59
2024	180,700	--	--

a/ Original preseason forecasts for years 1985-2001 w ere for May 1 (t); converted to Sept. 1 (t-1) forecasts by dividing the May 1 (t) number by the assumed Sept. 1 (t-1) through May 1 (t) survival rate in those years: 0.5 age-3, 0.8 age-4, 0.8 age-5.

b/ A scalar of 0.75 w as applied to the jack count to produce the forecast because, (1) most jacks returned to the Trinity River, and (2) the jack count w as outside the database range.

c/ Postseason estimates are preliminary.

d/ Does not include age-5 adults.

TABLE II-5. Summary of management objectives and predictor performance for Klamath River fall Chinook.

Average or Year (t)	Preseason Ocean Abundance Sept. 1 (t-1) Forecast[a/]		Postseason Ocean Abundance Sept. 1 (t-1) Estimate		Preseason Age-4 Harvest Rate Forecast[b/]		Postseason Age-4 Harvest Rate Estimate[c/]		Preseason Adult Harvest Forecast		Postseason Adult Harvest Estimate	
	Age-3	Age-4	Age-3	Age-4	Ocean	River	Ocean	River	Ocean	River	Ocean	River
1986-90	447,640	144,880	677,548	199,729	0.30	0.51	0.44	0.54	104,100	56,020	214,598	51,814
1991-95	185,520	52,320	236,925	30,168	0.09	0.28	0.13	0.34	12,980	14,460	13,095	13,667
1996-00	262,960	97,220	246,677	81,693	0.11	0.44	0.10	0.33	30,500	44,180	21,336	31,382
2001	187,200	247,000	356,128	133,801	0.14	0.61	0.09	0.29	45,600	105,300	21,747	50,780
2002	209,000	143,800	513,604	98,927	0.13	0.57	0.15	0.26	30,000	70,900	28,896	35,069
2003	171,300	132,400	401,112	192,180	0.16	0.50	0.21	0.28	30,600	52,200	70,995	39,715
2004	72,100	134,500	159,446	105,246	0.15	0.38	0.35	0.48	26,500	35,800	64,226	29,807
2005	185,700	48,900	189,977	38,079	0.08	0.16	0.20	0.19	7,100	9,600	12,807	10,001
2006	44,100	63,700	90,666	63,384	0.11	0.23	0.10	0.18	10,000	10,000	10,401	10,345
2007	515,400	26,100	376,940	33,650	0.16	0.63	0.21	0.56	30,200	51,400	30,275	33,884
2008	31,600	157,200	68,015	81,411	0.02	0.43	0.10	0.38	4,500	49,500	8,716	24,180
2009	474,900	25,200	240,787	21,131	0.00	0.57	0.00	0.40	100	61,700	53	34,040
2010	223,400	106,300	192,750	62,089	0.12	0.49	0.04	0.40	22,600	46,600	4,489	32,920
2011	304,600	61,600	240,222	64,570	0.16	0.54	0.08	0.34	26,900	42,700	12,011	30,502
2012	1,567,600	79,600	799,446	74,300	0.16	0.77	0.08	0.51	92,400	227,600	34,719	109,263
2013	390,700	331,200	438,443	194,407	0.16	0.62	0.20	0.51	74,800	154,800	59,511	82,835
2014	219,800	67,400	216,493	180,669	0.16	0.40	0.17	0.25	23,200	31,400	40,158	31,353
2015	342,200	71,100	110,506	60,979	0.16	0.59	0.22	0.47	29,400	57,700	20,019	35,890
2016	93,400	45,100	32,670	24,777	0.08	0.19	0.09	0.31	6,300	8,500	3,025	6,470
2017	42,000	10,600	63,235	9,821	0.03	0.06	0.04	0.08	700	900	1,783	1,951
2018	330,000	28,400	193,685	10,531	0.12	0.34	0.24	0.36	14,600	21,600	13,227	18,879
2019	167,500	106,100	81,821	15,660	0.16	0.47	0.36	0.38	24,800	40,000	8,678	11,365
2020	149,600	36,200	128,719	14,238	0.09	0.22	0.23	0.37	7,300	9,900	4,705	10,335
2021	135,600	45,100	142,529	35,522	0.11	0.19	0.28	0.22	6,900	9,400	17,589	10,487
2022[d/]	155,000	43,200	131,349	38,219	0.10	0.22	0.39	0.31	7,300	11,600	23,759	10,496
2023[e/]	75,300	27,200	138,441	35,570	0.00	0.10	0.00	0.04	100	3,700	48	2,144
2024	138,700	39,500	-	-	-	-	-	-	-	-	-	-

a/ Original preseason forecasts for years 1990-2001 were for May 1 (t); converted to Sept. 1 (t-1) forecasts by dividing the May 1 (t) number by the assumed Sept. 1 (t-1) through May 1 (t) survival rate in those years: 0.5 age-3, 0.8 age-4, 0.8 age-5.

b/ Ocean harvest rate forecast is the fraction of the predicted ocean abundance expected to be harvested Sept. 1 (t-1) through August 31(t). River harvest rate forecast is the fraction of the predicted river run expected to be harvested in river fisheries. Original ocean harvest rate forecasts for year (t), 1990-2001, were based on a May 1 (t) ocean abundance denominator; converted to Sept. 1 (t-1) abundance denominator by multiplying former values by 0.8 (assumed age-4 survival rate between Sept. 1 (t-1) and May 1 (t) in those years).

c/ Ocean harvest rate is the fraction of the postseason ocean abundance harvested Sept. 1 (t-1) through August 31 (t). River harvest rate is the fraction of the river run harvested by river fisheries.

d/ Postseason estimates are preliminary for age-3.

e/ Postseason estimates are preliminary for age-3 and age-4.

TABLE II-6. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 1 of 4)

Year (t) or Average	Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t)) KMZ Troll	KMZ Sport	KMZ Subtotal	North of KMZ	South of KMZ	Subtotal	Ocean Total	River Fisheries (t) Net	River Sport	River Total
					HARVEST (numbers of fish)					
Age-3										
1986-90	15,081	6,253	21,334	38,683	64,397	103,080	124,414	7,200	9,480	16,680
1991-95	8	689	698	3,055	5,086	8,141	8,839	4,980	2,189	7,170
1996-00	93	740	833	2,157	7,326	9,483	10,316	8,840	3,764	12,604
2001	113	105	218	2,749	6,082	8,831	9,049	17,885	7,294	25,179
2002	220	784	1,004	1,501	9,916	11,417	12,421	11,734	6,258	17,992
2003	176	669	845	1,921	27,586	29,507	30,352	6,996	5,061	12,057
2004	402	970	1,372	9,710	7,324	17,034	18,406	4,679	2,051	6,730
2005	0	568	568	619	2,381	3,000	3,568	4,394	1,641	6,035
2006	0	478	478	32	341	373	851	2,388	13	2,401
2007	770	8,101	8,871	4,194	9,366	13,560	22,431	17,543	5,734	23,277
2008	0	0	0	0	0	0	0	3,225	608	3,833
2009	0	53	53	0	0	0	53	19,820	4,715	24,535
2010	106	28	134	0	1,664	1,664	1,798	13,132	1,884	15,016
2011	334	1,119	1,453	48	4,829	4,877	6,330	13,286	2,630	15,916
2012	1,116	11,350	12,466	928	13,089	14,017	26,483	70,409	12,104	82,513
2013	390	5,574	5,964	868	12,053	12,921	18,885	18,996	7,675	26,671
2014	0	566	566	4,144	1,550	5,694	6,260	3,386	1,778	5,164
2015	48	293	341	652	1,597	2,249	2,590	10,604	4,509	15,113
2016	0	0	0	14	308	322	322	918	430	1,348
2017	0	0	0	115	1,263	1,378	1,378	1,261	23	1,284
2018	1,511	1,628	3,139	3,960	3,577	7,537	10,676	12,954	3,931	16,885
2019	157	371	528	181	2,391	2,572	3,100	4,089	4,656	8,745
2020	0	44	44	46	1,258	1,304	1,348	2,997	4,554	7,551
2021	0	281	281	785	6,700	7,485	7,766	4,648	1,803	6,451
2022[a/]	0	453	453	13	7,995	8,008	8,461	3,947	1,976	5,923
2023[a/]	0	0	0	0	0	0	0	1,151	53	1,204

TABLE II-6. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 2 of 4)

Year (t) or	Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t))							River Fisheries (t)		
	KMZ			North of	South of					
Average	Troll	Sport	Subtotal	KMZ	KMZ	Subtotal	Ocean Total	Net	Sport	Total
					HARVEST (numbers of fish)					
Age-4										
1986-90	10,282	4,358	14,640	38,450	31,653	70,103	84,743	28,720	5,500	34,220
1991-95	34	484	519	1,438	1,807	3,245	3,764	5,072	856	5,928
1996-00	200	1,002	1,202	3,833	5,093	8,926	10,128	15,076	2,948	18,023
2001	1,312	1,604	2,916	5,819	3,926	9,745	12,661	20,759	4,819	25,578
2002	1,938	827	2,765	2,811	9,416	12,227	14,992	11,929	4,063	15,992
2003	834	919	1,753	7,856	30,011	37,867	39,620	22,754	4,592	27,346
2004	1,429	1,234	2,663	11,645	22,132	33,777	36,440	17,623	1,751	19,374
2005	247	317	564	5,243	1,909	7,152	7,716	3,048	304	3,352
2006	196	725	921	4,192	985	5,177	6,098	7,569	42	7,611
2007	270	2,336	2,606	2,019	2,472	4,491	7,097	8,987	502	9,489
2008	6,378	1,105	7,483	581	113	694	8,177	17,891	1,260	19,151
2009	0	0	0	0	0	0	0	5,831	706	6,537
2010	36	113	149	889	1,482	2,371	2,520	16,630	1,134	17,764
2011	417	175	592	1,045	3,780	4,825	5,417	12,587	1,466	14,053
2012	334	2,085	2,419	759	2,960	3,719	6,138	23,285	1,718	25,003
2013	4,277	6,236	10,513	4,054	23,994	28,048	38,561	43,671	12,043	55,714
2014	1,292	1,434	2,726	19,822	8,977	28,799	31,525	21,303	3,404	24,707
2015	273	197	470	5,763	7,127	12,890	13,360	13,160	2,692	15,852
2016	0	56	56	633	1,571	2,204	2,260	3,966	870	4,836
2017	0	124	124	98	183	281	405	503	43	546
2018	637	91	728	927	852	1,779	2,507	1,815	179	1,994
2019	670	47	717	1,075	3,779	4,854	5,571	1,860	716	2,576
2020	53	0	53	228	3,064	3,292	3,345	2,209	568	2,777
2021	0	238	238	753	8,832	9,585	9,823	3,353	605	3,958
2022	0	331	331	651	13,964	14,615	14,946	4,003	485	4,488
2023[a/]	0	15	15	0	33	33	48	938	0	938

TABLE II-6. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 3 of 4)

Year (t) or Average	Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t)) KMZ Troll	KMZ Sport	KMZ Subtotal	North of KMZ	South of KMZ	Subtotal	Ocean Total	River Fisheries (t) Net	Sport	Total
						HARVEST RATE[b/]				
Age-3										
1986-90	0.02	0.01	0.03	0.08	0.09	0.17	0.20	0.09	0.11	0.20
1991-95	0.00	0.01	0.01	0.01	0.02	0.03	0.03	0.13	0.06	0.18
1996-00	0.00	0.00	0.00	0.01	0.02	0.03	0.03	0.14	0.07	0.21
2001	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.18	0.07	0.25
2002	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.12	0.07	0.19
2003	0.00	0.00	0.00	0.00	0.07	0.07	0.08	0.07	0.05	0.13
2004	0.00	0.01	0.01	0.06	0.05	0.11	0.12	0.14	0.06	0.20
2005	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.10	0.04	0.14
2006	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.13	0.00	0.13
2007	0.00	0.02	0.02	0.01	0.02	0.04	0.06	0.15	0.05	0.20
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.03	0.21
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.06	0.31
2010	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.28	0.04	0.33
2011	0.00	0.00	0.01	0.00	0.02	0.02	0.03	0.23	0.04	0.27
2012	0.00	0.01	0.02	0.00	0.02	0.02	0.03	0.29	0.05	0.34
2013	0.00	0.01	0.01	0.00	0.03	0.03	0.04	0.34	0.14	0.48
2014	0.00	0.00	0.00	0.02	0.01	0.03	0.03	0.06	0.03	0.09
2015	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.29	0.12	0.41
2016	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.11	0.05	0.16
2017	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.05	0.00	0.05
2018	0.01	0.01	0.02	0.02	0.02	0.04	0.06	0.15	0.05	0.20
2019	0.00	0.00	0.01	0.00	0.03	0.03	0.04	0.14	0.15	0.29
2020	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.08	0.12	0.20
2021	0.00	0.00	0.00	0.01	0.05	0.05	0.05	0.13	0.05	0.18
2022[a/]	0.00	0.00	0.00	0.00	0.06	0.06	0.06	0.12	0.06	0.18
2023[a/]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03

TABLE II-6. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 4 of 4)

Year (t) or Average	Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t)) KMZ Troll	KMZ Sport	KMZ Subtotal	North of KMZ	South of KMZ	Subtotal	Ocean Total	River Fisheries (t) Net	River Sport	River Total
					HARVEST RATE[b/]					
Age-4										
1986-90	0.05	0.02	0.07	0.21	0.16	0.37	0.44	0.45	0.09	0.54
1991-95	0.00	0.01	0.01	0.05	0.06	0.11	0.13	0.29	0.04	0.34
1996-00	0.00	0.01	0.01	0.05	0.04	0.09	0.10	0.28	0.05	0.33
2001	0.01	0.01	0.02	0.04	0.03	0.07	0.09	0.24	0.05	0.29
2002	0.02	0.01	0.03	0.03	0.10	0.12	0.15	0.19	0.06	0.26
2003	0.00	0.00	0.01	0.04	0.16	0.20	0.21	0.24	0.05	0.28
2004	0.01	0.01	0.03	0.11	0.21	0.32	0.35	0.43	0.04	0.48
2005	0.01	0.01	0.01	0.14	0.05	0.19	0.20	0.17	0.02	0.19
2006	0.00	0.01	0.01	0.07	0.02	0.08	0.10	0.18	0.00	0.18
2007	0.01	0.07	0.08	0.06	0.07	0.13	0.21	0.53	0.03	0.56
2008	0.08	0.01	0.09	0.01	0.00	0.01	0.10	0.36	0.03	0.38
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.04	0.40
2010	0.00	0.00	0.00	0.01	0.02	0.04	0.04	0.37	0.03	0.40
2011	0.01	0.00	0.01	0.02	0.06	0.07	0.08	0.31	0.04	0.34
2012	0.00	0.03	0.03	0.01	0.04	0.05	0.08	0.47	0.03	0.51
2013	0.02	0.03	0.05	0.02	0.12	0.14	0.20	0.40	0.11	0.51
2014	0.01	0.01	0.02	0.11	0.05	0.16	0.17	0.22	0.03	0.25
2015	0.00	0.00	0.01	0.09	0.12	0.21	0.22	0.39	0.08	0.47
2016	0.00	0.00	0.00	0.03	0.06	0.09	0.09	0.26	0.06	0.31
2017	0.00	0.01	0.01	0.01	0.02	0.03	0.04	0.07	0.01	0.08
2018	0.06	0.01	0.07	0.09	0.08	0.17	0.24	0.33	0.03	0.36
2019	0.04	0.00	0.05	0.07	0.24	0.31	0.36	0.27	0.10	0.38
2020	0.00	0.00	0.00	0.02	0.22	0.23	0.23	0.29	0.07	0.37
2021	0.00	0.01	0.01	0.02	0.25	0.27	0.28	0.19	0.03	0.22
2022	0.00	0.01	0.01	0.02	0.37	0.38	0.39	0.28	0.03	0.31
2023[a/]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04

a/ Preliminary (incomplete cohort).

b/ Ocean harvest rates are the fraction of Sept. 1 (t-1) ocean abundance harvested in these fisheries. River harvest rates are the fraction of the river run (t) harvested in these fisheries.

TABLE II-7. Rogue River fall Chinook inriver run and ocean population indices.

Return	Inriver Run Index in Thousands of Fish[a]					Ocean Harvest Rate by Age[b]		Rogue Ocean Population Index (ROPI) in Thousands of Fish[c/d]			
Year	Age-2	Age-3	Age-4	Age-5-6	Total[d]	Age-3	Age-4-6	Age-3	Age-4	Age-5-6	Total
1977-80	1.0	2.3	2.2	0.2	5.7	0.23	0.55	14.1	6.5	0.5	21.1
1981-85	21.4	17.6	22.9	2.3	64.1	0.18	0.45	197.5	60.0	16.6	274.1
1986-90	30.8	47.2	37.5	4.5	120.0	0.20	0.44	485.0	112.0	30.3	627.2
1991-95	16.7	28.9	17.2	3.5	66.4	0.03	0.13	165.1	51.2	11.8	228.1
1996-00	15.1	31.2	18.2	4.6	69.1	0.03	0.10	199.1	66.6	13.6	279.3
2001	27.9	29.5	33.9	16.6	107.9	0.03	0.09	164.8	146.2	18.6	329.6
2002	43.8	64.1	63.1	30.6	201.6	0.02	0.15	337.9	70.0	28.4	436.3
2003	20.1	66.9	99.0	47.0	233.0	0.08	0.21	530.4	151.9	52.2	734.5
2004	20.3	30.6	69.5	35.4	155.8	0.12	0.34	243.3	158.4	82.5	484.2
2005[f]	5.0	17.7	28.7	11.6	63.0	0.02	0.20	245.2	72.6	58.2	376.0
2006	7.4	11.6	19.6	7.1	45.7	0.01	0.10	60.4	42.1	23.5	126.0
2007	3.4	15.8	16.6	12.7	48.5	0.06	0.21	89.5	27.5	15.8	132.8
2008	16.2	7.6	14.1	4.2	42.1	0.00	0.10	41.3	37.6	15.4	94.3
2009	15.2	34.3	28.0	4.5	82.0	0.00	0.00	195.9	18.0	11.4	225.3
2010	15.1	23.6	26.5	2.7	67.9	0.01	0.04	183.4	81.3	21.5	286.2
2011	31.9	25.1	41.1	5.5	103.6	0.03	0.08	183.2	56.0	19.9	259.1
2012	11.0	39.9	28.0	5.3	84.2	0.03	0.08	385.6	59.4	31.2	476.2
2013	24.3	17.0	66.1	3.1	110.5	0.04	0.20	133.4	94.5	21.7	249.6
2014	12.5	20.5	29.2	6.7	68.9	0.03	0.17	295.5	40.5	49.0	385.0
2015	8.5	6.8	23.1	3.0	41.4	0.02	0.22	151.5	48.5	22.8	222.8
2016	17.7	8.1	17.7	2.9	46.4	0.01	0.09	102.6	16.2	17.6	136.4
2017	25.0	58.6	24.4	12.7	120.7	0.02	0.04	214.0	19.2	13.6	246.8
2018	23.9	27.7	11.4	0.4	63.4	0.06	0.24	303.0	138.8	21.0	462.8
2019	18.0	14.8	6.2	0.1	39.1	0.04	0.36	305.4	69.2	8.9	383.5
2020	17.5	24.1	8.0	0.1	49.6	0.01	0.23	217.2	35.1	4.6	256.9
2021	14.0	22.5	27.0	2.0	65.5	0.05	0.28	211.2	57.1	5.8	274.1
2022	15.4	11.3	7.4	0.9	35.0	0.06 [e]	0.38	173.4 [e]	53.5	20.0	246.9 [e]
2023	12.8	15.1	13.9	3.6	45.5	-	0.00 [e]	185.8 [e]	26.9 [e]	5.6	218.3 [e]
2024	NA	NA	NA	NA	NA	-	-	155.2 [f]	35.7 [f]	11.1 [f]	201.9 [f]

a/ Huntley Park passage estimate and estuary harvest. Age composition from Huntley Park scale analysis.
b/ Exploitation rates since 1981 are based on Klamath River fall Chinook cohort analysis.
c/ Based on cohort reconstruction methods. Index values predicted from regression equations; postseason estimates are not available.
d/ Rogue ocean abundances initially reconstructed to May 1 (t); converted to Sept. 1 (t-1) forecasts by dividing the May 1 (t) number by the assumed Sept. 1 (t-1) through May 1 (t) survival rate: 0.5 age-3, 0.8 age-4, 0.8 age-5, 0.8 age-6.
e/ Preliminary, complete cohort not available.
f/ Preseason forecast.

TABLE II-8. Predicted and postseason returns of Columbia River adult summer and fall Chinook in thousands of fish. (Page 1 of 3)

Year or Average	March Preseason Forecast[a/]	April STT Modeled Forecast[b/]	Postseason Return	March Pre/Postseason	April Pre/Postseason
			URB		
1984-85	124.6	126.1	163.9	0.75	0.76
1986-90	306.8	305.5	291.4	1.02	1.02
1991-95	86.2	91.5	105.3	0.83	0.87
1996-00	144.9	140.9	153.8	0.94	0.92
2001-05	266.6	260.3	303.9	0.88	0.87
2006	253.9	249.1	230.4	1.10	1.08
2007	182.4	185.2	112.6	1.62	1.64
2008	162.5	165.9	196.9	0.83	0.84
2009	259.9	269.8	212.0	1.23	1.27
2010	310.8	319.1	324.9	0.96	0.98
2011	398.2	399.5	324.1	1.23	1.23
2012	353.5	353.0	298.1	1.19	1.18
2013	432.5	434.7	784.1	0.55	0.55
2014	973.3	919.4	684.2	1.42	1.34
2015	500.3	516.2	795.9	0.63	0.65
2016	589.0	579.4	406.6	1.45	1.42
2017	260.0	275.1	297.1	0.88	0.93
2018	200.1	205.8	149.0	1.34	1.38
2019	158.4	162.6	212.2	0.75	0.77
2020	233.4	227.0	299.3	0.78	0.76
2021	354.2	349.2	239.9	1.48	1.46
2022	230.4	229.6	254.9	0.91	0.90
2023[c/]	272.4	278.5	339.0	0.80	0.82
2024	258.3	-	-	-	-
			LRW		
1984-85	14.8	NA	13.3	1.12	NA
1986-90	27.8	30.8	32.6	0.86	0.95
1991-95	13.9	13.2	14.8	0.99	0.93
1996-00	6.1	5.5	9.5	0.69	0.62
2001-05	20.9	21.2	21.1	1.01	1.03
2006	16.6	16.6	18.1	0.92	0.92
2007	10.1	10.0	4.3	2.35	2.33
2008	3.8	3.8	7.1	0.54	0.54
2009	8.5	8.6	7.5	1.13	1.15
2010	9.7	10.0	10.9	0.89	0.92
2011	12.5	13.1	15.2	0.82	0.86
2012	16.2	16.2	13.9	1.17	1.17
2013	14.2	14.3	25.8	0.55	0.55
2014	34.2	33.4	25.8	1.33	1.29
2015	18.9	19.4	32.4	0.58	0.60
2016	22.2	22.4	13.0	1.71	1.72
2017	12.5	13.6	7.8	1.60	1.74
2018	7.6	7.9	8.3	0.92	0.95
2019	13.7	14.1	16.6	0.83	0.85
2020	19.7	19.2	35.4	0.56	0.54
2021	20.0	20.4	16.9	1.18	1.21
2022	10.8	10.9	9.4	1.16	1.17
2023[c/]	8.6	8.7	11.4	0.75	0.76
2024	10.5	-	-	-	-

TABLE II-8. Predicted and postseason returns of Columbia River adult summer and fall Chinook in thousands of fish. (Page 2 of 3)

Year	March Preseason Forecast[a/]	April STT Modeled Forecast[b/]	Postseason Return	March Pre/Postseason	April Pre/Postseason
			LRH		
1984-85	76.0	87.9	106.7	0.71	0.83
1986-90	209.8	204.2	234.9	0.91	0.88
1991-95	67.2	72.2	55.5	1.18	1.28
1996-00	33.9	40.8	49.0	0.72	0.86
2001-05	87.4	87.6	118.6	0.73	0.73
2006	55.8	57.5	58.3	0.96	0.99
2007	54.9	54.4	32.7	1.68	1.66
2008	59.0	55.9	60.3	0.98	0.93
2009	88.8	88.2	76.7	1.16	1.15
2010	90.6	85.6	103.0	0.88	0.83
2011	133.5	128.9	109.0	1.22	1.18
2012	127.0	128.4	84.8	1.50	1.51
2013	88.0	87.4	103.2	0.85	0.85
2014	110.0	100.7	101.8	1.08	0.99
2015	94.9	96.8	128.7	0.74	0.75
2016	133.7	142.5	81.9	1.63	1.74
2017	92.4	98.8	64.6	1.43	1.53
2018	62.4	63.9	50.4	1.24	1.27
2019	54.5	55.1	48.9	1.11	1.13
2020	51.0	50.0	77.9	0.65	0.64
2021	73.1	73.8	74.7	0.98	0.99
2022	73.0	73.6	87.5	0.83	0.84
2023[c/]	77.1	77.0	87.1	0.89	0.88
2024	85.5	-	-	-	-
			SCH		
1984-85	28.1	32.1	40.4	0.75	0.85
1986-90	17.7	15.6	16.7	1.01	0.92
1991-95	31.0	34.5	30.2	1.05	1.18
1996-00	30.3	32.6	30.3	0.94	1.05
2001-05	110.0	113.1	148.5	0.76	0.78
2006	50.0	51.8	27.9	1.79	1.86
2007	21.8	21.3	14.5	1.50	1.47
2008	87.2	86.2	93.8	0.93	0.92
2009	59.3	56.5	49.0	1.21	1.15
2010	169.0	162.9	128.6	1.31	1.27
2011	116.4	116.7	70.5	1.65	1.66
2012	63.8	60.0	56.9	1.12	1.05
2013	38.0	36.7	86.7	0.44	0.42
2014	115.1	103.3	127.0	0.91	0.81
2015	160.5	163.9	166.4	0.96	0.98
2016	89.5	100.7	41.4	2.16	2.43
2017	158.4	164.4	48.1	3.29	3.42
2018	50.1	51.4	28.9	1.73	1.78
2019	46.0	48.4	29.0	1.59	1.67
2020	46.2	45.5	52.3	0.88	0.87
2021	46.8	47.3	73.7	0.64	0.64
2022	91.2	92.2	258.3	0.35	0.36
2023[c/]	136.1	135.8	198.9	0.68	0.68
2024	129.8	-	-	-	-

TABLE II-8. Predicted and postseason returns of Columbia River adult summer and fall Chinook in thousands of fish. (Page 3 of 3)

Year	March Preseason Forecast[a/]	April STT Modeled Forecast[b/]	Postseason Return	March Pre/Postseason	April Pre/Postseason
			MCB		
1991-95	34.6	35.6	32.4	1.08	1.10
1996-00	49.9	47.9	48.6	1.07	1.04
2001-05	84.9	82.0	110.1	0.77	0.75
2006	88.3	86.6	80.4	1.10	1.08
2007	68.0	69.1	46.9	1.45	1.47
2008	54.0	55.1	75.5	0.72	0.73
2009	94.4	97.9	73.1	1.29	1.34
2010	79.0	74.6	79.0	1.00	0.94
2011	100.0	100.4	85.4	1.17	1.18
2012	90.8	90.7	58.7	1.55	1.55
2013	105.2	96.3	243.4	0.43	0.40
2014	360.1	340.2	203.8	1.77	1.67
2015	113.3	116.9	170.6	0.66	0.69
2016	99.0	99.4	87.8	1.13	1.13
2017	48.2	48.3	50.5	0.95	0.96
2018	42.0	41.2	50.2	0.84	0.82
2019	64.7	66.4	68.1	0.95	0.98
2020	79.7	77.5	109.0	0.73	0.71
2021	86.2	85.0	73.8	1.17	1.15
2022	78.9	78.6	67.7	1.17	1.16
2023[c/]	52.6	53.8	82.1	0.64	0.66
2024	63.4	-	-	-	-
			SUMMER		
2008	52.0		55.5	0.94	
2009	70.7		53.9	1.31	
2010	88.8		72.3	1.23	
2011	91.1		80.6	1.13	
2012	91.2	92.6	58.3	1.56	1.59
2013	73.5	78.5	67.6	1.09	1.16
2014	67.5	64.7	78.3	0.86	0.83
2015	73.0	100.1	126.9	0.58	0.79
2016	93.3	95.6	91.0	1.03	1.05
2017	63.1	64.8	68.2	0.93	0.95
2018	67.3	70.5	42.1	1.60	1.67
2019	35.9	36.3	34.6	1.04	1.05
2020	38.3	38.0	65.5	0.58	0.58
2021	77.6	78.8	56.8	1.37	1.39
2022	57.5	56.3	78.5	0.73	0.72
2023[c/]	84.8	85.4	54.7	1.55	1.56
2024	53.0	-	-	-	-

a/ March preseason forecasts are ocean escapements based on terminal run size and stock-specific cohort relationships affected by the historical "normal" ocean fisheries, generally between 1979 and the most recent complete broods.

b/ STT-modeled forecasts adjust March preseason forecasts for Council-adopted ocean regulations each year, and should provide a more accurate estimate of expected ocean escapement.

c/ Postseason estimates are preliminary.

TABLE II-9. Preseason forecasts and postseason estimates of Puget Sound run size for summer/fall Chinook in thousands of fish.[a/] (Page 1 of 3)

Year or Average	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season
	Nooksack-Samish Hatchery and Natural			**East Sound Bay Hatchery**			**Skagit [b/] Hatchery**			**Skagit Natural**		
1993-95	45.2	27.9	1.63	3.3	1.6	15.40	1.3	3.4	0.47	9.1	7.3	1.33
1996-00	27.0	36.2	0.75	2.1	0.5	9.58	0.2	0.3	0.38	7.0	10.9	0.81
2001	34.9	66.5	0.52	1.6	0.9	1.85	0.0	0.2	0.00	9.1	14.0	0.65
2002	52.8	56.5	0.93	1.6	0.9	1.87	0.0	0.1	0.00	13.8	19.9	0.69
2003	45.8	29.9	1.53	1.6	0.2	7.51	0.0	0.3	0.00	13.7	10.1	1.36
2004	34.2	17.1	2.00	0.8	0.0	400.00	0.5	0.2	2.16	20.3	24.1	0.84
2005	19.5	16.6	1.17	0.4	0.1	7.69	0.7	0.4	1.88	23.4	23.4	1.00
2006	16.9	31.9	0.53	0.4	0.0	26.67	0.6	0.4	1.51	24.1	22.5	1.07
2007	18.8	26.6	0.71	0.4	0.0	-	1.1	0.4	2.59	15.0	12.9	1.16
2008	35.3	29.1	1.21	0.8	0.0	-	0.7	0.2	3.32	23.8	15.0	1.59
2009	23.0	20.9	1.10	0.1	0.0	4.76	0.6	0.1	4.48	23.4	12.1	1.93
2010	30.3	36.3	0.84	2.3	0.7	3.19	0.9	0.1	10.59	13.0	9.7	1.34
2011	37.5	33.5	1.12	0.4	0.7	0.57	1.5	0.1	13.51	14.3	9.2	1.55
2012	44.0	33.7	1.30	0.4	1.6	0.25	1.3	0.1	13.83	8.3	15.8	0.53
2013	47.2	32.9	1.43	2.0	1.1	1.79	0.3	0.1	3.45	12.9	13.0	0.99
2014	43.9	25.7	1.71	1.2	0.4	3.23	0.3	0.1	2.78	18.0	12.0	1.49
2015	38.6	18.8	2.05	1.2	0.9	1.39	0.6	0.1	5.94	11.8	14.8	0.80
2016	27.9	15.9	1.75	0.7	0.7	1.05	0.4	0.1	4.55	15.1	21.0	0.72
2017	21.2	25.7	0.83	0.8	0.5	1.70	0.4	0.1	4.04	15.8	13.7	1.16
2018	24.6	19.5	1.26	0.7	0.0	63.64	0.3	0.1	3.13	13.3	12.2	1.10
2019	21.3	14.3	1.49	0.3	0.5	0.71	0.3	0.1	3.12	13.6	13.0	1.05
2020	18.2	14.7	1.24	0.3	0.2	1.21	0.5	0.1	5.65	12.9	12.5	1.03
2021[c/]	18.9	27.9	0.68	0.6	0.3	2.28	0.5	0.1	3.62	10.5	9.0	1.16
2022	28.1	43.0	0.65	0.4	0.1	4.49	0.5	0.1	5.77	12.5	19.1	0.66
2023	41.2	-	-	0.2	-	-	0.5	-	-	12.2	-	-
2024	40.9	-	-	0.2	-	-	0.6	-	-	10.4	-	-

TABLE II-9. Preseason forecasts and postseason estimates of Puget Sound run size for summer/fall Chinook in thousands of fish.[a/] (Page 2 of 3)

Year or Average	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season
	Stillaguamish [d/] Natural			**Snohomish [d/] Hatchery**			**Snohomish [d/] Natural**			**Tulalip [d/] Hatchery**		
1993-95	1.8	1.3	1.29	2.0	3.8	0.43	4.6	4.0	1.15	2.6	5.2	0.58
1996-00	1.6	2.0	0.82	7.0	8.1	0.93	5.3	3.5	1.64	3.7	9.5	0.43
2001	1.7	2.0	0.86	4.1	2.9	1.43	5.8	6.7	0.86	5.5	4.8	1.14
2002	2.0	2.2	0.90	6.8	2.6	2.60	6.7	7.4	0.90	5.8	5.2	1.11
2003	2.0	1.5	1.32	9.4	6.0	1.57	5.5	5.8	0.95	6.0	8.6	0.70
2004	3.3	2.1	1.55	10.1	6.4	1.58	15.7	11.0	1.42	6.8	5.5	1.24
2005	2.0	1.7	1.20	9.9	4.0	2.49	14.2	5.0	2.86	6.4	6.9	0.93
2006	1.6	1.8	0.87	9.6	5.9	1.62	8.7	7.2	1.21	9.3	5.1	1.84
2007	1.9	1.1	1.73	8.7	8.1	1.08	12.3	2.8	4.33	8.4	5.4	1.56
2008	1.1	2.1	0.53	8.8	7.4	1.20	6.5	7.1	0.92	2.7	3.5	0.77
2009	1.7	1.2	1.38	4.9	2.5	1.95	8.4	1.8	4.58	4.0	1.7	2.32
2010	1.4	1.5	0.91	5.6	3.4	1.65	9.9	3.5	2.81	3.4	3.6	0.94
2011	1.8	1.6	1.13	5.2	3.3	1.58	7.4	1.4	5.21	3.5	5.1	0.68
2012	0.9	1.9	0.46	3.9	8.4	0.47	2.8	3.4	0.83	5.9	0.4	16.16
2013	1.3	1.7	0.79	5.9	5.7	1.04	3.6	2.7	1.34	10.9	1.8	6.22
2014	1.6	0.9	1.81	5.4	6.1	0.89	5.3	2.4	2.21	4.7	1.7	2.83
2015	0.5	0.9	0.58	3.3	4.8	0.68	4.2	2.3	1.79	1.3	2.1	0.60
2016	0.5	1.2	0.41	5.0	10.0	0.50	3.3	3.5	0.95	1.4	6.0	0.23
2017	1.5	1.3	1.19	4.8	9.0	0.53	3.4	4.4	0.78	5.3	11.4	0.47
2018	1.6	1.2	1.35	6.5	6.0	1.09	3.5	3.3	1.06	7.5	9.3	0.80
2019	0.9	1.1	0.78	7.0	6.2	1.13	3.2	1.1	3.00	12.5	8.7	1.43
2020	0.9	1.6	0.56	6.8	5.3	1.28	3.0	2.8	1.05	6.0	3.4	1.78
2021[c/]	0.9	0.9	1.07	6.1	6.2	0.98	2.9	2.1	1.42	5.8	2.1	2.79
2022	0.9	1.7	0.52	6.0	8.3	0.73	2.4	3.7	0.65	7.7	2.6	2.94
2023	1.2	-	-	7.5	-	-	3.4	-	-	5.5	-	-
2024	0.9	-	-	8.4	-	-	2.7	-	-	5.9	-	-

TABLE II-9. Preseason forecasts and postseason estimates of Puget Sound run size for summer/fall Chinook in thousands of fish.[a/] (Page 3 of 3)

Year or Average	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season
	South Puget Sound Hatchery			**South Puget Sound Natural**			**Strait of Juan de Fuca Hatchery and Natural**			**Hood Canal Hatchery and Natural**		
1993-95	54.7	70.8	0.83	22.1	13.5	1.78	4.2	2.3	1.88	11.6	6.3	2.09
1996-00	64.3	72.6	0.93	19.2	14.7	1.31	3.0	3.5	0.89	7.3	16.3	0.54
2001	73.7	105.4	0.70	16.2	19.6	0.83	3.5	3.7	0.96	19.2	26.1	0.74
2002	90.8	104.3	0.87	16.9	19.9	0.85	3.6	3.7	0.96	25.3	30.2	0.84
2003	86.6	89.9	0.96	19.6	6.0	3.26	3.4	4.1	0.84	24.0	33.0	0.73
2004	86.5	95.6	0.90	17.5	10.4	1.68	3.6	5.4	0.66	29.6	34.3	0.86
2005	83.1	86.2	0.96	17.7	5.7	3.10	4.2	3.7	1.12	30.6	54.6	0.56
2006	85.8	129.9	0.66	21.3	9.1	2.34	4.2	4.6	0.91	30.2	39.8	0.76
2007	83.0	161.3	0.51	17.0	11.0	1.54	4.4	2.1	2.07	47.5	32.4	1.46
2008	101.6	109.7	0.93	21.1	14.9	1.42	3.2	1.9	1.69	36.8	33.4	1.10
2009	93.0	85.0	1.09	17.2	2.7	6.28	2.4	4.4	0.54	42.6	38.1	1.12
2010	97.4	92.0	1.06	12.7	4.0	3.16	1.9	2.9	0.65	45.0	37.8	1.19
2011	118.6	82.3	1.44	8.9	3.3	2.74	2.5	4.1	0.61	40.6	62.9	0.65
2012	95.8	78.5	1.22	8.9	5.5	1.61	2.9	4.3	0.68	46.8	85.6	0.55
2013	102.0	86.6	1.18	5.0	4.4	1.15	4.3	6.4	0.67	66.2	71.8	0.92
2014	96.7	41.9	2.31	4.8	3.2	1.51	5.3	6.9	0.76	84.1	25.2	3.34
2015	62.4	50.4	1.24	3.8	5.3	0.71	8.4	7.3	1.15	62.1	32.9	1.89
2016	43.1	86.0	0.50	4.5	6.6	0.68	6.6	4.5	1.48	45.0	66.2	0.68
2017	80.4	146.3	0.55	4.7	8.5	0.55	4.6	5.0	0.92	50.8	101.0	0.50
2018	123.6	111.2	1.11	4.8	7.2	0.67	7.4	10.3	0.72	61.4	72.5	0.85
2019	99.9	94.8	1.05	8.4	5.3	1.59	8.3	10.4	0.80	67.2	62.5	1.08
2020	100.7	60.5	1.67	5.8	5.7	1.02	5.0	6.2	0.80	72.2	23.6	3.06
2021[c/]	78.8	93.8	0.84	7.0	6.7	1.05	5.5	5.5	0.99	69.8	54.6	1.28
2022	90.3	88.3	1.02	6.9	8.1	0.85	5.0	6.4	0.77	57.3	75.8	0.76
2023	90.4	-	-	7.0	-	-	3.7	-	-	56.8	-	-
2024	90.5	-	-	7.3	-	-	4.3	-	-	56.3	-	-

a/ Puget Sound run size is defined as the run available to Puget Sound net fisheries. Does not include fish caught by troll and recreational fisheries inside Puget Sound.

b/ Postseason returns do not include hatchery strays to the spawning grounds.

c/ Postseason returns are preliminary.

d/ Preseason forecasts include a variety of runsize types including escapement without fishing and terminal run. Postseason returns are in terms of terminal run of Chinook returning to area 8A. This includes all adult Chinook harvested in the net fisheries in Areas 8A, 8D, and the Stillaguamish and Snohomish Rivers, harvest in sport fisheries in Area 8D, and the Stillaguamish and Snohomish River escapements.

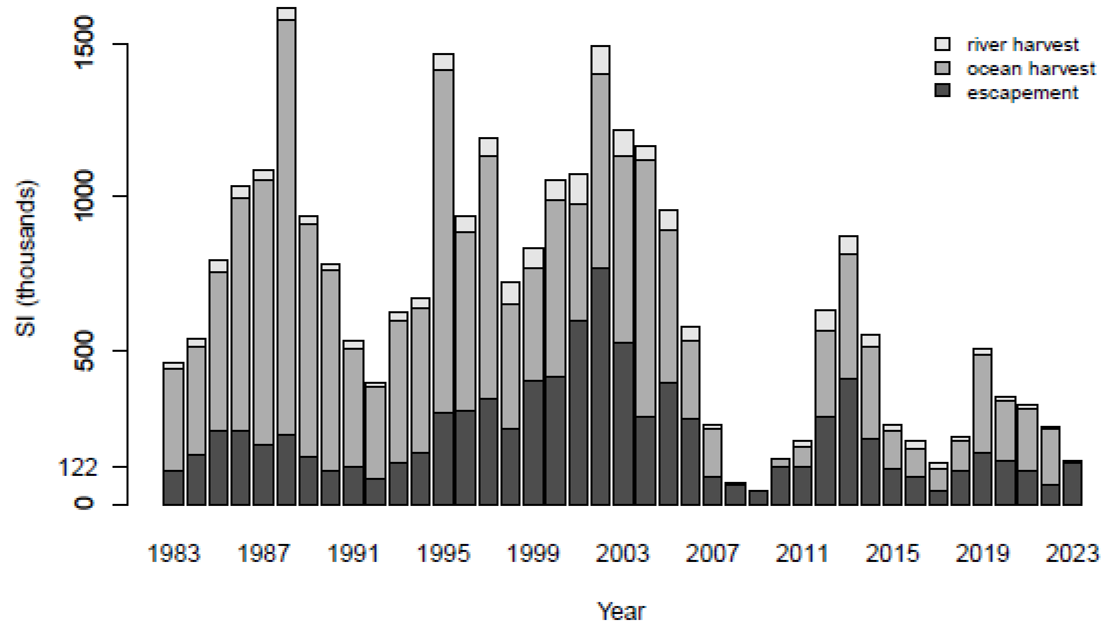

FIGURE II-1. The Sacramento Index (SI) and relative levels of its components. The Sacramento River fall Chinook S_{MSY} of 122,000 adult spawners is noted on the vertical axis.

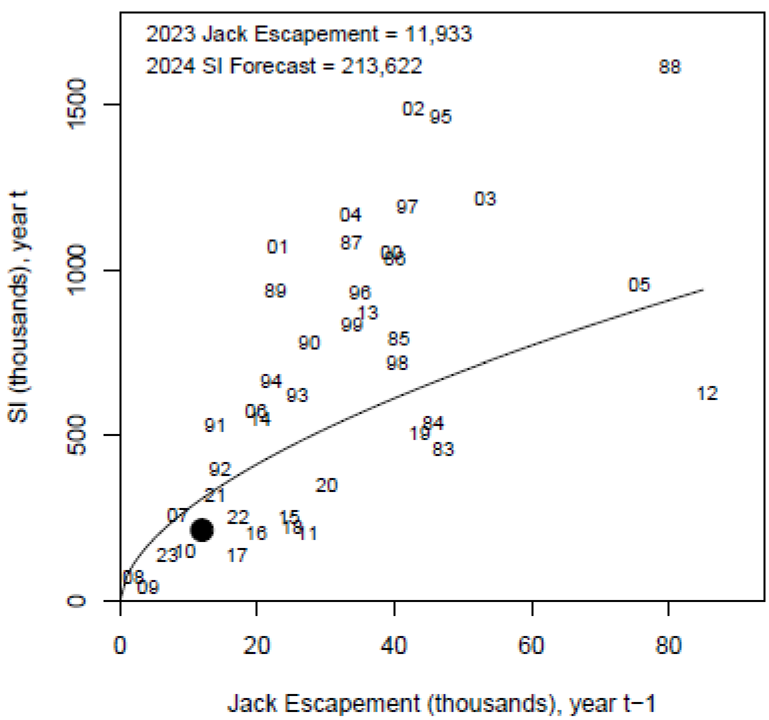

FIGURE II-2. Sacramento Index (SI) forecast based on log-log regression of the SI on jack escapement from the previous year, accounting for autocorrelated errors. The solid line represents the fitted model and the black dot denotes the SI forecast. Years shown are SI years.

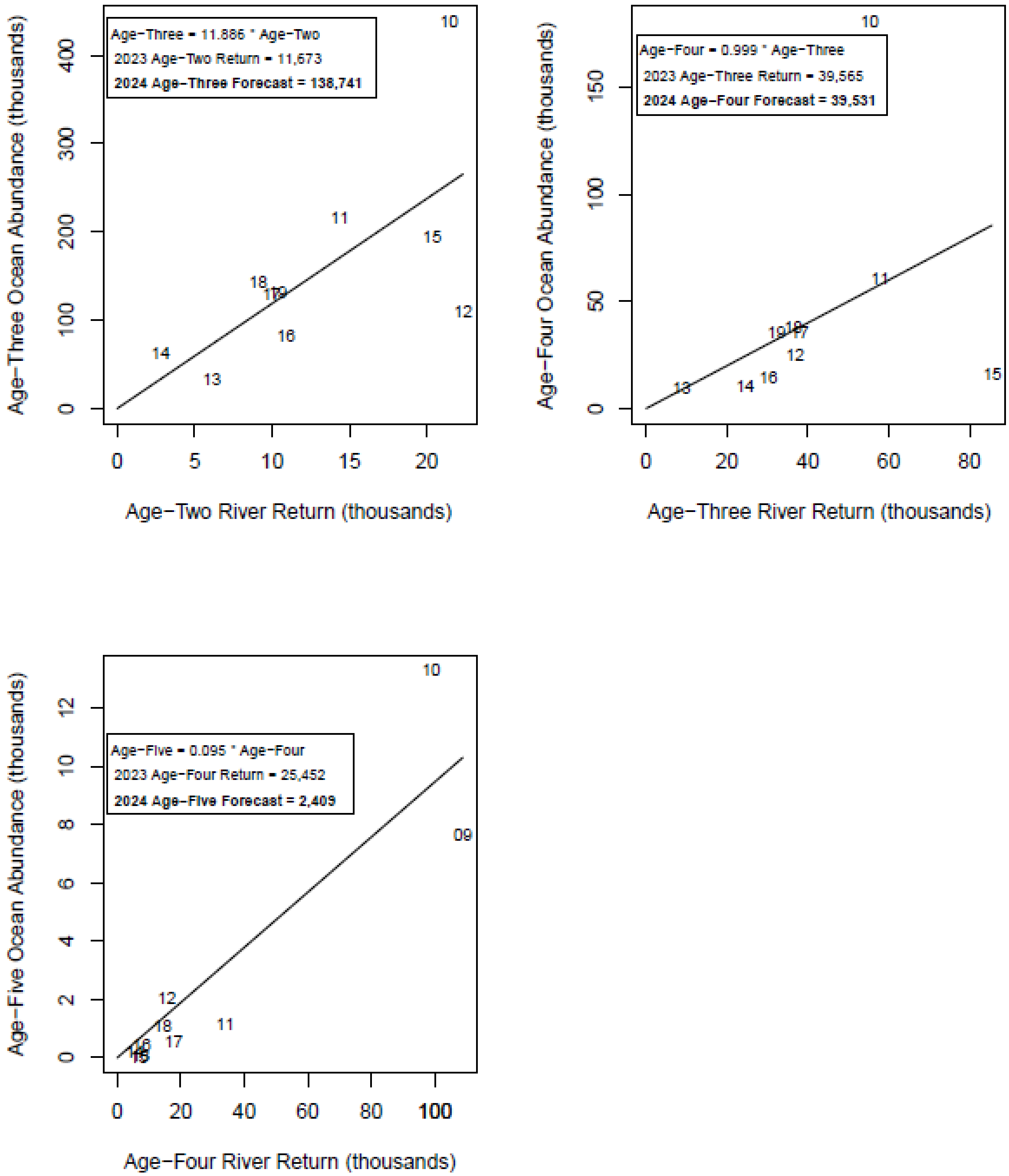

FIGURE II-3. Regression estimators for Klamath River fall Chinook ocean abundance (September 1) based on that year's river return of same cohort. Numbers in plots denote brood years.

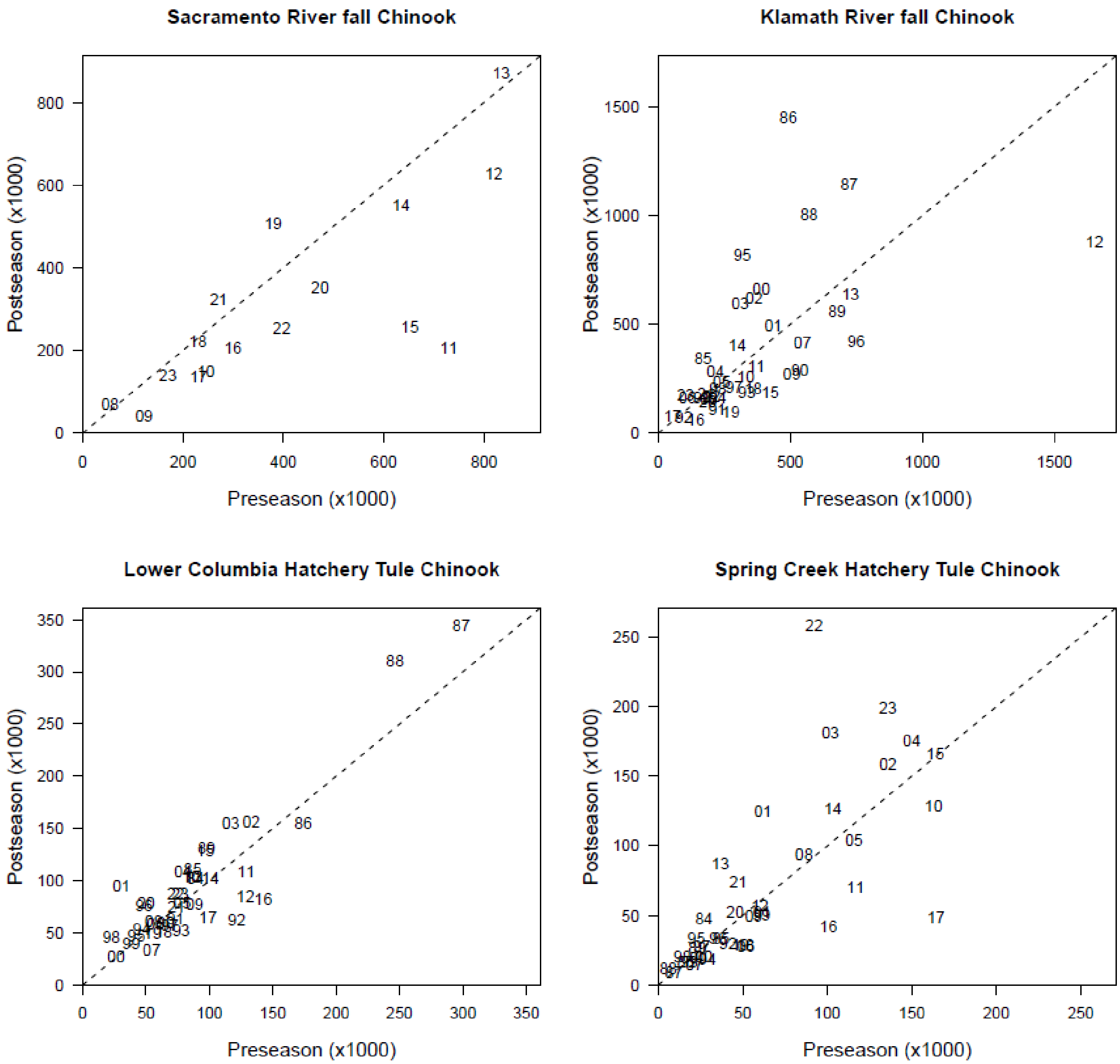

FIGURE II-4. Selected preseason vs. postseason forecasts for Chinook stocks with substantial contribution to Council area fisheries.

CHAPTER III - COHO SALMON ASSESSMENT

COLUMBIA RIVER AND OREGON/CALIFORNIA COAST COHO

3.1 OREGON PRODUCTION INDEX AREA

The majority of coho harvested in the Oregon Production Index (OPI) area originate from stocks produced in rivers located within the OPI area (Leadbetter Point, Washington to the U.S./Mexico border). These stocks include hatchery and natural production from the Columbia River, Oregon Coast, and northern California, and are divided into the following components: (1) Columbia River, coastal Oregon, and northern California public hatchery (OPIH), (2) Oregon coastal natural (OCN), including river and lake components, and (3) Lower Columbia natural (LCN). Direct comparisons of 2024 abundance forecasts with recent year preseason abundance forecasts and postseason estimates are reported in Table III-1.

Beginning in 2008, a new method was developed to estimate postseason coho abundances for both the natural and hatchery components of the Columbia River and the Oregon coast. The new run size estimates are based on Backwards FRAM (BKFRAM, also referred to as postseason FRAM) run reconstructions. BKFRAM is used to estimate the pre-fishing abundances and post-season exploitation rates of OPI stocks. FRAM is populated with post-season estimates of escapements and catches/non-retention mortalities for OPI fisheries. When run in BKFRAM mode, stock specific mortalities are added to escapements to reconstruct pre-fishing abundances and to estimate exploitation rates. Prior to 2008, the method of stock abundance estimation used only catch data from Leadbetter Point, Washington, to the U.S./Mexico border. The assumption was that OPI stocks that were caught north of the OPI area were balanced by northern stocks that were caught inside the OPI area. This assumption was valid as long as fisheries north and south were balanced. However, in some recent years, fisheries to the south have been more restricted than those to the north, leading to underestimation of harvest of OPI area stocks. In addition, the estimation technique was not consistent with the methods used in Coho FRAM. The Mixed Stock Model (MSM) for constructing the FRAM base period data was used to estimate the contribution of various coho stocks, including the OPI area stocks, to ocean fisheries. MSM is based on CWT recoveries (release years 1986-1992) and associated tag rates. FRAM includes all fisheries that impact a particular stock, and therefore should provide a better overall accounting of total harvest and mortality of both Columbia River and Oregon coast coho stocks.

3.1.1 Hatchery Coho

OPI area public hatchery coho smolt production occurs primarily in Columbia River facilities and net pens. Several facilities located in Oregon coastal rivers and in the Klamath River Basin, California, collectively produce fewer coho. Salmon Trout Enhancement Hatchery Coho Smolt Program (STEP) releases were discontinued after the 2004 brood. There have been no Oregon coastal private hatchery coho (PRIH) smolt releases since 1990. OPI area smolt releases since 1960 are reported by geographic area in Appendix C, Table C-1.

The OPIH abundance forecast includes all hatchery production in the OPI area, and all naturally produced coho from the Columbia River basin. After the total OPIH forecast is produced, stock components including Columbia River early and late hatchery stocks, LCN, and coastal Oregon and northern California hatchery coho, are partitioned from the total forecast value.

Predictor Description

Beginning in 2024, OPIH abundance was forecasted using an autoregressive integrated moving average (ARIMA) model with an ensemble approach. A detailed description of this modeling approach can be found in the PFMC November 2023 Briefing Book, Agenda Item D.3 Attachment 1. From 1996 to 2023, the OPIH forecast was a regression model that included adult recruits, jack returns, and smolt production.

Further documentation for this past forecast approach can be found in the 2023 Preseason Report I (PFMC, 2023a).

The ARIMA model forecasts ocean adult abundance for the OPIH component with 11 covariates: jack returns and the delayed smolt adjustment metric used in the past forecast approach, as well as nine environmental variables (Table C-2). The jack return metric include hatchery jack returns to all OPI coastal areas and to the Columbia River. The jack return values are also log-transformed because the ARIMA models are fit using a log-link (as opposed to the past methodology that used an identity link). The adjusted smolt metric was also modified by log-transforming Columbia River jack abundance in its calculation:

$$lag1\_\log\ \_SmAdj \quad = \log(lag1.JackCR) * (lag1.SmD/lag1.SmCR)$$

Where, JackCR is the total jack return to the Columbia River hatcheries and dams, SmD is the delayed smolt release from Columbia River hatcheries, and SmCR is the total smolts releases from Columbia River hatcheries.

The OPIH ARIMA model approach is a multistep process that results in an ensemble forecast. First, ARIMA models were fit to 1,485 unique combinations of the 11 covariates to subsets of the data beginning with the first year of post-season run size estimates (t_0 = 1970) and running through subsequent year $t \in$ {2007, 2008, 2009 … 2023}. Each ARIMA model forecasts the abundance for 2024, such that 1,485 one-year-ahead forecasts with distinct combinations of covariates for 2024 were generated. The models' performance were assessed based on the models mean average percent error (MAPE) over the 15 most recent years. The ensemble forecast was generated by taking weighted means of the 10 models with the lowest MAPE. The final method of generating weights to each model used a Markov-Chain Monte-Carlo optimization algorithm that minimized the MAPE of the ensemble forecasts across 2009–2023, termed stacking weights (Smyth and Wolpert 1999). The ten models used to generate the 2024 OPIH forecast, their weight in the ensemble, and their ARIMA orders can be found in Table C-5.

The OPIH forecast was divided into Columbia River early and late and coastal components. In 2024, three linear regressions were conducted, where the jack return in 2023 predicted the adult abundance for 2024. For the early and late stocks, the time series from 1986 to 2023 was fit to the regression. The coastal component relied on a regression fit to the most recent 20 years. The coastal hatchery stock is further partitioned into northern and southern coastal stock components using the proportion of smolt releases north and south of Cape Blanco in 2023. The proportion of the regression results was applied to the ARIMA-based forecast to derive the component forecast seen in Table III-1. LCN abundance is included as a subset of the early and late hatchery abundance. After the LCN forecast is developed (see 3.1.4), the LCN subset for the early and late components is derived. The LCN component within the early OPIH forecast is 35 percent of the Washington LCN forecast, 75 percent of the Clackamas forecast and 100 percent of all other Oregon tributary forecasts. The LCN component of the OPIH late forecast is 65 percent of the Washington LCN forecast and 25 percent of the Clackamas forecast.

Predictor Performance

Recent year OPIH stock preseason abundance forecasts partitioned by production area, stock, and as a total, are compared with postseason estimates in Table III-1 and Figure III-1a. The 2023 preseason abundance prediction of 896,900 OPIH coho was 174 percent of the preliminary postseason estimate of 514,200 coho.

Stock Forecast and Status

The OPIH abundance forecast for 2024 is 403,100 coho, 45 percent of the 2023 preseason abundance prediction and 78 percent of the preliminary 2023 postseason estimate (Table III-1).

3.1.2 Oregon Coastal Natural Coho

The OCN stock is composed of natural production north of Cape Blanco, Oregon from river (OCNR) and lake (OCNL) systems, which are forecasted independently.

Under the FMP, ESA consultation standards are used in place of ACLs for ESA-listed stocks like OCN (and Southern Oregon/Northern California Coast (SONCC) and Central California Coast (CCC)) coho.

Predictor Description

3.1.2.1.1 Oregon Coastal Natural Rivers

Prior to 2010, a variety of methods were used to forecast OCNR coho abundance. Beginning in 2011, generalized additive models (GAMs) were used to relate OCNR recruitment to ocean environment indices. Nine variables were evaluated, ranging from indices of large-scale ocean patterns (e.g., Pacific Decadal Oscillation [PDO]) to local ecosystem variables (e.g., sea surface temperature at Charleston, OR). It was found that high explanatory power and promising forecast skill could be achieved when the mean May-July PDO averaged over the four years prior to the return year was used in combination with two other variables in a GAM. The multi-year average of the PDO, in essence, explains the lower frequency (multi-year) variability in recruitment, and can be viewed as a replacement of the Regime Index used previously. A final set of six models using six different environmental indices plus parent spawner abundance was chosen from the possible model combinations. When averaging the predictions from the set of models (the ensemble mean), a higher skill (in terms of variance explained or cross-validation) was achieved than by selecting any single model. Making multiple forecasts from a set of models also provides a range of possible outcomes that reflects, to some degree, the uncertainty in understanding how salmon productivity is driven by ocean conditions.

Specifically, the final estimate is the mean of six GAM estimates, each with three predictor variables. The individual GAMs can be expressed in the following general form:

$$\hat{Y} = f(X_1) + f(X_2) + f(X_3) + \varepsilon$$

Where $\hat{Y}$ is the prediction, X_1 through X_3 are the predictor variables, and ε is the deviation of $\hat{Y}$ from the observation Y. For the prediction, Y was the log-transformation of annual recruit abundance. The term f represents a smooth function, which in this case is a cubic spline.

The ensemble mean predictor was the geometric mean of the six GAM predictors which is provided in Appendix C, Table C-6. For 2024, the OCNR forecast is 217,700.

The OCNR stock data set and a definition of the above terms are presented in Appendix C, Table C-4.

3.1.2.1.2 Oregon Coastal Natural Lakes

Since 1988, except for 2008, the abundance of OCNL index coho has been predicted using the most recent three-year average adult stock abundance. OCNL coho production occurs from three lake systems (Tenmile, Siltcoos, and Tahkenitch). Following the same reasoning used for the OCN Rivers predictor in 2008, OPITT chose to use the 2007 postseason abundance estimate of 10,000 coho for the 2008 preseason prediction instead of using the most recent three-year average. For 2024, the OCNL forecast is 15,500, based on most recent three-year average adult stock abundance.

Predictor Performance

Recent year OCN preseason abundance predictions are compared to postseason estimates in Table III-1. The 2023 preseason abundance prediction of 238,800 OCN coho was 129 percent of the preliminary postseason estimate of 185,700 coho.

Stock Forecasts and Status

The 2024 preseason prediction for OCN (river and lake systems combined) is 233,200 coho, 98 percent of the 2023 preseason prediction and 126 percent of the 2023 postseason estimate (Table III-1). The 2024 preseason prediction for OCNR and OCNL components are 217,700 and 15,500 coho, respectively.

Based on parent escapement levels and observed OPI smolt-to-jack survival for 2021 brood OPI smolts, the total allowable OCN coho exploitation rate for 2024 fisheries is no greater than 35.0 percent under the Salmon FMP (Amendment 13) and no greater than 30.0 percent under the matrix developed by the OCN Coho Work Group during their review of Amendment 13 (Table V-8; Appendix A, Tables A-2, and A-3, respectively). The work group recommendation was accepted by the Council as expert biological advice in November 2000.

In November 2013, the Council approved a methodology change for a new marine survival index for the OCN coho harvest matrix that uses biological and oceanographic indicators for preseason planning beginning in 2014[2]. Based on this methodology, the marine survival index of 7.79 percent and the parent escapement levels, allows for a total allowable exploitation rate for 2024 fisheries that is no greater than 30.0 percent (Table V-8: Appendix Table A-4).

3.1.3 Southern Oregon / Northern California Coast Coho

The SONCC coho ESU consists of all naturally produced populations of coho from coastal streams between Cape Blanco, OR and Punta Gorda, CA. Under the FMP, ESA consultation standards are used to manage ESA-listed stocks, including SONCC coho and CCC coho.

Under FMP Amendment 22, the harvest control rule was revised to include (1) a total fishery (marine and freshwater) exploitation rate limit of 15.0 percent for all populations within the SONCC ESU, except the Trinity River coho populations, and (2) a total fishery exploitation rate limit of 16.0 percent for the Trinity River coho populations.

3.1.4 Lower Columbia River Natural

LCN coho consist of naturally produced coho mostly from Columbia River tributaries below Bonneville Dam; however, coho produced in the upper Willamette are not part of the ESA-listed ESU and are not included in the LCN coho forecast. LCN coho were listed as endangered under the Oregon State ESA in 2002, and as threatened under the Federal ESA on June 28, 2005. Under the FMP, ESA consultation standards are used in place of ACLs for ESA-listed stocks like LCN coho.

Predictor Description

The LCN stock predictor methodology was developed in 2007.

The 2024 predictions for the Oregon LCN coho populations are derived by the recent 3-year average abundances based on spawning ground counts. The 2024 adult abundance forecast for Oregon LCN coho is 26,000.

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[2] For additional information see the November 2013 PFMC Briefing Book, Agenda Item C.2.a, Attachment 1: Technical Revision to the OCN Coho Work Group Harvest Matrix.

The 2024 predictions for the Washington LCN coho populations are derived by combining estimates of the 2021 brood year natural smolt production based on watershed area and the marine survival rate of 7.7 percent. The 2024 adult abundance forecast for Washington LCN coho is 61,908.

Predictor Performance

The preseason abundance compared to the postseason estimate is presented in Table III-1. The 2023 preseason abundance prediction of 45,500 LCN coho was 58 percent of the preliminary postseason estimate of 77,900 coho.

Stock Forecast and Status

The 2024 prediction for LCN coho is 87,800 coho (Table III-1). This abundance estimate includes both Oregon and Washington LCN components.

NMFS ESA guidance for harvest of LCN coho in marine and mainstem Columbia River fisheries is based on a matrix describing parent escapement levels for multiple populations and the observed Columbia River OPI smolt-to-jack survival rate. Based on this matrix, the total allowable marine and mainstem Columbia River exploitation rate for LCN coho in 2024 fisheries would be no more than 23.0 percent.

3.1.5 Oregon Production Index Area Summary of Forecasts

The 2024 combined OPI area stock abundance is predicted to be 636,300 coho, which is 56 percent of the 2023 preseason prediction of 1,135,700 coho, and 91 percent of the 2023 preliminary postseason estimate of 699,900 coho. The historical OPI abundances are reported in Table III-2.

3.2 WASHINGTON COAST COHO

Washington coastal coho stocks include all natural and hatchery stocks originating in Washington coastal streams north of the Columbia River to the western Strait of Juan de Fuca (west of the Sekiu River). The stocks in this group most pertinent to ocean salmon fishery management are Willapa Bay (hatchery), Grays Harbor, Quinault (hatchery), Queets, Hoh, and Quillayute coho. These stocks contribute primarily to ocean fisheries off Washington and B.C.

A variety of preseason abundance estimators currently are employed for Washington coast and Puget Sound coho stocks, primarily based on smolt production and survival (Table I-2). These estimators are used to forecast preseason abundance of adult ocean (age-3) recruits.

A comparison was made of preseason OA3 forecasts with postseason estimates derived from run reconstructions using FRAM ("Backwards" mode, BKFRAM) to expand observed escapements to ocean abundance from CWT recovery data. It should be noted that forecast methodology has changed over time, and the overall trends and biases may not reflect the current methods.

Except for Willapa Bay, Washington coast coho fall within an exception to the ACL requirements of the MSA because they are managed under an international agreement (the PST); therefore, specification of ACLs is not necessary for these stocks.

3.2.1 Willapa Bay

Predictor Description

Willapa Bay natural coho ocean abundance predictions were generated with the auto-regressive (AR1) and spatio-temporal integrated population model (STIPM) state-space models presented for SSC review in

October 2021 and built from the work of DeFilippo et al 2021. These approaches base estimates on the series of past total returns (AR1) and a simplified life cycle model (returning spawners give rise to smolts, which are subject to marine survival and harvest). Higher recent year skill for the simpler model (AR1), in conjunction with uncertainties regarding some of the STIPM input data and concerns about the current marine environment (e.g., high temperatures affecting the 2023 outmigrant class from the 2021 return), supported use of the AR1 forecast in 2024.

The hatchery terminal run size was calculated using a marine survival rate of 2.81 percent (6-year average – 2 brood cycles; 2015-2020 brood years) applied to the 2021 estimated brood year smolts (2,215,715) released in the spring of 2023 from all Willapa Bay hatchery facilities. The terminal runsize was then expanded to an OA3 runsize using a 0.32 exploitation rate expansion factor, which is a 10-year average (2013-2022) of Willapa Bay hatchery coho marine survival based on coded wire tag (CWT) recoveries.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-3; Figure III-1a). In 2021, the preseason forecast was 64 percent of the postseason estimate. Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Willapa Bay natural coho OA3 abundance forecast is 29,512, compared to the 2023 preseason forecast of 42,663.

The 2024 Willapa Bay hatchery coho OA3 abundance forecast is 91,536, compared to the 2023 preseason forecast of 110,954.

OFL, ABC, and ACL

The OFL, ABC, and ACL are defined in terms of spawner escapement (S_{OFL}, S_{ABC}, and S_{ACL}), and are calculated using potential spawner abundance forecasts and established exploitation rates. Potential Willapa Bay coho natural area spawner abundance was derived by adding the current forecast of natural origin coho OA3 abundance, 29,512, to the predicted abundance of OA3 hatchery origin coho spawning in natural areas. The forecast of OA3 naturally spawning, hatchery origin coho is 12,724 and was calculated by multiplying the OA3 hatchery coho abundance forecast, 91,536, by the most recent 3-year average stray rate (0.139). Annual stray rates were estimated by dividing the number of hatchery origin spawners in natural areas by the number of hatchery origin river mouth returns. Stray rates in 2020, 2021, and 2022 were 0.119, 0.175, and 0.124, respectively.

For Willapa Bay natural coho, $F_{MSY} = 0.74$, the value estimated from a stock-specific spawner-recruit analysis. The OFL for Willapa Bay natural coho is $S_{OFL} = 42{,}236 \times (1\text{-}0.74) = 10{,}981$. Because Willapa Bay natural coho are a Tier-1 stock, $F_{ABC} = F_{MSY} \times 0.95 = 0.70$, and $F_{ACL} = F_{ABC}$. The ABC for Willapa Bay natural coho is $S_{ABC} = 42{,}236 \times (1\text{-}0.70) = 12{,}671$, with $S_{ACL} = S_{ABC}$. These preseason estimates will be recalculated with postseason abundance estimates (when available) to assess ACL and OFL compliance.

3.2.2 Grays Harbor

Preseason abundance forecasts are made for natural fish throughout the system and for hatchery fish returning to three freshwater rearing complexes and three saltwater net-pen sites. The forecasts include fish originating from numerous volunteer production projects.

Predictor Description

The natural forecast is the sum of the Chehalis River natural, Humptulips River natural, and South Bay tributary natural forecasts. An OA3 coho marine survival prediction was developed by dividing the Quinault Department of Fisheries prediction of Queets coho JA3 marine survival by the natural mortality rate of 1.23169. The Chehalis wild coho smolt production estimate was developed by scaling the 2023 Queets River natural coho smolt production to the Chehalis River production based on the relationship between the Backward FRAM (BKFRAM) OA3 ocean abundances of Queets and Chehalis natural coho abundances during the past 15 years. The Humptulips and South Bay tributary forecasts are based on recruit densities scaled from Clearwater and Chehalis basins, respectively.

The hatchery forecast is the sum of the Chehalis River, Humptulips River, and Grays Harbor net pen and off-site hatchery program hatchery-origin forecasts. The Chehalis River, Humptulips River, and Grays Harbor net-pen and off-site hatchery program hatchery-origin forecasts were based on Bingham Creek hatchery tag recoveries for brood year released 2013-2016 (most recent full complement of tag code recoveries, 9.81 percent of the tags recovered pre-terminally).

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-3; Figure III-1a). In 2021, the preseason forecast was 58 percent of the postseason estimate. Postseason estimates are not yet available for 2022

Stock Forecasts and Status

The 2024 Grays Harbor natural OA3 abundance forecast is 74,851 compared to a 2023 preseason forecast of 102,841. This ocean abundance results in classification of this stock's status as "Abundant" under the 2019 PST Southern Coho Management Plan (Table III-5).

The 2024 Grays Harbor hatchery coho OA3 abundance forecast is 68,200, compared to the 2023 preseason forecast of 111,430.

OFL

The OFL is defined in terms of spawner escapement (S_{OFL}). Potential Grays Harbor coho natural area spawner abundance was derived by adding the current forecast of natural origin coho OA3 abundance, 74,851, to the predicted abundance of OA3 hatchery origin coho spawning in natural areas. The forecast of OA3 naturally spawning hatchery origin coho is 7,025 and was calculated by multiplying the OA3 hatchery coho abundance forecast, 68,200, by the most recent 5-year average stray rate (2018-2022 average = 0.103). Annual stray rates were estimated by dividing the number of hatchery origin spawners in natural areas by the total hatchery origin escapement. For Grays Harbor natural coho MFMT = 0.65 and the OFL is S_{OFL} = 81,876 × (1-0.65) = 28,657. The preseason S_{OFL} will also be recalculated with postseason abundance estimates (when available) to assess OFL compliance.

3.2.3 Quinault River

Predictor Description

The 2024 Quinault natural coho forecast is the recent 5-year average JA3 abundance calculated from PSC post season FRAM modeling.

The hatchery forecast is calculated by multiplying the smolt releases from the Quinault (Cook Creek) Hatchery (658,214 adipose clipped smolts) by a forecasted marine survival rate of 5.2790 percent. The marine survival rate (OA3 recruits/release) forecast is a recent 3-year mean (2019-2021 smolt years).

Predictor Performance

There was no information available to evaluate performance of predictors for these stocks.

Stock Forecasts and Status

The 2024 forecast for Quinault natural coho is 25,261 OA3 recruits, compared to the 2023 forecast of 23,595.

The 2024 Quinault hatchery coho forecast is 34,745 OA3 recruits, compared to the 2023 forecast of 30,566.

3.2.4 Queets River

Predictor Description

The natural forecast was developed by multiplying the 2023 smolt outmigration of 205,963 by the predicted marine survival rate of 7.669 percent, which results in an abundance prediction of 15,795 JA3. The model uses run reconstructions developed by the Quinault Department of Fisheries (QDFi) as a response, which includes FRAM natural and incidental mortality, but does not include estimates of mark-selective fishery mortality. Expansion for mark-selective fishery mortality for the 2024 run abundance prediction was not available at the time of this report but was estimated as mean (post season FRAM / QDFi run reconstruction for run years 2010 to 2020) * abundance prediction for 2023 = 1.095037 * 13,963 = 15,290.

Marine survival is typically predicted using a general additive logistic regression model (logit (recruits/smolts) ~ spline (explanatory variable(s)). The explanatory variables are the Pacific Decadal Oscillation index (PDO) maximum May-August and Biologically Effective Upwelling Transport Index (BEUTI) median April-August.

The hatchery forecast is based on the 2023 coho smolt release from the Salmon River Hatchery of 701,265 (615,690 adipose clipped). The OA3 marine survival rate of 2.6945 percent is estimated using the 3-year mean of marine survival over the years 2019-2021.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-3; Figure III-1a). In 2021, the preseason forecast was 78 percent of the postseason estimate. Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Queets natural coho forecast is 12,824 OA3 recruits, compared to the 2023 forecast of 12,414. This ocean abundance results in classification of this stock's status as “Abundant” under the 2019 PST Southern Coho Management Plan (Table III-5).

The 2024 Queets hatchery (Salmon River) coho forecast is 18,895 OA3 recruits, compared to the 2023 forecast of 14,906. Approximately 88 percent of the fish released from the Salmon River facility were marked with an adipose fin clip.

OFL

The OFL is defined in terms of spawner escapement (S_{OFL}). For Queets River coho, MFMT = 0.65, and the OFL is $S_{OFL} = 12{,}824 \times (1-0.65) = 4{,}488$. The preseason S_{OFL} value will be recalculated with postseason abundance estimates (when available) to assess OFL compliance.

3.2.5 Hoh River

Predictor Description

The natural coho forecast is based on estimated average smolt production per square mile of watershed from the Clearwater tributary which lies between the Queets River mainstem and the Hoh River. The Quinault Fisheries Department has a long-standing trapping program on the Clearwater River to estimate smolt production; it is assumed the two rivers produce smolts at a comparable rate per square mile of watershed. In 2023, the Clearwater produced 51,620 smolts at the rate of 369 smolts/mi^2. Applying that rate to the Hoh watershed of 299 mi^2 yields 110,331 natural coho smolts emigrating from the Hoh River in 2023.

A marine survival estimate to JA3 of 5.44 percent was applied to the total natural smolt production estimate to predict the 2024 return of Hoh River wild coho. This rate is the mean of two marine survival estimates of wild stocks that are to the north and south of the Hoh River: the Queets wild coho to the south with a marine survival estimate of 7.69 percent JA3 (Jurasin, QDFi) and Washington Coast wild coho stocks with a marine survival estimate of 3.20 percent JA3 (WDFW, 2023). The average marine survival rate of 5.44 percent JA3 (4.41 percent OA3) is within 2 percent of the OA3 survival of 3.2 percent predicted in 2024 for other Washington Coast coho stocks (WDFW, 2024).

No hatchery production is projected for the Hoh system for 2024.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-3; Figure III-1a). In 2021, the preseason forecast was 39 percent of the postseason estimate. Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Hoh River natural coho forecast is 4,870 OA3 recruits, compared to the 2023 forecast of 6,531. This ocean abundance results in classification of this stock's status as "Abundant" under the 2019 PST Southern Coho Management Plan (Table III-5).

OFL

The OFL is defined in terms of spawner escapement (S_{OFL}). For Hoh River coho, MFMT = 0.65, and the OFL is $S_{OFL} = 4{,}870 \times (1-0.65) = 1{,}705$. The preseason S_{OFL} value will be recalculated with postseason abundance estimates (when available) to assess OFL compliance.

3.2.6 Quillayute River

Quillayute River coho consist of a summer run that is managed primarily for hatchery production, and a fall run that is managed primarily for natural production. Quillayute River coho have both natural and hatchery components to both runs.

Predictor Description

The natural coho forecast is based on coho smolt data measured in the Quillayute watershed in 2023 by West Fork Environmental and the Quileute Nation. A total of 252,000 coho smolts are estimated to have emigrated from the Quillayute River system in 2023.

Smolt abundance from the Dickey River was estimated to be 27,431 wild coho smolts (245 smolts/mi^2). Smolt abundance from the Bogachiel, Calawah, and Sol Duc rivers was estimated to be 164,701 wild coho smolts (316 smolts/mi^2).

Total smolts were separated into summer and fall natural coho smolts by the relative number of natural brood year 2021 spawners, 3.69 percent and 96.31 percent, respectively. Results from this separation yield estimates of 9,300 natural summer coho smolts and 242,700 natural fall coho smolts.

Summer Coho

The summer natural coho forecast is based on the estimated total summer coho smolt production (9,300) and a JA3 projected marine survival rate of 5.20 percent.

The summer hatchery production forecast was based on a marine survival estimate of 2.63 percent multiplied by a release of 106,466 smolts from the Sol Duc Hatchery.

Fall Coho

The forecast for the natural component was based on the estimated total fall coho smolt production (242,700) multiplied by an expected marine survival rate of 5.20 percent, the same survival rate used to forecast summer natural returns.

The fall hatchery production forecast was based on a marine survival estimate of 2.63 percent multiplied by a release of 482,412 smolts.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-3; Figure III-1a). In 2021, the preseason forecast was 73% of the postseason estimate. Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Quillayute River summer natural and hatchery coho forecasts are 393 and 2,273 OA3 recruits, respectively; 98.1 percent of the hatchery smolts were marked with an adipose fin clip and coded wire tag. The 2024 forecast abundance of natural summer coho is lower than the 2023 forecast of 1,638.

The 2024 Quillayute River fall natural and hatchery coho forecasts are 10,246 and 10,300 OA3 recruits, respectively. The 2024 forecast abundance of Quillayute fall natural coho is lower than the 2023 forecast of 13,475. Approximately 83 percent of the hatchery fish were marked with an adipose fin clip.

The ocean abundance forecast for Quillayute fall natural coho results in classification of the stock abundance as "Moderate" under the 2019 PST Southern Coho Management Plan (Table III-5).

3.2.7 North Washington Coast Independent Tributaries

Predictor Description

The 2024 forecast of natural coho production for these independent streams is based on a prediction of 433 smolts per square mile of watershed drainage, 424 square miles of watershed, and resulting in 183,431 smolts. This is multiplied by an expected marine survival rate of 2.6 percent.

The 2024 hatchery forecast is based on the predicted JA3 marine survival of 8.81 percent for the brood year 2021 multiplied by a proxy brood year smolt release (124,183 marked) and smolt from fry release (1,317 marked) into the Tsoo-Yess River from the Makah National Fish Hatchery. As a result of changing climate conditions and increasing difficulty with rearing coho in the hatchery over the summer, Makah National

Fish Hatchery and the Makah Tribe implemented a coho fry release program. Smolt outmigration was estimated using a rotary screw trap.

Recently, new data became available to estimate hatchery origin adults separate from natural origin adults which rendered previous estimation methods based on the jack return rate insignificant. A single, best fit model was selected to predict marine survival of Tsoo-Yess coho entering the ocean in 2023. The best-fit model uses the North Pacific Gyre Oscillation (NPGO) for the months of January through April as a predictor variable and predicted a JA3 marine survival rate of 8.81 percent.

Predictor Performance

There was no information available to evaluate performance of predictors for these stocks.

Stock Forecasts and Status

The 2024 North Coast Independent Tributaries natural coho forecast is 4,882 OA3 recruits, compared to the 2023 forecast of 13,530.

The 2024 North Coast Independent Tributaries hatchery coho forecast is 8,977 OA3 recruits (8,977 marked), compared to the 2023 forecast of 11,508. 100 percent of smolts released were marked with an adipose fin clip.

3.3 PUGET SOUND COHO STOCKS

Puget Sound coho salmon stocks include natural and hatchery stocks originating from U.S. tributaries in Puget Sound and the Strait of Juan de Fuca. The primary stocks in this group that are most pertinent to ocean salmon fishery management are Strait of Juan de Fuca, Hood Canal, Skagit, Stillaguamish, Snohomish, and South Puget Sound (hatchery) coho. These stocks contribute primarily to ocean fisheries off Washington and B.C.

A variety of preseason abundance estimators are currently employed for Puget Sound coho stocks, primarily based on smolt production and survival (Table I-2). These estimators are used to forecast preseason abundance of adult OA3 recruits. Forecasts for natural Puget Sound coho stocks were generally derived by measured or predicted smolt production from each major watershed or region, multiplied by stock-specific marine survival rate predictions based on a jack return model from the WDFW Big Beef Creek Research Station in Hood Canal, natural coho CWT tagging programs at Baker Lake (Skagit River basin) and South Fork Skykomish River, adult recruits/smolt data generated from the WDFW Deschutes River Research Station, or other information. Puget Sound hatchery forecasts were generally the product of 2021 brood year (BY) smolt releases from each facility, and a predicted marine survival rate for each program. Hatchery marine survival rates were typically based on recent year average survival rates derived from CWT recovery information and/or run reconstructions.

The 2024 total Puget Sound region natural and hatchery coho ocean recruit forecast is 722,134, compared to a 2023 preseason forecast of 742,673. The 2024 natural forecast is 295,282, compared to the 2023 preseason forecast of 291,248. The 2024 hatchery forecast is 426,852, compared to the 2023 preseason forecast of 468,784.

A comparison was made of preseason OA3 forecasts with postseason estimates derived from run reconstructions using BKFRAM. This method expands observed escapements and actual catch to produce a FRAM estimate of post-season ocean abundance. This post-season FRAM estimate is dependent upon Base Period (1986-1992 fishing years) CWT recovery data. It should be noted that forecast methodology has changed over time, and the overall trends and biases may not reflect the current methods.

Puget Sound coho fall within an exception to the ACL requirements of the MSA because they are managed under an international agreement (the PST); therefore, specification of ACLs is not necessary for these stocks.

3.3.1 Strait of Juan de Fuca

Predictor Description

The natural forecast includes both Eastern and Western Strait of Juan de Fuca drainages. JA3 ocean recruits were predicted as the product of the estimated 2023 coho smolt outmigration from all independent tributaries of the Strait of Juan de Fuca, and a predicted marine survival rate (7.15 percent). The marine survival rate was predicted by an r^2-weighted average of two linear regression models using the southern copepod biomass anomaly and the Pacific decadal oscillation index (PDO) from May through September, both during the year of smolt outmigration. The linear relationships that these models solved for have r^2 values of 0.34 and 0.33, respectively.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates. In 2021, the preseason forecast was 30 percent of the postseason estimate (Table III-4). Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Strait of Juan de Fuca natural OA3 abundance forecast is 19,690 compared to the 2023 preseason forecast of 15,625.

The 2024 Strait of Juan de Fuca hatchery OA3 abundance forecast is 22,557, compared to the 2023 preseason forecast of 21,776.

The ocean abundance forecast for Strait of Juan de Fuca natural coho results in classification of the stock abundance as "Moderate" under the 2019 PST Southern Coho Management Plan and “Low” under the FMP. This results in an allowable total exploitation rate of no more than 40 percent under both the Council-adopted exploitation rate matrix (Appendix A, Table A-5) and the 2019 PST Southern Coho Management Plan (Table III-5).

OFL

The OFL is defined in terms of spawner escapement (S_{OFL}). For Strait of Juan de Fuca coho MFMT = 0.60, and the OFL is $S_{OFL} = 19{,}690 \times (1\text{-}0.60) = 7{,}876$. The preseason S_{OFL} value will be recalculated with postseason abundance estimates (when available) to assess OFL compliance.

3.3.2 Nooksack-Samish

Predictor Description

The natural coho forecast is the product of projected natural smolt production from each stream basin in the region, multiplied by stock-specific marine survival rate expectations, ranging from 3.5 to 5.5 percent.

The hatchery forecast is the product of projected smolt releases from hatcheries in the region, multiplied by stock-specific marine survival rate expectations, ranging from 0.9 to 9.0 percent.

Predictor Performance

There was no information available to evaluate performance of predictors for Nooksack-Samish coho stocks.

Stock Forecasts and Status

The 2024 Nooksack-Samish natural OA3 abundance forecast is 35,103, compared to the 2023 preseason forecast of 29,504.

The 2024 Nooksack-Samish hatchery OA3 abundance forecast is 72,320, compared to the 2023 preseason forecast of 66,567

3.3.3 Skagit

Predictor Description

The 2024 Skagit wild coho forecast was based on a prediction of total (Baker wild + Skagit wild) smolt to OA3 survival. Note that this forecast is not based on Baker wild indicator CWT survival. The total survival was calculated assuming that the ratio of total wild terminal run size to Baker wild indicator run size is equal to the ratio of total pre-terminal wild catch to Baker pre-terminal wild catch. Using that ratio, total wild OA3 run size can be calculated utilizing pieces of the Skagit co-manager run reconstruction, RMIS, and RRTERM. Due to the large uncertainty surrounding how ocean conditions would influence the survival of 2023 outmigrants, WDFW's alternative coho forecast for Baker wild indicator survival in the WDFW report '2024 Wild Coho Forecasts for Puget Sound, Washington Coast, and Lower Columbia' relying on GAM methodology was also incorporated into the final agreed forecast (WDFW 2024).

The hatchery forecast is based on the weighted average of beta regression models of PDO_ May – September and SAR Chloro in May, and ONI May and SAR Chloro in May. The 2023 hatchery outmigration/release estimates were 54,262 Baker marked hatchery smolts, 49,895 Marblemount unmarked hatchery smolts, and 468,112 Marblemount marked hatchery smolts. Multiplying each of these by the 4.25 percent survival estimate gives 2024 forecasts of 2,453 OA3 Baker marked hatchery coho, 2,255 OA3 Marblemount unmarked hatchery coho, and 21,159 OA3 Marblemount marked hatchery coho. The total 2024 hatchery forecast is 25,867 OA3 coho.

In addition to the Marblemount/Baker hatchery coho releases, 30,690 hatchery marked but untagged coho were released from the newly reinstated Oak Harbor net pen program. Applying the same 4.52 percent predicted hatchery survival rate to that release results in a 2024 forecast of 1,387 for Oak Harbor net pen coho.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-4; Figure III-1b). In 2021, the preseason forecast was 52 percent of the postseason estimate. Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Skagit natural OA3 abundance forecast is 63,430, compared to the 2023 preseason forecast of 43,146.

The 2024 Skagit hatchery OA3 abundance forecast is 27,254, compared to the 2023 preseason forecast of 21,053.

The ocean abundance forecast for Skagit natural coho results in classification of the stock abundance as "Abundant" under the 2019 PST Southern Coho Management Plan and “Normal” under the FMP. This results in an allowable total exploitation rate of no more than 60 percent under both the Council-adopted exploitation rate matrix (Appendix A, Table A-5) and the 2019 PST Southern Coho Management Plan (Table III-5).

OFL

The OFL is defined in terms of spawner escapement (S_{OFL}). For Skagit River coho, MFMT = 0.60 and the OFL is $S_{OFL} = 63{,}430 \times (1-0.60) = 25{,}372$. The preseason S_{OFL} value will be recalculated with postseason abundance estimates (when available) to assess OFL compliance.

3.3.4 Stillaguamish

Predictor Description

Regressing annual coho smolt trap CPUE (total fish/total hours fished) against terminal run size one year later generates a relationship that could be used to predict Stillaguamish adult returns. However, due to the high variability in marine survival (MS), coho smolt numbers at the trap are not a very precise predictor of adult returns one year later. Therefore, the Stillaguamish smolt trap CPUE was corrected with the SF Skykomish MS estimate for each brood and log transformed the data, which tightened the regression relationship with the terminal run.

The natural coho marine survival rate is estimated at 5.7 percent, based on recent 5-year SF Skykomish marine survival estimates.

The Stillaguamish Hatchery released an estimated 31,149 marked and 242 unmarked yearlings from brood year 2021, with an estimated 896 marked and 7 unmarked adults returning based on current Wallace hatchery marine survival estimate of 2.9 percent.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-4; Figure III-1b). In 2021, the preseason forecast was 63 percent of the postseason estimate. Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Stillaguamish natural OA3 abundance forecast is 30,809, compared to the 2023 preseason forecast of 30,238.

The 2024 Stillaguamish hatchery OA3 abundance is 903, compared to the 2023 preseason forecast of 1,744.

The ocean abundance forecast for Stillaguamish natural coho results in classification of the stock abundance as "Abundant" under the 2019 PST Southern Coho Management Plan and “Normal” under the FMP. This results in an allowable total exploitation rate of no more than 50 percent under both the Council-adopted exploitation rate matrix (Appendix A, Table A-5) and the 2019 PST Southern Coho Management Plan (Table III-5).

OFL

The OFL is defined in terms of spawner escapement (S_{OFL}). For Stillaguamish coho, MFMT = 0.50 and the OFL is S_{OFL}= 30,809× (1-0.50) = 15,405. The preseason S_{OFL} value will be recalculated with postseason abundance estimates (when available) to assess OFL compliance.

3.3.5 Snohomish

Predictor Description

The natural forecast is based on production of 2023 out-migrant smolts estimated from a mark-recapture estimate of smolt abundance from two smolt traps, one operated on the Skykomish River (river mile 26.5) and the second on the Snoqualmie River (river mile 12.2). Smolt trap estimates for the Skykomish and Snoqualmie rivers are summed and further expanded for rearing downstream of the trap locations in the Snohomish River. A marine survival rate of 4.6 percent (modeled using a GAM-M, including NPGO as an environmental variable, WDFW 2024) applied to the total smolt production estimate for the Snohomish watershed of 1,557,000 smolts. The resulting forecast was rounded to the nearest hundred to account for co-manager agreed-to precision.

The hatchery forecast is based on 2023 hatchery releases of smolts from the WDFW Wallace River Hatchery, the Everett Net Pens, Eagle Creek, and Tulalip Bernie Kai Kai Gobin Hatchery and estimated marine survival rates for each release group. 2024 marine survival rates for Tulalip releases, 3.8 percent, were estimated from coded-wire tag recovery rates averaged for brood years 2018 and 2019. For Wallace, Eagle Creek, and Everett net pen releases, marine survival rates were based on the recent three-year average survival rates of Wallace hatchery coho, 3.8%.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-4). In 2021, the preseason forecast was 55 percent of the postseason estimate. Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Snohomish natural OA3 abundance forecast is 71,600, compared to the 2023 preseason forecast of 76,500.

The 2024 Snohomish hatchery OA3 abundance forecast is 34,728, compared to the 2023 preseason forecast of 63,994.

The ocean abundance forecast for Snohomish natural coho results in classification of the stock abundance as "Moderate" under the 2019 PST Southern Coho Management Plan and “Low” under the FMP. This results in an allowable total exploitation rate of no more than 40 percent under both the Council-adopted exploitation rate matrix (Appendix A, Table A-5) and the 2019 PST Southern Coho Management Plan (Table III-5).

OFL

The OFL is defined in terms of spawner escapement (S_{OFL}). For Snohomish coho, MFMT = 0.60 and the OFL is S_{OFL}= 71,600 × (1-0.60) = 28,640. The preseason S_{OFL} value will be recalculated with postseason abundance estimates (when available) to assess OFL compliance.

3.3.6 Hood Canal

Predictor Description

The natural forecast is based on a linear regression model that related the return of tagged natural jack coho at Big Beef Creek to Hood Canal December age-2 recruits in the subsequent run year, using brood years 1983-1998 and 2002-2019. This forecast was then converted to OA3. The 1999-2001 broods were excluded because of the unusually high recruit-per-tagged jack ratio, which is not expected to occur this year. For 2024, as was done since 2016, the co-managers agreed to apply a conservative bias correction for forecasting natural coho in Hood Canal.

The hatchery forecast utilized an average marine survival from CWT-based cohort reconstruction of December age-2 recruits/smolt for the six most recent available broods from each facility, applied to the 2021 brood smolt releases for each facility and converted to OA3.

Predictor Performance

Forecast performance can be assessed, in part, by examining the differences between preseason forecasts and postseason estimates (Table III-4; Figure III-1b). In 2021, the preseason forecast was 63 percent of the postseason estimate. Postseason estimates are not yet available for 2022.

Stock Forecasts and Status

The 2024 Hood Canal natural OA3 abundance forecast is 36,541, compared to the 2023 preseason forecast of 37,888.

The 2024 Hood Canal hatchery OA3 abundance forecast is 67,201, compared to the 2023 preseason forecast of 74,882.

The ocean abundance forecast for Hood Canal natural coho results in classification of the stock abundance as "Moderate" under the 2019 PST Southern Coho Management Plan and "Low" under the FMP. This results in an allowable total exploitation rate of no more than 45 percent under both the Council-adopted exploitation rate matrix (Appendix A, Table A-5) and the 2019 PST Southern Coho Management Plan (Table III-5).

OFL

The OFL is defined in terms of spawner escapement (S_{OFL}). For Hood Canal coho MFMT = 0.65, and the OFL is $S_{OFL} = 36{,}541 \times (1-0.65) = 12{,}789$. The preseason S_{OFL} value will be recalculated with postseason abundance estimates (when available) to assess OFL compliance.

3.3.7 South Sound

Predictor Description

Natural forecasts for the runs of coho that comprise the South Puget Sound natural coho aggregate are based on several forecasting approaches. The Lake Washington natural coho forecast is based on basin-wide 3-year average spawning grounds estimates divided by the recent 5-year average estimated escapement rate (0.5196) on Soos creek origin CWT coho. The Green River natural coho forecast is based on basin-wide 5-year average spawning grounds estimates divided by the recent 5-year average estimated escapement rate (0.5196) on Soos creek origin CWT coho. The East Kitsap natural coho forecast is based on a marine survival rate of 5.4 percent applied to a smolt production estimate of 87,000. The deep South Sound natural stocks' forecasts are based on recent year survival rates and its relationship to ocean indicators. Survival rates are applied to the number of juveniles released or number of juvenile outmigrants for the 2021 brood year to estimate the 2024 adult coho returns for these South Sound populations. Marine survival predictions ranged from 1.2 to 5.6 percent. Deschutes River natural and South Sound natural forecasts were based modeling of North Pacific Gyre Oscillation (NPGO) index May to September of ocean entry in the WDFW report '2024 Wild Coho Forecasts for Puget Sound, Washington Coast, and Lower Columbia' (WDFW 2024).

Stock Forecasts and Status

The 2024 South Sound natural OA3 abundance forecast is 38,109 compared to the 2023 preseason forecast of 58,347.

The 2024 South Sound hatchery OA3 abundance forecast is 201,889, compared to the 2023 preseason forecast of 218,828.

3.4. STOCK STATUS DETERMINATION UPDATES

Queets River natural coho, Strait of Juan de Fuca natural coho, and Snohomish River natural coho were found to meet the criteria for being classified as overfished in the PFMC *Review of 2017 Ocean Salmon Fisheries,* released in February 2018. In 2022, Snohomish natural coho met the criteria for rebuilt status

Based on spawner escapement estimates for 2020-2022, Queets natural coho and Strait of Juan de Fuca natural coho now meet the criteria for rebuilt status as detailed in the PFMC *Review of 2023 Ocean Salmon Fisheries* (PFMC 2024).

3.5. SELECTIVE FISHERY CONSIDERATIONS FOR COHO

As the region has moved forward with mass marking of hatchery coho salmon stocks, selective fishing options have become an important consideration for fishery managers. Projected coho mark rates in Council area fisheries are generally expected to be lower than 2023 projections. Table III-6 summarizes projected 2024 mark rates for coho fisheries by month from Southern British Columbia, Canada to the Oregon Coast, based on preseason abundance forecasts

TABLE III-1. Preliminary preseason and postseason coho stock abundance estimates for Oregon production index area stocks in thousands of fish. (Page 1 of 2)

Year or Average	Preseason	Postseason[a/]	Pre/Post season[a/]	Preseason	Postseason[a/]	Pre/Post season[a/]	Preseason	Postseason[a/]	Pre/Post season[a/]	Preseason	Postseason[a/]	Pre/Post season[a/]
	Columbia River Hatchery Early			Columbia River Hatchery Late			Lower Columbia River Natural (LCN)			Oregon Coast Natural (OCN) (Rivers and Lakes)		
1996-00	212.9	181.4	1.3	128.9	102.5	1.6				62.7	52.8	1.5
2001	1036.5	873.0	1.2	491.8	488.3	1.0				50.1	163.2	0.3
2002	161.6	324.7	0.5	143.5	271.8	0.5				71.8	304.5	0.2
2003	440.0	645.7	0.7	377.9	248.0	1.5				117.9	278.8	0.4
2004	313.6	389.0	0.8	274.7	203.0	1.4				150.9	197.0	0.8
2005	284.6	282.7	1.0	78.0	111.6	0.7				152.0	150.1	1.0
2006	245.8	251.4	1.0	113.8	156.3	0.7				60.8	116.4	0.5
2007	424.9	291.0	1.5	139.5	171.0	0.8	21.5	20.5	1.0	255.4	60.0	4.3
2008	110.3	342.3	0.3	86.4	219.9	0.4	13.4	28.7	0.5	60.0	183.1	0.3
2009	672.7	637.6	1.1	369.7	403.9	0.9	32.7	37.6	0.9	211.6	281.5	0.8
2010	245.3	272.6	0.9	144.2	260.3	0.6	15.1	53.2	0.3	148.0	296.7	0.5
2011	216.0	294.4	0.7	146.5	147.1	1.0	22.7	29.5	0.8	249.4	378.9	0.7
2012	229.8	115.7	2.0	87.4	55.7	1.6	30.1	12.9	2.3	291.0	121.3	2.4
2013	331.6	193.3	1.7	169.5	128.6	1.3	46.5	36.8	1.3	191.0	146.2	1.3
2014	526.6	777.4	0.7	437.5	516.5	0.8	33.4	108.7	0.3	230.6	402.0	0.6
2015	515.2	165.5	3.1	261.9	94.0	2.8	35.9	20.9	1.7	206.6	70.4	2.9
2016	153.7	134.0	1.1	226.9	102.4	2.2	40.0	25.1	1.6	152.7	83.2	1.8
2017	231.7	177.9	1.3	154.6	108.4	1.4	30.1	31.2	1.0	101.9	68.9	1.5
2018	164.7	98.7	1.7	121.5	82.0	1.5	21.9	29.7	0.7	54.9	81.3	0.7
2019	545.0	213.7	2.6	360.6	124.0	2.9	36.9	34.1	1.1	76.1	107.6	0.7
2020	130.7	247.0	0.5	50.3	134.8	0.4	24.8	55.4	0.4	83.0	110.0	0.8
2021	1014.0	580.3	1.7	576.0	249.6	2.3	39.2	70.5	0.6	125.0	273.3	0.5
2022	592.5	431.1	1.4	404.7	253.8	1.6	65.7	74.7	0.9	222.4	200.1	1.1
2023	481.8	365.3	1.3	404.3	143.6	2.8	45.5	77.9	0.6	238.8	185.7	1.3
2024	227.5	-	-	173.6	-	-	87.8	-	-	233.2	-	-

TABLE III-1. Preliminary preseason and postseason coho stock abundance estimates for Oregon production index area stocks in thousands of fish. (Page 2 of 2)

Year or Average	Preseason	Postseason[a/]	Pre/Post season[a/]	Preseason	Postseason[a/]	Pre/Post season[a/]	Preseason	Postseason[a/]	Pre/Post season[a/]	Preseason	Postseason[a/]	Pre/Post season[a/]
	Salmon Trout Enhancement Program (STEP)[c/]			Oregon Coast North of Cape Blanco			California and Oregon Coast South of Cape Blanco			Oregon Production Index (OPI) Area Hatchery Total[b/]		
1996-00	0.6											
2001	1.0	1.4	0.7	127.3	46.9	2.7	52.0	46.0	1.1	1,707.6	1,454.2	1.2
2002	0.6	3.0	0.2	36.6	41.6	0.9	20.0	22.0	0.9	361.7	660.1	0.5
2003	3.6	3.6	1.0	29.3	34.5	0.8	15.9	24.3	0.7	863.1	952.5	0.9
2004	3.1	1.0	3.1	16.6	21.7	0.8	19.0	29.9	0.6	623.9	634.6	1.0
2005	1.0	0.4	2.5	11.5	10.7	1.1	15.8	38.1	0.4	389.9	443.1	0.9
2006	0.6	0.1	6.0	8.6	7.9	1.1	30.6	25.0	1.2	398.8	440.6	0.9
2007	0.2	0.0	-	7.0	1.3	5.4	22.2	13.2	1.7	593.6	476.5	1.2
2008				1.7	6.9	0.2	17.7	2.2	8.2	216.1	571.3	0.4
2009				7.3	6.5	1.1	23.4	3.1	7.6	1,073.1	1,051.0	1.0
2010				4.4	8.6	0.5	14.1	5.0	2.8	408.0	546.5	0.7
2011				3.6	3.6	1.0	9.0	9.0	1.0	375.1	454.2	0.8
2012				6.4	3.1	2.1	18.1	8.6	2.1	341.7	183.1	1.9
2013				5.6	5.7	1.0	18.7	7.6	2.5	525.4	335.1	1.6
2014				4.8	19.3	0.2	14.2	3.4	4.2	983.1	1,316.5	0.7
2015				6.9	5.6	1.2	24.4	3.8	6.5	808.4	268.9	3.0
2016				5.5	9.0	0.6	10.4	2.3	4.5	396.5	247.7	1.6
2017				3.5	1.9	1.9	4.5	3.6	1.2	394.3	291.8	1.4
2018				3.3	1.1	3.0	4.6	1.0	4.7	294.1	182.8	1.6
2019				12.0	2.2	5.5	15.9	0.8	18.8	933.5	340.7	2.7
2020				2.4	4.7	0.5	2.3	1.3	1.7	185.7	387.7	0.5
2021				6.4	5.8	1.1	11.5	5.6	2.0	1,607.9	841.3	1.9
2022				1.9	5.5	0.3	4.4	5.2	0.8	1,003.5	696.0	1.4
2023				3.0	1.4	2.2	7.8	4.0	-	896.9	514.2	1.7
2024				0.6	-	-	1.4	-	-	403.1	-	-

a/ Postseason estimates are based on preliminary data and not all stocks have been updated.
b/ LCN abundance is included as a subset of early/late hatchery abundance beginning in 2007. STEP estimates not included.
c/ Program was discontinued in 2005.

TABLE III-2. Oregon production index (OPI) area coho harvest impacts, spawning, abundance, and exploitation rate estimates in thousands of fish.[a/]

Year or Avg.	Ocean Fisheries[b/]		Oregon and California Coastal Returns			Columbia River Returns	Abundance[e/]	Ocean Exploitation Rate Based on OPI Abundance[f/]
	Troll	Sport	Hatcheries and Freshwater Harvest[c/]	OCN Spawners[d/]	Private Hatcheries			
1970-1975	1,629.6	558.4	45.8	55.2	-	460.4	2,749.3	0.80
1976-1980	1,253.6	555.0	31.2	31.1	26.1	263.3	2,154.2	0.84
1981-1985	451.2	274.0	37.2	56.0	176.8	305.3	1,328.6	0.55
1986-1990	574.6	339.3	55.1	45.5	154.3	705.0	1,602.2	0.57
1991-1995	107.4	182.7	46.6	53.2	35.1	315.1	668.4	0.43
1996	7.0	31.8	45.8	87.5	-	117.1	260.3	0.15
1997	5.5	22.4	27.9	31.6	-	156.4	230.5	0.12
1998	3.5	12.8	31.2	34.9	-	175.9	270.8	0.06
1999	3.6	36.5	23.4	48.6	-	289.1	432.0	0.09
2000	25.2	74.6	37.0	84.8	-	558.3	762.4	0.13
2001	38.1	216.8	75.7	174.7	-	1128.3	1,673.2	0.15
2002	15.0	118.7	53.9	266.9	-	535.8	972.2	0.14
2003	28.8	252.4	44.9	236.2	-	713.2	1,266.9	0.22
2004	26.2	159.3	38.1	198.5	-	463.5	904.5	0.21
2005	10.5	58.2	42.7	165.1	-	354.7	629.9	0.11
2006	4.5	47.5	29.5	133.1	-	409.7	674.1	0.08
2007	26.2	128.5	10.9	71.6	-	349.0	631.3	0.25
2008	0.6	26.4	16.0	180.2	-	520.8	769.8	0.04
2009	27.7	201.2	16.5	265.5	-	760.2	1,341.3	0.17
2010	5.8	48.8	18.5	287.7	-	474.0	848.4	0.06
2011	4.2	54.7	20.0	361.3	-	382.4	836.4	0.07
2012	4.7	45.5	18.5	104.9	-	159.1	311.3	0.16
2013	8.4	48.3	26.5	136.8	-	260.4	494.1	0.11
2014	35.6	197.4	42.0	362.4	-	1045.3	1,724.8	0.14
2015	11.7	84.4	11.8	61.6	-	173.7	350.5	0.27
2016	2.8	31.7	11.4	83.5	-	210.8	340.3	0.10
2017	2.1	50.0	3.9	66.2	-	245.5	362.4	0.14
2018	1.5	53.8	3.1	83.8	-	132.6	265.8	0.21
2019	5.0	135.4	4.2	97.8	-	223.0	454.3	0.31
2020	2.3	40.2	7.4	111.8	-	344.7	499.7	0.08
2021	5.0	158.6	20.4	251.1	-	668.4	1,126.9	0.15
2022	8.5	127.4	16.9	177.9	-	539.7	905.2	0.15
2023[g/]	5.3	97.3	15.5	155.1	-	419.5	707.7	0.14

a/ The OPI area includes ocean and inside harvest impacts and escapement to streams and lakes south of Leadbetter Pt., Washington.

b/ Includes estimated non-retention mortalities; troll: release mort.(1982-present) and drop-off mort.(all yrs.); sport: release mort.(1994-present) and drop-off mort.(all yrs.).

c/ Includes STEP smolt releases through the 2007 return year, after which the program was terminated.

d/ Includes Rogue River.

e/ FRAM post-season runs used after 1985 and includes OPI origin stock catches in all fisheries.

f/ Private hatchery stocks are excluded in calculating the OPI area stock aggregate ocean exploitation rate index.

g/ Preliminary.

TABLE III-3. Preseason forecasts and postseason estimates of ocean abundance for selected Washington coastal adult natural coho stocks in thousands of fish. (Page 1 of 2)

Year or Ave.	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season
		Quillayute River Fall			**Hoh River**			**Queets River**	
1991-1995	15.4	16.2	1.07	7.1	8.5	1.32	11.9	14.0	1.2
1996	13.0	20.3	0.64	4.2	7.7	0.54	8.3	22.6	0.37
1997	8.9	5.8	1.53	2.8	4.1	0.68	4.3	2.2	1.92
1998	8.0	17.4	0.46	3.4	5.6	0.61	4.2	6.3	0.66
1999	14.5	16.1	0.90	3.2	6.8	0.47	4.3	8.6	0.50
2000	8.7	16.5	0.53	3.5	9.3	0.38	2.7	12.1	0.22
2001	23.0	28.4	0.81	8.5	16.2	0.52	12.0	35.8	0.33
2002	22.3	33.2	0.67	8.5	13.2	0.64	12.5	26.3	0.47
2003	24.9	22.5	1.11	12.5	8.7	1.44	24.0	15.7	1.52
2004	21.2	20.7	1.02	8.1	6.9	1.17	18.5	13.3	1.39
2005	18.6	20.9	0.89	7.6	8.2	0.93	17.1	11.9	1.43
2006	14.6	9.9	1.48	6.4	2.7	2.36	8.3	9.2	0.90
2007	10.8	10.7	1.01	5.4	5.8	0.93	13.6	7.1	1.92
2008	10.5	11.1	0.95	4.3	4.3	1.00	10.2	7.4	1.39
2009	19.3	15.5	1.24	9.5	9.5	1.00	31.4	16.0	1.97
2010	22.0	17.1	1.29	7.6	11.4	0.67	21.8	19.9	1.09
2011	28.2	13.3	2.11	11.6	13.0	0.89	13.3	15.1	0.88
2012	33.5	12.8	2.61	14.3	8.1	1.77	37.2	9.1	4.08
2013	17.2	15.8	1.09	8.6	9.2	0.94	24.5	9.9	2.48
2014	18.4	17.3	1.07	8.9	9.1	0.97	10.3	12.8	0.80
2015	10.5	4.8	2.19	5.1	2.9	1.74	7.5	2.7	2.75
2016	4.5	11.7	0.38	2.1	5.4	0.39	3.5	6.5	0.54
2017	15.8	12.9	1.22	6.2	6.0	1.03	6.5	6.8	0.96
2018	10.6	8.7	1.22	5.8	3.7	1.56	7.0	3.4	2.04
2019	14.8	10.9	1.36	7.0	5.2	1.36	11.2	3.9	2.84
2020	9.2	9.1	1.01	4.2	5.4	0.77	7.8	5.1	1.53
2021	7.5	10.4	0.73	3.0	7.8	0.39	3.9	5.0	0.78
2022	12.5	-	-	4.7	-	-	18.2	-	-
2023	13.5	-	-	6.5	-	-	12.4	-	-
2024	10.2	-	-	4.9	-	-	12.8	-	-

TABLE III-3. Preseason forecasts and postseason estimates of age-3 ocean abundance for selected Washington coastal adult natural coho stocks in thousands of fish.[a/] (Page 2 of 2)

Year or Ave.	Preseason Forecast	Postseason Return	Pre/Post-season	Preseason Forecast	Postseason Return	Pre/Post-season
		Grays Harbor			Willapa Bay	
1991-1995	122.8	68.0	2.2			
1996	121.4	89.7	1.4			
1997	26.1	20.2	1.3			
1998	30.1	46.4	0.6			
1999	57.7	42.7	1.4			
2000	47.8	51.9	0.9			
2001	51.3	103.2	0.5			
2002	55.4	142.0	0.4		Data not available until 2010	
2003	58.0	108.4	0.5			
2004	117.9	90.8	1.3			
2005	91.1	65.9	1.4			
2006	67.3	30.6	2.2			
2007	59.4	34.6	1.7			
2008	42.7	49.0	0.9			
2009	59.2	104.6	0.6			
2010	67.9	117.4	0.6	20.4	101.1	0.20
2011	89.1	86.2	1.0	47.8	61.6	0.78
2012	150.2	103.9	1.4	81.3	40.6	2.00
2013	196.8	80.3	2.4	58.6	36.7	1.60
2014	108.8	152.9	0.7	58.9	95.6	0.62
2015	142.6	31.7	4.5	42.9	18.6	2.30
2016	35.7	35.3	1.0	39.5	40.5	0.98
2017	50.0	37.3	1.3	36.7	14.3	2.56
2018	42.5	60.8	0.7	20.7	17.0	1.21
2019	71.8	51.0	1.4	63.4	19.4	3.27
2020	50.0	31.6	1.6	17.9	18.5	0.96
2021	44.8	77.4	0.6	19.0	29.8	0.64
2022	120.4	-	-	35.8	-	-
2023	102.8	-	-	42.7	-	-
2024	74.9	-	-	29.5	-	-

a/ Coho FRAM was used to estimate post-season ocean abundance.
b/ In 1993 and 1994 preseason forecasts were a range of 144-153 and 53.8-60.2 respectively. The midpoint of each range was used in calculating the 1991-1995 average.

TABLE III-4. Preseason forecasts and postseason estimates of ocean abundance for selected Puget Sound adult natural coho stocks in thousands of fish[a/]. (Page 1 of 2)

Year or Ave.	Preseason Forecast[b/]	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason
		Skagit River			**Stillaguamish River**			**Hood Canal**	
1991-1995	NA	82.0	-	53.6	18.1	3.74	94.2	14.2	6.63
1996	NA	48.3	-	51.6	12.5	4.13	25.1	37.2	0.67
1997	70.9	63.1	1.12	36.0	14.1	2.56	78.4	101.8	0.77
1998	55.0	95.1	0.58	47.8	31.1	1.54	108.0	118.5	0.91
1999	75.7	40.9	1.85	35.7	7.5	4.77	65.1	17.6	3.70
2000	30.2	95.2	0.32	17.7	31.2	0.57	61.0	39.7	1.54
2001	87.2	132.5	0.66	24.4	81.8	0.30	62.0	110.0	0.56
2002	98.5	71.8	1.37	19.7	30.4	0.65	34.9	81.0	0.43
2003	116.6	114.1	1.02	37.8	49.8	0.76	33.4	199.9	0.17
2004	155.8	145.3	1.07	38.0	73.9	0.51	98.7	219.7	0.45
2005	61.8	52.4	1.18	56.7	29.1	1.95	98.4	68.3	1.44
2006	106.6	11.5	9.25	45.0	11.8	3.81	59.4	49.7	1.20
2007	26.8	83.0	0.32	69.2	45.2	1.53	42.4	78.6	0.54
2008	61.4	35.5	1.73	31.0	15.3	2.03	30.4	25.8	1.18
2009	33.4	87.5	0.38	13.4	27.4	0.49	48.6	45.7	1.06
2010	95.9	64.6	1.48	25.9	16.8	1.55	33.2	14.5	2.29
2011	138.1	78.1	1.77	66.6	61.3	1.09	74.7	56.8	1.31
2012	48.3	139.1	0.35	47.5	60.6	0.78	73.4	125.5	0.58
2013	137.2	150.7	0.91	33.1	78.1	0.42	36.8	37.9	0.97
2014	112.4	51.7	2.17	32.5	49.1	0.66	82.8	69.6	1.19
2015	121.4	15.5	7.82	31.3	5.6	5.59	61.5	63.7	0.96
2016	8.9	44.7	0.20	2.8	15.6	0.18	35.3	31.8	1.11
2017	11.2	22.3	0.50	7.6	6.9	1.10	115.6	35.0	3.31
2018	59.4	36.9	1.61	19.0	30.9	0.62	59.9	18.7	3.20
2019	58.2	27.5	2.12	23.9	16.2	1.48	40.4	14.7	2.76
2020	31.0	41.5	0.75	19.5	24.7	0.79	35.0	23.6	1.48
2021	58.4	112.0	0.52	26.8	42.7	0.63	28.8	45.7	0.63
2022	80.4	-	-	24.9	-	-	20.2	-	-
2023	43.1	-	-	30.2	-	-	37.9	-	-
2024	63.4	-	-	30.8	-	-	36.5	-	-

TABLE III-4. Preseason and postseason estimates of ocean abundance for selected Puget Sound adult natural coho stocks in thousands of fish[a/]. (Page 2 of 2)

Year or Ave.	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason
		Snohomish			**Strait of Juan de Fuca**	
1991-1995	341.6	200.6	1.85	20.6	19.3	1.22
1996	338.1	132.3	2.55	10.7	19.4	0.55
1997	186.6	106.4	1.75	6.5	20.3	0.32
1998	165.3	193.9	0.85	16.8	21.0	0.80
1999	141.6	82.2	1.72	14.7	9.9	1.48
2000	53.0	154.6	0.34	13.5	28.6	0.47
2001	129.6	360.1	0.36	21.4	43.9	0.49
2002	123.1	185.5	0.66	21.3	26.3	0.81
2003	203.0	198.0	1.03	25.6	22.9	1.12
2004	192.1	287.9	0.67	35.7	23.8	1.50
2005	241.6	133.4	1.81	20.7	12.5	1.66
2006	139.5	94.2	1.48	26.1	4.6	5.65
2007	98.9	156.4	0.63	29.9	10.2	2.92
2008	92.0	49.5	1.86	24.1	3.9	6.25
2009	67.0	133.4	0.50	20.5	24.7	0.83
2010	99.4	54.4	1.83	8.5	20.1	0.42
2011	180.0	137.4	1.31	12.3	11.7	1.05
2012	109.0	175.8	0.62	12.6	12.5	1.01
2013	163.8	176.0	0.93	12.6	9.8	1.29
2014	150.0	66.6	2.25	12.5	13.8	0.91
2015	151.5	28.3	5.35	11.1	4.7	2.36
2016	20.6	54.1	0.38	4.4	8.7	0.51
2017	107.3	23.2	4.63	13.1	5.9	2.24
2018	66.3	77.6	0.85	7.2	5.9	1.21
2019	62.9	48.7	1.29	8.8	5.3	1.68
2020	39.0	47.7	0.82	7.5	9.2	0.82
2021	60.0	109.9	0.55	6.7	22.5	0.30
2022	64.2	-	-	7.3	-	-
2023	76.5	-	-	15.6	-	-
2024	71.6	-	-	19.7	-	-

a/ Coho FRAM was used to estimate post season ocean abundance.

b/ Preseason forecasts in 1986-1996 were based on accounting system that signficantly underestimated escapement and are not comparable to post season.

TABLE III-5. Status categories and constraints for Puget Sound and Washington Coast coho under the FMP and PST Southern Coho Management Plan.

FMP

FMP Stock	Total Exploitation Rate Constraint[a/]	Categorical Status[a/]
Skagit	60%	Normal
Stillaguamish	50%	Normal
Snohomish	40%	Low
Hood Canal	45%	Low
Strait of Juan de Fuca	40%	Low
Quillayute Fall	59%	
Hoh	65%	
Queets	65%	
Grays Harbor	65%	

PST Southern Coho Management Plan

U.S. Management Unit	Total Exploitation Rate Constraint[b/]	Categorical Status[c/]
Skagit	60%	Abundant
Stillaguamish	50%	Abundant
Snohomish	40%	Moderate
Hood Canal	45%	Moderate
Strait of Juan de Fuca	40%	Moderate
Quillayute Fall[c/]	39%	Moderate
Hoh[c/]	59%	Abundant
Queets[c/]	55%	Abundant
Grays Harbor[c/d/]	57%	Abundant

a/ Preliminary. For Puget Sound stocks, the exploitation rate constraints and categorical status (Normal, Low , Critical) reflect application of Comprehensive Coho Agreement rules, as adopted in the FMP. For Washington Coast stocks, exploitation rate constraints represent MFMT. Note that under *U.S. v. Washington* and *Hoh v. Baldrige* case law , the management objectives can differ from FMP objectives provided there is an annual agreement among the state and tribal comanagers; therefore, the exploitation rates used to report categorical status do not necessarily represent maximum allow able rates for these stocks.

b/ Preliminary. For Puget Sound and Washington Coast management units, the exploitation rate constraints reflect application of the 2019 PST Southern Coho Management Plan.

c/ Categories (Abundant, Moderate, Low) correspond to the general exploitation rate ranges depicted in paragraph 8(b)(iii) of the 2019 PST Southern Coho Management Plan. For Washington Coast stocks, categorical status is determined by the exploitation rate associated w ith meeting the escapement goal (or the low er end of the escapement goal range). As Washington Coast stocks are managed to achieve agreed escapment goals, this exploitation rate also becomes an approximation of the maximum allow able rate unless the stock is in the "Low " status. In that case, an ER of up to 20% is allow ed.

d/ Based on projected natural area spaw ners (w ild plus hatchery strays) and MSP escapement goal of 35,400. Exploitation rate constraint subject to change should comanagers agree to a modified escapement goal under *U.S. v. Washington* and *Hoh v. Baldrige* case law .

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TABLE III-6. Projected coho mark rates for 2024 U.S. forecasts under base period fishing patterns (percent marked).

Area	Fishery	June	July	August	Sept
Canada					
Johnstone Strait	Recreational	--	27%	22%	--
West Coast Vancouver Island	Recreational	44%	43%	41%	42%
North Georgia Strait	Recreational	43%	44%	43%	38%
South Georgia Strait	Recreational	46%	49%	44%	45%
Juan de Fuca Strait	Recreational	44%	44%	45%	43%
Johnstone Strait	Troll	50%	40%	33%	37%
NW Vancouver Island	Troll	47%	42%	43%	43%
SW Vancouver Island	Troll	53%	48%	48%	49%
Georgia Strait	Troll	52%	50%	51%	46%
Puget Sound					
Strait of Juan de Fuca (Area 5)	Recreational	49%	47%	47%	46%
Strait of Juan de Fuca (Area 6)	Recreational	46%	46%	48%	43%
San Juan Island (Area 7)	Recreational	52%	53%	47%	34%
North Puget Sound (Areas 6 & 7A)	Net	--	48%	49%	38%
Council Area					
Neah Bay (Area 4/4B)	Recreational	44%	50%	48%	53%
LaPush (Area 3)	Recreational	44%	51%	54%	51%
Westport (Area 2)	Recreational	56%	56%	54%	52%
Columbia River (Area 1)	Recreational	57%	59%	54%	55%
Tillamook	Recreational	51%	47%	40%	28%
New port	Recreational	46%	41%	38%	26%
Coos Bay	Recreational	32%	30%	20%	10%
Brookings	Recreational	27%	17%	15%	3%
Neah Bay (Area 4/4B)	Troll	51%	50%	49%	48%
LaPush (Area 3)	Troll	50%	51%	48%	47%
Westport (Area 2)	Troll	49%	53%	54%	56%
Columbia River (Area 1)	Troll	57%	57%	55%	46%
Tillamook	Troll	51%	48%	45%	45%
New port	Troll	46%	43%	37%	35%
Coos Bay	Troll	32%	29%	24%	14%
Brookings	Troll	23%	24%	27%	47%
Columbia River					
Buoy 10	Recreational	--	--	--	54%

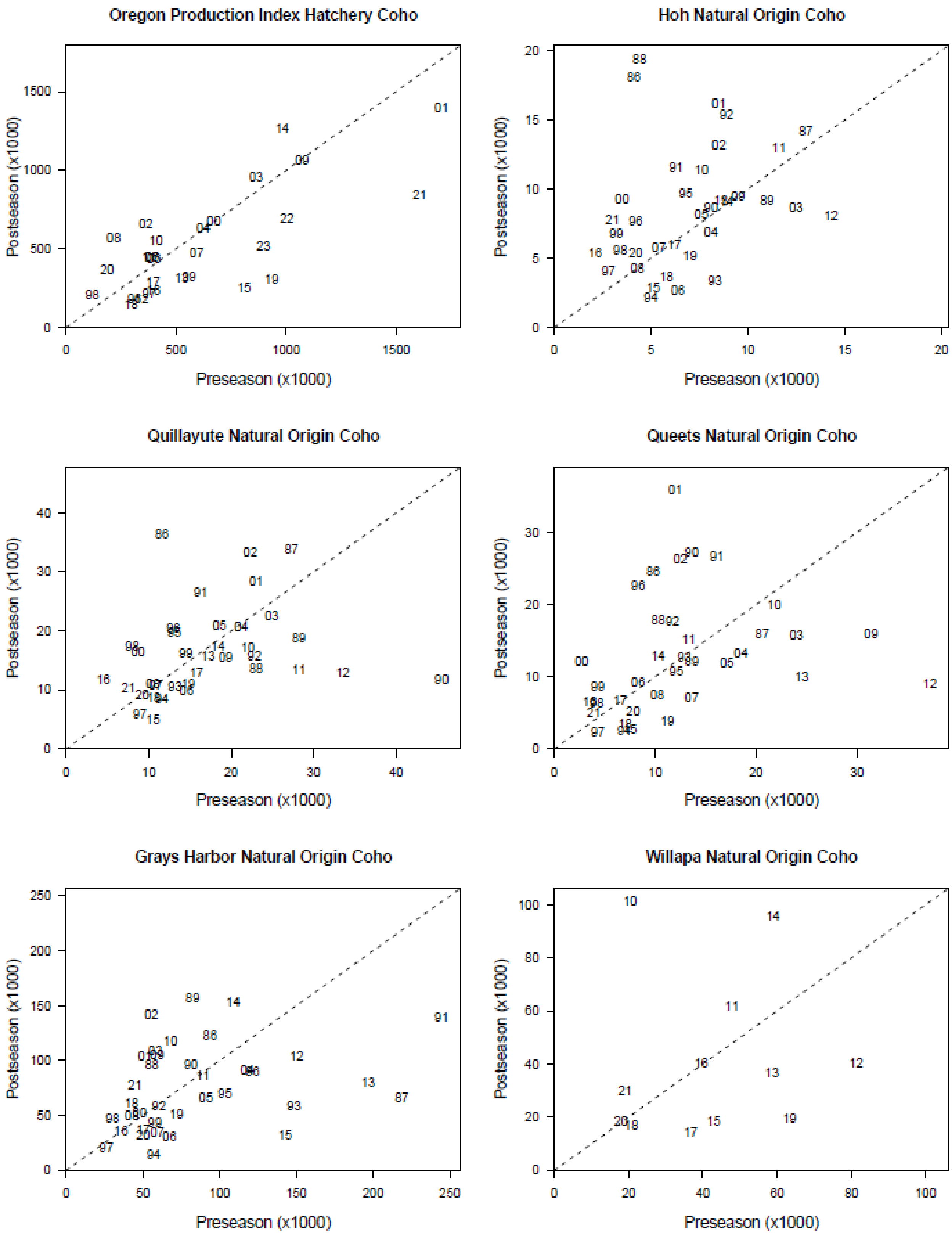

FIGURE III-1a. Selected preseason vs. postseason forecasts for coho stocks with substantial contribution to Council area fisheries.

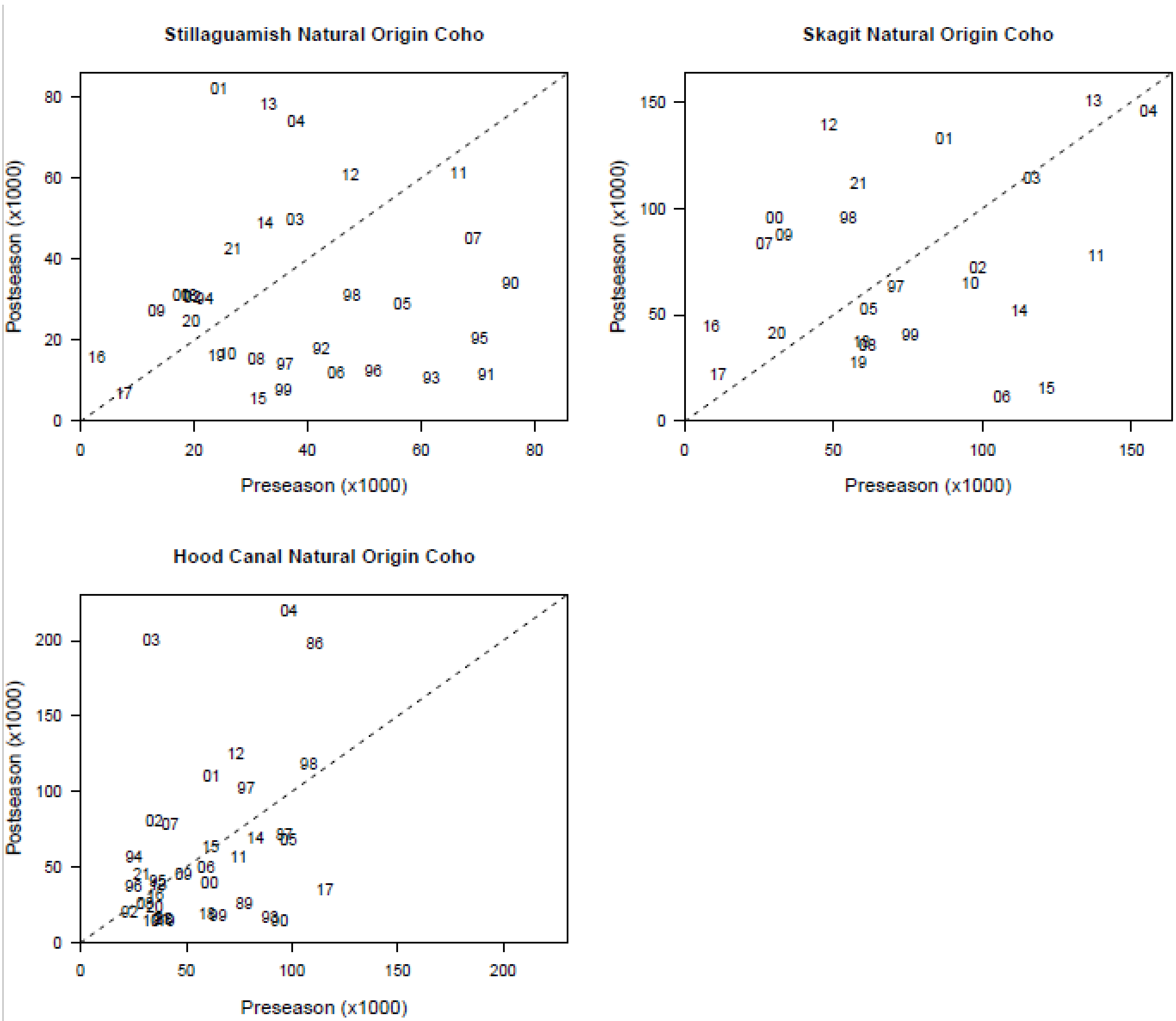

FIGURE III-1b. Selected preseason vs. postseason forecasts for coho stocks with substantial contribution to Council area fisheries.

CHAPTER IV: AFFECTED ENVIRONMENT - PINK SALMON ASSESSMENT

Two major runs comprise the pink salmon population available to Council fisheries during odd-numbered years: the Puget Sound run, and the Fraser River (British Columbia) run, the latter is the more abundant of the two. The 2021 pink salmon run size forecasts were 2,925,681 for the Puget Sound and 3,009,000 for the Fraser River. The actual 2021 run size was 8,105,000 in the Fraser River and 3,771,032 in Puget Sound (Table IV-1).

The 2023 pink salmon run size forecasts were 3,950,917 for the Puget Sound and 6,140,000 for the Fraser River. See Table IV-1 for details. The final accounted 2023 run size for the Fraser River was estimated at 10,510,000, and the actual run size for Puget Sound is not available.

TABLE IV-1. Estimated annual (odd-numbered years) run sizes and forecasts for Fraser River and Puget Sound pink salmon in millions of fish.

	Puget Sound		Fraser River[a/]	
Year	Forecast	Actual	Forecast	Actual
1977	NA	0.88	NA	8.21
1979	NA	1.32	NA	14.40
1981	NA	0.50	NA	18.69
1983	NA	1.01	NA	15.35
1985	NA	1.76	NA	19.04
1987	NA	1.57	NA	7.17
1989	NA	1.93	NA	16.48
1991	NA	1.09	NA	22.18
1993	NA	1.06	NA	16.98
1995	3.4	2.08	NA	12.90
1997	NA	0.44	11.40	8.18
1999	NA	0.96	NA	3.61
2001	2.92	3.56	5.47	21.26
2003	2.32	2.90	17.30	24.25
2005	1.98	1.23	16.32	9.87
2007	3.34	2.45	19.60	8.49
2009	5.16	9.84	17.54	19.94
2011	5.98	5.27	17.50	20.65
2013	6.27	8.75	8.93	15.90
2015	6.76	3.70	14.50	5.87
2017	1.15	0.51	8.69	3.56
2019	0.61	2.94	5.02	8.86
2021	2.93	3.77	3.01	8.11
2023[b/]	3.95	NA	6.14	10.51

a/ Total run size.

b/ Preliminary forecasts

CHAPTER V: DESCRIPTION AND ANALYSIS OF THE NO-ACTION ALTERNATIVE

The No-Action Alternative consists of the preseason management measures adopted by the Council and approved by the Secretary of Commerce for the 2023 ocean salmon season between the U.S./Canada border and the U.S./Mexico border. The management measures relate to three fishery sectors: non-Indian commercial (Table V-1), recreational (Table V-2), and treaty Indian (Table V-3). A description of the 2023 preseason management measures and analyses of their projected effects on the biological and socioeconomic environment are presented in Preseason Report III (PFMC 2023c). A description of the 2023 management measures as implemented, including inseason modifications, and an analysis of their effects on the environment, including a historical perspective, is presented in the SAFE document - Review of 2023 Ocean Salmon Fisheries (PFMC 2024).

5.1 ANALYSIS OF EFFECTS ON THE ENVIRONMENT OF THE NO-ACTION ALTERNATIVE

5.1.1 Overview

Table V-4 provides a summary, where possible, of Salmon FMP stock spawning escapement and exploitation rate projections for 2024 under the No-Action Alternative (2023 regulations), as well as postseason estimates of these quantities for earlier years, which are compared to FMP conservation objectives. For some stocks, postseason estimates of these metrics were either incomplete or unavailable when the Review of 2023 Ocean Salmon Fisheries (PFMC 2024) was published. A preliminary determination of stock status under the FMP Status Determination Criteria (SDC) was available for some of these stocks in time for this report; however, some estimates remain unavailable. The STT will report to the Council on the status of stocks at the March 2024 Council meeting and may further update the status of stocks present in Table V-4 at that time.

Chinook escapements and fishery impacts were forecast using the Sacramento Harvest Model, the Winter Run Harvest Model, and the Klamath Ocean Harvest Model for SRFC, SRWC, and KRFC, respectively. Assessment of effects under the No-Action Alternative for Oregon Coast Chinook are not available. Columbia River Chinook stock assessments were based on qualitative assessment of the magnitude of forecasts, if available, in relation to escapement goals.

Initial analyses of the No-Action Alternative (2023 regulations) using the Coho FRAM indicated that it is biologically infeasible to support last year's catches/seasons given the much lower 2024 ocean abundance forecasts for several stocks. In other words, target quotas exceed the abundance of fish available to some time-area fisheries, yielding extremely low or near-zero escapements for a number of stocks when using Coho FRAM in a traditional No-Action Alternative analysis. Based on these findings, it was determined that conservation objectives would not be met for several coho stocks in 2024 under the No-Action Alternative.

5.1.2 Sacramento River Fall Chinook

A repeat of 2023 regulations would be expected to result in an escapement of 213,469 hatchery and natural area SRFC adults. This projection is greater than the minimum escapement level specified by the control rule for 2024, which is S_{MSY} (122,000), and greater than the 2024 preseason S_{ACL} (64,082); Tables V-4 and V-5). The geometric mean of the 2022 and 2023 spawning escapement estimates and the 2024 forecast spawning escapement under the No-Action Alternative is greater than the MSST but below S_{MSY} (Table V-4). The predicted SRFC exploitation rate under the No-Action Alternative is 0.1 percent, which is below the MFMT (78.0 percent; Table V-4) and the maximum allowable rate specified by the control rule for 2024 (42.9 percent). If the ocean fisheries were closed from January through August 2024 between Cape

Falcon and the U.S./Mexico border, and Sacramento Basin fisheries were closed in 2024, the expected number of hatchery and natural area adult spawners would be 213,469.

The 2023 estimate of SRFC escapement was 133,638 hatchery and natural area adults, which is greater than the 2023 postseason S_{ACL} of 41,846 and the S_{OFL} of 30,687 (Table V-5).

5.1.3 Sacramento River Winter Chinook

A repeat of 2023 regulations would be expected to result in an age-3 impact rate of 0.0 percent for the area south of Point Arena, California. The 2024 forecast age-3 impact rate under the No-Action Alternative is lower than the 2024 maximum allowable rate of 12.3 percent.

5.1.4 Klamath River Fall Chinook

A repeat of 2023 regulations, which included a river recreational harvest allocation of 98.2 percent of the non-tribal harvest and a tribal allocation of 50 percent of the overall adult harvest, would be expected to result in 42,932 natural area adult spawners. This projection is greater than the minimum escapement level specified by the control rule for 2024 (34,229), S_{MSY} (40,700), and the 2024 preseason S_{ACL} (14,605; Tables V-4 and V-5). The geometric mean of the 2022 and 2023 natural area adult spawner escapement estimates and the 2024 forecast spawning escapement under the No-Action Alternative is greater than the MSST but lower than S_{MSY} (Table V-4). The predicted KRFC exploitation rate under the No-Action Alternative is 5.9 percent, which is lower than the MFMT (71.0 percent; Table V-4) and the maximum allowable rate specified by the control rule for 2024 (25.0 percent). If the ocean fisheries were closed from January through August 2024 between Cape Falcon and Point Sur, and the Klamath Basin fisheries (tribal and recreational) were closed in 2024, the expected number of natural area adult spawners would be 45,620.

The 2023 estimate of KRFC escapement was 41,623 natural area adults, which exceeds the 2023 postseason S_{ACL} (Table V-5).

5.1.5 California Coastal Chinook Stocks

The NMFS ESA consultation standard restricts the KRFC age-4 ocean harvest rate to no more than 16.0 percent to limit impacts on these stocks. The postseason estimate of this rate for 2023 is 0.1 percent. Applying 2023 regulations to the 2024 KRFC abundance results in an age-4 ocean harvest rate forecast of 0.1 percent. If the ocean fisheries were closed from January through August 2024 between Cape Falcon and Point Sur, the expected age-4 ocean harvest rate would be 0.1 percent (21 age-4 KRFC were harvested during the September through November 2023 period).

5.1.6 Oregon Coast Chinook Stocks

The FMP conservation objective for the northern and central Oregon coast Chinook stock complexes is based on a total goal of 150,000 to 200,000 natural adult spawners. For these two stock complexes, attainment of goals is assessed using peak spawner counts observed in standard index reaches for the respective complexes. For the southern Oregon coast Chinook stock complex, the FMP conservation objective is assessed using the escapement estimate at Huntley Park on the Rogue River. Forecasts are not available for all these stocks, but given recent trends, the escapement goals may not be met for all stocks in 2024 under 2023 fishing seasons.

5.1.7 Columbia River Chinook Stocks

The 2024 forecasts for Columbia River spring Chinook originating from both below and above Bonneville dam are less than the 2023 forecasts. The 2024 forecasts for LRW, LRH, and MCB fall Chinook are greater than their 2023 forecasts, whereas the 2024 forecasts for URB, SCH, and summer Chinook are less than their 2023 forecasts. The 2024 aggregate forecast for fall Chinook (547,800) is nearly identical to the 2023 aggregate forecast (547,400). Given these differences in the stock-specific forecasts for 2024 relative to 2023, applying 2023 regulations to the forecasted 2024 abundance of Columbia River Chinook may not result in ocean escapements meeting spawning escapement goals for all summer and fall Chinook stocks (Table V-4)

5.1.8 Washington Coast and Puget Sound Chinook Stocks

Council fisheries north of Cape Falcon have a negligible impact on Washington coast Chinook stocks and a minor impact on stocks that originate in Puget Sound. These stocks have northerly marine distribution patterns and are therefore impacted primarily by Canadian and Alaskan fisheries. Thus, an evaluation of 2023 Council area management measures on projected 2024 abundance would not provide a useful comparison of fishery impacts in relation to conservation objectives.

5.1.9 Oregon Production Index Area Coho Stocks

As stated above, analysis of the No-Action Alternative on coho stocks for 2024 using the Coho FRAM was not possible using 2024 coho abundance forecasts. The lower coho abundance forecasts for 2024 would not support the coho harvest predicted under the 2023 fishery regulations. Qualitative analysis indicates that FMP spawning escapement and exploitation rate conservation objectives, in addition to PST Coho Agreement objectives, may not be met for some coho stocks in 2024 under the No-Action Alternative.

5.1.10 Washington Coast, Puget Sound, and Canadian Coho Stocks

As stated above, analysis of the No-Action Alternative on coho stocks for 2024 using the Coho FRAM was not possible using 2024 coho abundance forecasts. The lower coho abundance forecasts for 2024 would not support the coho harvest predicted under the 2023 fishery regulations. Qualitative analysis indicates that FMP spawning escapement and exploitation rate conservation objectives, in addition to PST Coho Agreement objectives, may not be met for some coho stocks in 2024 under the No-Action Alternative.

5.1.11 Summary

The effects of projected impacts (where available) under 2023 fishery regulations and 2024 abundance forecasts are as follows:

- The projected SRFC exploitation rate under the No Action Alternative is lower than the maximum level specified by the control rule for 2024.
- SRFC are not at risk of approaching an overfished condition.
- For SRWC, the predicted age-3 impact rate is lower than the maximum allowable rate specified by the control rule.
- The projected KRFC exploitation rate under the No Action Alternative is lower than the maximum level specified by the control rule.
- KRFC are not at risk of approaching an overfished condition.
- Although Coho FRAM analysis of 2023 fishery regulations was not possible due to lower abundance forecasts in 2024, allowable exploitation rate limits are likely to be exceeded and spawning escapement objectives are unlikely to be met for at least some natural and hatchery coho stocks under the No-Action Alternative.

5.1.12 Conclusion

The No-Action Alternative would not meet the Purpose and Need for the proposed action because:

- Lower coho abundance forecasts in 2024 relative to 2023 could not support the fishery regulations of 2023, likely resulting in some coho stocks the exceed their exploitation rate limits or do not achieve their spawning escapement objectives.

The No-Action Alternative does not reflect consideration of changes in the status of salmon stocks from the previous year; therefore, over- or under- harvest of some salmon stocks would occur if this alternative were implemented. The analysis of the No-Action Alternative does, however, provide perspective that is useful in the planning process for 2024 ocean salmon fishery management measures. An understanding of stock shortfalls and surpluses under the No-Action Alternative helps managers, advisors, and constituents construct viable alternatives to the status-quo management measures.

TABLE V-I. 2023 Commercial troll management measures for non-Indian ocean salmon fisheries - Council adopted.

A. SEASON DESCRIPTIONS

North of Cape Falcon

Supplemental Management Information

1. Overall non-Indian TAC: 78,000 Chinook and 190,000 coho marked with a healed adipose fin clip (marked).
2. Non-Indian commercial troll TAC: 39,000 Chinook and 30,400 marked coho.
3. For fisheries scheduled prior to May 16, 2023: See 2022 management measures, which are subject to inseason action and the 2023 season description described below.

Model run: Coho-2317, Chinook-2023

U.S./Canada Border to Cape Falcon

- May 1-15. See 2022 management measures, which are subject to inseason action and the 2023 season described below.

- May 16 through the earlier of June 29, or 26,000 Chinook. No more than 6,890 of which may be caught in the area between the U.S./Canada border and the Queets River, and no more than 6,040 of which may be caught in the area between Leadbetter Pt. and Cape Falcon (C.8).

  - May 16 – June 21; open seven days per week (C.1); then
  - June 22 – June 29.

In the area between the U.S./Canada border and the Queets River the landing and possession limit is 70 Chinook per vessel per landing week (Thurs.-Wed.) and June 22-29. Landing limits will be evaluated weekly, inseason (C.1, C.6).

In the area between the Queets River and Leadbetter Pt. the landing and possession limit is 150 Chinook per vessel per landing week (Thurs.-Wed.) and June 22-29. Landing limits will be evaluated weekly, inseason (C.1, C.6).

In the area between Leadbetter Pt. and Cape Falcon the landing and possession limit is 60 Chinook per vessel per landing week (Thurs.-Wed.) and June 22-29. Landing limits will be evaluated weekly inseason (C.1, C.6).

All salmon, except coho (C.4, C.7). Chinook minimum size limit of 27 inches total length (B). See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3).

When it is estimated that approximately 50% of the overall Chinook quota or any Chinook subarea guideline has been landed, inseason action may be considered to ensure the quota and subarea guidelines are not exceeded.

If the Chinook quota is exceeded, the excess will be deducted from the all-salmon season (C.5).

In 2024, the season will open May 1 consistent with all preseason regulations in place in this area and subareas during May 16-June 30, 2023, including subarea salmon guidelines and quotas and weekly vessel limits except as described below for vessels fishing or in possession of salmon north of Leadbetter Point. This opening could be modified following Council review at its March and/or April 2024 meetings.

U.S./Canada Border to Cape Falcon

- July 1 through the earlier of September 30, or 13,000 Chinook or 30,400 marked coho (C.8).

Open seven days per week. All salmon. Chinook minimum size limit of 27 inches total length. Coho minimum size limit of 16 inches total length (B, C.1). All coho must be marked with a healed adipose fin clip (C.8.d). No chum retention north of Cape Alava, Washington in August and September (C.4, C.7). See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3).

Landing and possession limit of 150 marked coho per vessel per landing week (Thurs.-Wed.). Landing limits will be evaluated weekly inseason (C.1).

When it is estimated that approximately 50% of the overall Chinook quota has been landed, inseason action may be considered to ensure the quota is not exceeded.

An impact neutral, non-selective coho fishery may be considered through inseason management action later in the season.

TABLE V-1. 2023 Commercial troll management measures for non-tribal ocean salmon fisheries – Council adopted. (Page 2 of 6)

A. SEASON DESCRIPTIONS

North of Cape Falcon

For all commercial troll fisheries north of Cape Falcon:

Mandatory closed areas include Salmon Troll Yelloweye Rockfish Conservation Area, Cape Flattery, and Columbia Control Zones.

Vessels must land and deliver their salmon within 24 hours of any closure of this fishery.

Vessels may not land fish east of the Sekiu River or east of Tongue Point, Oregon.

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. For delivery to Washington ports south of Leadbetter Point, vessels must notify the Washington Department of Fish and Wildlife at 360-249-1215 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** (C.11).

Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver all species of fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land all species of fish in Garibaldi, Oregon. All Chinook caught north of Cape Falcon and being delivered by boat to Garibaldi must meet the minimum legal total length of 28 inches for Chinook for south of Cape Falcon seasons unless the season in waters off Garibaldi have been closed for Chinook retention for more than 48 hours (C.1.).

Under state law, vessels must report their catch on a state fish receiving ticket. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon to notify ODFW within one hour of delivery or prior to transport away from the port of landing by either calling 541-857-2546 or sending notification via e-mail to nfalcon.trollreport@odfw.oregon.gov. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8).

Vessels in possession of salmon north of the Queets River may not cross the Queets River line without first notifying WDFW at 360-249-1215 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 at 360-249-1215 with area fished, total Chinook, coho and halibut catch aboard, and destination (C.11). Inseason actions may modify harvest guidelines in later fisheries to achieve or prevent exceeding the overall allowable troll harvest impacts (C.8).

A. SEASON DESCRIPTIONS

South of Cape Falcon

Supplemental Management Information

1. Sacramento River fall Chinook spawning escapement of 164,964 hatchery and natural area adults.
2. Sacramento Index exploitation rate of 2.8 %.
3. Klamath River recreational fishery allocation: 1,804 adult Klamath River fall Chinook.
4. Klamath tribal allocation: 1,872 adult Klamath River fall Chinook.
5. CA/OR share of Klamath River fall Chinook commercial ocean harvest: NA.
6. Overall commercial troll coho TAC: 10,000.

Cape Falcon to Humbug Mt.

- September 1-October 31 (C.9.a).

Open seven days per week. All salmon, through the earlier of September 30 or reaching the 10,000 non-mark selective coho quota; all salmon except coho thereafter (C.4, C.7). Coho minimum size limit of 16 inches total length, and Chinook minimum size limit of 28 inches total length (B, C.1). All vessels fishing in the area must land their salmon in the State of Oregon. See gear restrictions and definitions (C.2, C.3). Beginning October 1, open shoreward of the 40-fathom regulatory line (C.5.f).

No more than 75 Chinook allowed per vessel per landing week (Thurs.-Wed.) (C.8.f).

Coho quota of 10,000 non-mark selective. No more than 75 coho allowed per vessel per landing week (Thurs.-Wed.). Vessel limits may be modified inseason (C.8.f).

Any remainder of the mark-selective coho quota from Cape Falcon to Humbug Mt. recreational fishery may be transferred inseason to the Cape Falcon to Humbug Mt. troll fishery on an impact neutral basis. Recreational fishery needs will be prioritized for this transfer (C.8.h).

In 2024, the season will open March 15 for all salmon except coho. Chinook minimum size limit of 28 inches total length. Gear restrictions same as in 2023. This opening could be modified following Council review at its March 2024 meeting.

TABLE V-1. 2023 Commercial troll management measures for non-tribal ocean salmon fisheries – Council adopted. (Page 3 of 6)

Humbug Mt. to OR/CA Border (Oregon KMZ)
- Closed.

In 2024, the season will open March 15 for all salmon except coho. Chinook minimum size limit of 28 inches total length. Gear restrictions same as in 2023. This opening could be modified following Council review at its March 2024 meeting.

OR/CA Border to Humboldt South Jetty (California KMZ)
- Closed.

In 2024, the season will open May 1 through the earlier of May 31, or a 3,000 Chinook quota. Chinook minimum size limit of 27 inches total length. Landing and possession limit of 20 Chinook per vessel per day (C.8.f). Open five days per week (Fri.-Tue.). All salmon except coho (C.4, C.7). Any remaining portion of Chinook quotas may be transferred inseason on an impact neutral basis to the next open quota period (C.8.b). All fish caught in this area must be landed within the area, within 24 hours of any closure of the fishery (C.6), and prior to fishing outside the area (C.10). See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3). Klamath Control Zone closed (C.5.e). See California State regulations for an additional closure adjacent to the Smith River. This opening could be modified following Council review at its March or April 2024 meetings.

Humboldt South Jetty to Latitude 40°10' N
- Closed.

When the fishery is closed between the OR/CA border and Humbug Mountain and open to the south, vessels with fish on board caught in the open area off California may seek temporary mooring in Brookings, Oregon prior to landing in California only if such vessels first notify the Chetco River Coast Guard Station via VHF channel 22A between the hours of 0500 and 2200 and provide the vessel name, number of fish on board, and estimated time of arrival (C.6).

Latitude 40°10' N. to Point Arena (Fort Bragg)
- Closed.

In 2024, the season will open April 16 for all salmon except coho (C.4, C.7). Chinook minimum size limit of 27 inches total length (B); See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3). All salmon must be landed in California and north of Point Arena (C.6, C.11). Landing and possession limits may be considered inseason (C.8.g). This opening could be modified following Council review at its March 2024 meeting.

Pt. Arena to Pigeon Pt. (San Francisco)
- Closed.

In 2024, the season will open May 1 for all salmon except coho (C.4, C.7). Chinook minimum size limit of 27 inches total length (B, C.1); See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3). Landing and possession limits may be considered inseason (C.8.g). This opening could be modified following Council review at its March or April 2024 meeting.

Point Reyes to Point San Pedro (Fall Area Target Zone)
- Closed.

Pigeon Point to U.S./Mexico Border (Monterey)
- Closed.

In 2024, the season will open May 1 for all salmon except coho (C.4, C.7). Chinook minimum size limit of 27 inches total length (B). See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3). Landing and possession limits may be considered inseason (C.8.g). This opening could be modified following Council review at its March or April 2024 meeting.

California State regulations require all salmon be made available to a CDFW representative for sampling immediately at port of landing. Any person in possession of a salmon with a missing adipose fin, upon request by an authorized agent or employee of the CDFW, shall immediately relinquish the head of the salmon to the State (California Fish and Game Code §8226).

B. MINIMUM SIZE (Inches) (See C.1)

	Chinook		Coho		
Area (when open)	Total Length	Head-off	Total Length	Head-off	Pink
North of Cape Falcon	27	20.5	16	12	None
Cape Falcon to Humbug Mt.	28	21.5	16	12	None
Humbug Mt. to OR/CA Border	28	21.5	-	-	None
OR/CA Border to Humboldt South Jetty	-	-	-	-	-
Latitude 40°10' N. to Pt. Arena	-	-	-	-	-
Pt. Arena to Pigeon Pt.	-	-	-	-	-
Pigeon Pt. to U.S./Mexico Border (Alt. 3)	-	-	-	-	-

TABLE V-1. 2023 Commercial troll management measures for non-tribal ocean salmon fisheries – **Council adopted**. (Page 4 of 6)

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Compliance with Minimum Size or Other Special Restrictions: All salmon on board a vessel must meet the minimum size, landing/possession limit, or other special requirements for the area being fished and the area in which they are landed if the area is open or has been closed less than 48 hours for that species of salmon. Salmon may be landed in an area that has been closed for a species of salmon more than 48 hours only if they meet the minimum size, landing/possession limit, or other special requirements for the area in which they were caught. Salmon may not be filleted prior to landing.

Any person who is required to report a salmon landing by applicable state law must include on the state landing receipt for that landing both the number and weight of salmon landed by species. States may require fish landing/receiving tickets be kept on board the vessel for 90 days or more after landing to account for all previous salmon landings.

C.2. Gear Restrictions:

a. Salmon may be taken only by hook and line using single point, single shank, barbless hooks.
b. Cape Falcon, Oregon, to the OR/CA border: No more than 4 spreads are allowed per line.
c. OR/CA border to U.S./Mexico border: No more than 6 lines are allowed per vessel, and barbless circle hooks are required when fishing with bait by any means other than trolling.

C.3. Gear Definitions:

Trolling defined: Fishing from a boat or floating device that is making way by means of a source of power, other than drifting by means of the prevailing water current or weather conditions.
Troll fishing gear defined: One or more lines that drag hooks behind a moving fishing vessel engaged in trolling. In that portion of the fishery management area off Oregon and Washington, the line or lines must be affixed to the vessel and must not be intentionally disengaged from the vessel at any time during the fishing operation.
Spread defined: A single leader connected to an individual lure and/or bait.
Circle hook defined: A hook with a generally circular shape and a point which turns inward, pointing directly to the shank at a 90º angle.

C.4. Vessel Operation in Closed Areas with Salmon on Board:

a. Except as provided under C.4.b below, it is unlawful for a vessel to have troll or recreational gear in the water while in any area closed to fishing for a certain species of salmon while possessing that species of salmon; however, fishing for species other than salmon is not prohibited if the area is open for such species, and no salmon are in possession.
b. When Genetic Stock Identification (GSI) samples will be collected in an area closed to commercial salmon fishing, the scientific research permit holder shall notify NOAA OLE, USCG, CDFW, WDFW, ODFW, and OSP at least 24 hours prior to sampling and provide the following information: the vessel name, date, location, and time collection activities will be done. Any vessel collecting GSI samples in a closed area shall not possess any salmon other than those from which GSI samples are being collected. Salmon caught for collection of GSI samples must be immediately released in good condition after collection of samples.

C.5. Control Zone Definitions:

a. *Cape Flattery Control Zone* - The area from Cape Flattery (48º23'00" N. lat.) to the northern boundary of the U.S. EEZ; and the area from Cape Flattery south to Cape Alava (48º10'00" N. lat.) and east of 125º05'00" W. long.
b. *Salmon Troll Yelloweye Rockfish Conservation Area* – The area in Washington Marine Catch Area 3 from 48°00.00' N. lat.; 125°14.00' W. long. to 48°02.00' N. lat.; 125°14.00' W. long. to 48°02.00' N. lat.; 125°16.50' W. long. to 48°00.00' N. lat.; 125°16.50' W. long. and connecting back to 48°00.00' N. lat.; 125°14.00' W. long.
c. *Grays Harbor Control Zone* - The area defined by a line drawn from the Westport Lighthouse (46° 53'18" N. lat., 124° 07'01" W. long.) to Buoy #2 (46° 52'42" N. lat., 124°12'42" W. long.) to Buoy #3 (46° 55'00" N. lat., 124°14'48" W. long.) to the Grays Harbor north jetty (46° 55'36" N. lat., 124°10'51" W. long.).
d. *Columbia Control Zone* - An area at the Columbia River mouth, bounded on the west by a line running northeast/southwest between the red lighted Buoy #4 (46°13'35" N. lat., 124°06'50" W. long.) and the green lighted Buoy #7 (46°15'09' N. lat., 124°06'16" W. long.); on the east, by the Buoy #10 line which bears north/south at 357° true from the south jetty at 46°14'00" N. lat.,124°03'07" W. long. to its intersection with the north jetty; on the north, by a line running northeast/southwest between the green lighted Buoy #7 to the tip of the north jetty (46°15'48" N. lat., 124°05'20" W. long.), and then along the north jetty to the point of intersection with the Buoy #10 line; and, on the south, by a line running northeast/southwest between the red lighted Buoy #4 and tip of the south jetty (46°14'03" N. lat., 124°04'05" W. long.), and then along the south jetty to the point of intersection with the Buoy #10 line.

e. *Klamath Control Zone* - The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately 6 nautical miles north of the Klamath River mouth); on the west by 124°23'00" W. long. (approximately 12 nautical miles off shore); and on the south by 41°26'48" N. lat. (approximately 6 nautical miles south of the Klamath River mouth

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

f. Waypoints for the 40 fathom regulatory line from Cape Falcon to Humbug Mt. (50 CFR 660.71 (o) (12)-(62), when in place.

45°46.00′ N. lat., 124°04.49′ W. long.;
45°44.34′ N. lat., 124°05.09′ W. long.;
45°40.64′ N. lat., 124°04.90′ W. long.;
45°33.00′ N. lat., 124°04.46′ W. long.;
45°32.27′ N. lat., 124°04.74′ W. long.;
45°29.26′ N. lat., 124°04.22′ W. long.;
45°20.25′ N. lat., 124°04.67′ W. long.;
45°19.99′ N. lat., 124°04.62′ W. long.;
45°17.50′ N. lat., 124°04.91′ W. long.;
45°11.29′ N. lat., 124°05.20′ W. long.;
45°05.80′ N. lat., 124°05.40′ W. long.;
45°05.08′ N. lat., 124°05.93′ W. long.;
45°03.83′ N. lat., 124°06.47′ W. long.;
45°01.70′ N. lat., 124°06.53′ W. long.;
44°58.75′ N. lat., 124°07.14′ W. long.;
44°51.28′ N. lat., 124°10.21′ W. long.;
44°49.49′ N. lat., 124°10.90′ W. long.;
44°44.96′ N. lat., 124°14.39′ W. long.;
44°43.44′ N. lat., 124°14.78′ W. long.;
44°42.26′ N. lat., 124°13.81′ W. long.;
44°41.68′ N. lat., 124°15.38′ W. long.;
44°34.87′ N. lat., 124°15.80′ W. long.;
44°33.74′ N. lat., 124°14.44′ W. long.;
44°27.66′ N. lat., 124°16.99′ W. long.;
44°19.13′ N. lat., 124°19.22′ W. long.;
44°15.35′ N. lat., 124°17.38′ W. long.;
44°14.38′ N. lat., 124°17.78′ W. long.;
44°12.80′ N. lat., 124°17.18′ W. long.;
44°09.23′ N. lat., 124°15.96′ W. long.;
44°08.38′ N. lat., 124°16.79′ W. long.;
44°08.30′ N. lat., 124°16.75′ W. long.;
44°01.18′ N. lat., 124°15.42′ W. long.;
43°51.61′ N. lat., 124°14.68′ W. long.;
43°42.66′ N. lat., 124°15.46′ W. long.;
43°40.49′ N. lat., 124°15.74′ W. long.;
43°38.77′ N. lat., 124°15.64′ W. long.;
43°34.52′ N. lat., 124°16.73′ W. long.;
43°28.82′ N. lat., 124°19.52′ W. long.;
43°23.91′ N. lat., 124°24.28′ W. long.;
43°20.83′ N. lat., 124°26.63′ W. long.;
43°17.96′ N. lat., 124°28.81′ W. long.;
43°16.75′ N. lat., 124°28.42′ W. long.;
43°13.97′ N. lat., 124°31.99′ W. long.;
43°13.72′ N. lat., 124°33.25′ W. long.;
43°12.26′ N. lat., 124°34.16′ W. long.;
43°10.96′ N. lat., 124°32.33′ W. long.;
43°05.65′ N. lat., 124°31.52′ W. long.;
42°59.66′ N. lat., 124°32.58′ W. long.;
42°54.97′ N. lat., 124°36.99′ W. long.;
42°53.81′ N. lat., 124°38.57′ W. long.;
42°50.00′ N. lat., 124°39.68′ W. long.;
42°49.13′ N. lat., 124°39.70′ W. long.;
42°46.47′ N. lat., 124°38.89′ W. long.;
42°45.74′ N. lat., 124°38.86′ W. long.;
42°44.79′ N. lat., 124°37.96′ W. long.;
42°45.01′ N. lat., 124°36.39′ W. long.;
42°44.14′ N. lat., 124°35.17′ W. long.;
42°42.14′ N. lat., 124°32.82′ W. long.;
42°40.50′ N. lat., 124°31.98′ W. long.

C.6. Notification When Unsafe Conditions Prevent Compliance with Regulations: If prevented by unsafe weather conditions or mechanical problems from meeting special management area landing restrictions, vessels must notify the U.S. Coast Guard and receive acknowledgment of such notification prior to leaving the area. This notification shall include the name of the vessel, port where delivery will be made, approximate number of salmon (by species) on board, the estimated time of arrival, and the specific reason the vessel is not able to meet special management area landing restrictions.

In addition to contacting the U.S. Coast Guard, vessels fishing south of the Oregon/California border must notify CDFW within one hour of leaving the management area by calling 800-889-8346 and providing the same information as reported to the U.S. Coast Guard. All salmon must be offloaded within 24 hours of reaching port.

C.7. Incidental Pacific Halibut Harvest: Permit applications for incidental harvest for Pacific halibut during commercial salmon fishing must be obtained from NMFS.

a. Pacific halibut retained must be no less than 32 inches in total length (with head on).

b. During the salmon troll season, incidental harvest is authorized only during April, May, and June, and after June 30 if quota remains and if announced on the NMFS hotline (phone: 800-662-9825 or 206-526-6667). WDFW, ODFW, and CDFW will monitor landings. If the landings are projected to exceed the preseason allocation for this fishery or the total Area 2A non-Indian commercial halibut allocation, NMFS will take inseason action to prohibit retention of halibut in the non-Indian salmon troll fishery. See the most current Pacific Halibut Catch Sharing Plan for more details.

c. Incidental Pacific halibut catch regulations in the commercial salmon troll fishery adopted for 2023, prior to any 2023 inseason action, will be in effect when incidental Pacific halibut retention opens on April 1, 2023 unless otherwise modified by inseason action at the March 2023 Council meeting.

Beginning May 16, 2023, through the end of the 2023 salmon troll fishery, and beginning April 1, 2024, until modified through inseason action or superseded by the 2024 management measures license holders may land or possess no more than one Pacific halibut per two Chinook, except one Pacific halibut may be possessed or landed without meeting the ratio requirement, and no more than 35 halibut may be possessed or landed per trip.

d. "C-shaped" yelloweye rockfish conservation area is an area to be voluntarily avoided for salmon trolling.
NMFS and the Council request salmon trollers voluntarily avoid this area in order to protect yelloweye rockfish. The area is defined in the Pacific Council Halibut Catch Sharing Plan in the North Coast subarea (Washington marine area 3), with the following coordinates in the order listed:

48°18' N. lat.; 125°18' W. long.;
48°18' N. lat.; 124°59' W. long.;
48°11' N. lat.; 124°59' W. long.;
48°11' N. lat.; 125°11' W. long.;
48°04' N. lat.; 125°11' W. long.;
48°04' N. lat.; 124°59' W. long.;
48°00' N. lat.; 124°59' W. long.;
48°00' N. lat.; 125°18' W. long.;
and connecting back to 48°18' N. lat.; 125°18' W. long.

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.8. Inseason Management: In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Chinook remaining from the May through June non-Indian commercial troll harvest guideline north of Cape Falcon may be transferred to the July through September harvest guideline if the transfer would not result in exceeding preseason impact expectations on any stocks.
b. Chinook remaining from May, June, and/or July non-Indian commercial troll quotas in the Oregon or California KMZ may be transferred to the Chinook quota for the next open period if the transfer would not result in exceeding preseason impact expectations on any stocks.
c. NMFS may transfer salmon between the recreational and commercial fisheries north of Cape Falcon if there is agreement among the areas' representatives on the Salmon Advisory Subpanel (SAS), and if the transfer would not result in exceeding preseason impact expectations on any stocks.
d. The Council will consider inseason recommendations for special regulations for any experimental fisheries annually in March; proposals must meet Council protocol and be received in November the year prior.
e. If retention of unmarked coho (adipose fin intact) is permitted by inseason action, the allowable coho quota will be adjusted to ensure preseason projected impacts on all stocks is not exceeded.
f. Landing limits may be modified inseason to sustain season length and keep harvest within overall quotas.
g. Landing limits in California may be implemented and/or modified inseason to sustain season length and keep harvest within preseason expectations.
h. Deviations from the allocation of allowable ocean harvest of coho salmon in the area south of Cape Falcon may be allowed to meet consultation standards for ESA-listed stocks (FMP 5.3.2). Therefore, should any rollovers result in a deviation from the south of Cape Falcon coho allocation schedule between sectors would still fall underneath this exemption.

C.9. State Waters Fisheries: Consistent with Council management objectives:

a. The State of Oregon may establish additional late-season fisheries in state waters.
b. The State of California may establish limited fisheries in selected state waters.
c. Check state regulations for details.

C.10. For the purposes of California Fish and Game Code, Section 8232.5, the definition of the Klamath Management Zone (KMZ) for the ocean salmon season shall be that area from Humbug Mountain, Oregon, to the Southern KMZ Boundary.

C.11. Latitudes for geographical reference of major landmarks along the west coast. Majority of information from source: 2022 West Coast federal salmon regulations.
https://www.federalregister.gov/documents/2022/05/16/2022-10430/fisheries-off-west-coast-states-west-coast-salmon-fisheries-2022-specifications-and-management

Cape Flattery, WA	48°23′00″ N lat.	Humboldt South Jetty, CA	40°45′53″ N lat.
Cape Alava, WA	48°10′00″ N lat.	40°10′ line (near Cape Mendocino, CA)	40°10′00″ N lat
Queets River, WA	47°31′42″ N lat.	Horse Mountain, CA	40°05′00″ N lat.
Leadbetter Point, WA	46°38′10″ N lat.	Point Arena, CA	38°57′30″ N lat.
Cape Falcon, OR	45°46′00″ N lat.	Point Reyes, CA	37°59′44″ N lat.
South end Heceta Bank line, OR	43°58′00″ N lat.	Point San Pedro, CA	37°35′40″ N lat.
Humbug Mountain, OR	42°40′30″ N lat.	Pigeon Point, CA	37°11′00″ N lat.
Oregon-California border	42°00′00″ N lat.	Point Sur, CA	36°18′00″ N lat.
		Point Conception, CA	34°27′00″ N lat.

TABLE V-2. 2023 Recreational management measures for non-Indian ocean salmon fisheries - Council adopted. (Page 1 of 5)

A. SEASON DESCRIPTIONS

North of Cape Falcon

Supplemental Management Information

1. Overall non-Indian TAC: 78,000 Chinook and 190,000 coho marked with a healed adipose fin clip (marked).
2. Recreational TAC: 39,000 Chinook and 159,600 marked coho; all retained coho must be marked.
3. Buoy 10 fishery opens August 1 with an expected landed catch of 40,000 marked coho in August and September

U.S./Canada Border to Cape Alava (Neah Bay Subarea)

- June 17 through earlier of September 30, or 16,600 marked coho subarea quota, with a subarea guideline of 8,710 Chinook (C.5).

Open seven days per week. All salmon, except no chum beginning August 1; two salmon per day, of which only one may be a Chinook. All coho must be marked with a healed adipose fin clip. See minimum size limits (B). See gear restrictions and definitions (C.1, C.2, C.3).

An impact neutral non-selective coho fishery may be considered through inseason management action later in the season.

Beginning August 1, no Chinook retention east of the Bonilla-Tatoosh line (C.4.a) during Council managed ocean fishery. Inseason management may be used to sustain season length and keep harvest within the overall Chinook and coho recreational TACs for north of Cape Falcon (C.5).

Cape Alava to Queets River (La Push Subarea)

- June 17 through earlier of September 30, or 4,150 marked coho subarea quota, with a subarea guideline of 1,440 Chinook (C.5).

Open seven days per week. All salmon, except no chum beginning August 1; two salmon per day, of which only one may be a Chinook. All coho must be marked with a healed adipose fin clip. See minimum size limits (B). See gear restrictions and definitions (C.1, C.2, C.3).

Inseason management may be used to sustain season length and keep harvest within the overall Chinook and coho recreational TACs for north of Cape Falcon (C.5).

An impact neutral non-selective coho fishery may be considered through inseason management action later in the season.

- October 3 through earlier of October 7, or 150 Chinook quota (C.5) in the area north of 47°50'00" N. lat. and south of 48°00'00" N. lat.

Chinook only, one Chinook per day. See minimum size limits (B). See gear restrictions and definitions (C.1, C.2, C.3).

Fishery may be closed if extreme freshwater temperature and/or flow events occur in the Quillayute basin in September.

Queets River to Leadbetter Point (Westport Subarea)

- June 24 through earlier of September 30, or 59,050 marked coho subarea quota, with a subarea guideline of 17,210 Chinook (C.5).

Open seven days per week. All salmon, two salmon per day, of which only one may be a Chinook. All coho must be marked with a healed adipose fin clip. See gear restrictions and definitions (C.1, C.2, C.3). Chinook minimum size limit of 22 inches total length (B).

An impact neutral non-selective coho fishery may be considered through inseason management action later in the season.

Inseason management may be used to sustain season length and keep harvest within the overall Chinook and coho recreational TACs for north of Cape Falcon (C.5).

Leadbetter Point to Cape Falcon (Columbia River Subarea)

- June 24 through earlier of September 30, or 79,800 marked coho subarea quota, with a subarea guideline of 11,490 Chinook (C.5).

Open seven days per week. All salmon, two salmon per day, of which only one may be a Chinook. All coho must be marked with a healed adipose fin clip. See gear restrictions and definitions (C.1, C.2, C.3). Chinook minimum size limit of 22 inches total length (B).

An impact neutral non-selective coho fishery may be considered through inseason management action later in the season.

Columbia Control Zone closed (C.4.c). Inseason management may be used to sustain season length and keep harvest within the overall Chinook and coho recreational TACs for north of Cape Falcon (C.5).

TABLE V-2. 2023 Recreational management measures for non-tribal ocean salmon fisheries – Council adopted. (Page 2 of 5)

South of Cape Falcon

Supplemental Management Information

1. Sacramento River fall Chinook spawning escapement of 164,964 hatchery and natural area adults.
2. Sacramento Index exploitation rate of 2.8 %.
3. Klamath River recreational fishery allocation: 1,804 adult Klamath River fall Chinook.
4. Klamath tribal allocation: 1,872 adult Klamath River fall Chinook.
5. Overall recreational coho TAC: 110,000 coho marked with a healed adipose fin clip (marked), and 25,000 coho in the non-mark-selective coho fishery.
6. Fisheries may need to be adjusted to meet NMFS ESA consultation standards, FMP requirements, other management objectives, or upon receipt of new allocation recommendations from the CFGC.

A. SEASON DESCRIPTIONS

South of Cape Falcon

Cape Falcon to OR/CA Border

Mark-selective coho fishery:

- June 17 through the earlier of August 31, or 110,000 marked coho quota (C.6).

Open seven days per week. All salmon except Chinook, two salmon per day. All retained coho must be marked with a healed adipose fin clip (C.1). See minimum size limits (B). See gear restrictions and definitions (C.2, C.3).

Any remainder of the mark-selective coho quota may be transferred inseason on an impact neutral basis to the recreational and/or commercial troll quotas for the non-selective coho fishery from Cape Falcon to Humbug Mountain. Recreational needs will be prioritized for this transfer (C.5).

Cape Falcon to Humbug Mt.

- September 1-October 31 (C.6).

Open seven days per week. All salmon except coho, except as described in the non-mark-selective coho fishery (C.5), one fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Beginning October 1, open only shoreward of the 40-fathom regulatory line (C.5.g).

In 2024, the season will open March 15 for all salmon except coho, two salmon per day (C.1). Chinook minimum size limit of 24 inches total length (B); and the same gear restrictions as in 2023 (C.2, C.3). This opening could be modified following Council review at its March 2024 meeting.

Cape Falcon to Humbug Mt.

Non-mark-selective coho fishery:

- September 1 through the earlier of September 30, or 25,000 non-mark-selective coho quota (C.6). Open days may be modified inseason.

Open seven days per week. All salmon, two salmon per day only one of which may be a Chinook (C.1). See minimum size limits (B). See gear restrictions and definitions (C.2, C.3).

For Recreational Fisheries from Cape Falcon to Humbug Mt.: Fishing in the Stonewall Bank yelloweye rockfish conservation area restricted to trolling only on days the all depth recreational halibut fishery is open (call the halibut fishing hotline 1-800-662-9825 for specific dates) (C.3.b, C.4.d).

TABLE V-2. 2023 Recreational management measures for non-tribal ocean salmon fisheries – Council adopted. (Page 3 of 5)
A. SEASON DESCRIPTIONS
OR/CA Border to latitude 40°10’ N. (California KMZ) • Closed. In 2024, season opens May 1 for all salmon except coho, two salmon per day (C.1). Chinook minimum size limit of 20 inches total length (B); See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3). Bag limits may be modified in season. This opening could be modified following Council review at its March or April 2024 meeting.
Latitude 40°10’ N. to Point Arena (Fort Bragg) • Closed. In 2024, season opens April 6 for all salmon except coho, two salmon per day (C.1). Chinook minimum size limit of 20 inches total length (B); See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3). Bag limits may be modified in season. This opening could be modified following Council review at its March or April 2024 meeting.
Point Arena to Pigeon Point (San Francisco) • Closed. In 2024, season opens April 6 for all salmon except coho, two salmon per day (C.1). Chinook minimum size limit of 24 inches total length (B); See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3). Bag limits may be modified in season. This opening could be modified following Council review at its March 2024 meeting.
Pigeon Point to U.S./Mexico Border (Monterey) • Closed. In 2024, season opens April 6 for all salmon except coho, two salmon per day (C.1). Chinook minimum size limit of 24 inches total length (B); See compliance requirements (C.1) and gear restrictions and definitions (C.2, C.3). Bag limits may be modified in season. This opening could be modified following Council review at its March 2024 meeting
California State regulations require all salmon be made available to a CDFW representative for sampling immediately at port of landing. Any person in possession of a salmon with a missing adipose fin, upon request by an authorized agent or employee of the CDFW, shall immediately relinquish the head of the salmon to the State (California Code of Regulations Title 14 Section 1.73).

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Compliance with Minimum Size and Other Special Restrictions: All salmon on board a vessel must meet the minimum size or other special requirements for the area being fished and the area in which they are landed if that area is open. Salmon may be landed in an area that is closed only if they meet the minimum size or other special requirements for the area in which they were caught. Salmon may not be filleted, or salmon heads removed prior to landing.
Ocean Boat Limits: Off the coast of Washington, Oregon, and California, each fisher aboard a vessel may continue to use angling gear until the combined daily limits of Chinook and coho salmon for all licensed and juvenile anglers aboard have been attained (additional state restrictions may apply).

C.2. Gear Restrictions: Salmon may be taken only by hook and line using barbless hooks. All persons fishing for salmon, and all persons fishing from a boat with salmon on board must meet the gear restrictions listed below for specific areas or seasons.

a. *U.S./Canada Border to Pt. Conception, California*: No more than one rod may be used per angler; and no more than two single point, single shank, barbless hooks are required for all fishing gear.

b. *Latitude 40°10’ N. to Pt. Conception, California:* Single point, single shank, barbless circle hooks (see gear definitions below) are required when fishing with bait by any means other than trolling, and no more than two such hooks shall be used. When angling with two hooks, the distance between the hooks must not exceed five inches when measured from the top of the eye of the top hook to the inner base of the curve of the lower hook, and both hooks must be permanently tied in place (hard tied). Circle hooks are not required when artificial lures are used without bait.

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

C.3. Gear Definitions:

a. *Recreational fishing gear defined*: Off Oregon and Washington, angling tackle consists of a single line that must be attached to a rod and reel held by hand or closely attended; the rod and reel must be held by hand while playing a hooked fish. No person may use more than one rod and line while fishing off Oregon or Washington. Off California, the line must be attached to a rod and reel held by hand or closely attended; weights directly attached to a line may not exceed four pounds (1.8 kg). While fishing off California north of Pt. Conception, no person fishing for salmon, and no person fishing from a boat with salmon on board, may use more than one rod and line. Fishing includes any activity which can reasonably be expected to result in the catching, taking, or harvesting of fish.

b. *Trolling defined*: Angling from a boat or floating device that is making way by means of a source of power, other than drifting by means of the prevailing water current or weather conditions.

c. *Circle hook defined*: A hook with a generally circular shape and a point which turns inward, pointing directly to the shank at a 90° angle.

C.4. Control Zone Definitions:

a. *The Bonilla-Tatoosh Line*: A line running from the western end of Cape Flattery to Tatoosh Island Lighthouse (48°23'30" N. lat., 124°44'12" W. long.) to the buoy adjacent to Duntze Rock (48°24'37" N. lat., 124°44'37" W. long.), then in a straight line to Bonilla Pt. (48°35'39" N. lat., 124°42'58" W. long.) on Vancouver Island, British Columbia.

b. *Grays Harbor Control Zone* - The area defined by a line drawn from the Westport Lighthouse (46° 53'18" N. lat., 124° 07'01" W. long.) to Buoy #2 (46° 52'42" N. lat., 124°12'42" W. long.) to Buoy #3 (46° 55'00" N. lat., 124°14'48" W. long.) to the Grays Harbor north jetty (46° 55'36" N. lat., 124°10'51" W. long.).

c. *Columbia Control Zone*: An area at the Columbia River mouth, bounded on the west by a line running northeast/southwest between the red lighted Buoy #4 (46°13'35" N. lat., 124°06'50" W. long.) and the green lighted Buoy #7 (46°15'09' N. lat., 124°06'16" W. long.); on the east, by the Buoy #10 line which bears north/south at 357° true from the south jetty at 46°14'00" N. lat., 124°03'07" W. long. to its intersection with the north jetty; on the north, by a line running northeast/southwest between the green lighted Buoy #7 to the tip of the north jetty (46°15'48" N. lat., 124°05'20" W. long. and then along the north jetty to the point of intersection with the Buoy #10 line; and on the south, by a line running northeast/southwest between the red lighted Buoy #4 and tip of the south jetty (46°14'03" N. lat., 124°04'05" W. long.), and then along the south jetty to the point of intersection with the Buoy #10 line.

d. *Stonewall Bank Yelloweye Rockfish Conservation Area*: The area defined by the following coordinates in the order listed:
44°37.46' N. lat.; 124°24.92' W. long.
44°37.46' N. lat.; 124°23.63' W. long.
44°28.71' N. lat.; 124°21.80' W. long.
44°28.71' N. lat.; 124°24.10' W. long.
44°31.42' N. lat.; 124°25.47' W. long.
and connecting back to 44°37.46' N. lat.; 124°24.92' W. long.

e. *Klamath Control Zone*: The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately 6 nautical miles north of the Klamath River mouth); on the west by 124°23'00" W. long. (approximately 12 nautical miles offshore); and, on the south by 41°26'48" N. lat. (approximately 6 nautical miles south of the Klamath River mouth).

C.5. Inseason Management: Regulatory modifications may become necessary inseason to meet preseason management objectives such as quotas, harvest guidelines, and season duration. In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Actions could include modifications to bag limits, or days open to fishing, and extensions or reductions in areas open to fishing.

b. Coho may be transferred inseason among recreational subareas north of Cape Falcon to help meet the recreational season duration objectives (for each subarea) after conferring with representatives of the affected ports and the Council's SAS recreational representatives north of Cape Falcon, and if the transfer would not result in exceeding preseason impact expectations on any stocks.

c. Chinook and coho may be transferred between the recreational and commercial fisheries north of Cape Falcon if there is agreement among the representatives of the SAS, and if the transfer would not result in exceeding preseason impact expectations on any stocks.

d. Fishery managers may consider inseason action modifying regulations restricting retention of unmarked (adipose fin intact) coho. To remain consistent with preseason expectations, any inseason action shall consider, if significant, the difference between observed and preseason forecasted (adipose-clipped) mark rates. Such a consideration may also include a change in bag limit of two salmon, no more than one of which may be a coho.

e. Marked coho remaining from the Cape Falcon to OR/CA Border recreational mark-selective coho quota may be transferred inseason to the Cape Falcon to Humbug Mt. non-mark-selective recreational fishery or the Cape Falcon to Humbug Mt. commercial troll fishery if the transfer would not result in exceeding preseason impact expectations on any stocks.

f. Deviations from the allocation of allowable ocean harvest of coho salmon in the area south of Cape Falcon may be allowed to meet consultation standards for ESA-listed stocks (FMP 5.3.2). Therefore, should any rollovers result in a deviation from the south of Cape Falcon coho allocation schedule between sectors would still fall underneath this exemption.

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS (continued)

g. Waypoints for the 40 fathom regulatory line from Cape Falcon to Humbug Mt. (50 CFR 660.71 (o) (12)-(62), when in place.

45°46.00′ N. lat., 124°04.49′ W. long.;	44°44.96′ N. lat., 124°14.39′ W. long.;	43°40.49′ N. lat., 124°15.74′ W. long.;
45°44.34′ N. lat., 124°05.09′ W. long.;	44°43.44′ N. lat., 124°14.78′ W. long.;	43°38.77′ N. lat., 124°15.64′ W. long.;
45°40.64′ N. lat., 124°04.90′ W. long.;	44°42.26′ N. lat., 124°13.81′ W. long.;	43°34.52′ N. lat., 124°16.73′ W. long.;
45°33.00′ N. lat., 124°04.46′ W. long.;	44°41.68′ N. lat., 124°15.38′ W. long.;	43°28.82′ N. lat., 124°19.52′ W. long.;
45°32.27′ N. lat., 124°04.74′ W. long.;	44°34.87′ N. lat., 124°15.80′ W. long.;	43°23.91′ N. lat., 124°24.28′ W. long.;
45°29.26′ N. lat., 124°04.22′ W. long.;	44°33.74′ N. lat., 124°14.44′ W. long.;	43°20.83′ N. lat., 124°26.63′ W. long.;
45°20.25′ N. lat., 124°04.67′ W. long.;	44°27.66′ N. lat., 124°16.99′ W. long.;	43°17.96′ N. lat., 124°28.81′ W. long.;
45°19.99′ N. lat., 124°04.62′ W. long.;	44°19.13′ N. lat., 124°19.22′ W. long.;	43°16.75′ N. lat., 124°28.42′ W. long.;
45°17.50′ N. lat., 124°04.91′ W. long.;	44°15.35′ N. lat., 124°17.38′ W. long.;	43°13.97′ N. lat., 124°31.99′ W. long.;
45°11.29′ N. lat., 124°05.20′ W. long.;	44°14.38′ N. lat., 124°17.78′ W. long.;	43°13.72′ N. lat., 124°33.25′ W. long.;
45°05.80′ N. lat., 124°05.40′ W. long.;	44°12.80′ N. lat., 124°17.18′ W. long.;	43°12.26′ N. lat., 124°34.16′ W. long.;
45°05.08′ N. lat., 124°05.93′ W. long.;	44°09.23′ N. lat., 124°15.96′ W. long.;	43°10.96′ N. lat., 124°32.33′ W. long.;
45°03.83′ N. lat., 124°06.47′ W. long.;	44°08.38′ N. lat., 124°16.79′ W. long.;	43°05.65′ N. lat., 124°31.52′ W. long.;
45°01.70′ N. lat., 124°06.53′ W. long.;	44°08.30′ N. lat., 124°16.75′ W. long.;	42°59.66′ N. lat., 124°32.58′ W. long.;
44°58.75′ N. lat., 124°07.14′ W. long.;	44°01.18′ N. lat., 124°15.42′ W. long.;	42°54.97′ N. lat., 124°36.99′ W. long.;
44°51.28′ N. lat., 124°10.21′ W. long.;	43°51.61′ N. lat., 124°14.68′ W. long.;	42°53.81′ N. lat., 124°38.57′ W. long.;
44°49.49′ N. lat., 124°10.90′ W. long.;	43°42.66′ N. lat., 124°15.46′ W. long.;	42°50.00′ N. lat., 124°39.68′ W. long.;

C.6. Additional Seasons in State Territorial Waters: Consistent with Council management objectives, the States of Washington, Oregon, and California may establish limited seasons in state waters. Check state regulations for details.

TABLE V-3. 2023 Treaty Indian ocean troll management measures for ocean salmon fisheries - Council adopted. (Page 1 of 2)

A. SEASON DESCRIPTIONS
Supplemental Management Information
1. Overall Treaty-Indian TAC: 45,000 Chinook and 57,000 coho. 2. Overall Chinook and/or coho TACs may need to be reduced or fisheries adjusted to meet NMFS ESA guidance, FMP requirements, upon conclusion of negotiations in the North of Falcon forum, or upon receipt of preseason catch and abundance expectations for Canadian and Alaskan fisheries. 3. In 2024, the season will open May 1, consistent with all preseason regulations in place for Treaty Indian Troll fisheries during May 16-June 30, 2023. All catch in May 2024 applies against the 2024 Treaty Indian Troll fisheries quota. This opening could be modified following Council review at its March and/or April 2024 meetings.
• May 1 through the earlier of June 30 or 22,500 Chinook quota. All salmon may be retained except coho. If the Chinook quota is exceeded, the excess will be deducted from the later all-salmon season (C.5). See size limit (B) and other restrictions (C). • July 1 through the earlier of September 15, or 22,500 Chinook quota or 57,000 coho quota. All salmon. See size limit (B) and other restrictions (C).

B. MINIMUM LENGTH (TOTAL INCHES)

	Chinook		Coho		
Area (when open)	Total Length	Head-off	Total Length	Head-off	Pink
North of Cape Falcon	24.0 (61.0 cm)	18.0 (45.7 cm)	16.0 (40.6 cm)	12.0 (30.5 cm)	None

C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS

C.1. Tribe and Area Boundaries. All boundaries may be changed to include such other areas as may hereafter be authorized by a Federal court for that tribe's treaty fishery.

S'KLALLAM - Washington State Statistical Area 4B (defined to include those waters of Puget Sound easterly of a line projected from the Bonilla Point light on Vancouver Island to the Tatoosh Island light, thence to the most westerly point on Cape Flattery and westerly of a line projected true north from the fishing boundary marker at the mouth of the Sekiu River [WAC 220-301-030]).

MAKAH - Washington State Statistical Area 4B and that portion of the FMA north of 48°02'15" N. lat. (Norwegian Memorial) and east of 125°44'00" W. long.

QUILEUTE - A polygon commencing at Cape Alava, located at latitude 48°10'00" north, longitude 124°43'56.9" west; then proceeding west approximately forty nautical miles at that latitude to a northwestern point located at latitude 48°10'00" north, longitude 125°44'00" west; then proceeding in a southeasterly direction mirroring the coastline at a distance no farther than forty nautical miles from the mainland Pacific coast shoreline at any line of latitude, to a southwestern point at latitude 47°31'42" north, longitude 125°20'26" west; then proceeding east along that line of latitude to the Pacific coast shoreline at latitude 47°31'42" north, longitude 124°21'9.0" west.

HOH - That portion of the FMA between 47°54'18" N. lat. (Quillayute River) and 47°21'00" N. lat. (Quinault River) and east of 125°44'00" W. long.

QUINAULT - A polygon commencing at the Pacific coast shoreline near Destruction Island, located at latitude 47°40'06" north, longitude 124°23'51.362" west; then proceeding west approximately thirty nautical miles at that latitude to a northwestern point located at latitude 47°40'06" north, longitude 125°08'30" west; then proceeding in a southeasterly direction mirroring the coastline no farther than thirty nautical miles from the mainland Pacific coast shoreline at any line of latitude, to a southwestern point at latitude 46°53'18" north, longitude 124°53'53" west; then proceeding east along that line of latitude to the pacific coast shoreline at latitude 46°53'18" north, longitude 124°7'36.6" west.

C.2. Gear restrictions

a. Single point, single shank, barbless hooks are required in all fisheries.
b. No more than eight fixed lines per boat.
c. No more than four hand-held lines per person in the Makah area fishery (Washington State Statistical Area 4B and that portion of the FMA north of 48°02'15" N. lat. (Norwegian Memorial) and east of 125°44'00" W. long.)

C.3. Quotas

a. The quotas include troll catches by the S'Klallam and Makah Tribes in Washington State Statistical Area 4B from May 1 through September 15.
b. The **Quileute Tribe may continue a ceremonial and subsistence fishery** during the time frame of October 1 through October 15 in the same manner as in 2004-2015. Fish taken during this fishery are to be counted against treaty troll quotas established for the 2024 season (estimated harvest during the October ceremonial and subsistence fishery: 20 Chinook; 40 coho).

C.4. Area Closures

a. The area within a six nautical mile radius of the mouths of the Queets River (47°31'42" N. lat.) and the Hoh River (47°45'12" N. lat.) will be closed to commercial fishing.

b. A closure within two nautical miles of the mouth of the Quinault River (47°21'00" N. lat.) may be enacted by the Quinault Nation and/or the State of Washington and will not adversely affect the Secretary of Commerce's management regime.

C.5. Inseason Management: In addition to standard inseason actions or modifications already noted under the season description, the following inseason guidance is provided to NMFS:

a. Chinook remaining from the May through June treaty-Indian ocean troll harvest guideline north of Cape Falcon may be transferred to the July through September harvest guideline on a fishery impact equivalent basis.

TABLE V-4. Stock status relative to overfished and overfishing criteria. A stock is approaching an overfished condition if the 3-year geometric mean of the most recent two years and the forecast spawning escapement is less than the minimum stock size threshold (MSST); a stock would experience overfishing if the total annual exploitation rate exceeds the maximum fishing mortality threshold (MFMT). Occurrences of stocks *at risk of* approaching an overfished condition or experiencing overfishing are indicated in **bold**. 2024 spawning escapement and exploitation rate estimates are based on preliminary 2024 preseason abundance forecasts and 2023 Council regulations.

	Estimated Adult Spawning Escapement									Total Exploitation Rate						
	2019	2020	2021	2022	2023[a/]	Forecast 2024[b/]	3-yr Geo Mean	MSST	S_{MSY}	2019	2020	2021	2022[a/]	2023[b/]	2024[b/]	MFMT
Chinook																
Sacramento Fall	163,767	138,091	105,584	61,862	133,638	213,352	120,823	91,500	122,000	0.68	0.61	0.68	0.76	0.04	0.00	0.78
Klamath River Fall	20,022	26,185	29,942	21,956	41,623	42,936	33,981	30,525	40,700	0.43	0.30	0.38	0.46	0.04	0.06	0.71
Southern Oregon[c/]	18,436	29,387	48,979	17,609	29,550	NA	29,428	20,500	34,992	NA	NA	NA	NA	NA	NA	0.78
Central and Northern OR[d/]	65	137	85	105	118	NA	102	30 fish/mi	60 fish/mi	0.42	0.42	0.49	NA	NA	NA	0.78
Upper River Bright - Fall[d/]	77,880	98,401	86,644	53,961	64,450	90,834	68,106	19,182	39,625	0.38	0.28	0.40	NA	NA	NA	0.86
Upper River - Summer[d/]	41,090	70,654	52,076	64,497	49,410	57,677	56,857	6,072	12,143	0.17	0.30	0.40	NA	NA	NA	0.75
Willapa Bay - Fall[e/]	2,894	3,585	2,966	2,351	NA	NA	2,924	1,696	3,393	0.65	0.55	0.71	NA	NA	NA	0.78
Grays Harbor Fall[d/e/]	14,880	20,879	13,207	14,259	NA	NA	15,783	5,694	13,326	0.64	0.58	0.69	NA	NA	NA	0.78
Grays Harbor Spring	983	2,828	2,573	1,348	NA	NA	2,141	700	1,400	NA	NA	NA	NA	NA	NA	0.78
Queets - Fall[d/]	2,663	3,622	3,364	1,784	NA	NA	2,791	1,250	2,500	0.73	0.73	0.79	NA	NA	NA	0.87
Queets - Sp/Su	322	342	280	434	NA	NA	346	350	700	NA	NA	NA	NA	NA	NA	0.78
Hoh - Fall[d/e/]	1,552	2,273	2,622	1,866	NA	NA	2,232	600	1,200	0.73	0.68	0.74	NA	NA	NA	0.90
Hoh Sp/Su	766	1,248	817	1,055	NA	NA	1,025	450	900	NA	NA	NA	NA	NA	NA	0.78
Quillayute - Fall[d/e/]	7,765	8,672	5,568	6,761	5,607	NA	5,954	1,500	3,000	0.65	0.60	0.69	NA	NA	NA	0.87
Quillayute - Sp/Su	1,442	942	1,056	1,441	1,791	NA	1,397	600	1,200	NA	NA	NA	NA	NA	NA	0.78
Hoko -Su/Fa[d/]	1,838	1,316	1,165	1,386	NA	NA	1,285	425	850	0.37	0.22	NA[g/]	NA	NA	NA	0.78
Coho																
Willapa Bay[f/]	15,115	16,476	31,369	24,197	NA	NA	27,551	8,600	17,200	0.39	0.33	0.24	NA	NA	NA	0.74
Grays Harbor[f/]	30,468	23,814	62,762	65,977	NA	NA	64,349	18,320	24,426	0.39	0.29	0.23	NA	NA	NA	0.65
Queets	1,700	4,181	5,752	12,083	NA	NA	8,337	4,350	5,800	0.57	0.22	0.10	NA	NA	NA	0.65
Hoh	2,445	2,840	6,396	8,224	NA	NA	7,253	1,890	2,520	0.57	0.49	0.18	NA	NA	NA	0.65
Quillayute Fall	6,852	7,695	9,938	13,000	7,245	NA	9,705	4,725	6,300	0.37	0.16	0.04	NA	NA	NA	0.59
Juan de Fuca	4,625	8,548	20,837	16,977	NA	NA	18,808	7,000	11,000	0.12	0.07	0.07	NA	NA	NA	0.60
Hood Canal	7,884	16,832	34,388	9,192	NA	NA	17,779	10,750	14,350	0.46	0.29	0.25	NA	NA	NA	0.65
Skagit	14,246	23,808	75,532	92,306	NA	NA	83,499	14,875	25,000	0.48	0.43	0.33	NA	NA	NA	0.60
Stillaguamish	12,887	21,555	38,176	53,828	NA	NA	45,331	6,100	10,000	0.20	0.13	0.11	NA	NA	NA	0.50
Snohomish	40,314	42,675	97,523	85,692	NA	NA	91,416	31,000	50,000	0.17	0.11	0.11	NA	NA	NA	0.60

a/ Preliminary.
b/ Preliminary approximations based on preseason forecasts and the previous year fishing regulations.
c/ MSST 18,440 (20,500 as measured at Huntley Park).
d/ Preliminary CWT based exploitation rates from PSC-CTC 2023 Exploitation Rate Analysis (TCCHINOOK (23)-06).
e/ Queets River fall Chinook coded-wire-tag (CWT) exploitation rates used as a proxy. Adjustments made to terminal fishery impacts to account for differential harvest rates.
f/ Willapa Bay and Grays Harbor coho escapement and exploitation rate estimates based on natural area adult spawners.
g/ Calculation of a reliable exploitation rate estimate was not possible due to insufficient CWT information.

TABLE V-5. Postseason S_{ACL}, S_{OFL}, and spawner escapement estimates for Sacramento River fall Chinook (SRFC), Klamath River fall Chinook (KRFC) and Willapa Bay coho. For the current year, S_{ACL} and S_{OFL} are preseason values. Current year spawner escapements are preseason values based on current abundance forecasts and the previous year fishing regulations. Bolded values indicate instances where the escapement is lower than the S_{ACL} and/or the S_{OFL}.

	SRFC			KRFC			Willapa Bay Coho		
Year	S_{ACL} [a/]	S_{OFL}	Escapement [b/]	S_{ACL} [a/]	S_{OFL}	Escapement [c/]	S_{ACL} [a/]	S_{OFL}	Escapement [c/]
2012	188,378	138,144	285,429	70,922	64,273	121,543	--	--	--
2013	260,798	191,251	406,846	52,032	47,154	59,156	--	--	--
2014	165,355	121,260	212,476	47,674	43,205	95,104	--	--	--
2015	76,485	56,089	113,468	22,202	20,120	28,112	9,440	8,181	17,086
2016	61,595	45,170	89,699	7,056	6,394	13,937	14,839	12,860	30,667
2017	41,119	30,154	44,329	7,113	6,446	19,904	5,180	4,489	11,379
2018	66,110	48,481	105,466	24,468	22,174	52,352	7,903	6,849	17,228
2019	152,115	111,551	163,767	11,314	10,253	20,022	7,458	6,464	15,115
2020	105,737	77,541	138,091	12,005	10,880	26,185	7,399	6,413	16,476
2021	97,095	71,203	105,584	15,624	14,159	29,942	12,432	10,774	31,369
2022	**75,895**	55,656	**61,862**	13,038	11,815	21,956	NA	NA	24,197
2023	41,846	30,687	133,638	13,805	12,511	41,623	NA	NA	NA
2024	64,087	46,997	213,352	14,605	13,235	42,932	12,671	10,981	NA [d/]

a/ $S_{ACL} = S_{ABC}$.

b/ Hatchery and natural area adult spawners.

c/ Natural area adult spawners.

d/ Analysis of 2023 preseason regulations combined with the substantially lower abundance forecasts for 2024 was beyond the capability of the FRAM model.

TABLE V-6. Comparison of projected ocean escapements and exploitation rates for critical natural and Columbia River hatchery coho stocks (thousands of fish) resulting from application of 2023 Council-adopted regulations to 2023 and 2024 ocean abundance forecasts.[a/]

	Ocean Escapement and ER Estimates Under 2023 Regulations[b/]				
	2023 Abundance Forecasts		2024 Abundance Forecasts[c/]		
Stock	Ocean Escapement	Exploitation Rate	Ocean Escapement	Exploitation Rate	2024 FMP Conservation Objective[d/]
Natural Coho Stocks					
Skagit	40.4	35.0%	NA	NA	Exploitation Rate ≤60.0%[e/]
Stillaguamish	75.3	28.5%	NA	NA	Exploitation Rate ≤50.0%[e/]
Snohomish	73.1	32.0%	NA	NA	Exploitation Rate ≤40.0%[e/]
Hood Canal	34.9	42.8%	NA	NA	Exploitation Rate ≤45.0%[e/]
Strait of Juan de Fuca	14.5	12.1%	NA	NA	Exploitation Rate ≤40.0%[e/]
Quillayute Fall	12.5	42.6%	NA	NA	6.3 - 15.8 Spawners
Hoh	5.4	51.0%	NA	NA	2.0 - 5.0 Spawners
Queets	10.3	40.9%	NA	NA	5.8 - 14.5 Spawners
Grays Harbor[g/]	102.1	55.6%	NA	NA	35.4 Spawners
LCN	37.9	19.0%	NA	NA	Exploitation Rate ≤23.0[f/]
OCN	192.4	19.8%	NA	NA	Exploitation Rate ≤30.0%[f/]
SONCC			NA	NA	
Trinity Natural	--	15.0%	NA	NA	Exploitation Rate ≤16.0%[f/]
Klamath Natural	--	7.7%	NA	NA	Exploitation Rate ≤15.0%[f/]
Rogue Natural	--	6.7%	NA	NA	Exploitation Rate ≤15.0%[f/]
Other Natural	--	1.8%	NA	NA	Exploitation Rate ≤15.0%[f/]
Hatchery Coho Stocks					
Columbia Early	318.9	46.6%	NA	NA	6.2 Hatchery Escapement
Columbia Late	230.6	52.0%	NA	NA	14.2 Hatchery Escapement

a/ Quota levels include harvest and hooking mortality estimates used in planning the Council's 2023 ocean fisheries and a coho catch for the Canadian troll fishery off the West Coast of Vancouver Island (WCVI).

b/ 2023 preseason regulations with the following coho quotas: U.S. Canada Border to Cape Falcon: Treaty Indian troll-57,000; non-Indian troll-30,400 selective; recreational-159,600 selective; Cape Falcon to OR/CA border: recreational-110,000 selective and 25,000 non-selective; troll-10,000 selective. Ocean escapement is generally the estimated number of coho escaping ocean fisheries and entering freshwater. For Puget Sound stocks, ocean escapement is the total abundance minus ocean fisheries (ie outside Puget Sound). For the OCN coho stock, this value represents the estimated spawner escapement in SRS accounting. For Columbia R. hatchery and LCN stocks, ocean escapement represents the number of coho after the Buoy 10 fishery; the LCN exploitation rates shown are total marine and mainstem Columbia R. fishery ERs.

c/Analysis of 2023 preseason regulations combined with the much lower abundance forecasts for 2024 was beyond the capability of the FRAM model. For all stocks, substantially lower ocean escapement estimates and higher exploitation rates compared with 2023 abundances would be expected with 2024 forecast abundance.

d/ Goals represent FMP conservation objectives, ESA consultation standards, or hatchery escapement needs. Spawning escapement

e/ Assumed exploitation rate based on preliminary abundance forecasts.

f/ Pending confirmation of 2024 ESA consultation standard.

g/ Grays Harbor escapements and exploitation rate estimates based on natural area adult spawners.

TABLE V-7. Comparison of Lower Columbia natural (LCN), Oregon coastal natural (OCN), and Southern Oregon/Northern California Coastal (SONCC) coho projected harvest mortality and exploitation rates by fishery under Council-adopted 2023 regulations and preliminary 2024 preseason abundance estimates.

	Projected Harvest Mortality and Exploitation Rate							
	LCN		OCN		SONCC Natural[a/]			
Fishery	Number	Percent	Number	Percent	Trinity	Klamath	Rogue	Other
SOUTHEAST ALASKA	NA	NA	NA	NA	NA	NA	NA	NA
BRITISH COLUMBIA	NA	NA	NA	NA	NA	NA	NA	NA
PUGET SOUND/STRAITS	NA	NA	NA	NA	NA	NA	NA	NA
NORTH OF CAPE FALCON								
Recreational	NA	NA	NA	NA	NA	NA	NA	NA
Treaty Indian Troll	NA	NA	NA	NA	NA	NA	NA	NA
Non-Indian Troll	NA	NA	NA	NA	NA	NA	NA	NA
SOUTH OF CAPE FALCON								
Recreational:								
Cape Falcon to Humbug Mt.	NA	NA	NA	NA	NA	NA	NA	NA
Humbug Mt. to Horse Mt. (KMZ)	NA	NA	NA	NA	NA	NA	NA	NA
Fort Bragg	NA	NA	NA	NA	NA	NA	NA	NA
South of Pt. Arena	NA	NA	NA	NA	NA	NA	NA	NA
Troll:								
Cape Falcon to Humbug Mt.	NA	NA	NA	NA	NA	NA	NA	NA
Humbug Mt. to Horse Mt. (KMZ)	NA	NA	NA	NA	NA	NA	NA	NA
Fort Bragg	NA	NA	NA	NA	NA	NA	NA	NA
South of Pt. Arena	NA	NA	NA	NA	NA	NA	NA	NA
BUOY 10	NA	NA	NA	NA	`NA	NA	NA	NA
ESTUARY/FRESHWATER	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL	NA	NA	NA	NA	NA	NA	NA	NA

a/ Analysis of 2023 preseason regulations combined with the substantially lower abundance forecasts for 2024 was beyond the capability of the FRAM model.

TABLE V-8 Maximum allowable fishery impact rate for OCN coho under Amendment 13 matrix and the revised OCN work group matrix based on parent escapement levels by stock component and marine survival category.[a/]

	OCN Coho Spawners by Stock Component				Marine Survival Indicator		Amendment 13 Matrix			OCN Work Group Matrix[a/]		
Fishery Year (t)	Parent Spawner Year (t-3)	Northern	North-Central	South-Central	Jack Survival Rate (t-1)	OCN Adult Survival Rate	Marine Survival Category	Parental Spawner Category	Maximum Allowable Impacts	Marine Survival Category[b/c/]	Parental Spawner Category	Maximum Allowable Impacts
1998	1995	3,900	13,600	36,500	0.04%	-	Low	Very Low	≤10-13%	Extremely Low	Very Low	≤8%
1999	1996	3,300	18,100	52,600	0.10%	-	Med	Very Low	≤15%	Low	Critical	0-8%
2000	1997	2,100	2,800	18,400	0.12%	-	Med	Very Low	≤15%	Low	Critical	0-8%
2001	1998	2,600	3,300	25,900	0.27%	-	Med	Very Low	≤15%	Medium	Critical	0-8%
2002	1999	8,900	11,800	29,200	0.09%	-	Med	Low	≤15%	Low	Low	≤15%
2003	2000	17,900	14,300	36,500	0.20%	-	Med	Low	≤15%	Med	Low	≤15%
2004	2001	33,500	25,200	112,000	0.14%	-	Med	Low	≤15%	Med	Low	≤15%
2005	2002	52,500	104,000	104,100	0.11%	-	Med	High	≤20%	Low	High	≤15%
2006	2003	59,600	68,900	99,800	0.12%	-	Med	High	≤20%	Low	High	≤15%
2007	2004	28,800	42,100	101,900	0.17%	-	Med	Med	≤20%	Med	Med	≤20%
2008	2005	16,500	51,400	86,700	0.07%	-	Low	High	≤15%	Extremely Low	High	≤8%
2009	2006	24,100	21,200	83,500	0.27%	-	Med	Low	≤15%	Med	Low	≤15%
2010	2007	17,500	12,300	36,500	0.12%	-	Med	Low	≤15%	Low	Low	≤15%
2011	2008	25,600	68,100	86,000	0.12%	-	Med	High	≤20%	Low	High	≤15%
2012	2009	48,100	86,400	128,200	0.09%	-	Med	High	≤20%	Low	High	≤15%
2013	2010	55,000	56,500	171,900	0.14%	6.8%	Med	High	≤20%	Med	High	≤30%
2014	2011	45,900	119,100	191,300	0.26%	7.1%	Med	High	≤20%	Med	High	≤30%
2015	2012	7,500	33,800	57,800	0.20%	7.5%	Med	Low	≤15%	Med	Low	≤15%
2016	2013	11,000	39,700	73,700	0.10%	6.2%	Med	Med	≤20%	Med	Med	≤20%
2017	2014	67,400	121,900	170,400	0.13%	5.6%	Med	High	≤30%	Med	High	≤30%
2018	2015	6,700	22,700	27,700	0.11%	4.3%	Low	Low	≤15%	Low	Low	≤15%
2019	2016	18,700	26,500	30,700	0.27%	3.80%	Low	Low	≤15%	Low	Low	≤15%
2020	2017	13,600	22,800	24,900	0.09%	4.10%	Low	Low	≤15%	Low	Low	≤15%
2021	2018	8,000	22,000	44,500	0.45%	7.72%	High	Low	≤15%	Med	Low	≤15%
2022	2019	22,300	20,100	52,800	0.31%	6.98%	Med	Low	≤15%	Med	Low	≤15%
2023	2020	21,500	30,800	57,600	0.30%	7.87%	Med	Med	≤20%	Med	Med	≤20%
2024[d/]	2021	42,800	88,600	110,800	0.38%	7.79%	High	High	≤35%	Med	High	≤30%
2025[d/]	2022	53,000	71,900	45,100	-	-	-	High	-	-	High	-
2026[d/]	2023	34,700	42,800	74,100	-	-	-	High	-	-	High	-

a/ Developed by the OCN Coho Work Group as a result of the 2000 Review of Amendment 13. See Appendix A, tables A-2 and A-4 for details

b/ OCN workgroup matrix was modified during the 2012 methodology review. For 2013, the marine survival category is determined by a predicted OCN adult survival rate that is based on the natural smolt to jack relationship at Mill Creek in the Yaquina River basin.

c/ OCN workgroup matrix was modified during the 2013 methodology review. Beginning in 2014, the marine survival category is determined by a predicted OCN adult survival rate that is based on biologic and oceanographic indicators.

d/ Preliminary.

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APPENDIX A
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CHINOOK					
Stocks In The Fishery	**Conservation Objective**	S_{MSY}	MSST	MFMT (F_{MSY})	ACL
Sacramento River Fall Indicator stock for the Central Valley fall (CVF) Chinook stock complex.	122,000-180,000 natural and hatchery adult spawners (MSY proxy adopted 1984). This objective is intended to provide adequate escapement of natural and hatchery production for Sacramento and San Joaquin fall and late-fall stocks based on habitat conditions and average run-sizes as follows: Sacramento River 1953-1960; San Joaquin River 1972-1977 (ASETF 1979; PFMC 1984; SRFCRT 1994). The objective is less than the estimated basin capacity of 240,000 spawners (Hallock 1977), but greater than the 118,000 spawners for maximum production estimated on a basin by basin basis before Oroville and Nimbus Dams (Reisenbichler 1986).	122,000	91,500	78% Proxy (SAC 2011a)	Based on F_{ABC} and annual ocean abundance. F_{ABC} is F_{MSY} reduced by Tier 2 (10%) uncertainty
Central Valley Spring ESA Threatened	NMFS ESA consultation standard/recovery plan: Conform to Sacramento River Winter Chinook ESA consultation standard (no defined objective for ocean management prior to listing).	Undefined	Undefined	Undefined	ESA consultation standard applies.
Sacramento River Winter ESA Endangered	NMFS ESA consultation standard/recovery plan: Recreational seasons: Point Arena to Pigeon Point between the first Saturday in April and the second Sunday in November; Pigeon Point to the U.S./Mexico Border between the first Saturday in April and the first Sunday in October. Minimum size limit ≥ 20 inches total length. Commercial seasons: Point Arena to the U.S./Mexico border between May 1 and September 30, except Point Reyes to Point San Pedro between October 1 and 15 (Monday through Friday). Minimum size limit ≥ 26 inches total length. Guidance from NMFS in 2010 and 2011 required implementation of additional closures and/or increased sized limits in the recreational fishery South of Point Arena. The winter-run management framework and consultation standard is an abundance based age-3 impact rate control rule established in 2018 (NMFS 2018) which sets the maximum allowable age-3 impact rate based on the forecast age-3 escapement in the absence of fisheries: above 3,000, the allowable, impact rate is fixed at 20 percent; between 3,000 and 500, the allowable impact rate declines linearly from 20 percent to 10 percent; between 500 and 0, the allowable impact rate declines linearly from 10 percent to 0 percent.	Undefined	Undefined	Undefined	
California Coastal Chinook ESA Threatened	NMFS ESA consultation standard/recovery plan: Limit ocean fisheries to no more than a 16.0% age-4 ocean harvest rate on Klamath River fall Chinook.	Undefined	Undefined	Undefined	
Klamath River Fall Indicator stock for the Southern Oregon Northern California (SONC) Chinook stock complex.	At least 32% of potential adult natural spawners, but no fewer than 40,700 naturally spawning adults in any one year. Brood escapement rate must average at least 32% over the long-term, but an individual brood may vary from this range to achieve the required tribal/nontribal annual allocation. Natural area spawners to maximize catch estimated at 40,700 adults (STT 2005).	40,700	30,525	71% (STT 2005)	Based on F_{ABC} and annual ocean abundance. F_{ABC} is F_{MSY} reduced by Tier 1 (5%) uncertainty
Klamath River - Spring	Undefined	Undefined	Undefined	Undefined	Component stock of SONC complex; ACL indicator stock is KRFC
Smith River	Undefined	Undefined	Undefined	78% Proxy (SAC 2011a)	

TABLE A-1. Conservation objectives and reference points governing harvest control rules and status determination criteria for salmon stocks and stock complexes[a/] (Page 2 of 6)

CHINOOK						
Stocks In The Fishery	**Conservation Objective**		S_{MSY}	MSST	MFMT (F_{MSY})	ACL
Southern Oregon	41,000 escapement at Huntley Park, Gold Beach, Oregon		34,992	20,500	78% Proxy (SAC 2011a)	Indicator stock is KRFC
Central and Northern Oregon	Unspecified portion of an aggregate 150,000 to 200,000 natural adult spawners for Oregon coast (Thompson 1977 and McGie 1982) measured by 60-90 fish per mile in index streams. ODFW developing specific conservation objectives for spring and fall stocks that may be implemented without plan amendment upon approval by the Council.		60 Fish per mile in index streams	30 Fish per mile in index streams	78% Proxy (SAC 2011a)	Component stock(s) of FNMC complex; international exception applies, ACLs are not applicable
Willapa Bay Fall	Undetermined in FMP. WDFW spawning escapement objective of 4,350.		3,393	1,697	78% Proxy (SAC 2011a)	
Grays Harbor Fall Indicator stock for the Far North Migrating Coastal (FNMC) Chinook stock complex	13,326 natural adult spawners--MSP based on full seeding of spawning and rearing habitat (QDNR & WDFW 2014).	Annual natural spawning escapement targets may vary from FMP conservation objectives if agreed to by WDFW and treaty tribes under the provisions of *Hoh v. Baldrige* and subsequent U.S. District Court orders.	13,326	6,663	63%	FNMC complex; international exception applies, ACLs are not applicable.
Queets Fall Indicator stock for the FNMC Chinook stock complex	Manage terminal fisheries for 40% harvest rate, but no less than 2,500 natural adult spawners, the MSY level estimated by Cooney (1984).		2,500	1,250	87% (Cooney 1984)	
Hoh Fall Indicator stock for the FNMC Chinook stock complex	Manage terminal fisheries for 40% harvest rate, but no less than 1,200 natural adult spawners, the MSY level estimated by Cooney (1984).		1,200	600	90% (Cooney 1984)	
Quillayute Fall Indicator stock for the FNMC Chinook stock complex	Manage terminal fisheries for 40% harvest rate, but no less than 3,000 natural adult spawners, the MSY level estimated by Cooney (1984).		3,000	1,500	87% (Cooney 1984)	
Hoko Summer/Fall Indicator stock for the FNMC Chinook stock complex	850 natural adult spawners, the MSP level estimated by Ames and Phinney (1977). May include adults used for supplementation program.		850	425	78% Proxy (SAC 2011a)	
Grays Harbor Spring	1,400 natural adult spawners.		1,400	700	78% Proxy (SAC 2011a)	FNMC complex; international exception applies, ACLs are not applicable.
Queets Sp/Su	Manage terminal fisheries for 30% harvest rate, but no less than 700 natural adult spawners.		700	350	78% Proxy (SAC 2011a)	
Hoh Spring/Summer	Manage terminal fisheries for 31% harvest rate, but no less than 900 natural adult spawners.		900	450	78% Proxy (SAC 2011a)	
Quillayute Spring/Summer	1,200 natural adult spawners for summer component (MSY).		1,200	600	78% Proxy (SAC 2011a)	

TABLE A-1. Conservation objectives and reference points governing harvest control rules and status determination criteria for salmon stocks and stock complexes[a/] (Page 3 of 6)

CHINOOK					
Stocks In The Fishery	**Conservation Objective**	S_{MSY}	MSST	MFMT (F_{MSY})	ACL
Willapa Bay Fall (hatchery)	8,200 adult return to hatchery. WDFW spawning escapement objective of 9,800 hatchery spawners.	Not applicable to hatchery stocks			
Quinault Fall (hatchery)	Hatchery production.				
North Lewis River Fall	NMFS consultation standard/recovery plan. McIsaac (1990) stock-recruit analysis supports MSY objective of 5,700 natural adult spawners.	5,700	ESA consultation standard applies.	76%	ESA consultation standard applies.
Snake River Fall	NMFS consultation standard/recovery plan. No more than 70.0% of 1988-1993 base period AEQ exploitation rate for all ocean fisheries.	Undefined		Undefined	
Upper Willamette Spring	NMFS consultation standard/recovery plan. Not applicable for ocean fisheries.	Undefined		Undefined	
Columbia Upper River Spring	NMFS consultation standard/recovery plan. Not applicable for ocean fisheries.	Undefined		Undefined	
Snake River - Spring/Summer	NMFS consultation standard/recovery plan. Not applicable for ocean fisheries.	Undefined		Undefined	
Columbia Lower River Hatchery - Fall	12,600 adults for hatchery egg-take.	Not applicable to hatchery stocks			
Columbia Lower River Hatchery Spring	2,700 adults to meet Cowlitz, Kalama, and Lewis Rivers broodstock needs.				
Columbia Mid-River Bright Hatchery Fall	4,700 adults for Bonneville Hatchery and 2,000 for Little White Salmon Hatchery egg-take.				
Columbia Spring Creek Hatchery Fall	7,000 adults to meet hatchery egg-take goal.				
Columbia Upper River Bright Fall	40,000 natural bright adults above McNary Dam (MSY proxy adopted in 1984 based on CRFMP). The management goal has been increased to 60,000 by Columbia River managers in recent years.	39,625 (Langness and Reidinger 2003)	19,812	85.91% (Langness and Reidinger 2003)	International exception applies, ACLs are not applicable.
Columbia Upper River Summer	Hold ocean fishery impacts at or below base period; recognize CRFMP objective - MSY proxy of 80,000 to 90,000 adults above Bonneville Dam, including both Columbia and Snake River stocks (state and tribal management entities considering separate objectives for these stocks).	12,143 (CTC 1999)	6,071	75% (CTC 1999)	

TABLE A-1. Conservation objectives and reference points governing harvest control rules and status determination criteria for salmon stocks and stock complexes[a/] (Page 4 of 6)

CHINOOK						
Stocks In The Fishery	**Conservation Objective**		S_{MSY}	MSST	MFMT (F_{MSY})	ACL
Eastern Strait of Juan de Fuca Summer/Fall	NMFS consultation standard/recovery plan. No more than 10.0% Southern U.S. (SUS) Rebuilding Exploitation Rate (RER) for the Elwha River and for the Dungeness River. 2011 comanagers Resource Management Plan (RMP)	Annual natural spawning escapement targets may vary from FMP conservation objectives if agreed to by WDFW and treaty tribes under the provisions of U.S. v. Washington and subsequent U.S. District Court orders.	Undefined	ESA consultation standard applies	Undefined	ESA Consultation standard applies.
Skokomish Summer/Fall	NMFS consultation standard/recovery plan. No more than 50.0% total RER. 2011 comanagers RMP		Undefined		Undefined	
Mid Hood Canal Summer/Fall	NMFS consultation standard/recovery plan. No more than 15.0% preterminal SUS CERC. 2011 comanagers RMP		Undefined		Undefined	
Nooksack Spring early	NMFS consultation standard/recovery plan. No more than 7.0% SUS CERC. 2011 comanagers RMP		Undefined		Undefined	
Skagit Summer/Fall	NMFS consultation standard/recovery plan. No more than 50.0% total RER. 2011 comanagers RMP		Undefined		Undefined	
Skagit Spring	NMFS consultation standard/recovery plan. No more than 38.0% total RER. 2011 comanagers RMP		Undefined		Undefined	
Stillaguamish Summer/Fall	NMFS consultation standard/recovery plan. No more than 25.0% total RER. 2011 comanagers RMP		Undefined		Undefined	
Snohomish Summer/Fall	NMFS consultation standard/recovery plan. No more than 15.0% SUS RER. 2011 comanagers RMP		Undefined		Undefined	
Cedar River Summer/Fall	NMFS consultation standard/recovery plan. No more than 20.0% SUS RER. 2011 comanagers RMP		Undefined		Undefined	
White River Spring	NMFS consultation standard/recovery plan. No more than 20.0% total RER. 2011 comanagers RMP		Undefined		Undefined	
Green River Summer/Fall	NMFS consultation standard/recovery plan. No more than 15.0% preterminal SUS RER, at least 5,800 adult spawners.		Undefined		Undefined	
Nisqually River Summer/Fall	NMFS consultation standard/recovery plan. No more than 65.0% total RER. 2011 comanagers RMP		Undefined		Undefined	
Puyallup Summer/Fall	NMFS consultation standard/recovery plan. No more than 50.0% total RER. 2011 comanagers RMP		Undefined		Undefined	

TABLE A-1. Conservation objectives and reference points governing harvest control rules and status determination criteria for salmon stocks and stock complexes[a/] (Page 5 of 6)

COHO					
Stocks In The Fishery	**Conservation Objective**	S_{MSY}	MSST	MFMT (F_{MSY})	ACL
Central California Coast ESA Threatened	NMFS ESA consultation standard/recovery plan: No retention of coho south of the OR/CA border.	Undefined	ESA consultation standard applies	Undefined	ESA consultation standard applies.
Southern Oregon/Northern California Coast ESA Threatened	A total fishery (marine and freshwater) exploitation rate (ER) limit of 15 % for all populations within the SONCC Evolutionary Significant Unit, except the Trinity River coho population unit (Upper Trinity River, Lower Trinity River, SF Trinity River) which has a total fishery ER limit of 16 %, including landed and non-landed mortality of age-3 adult SONCC coho salmon in any individual year. No retention of coho in the EEZ south of the OR/CA border. Freshwater impacts determined using projections provided by co-managing agencies and tribes (i.e., the Oregon Department of Fish and Wildlife, Yurok Tribe, Hoopa Valley Tribe, California Department of Fish and Wildlife).	Undefined		Undefined	
Oregon Coastal Natural ESA Threatened	NMFS ESA consultation standard/recovery plan: Total AEQ exploitation rate limit based on parental seeding level and marine survival matrix in FMP Table 3-2.	Undefined		Undefined	
Lower Columbia Natural ESA Threatened	NMFS ESA consultation standard/recovery plan: AEQ exploitation rate limit on ocean and mainstem Columbia fisheries identified in annual NMFS guidance.	Undefined		Undefined	
Oregon Coast Hatchery	Hatchery production.	Not applicable to hatchery stocks			
Columbia River Late Hatchery	Hatchery rack return goal of 14,200 adults.				
Columbia River Early Hatchery	Hatchery rack return goal of 6,200 adults.				
Willapa Bay - Hatchery	Hatchery rack return goal of 6,100 adults.				
Quinault - Hatchery	Hatchery production.				
Quillayute - Summer Hatchery	Hatchery production.				
South Puget Sound Hatchery	Hatchery rack return goal of 52,000 adults.				
Willapa Bay Natural	17,200 natural-area spawners	17,200	8,600	74%	Based on F_{ABC} and annual ocean abundance. F_{ABC} is F_{MSY} reduced by Tier 1 (5%) uncertainty

TABLE A-1. Conservation objectives and reference points governing harvest control rules and status determination criteria for salmon stocks and stock complexes[a/] (Page 6 of 6)

COHO

Stocks In The Fishery	**Conservation Objective**		S_{MSY}	MSST	MFMT (F_{MSY})	ACL
Grays Harbor	35,400 natural adult spawners (MSP based on WDF [1979])	Annual natural spawning escapement targets may vary from FMP conservation objectives if agreed to by WDFW and treaty tribes under the provisions of Hoh v. Baldrige, U.S. v. Washington, or subsequent U.S. District Court orders	24,426 S_{MSP} (FMP) *F_{SMY} (SAC 2010b)	18,320 (Johnstone et al. 2011)	MFMT=65% (Johnstone et al. 2011) F_{MSY}=69% (SAC 2011b)	International exception applies, ACLs are not applicable.
Queets	MSY range of 5,800 to 14,500 natural adult spawners (Lestelle et al 1984)		5,800 (Johnstone et al. 2011)	4,350 (Johnstone et al. 2011)	MFMT=65% (Johnstone et al. 2011) F_{MSY}=68% (SAC 2011b)	
Hoh	MSY range of 2,000 to 5,000 natural adult spawners (Lestelle et al. 1984)		2,520 (SAC 2010b)	1,890 S_{MSY}*0.75	MFMT=65% (Johnstone et al. 2011) F_{MSY}=69% (SAC 2011b)	
Quillayute - Fall	MSY range of 6,300 to 15,800 natural adult spawners (Lestelle et al. 1984)		6,300 (Johnstone et al. 2011)	4,725 (Johnstone et al. 2011)	MFMT=59%; F_{MSY}=59% (SAC 2011b)	
Strait of Juan de Fuca	Total allowable MSY exploitation rate of: 0.60 for ocean age-3 abundance > 27,445; 0.40 for ocean age-3 abundance >11,679 and ≤27,445; 0.20 for ocean age-3 abundance ≤11,679		11,000 (Bowhay et al. 2009)	7,000 (Bowhay et al. 2009)	60% (Bowhay et al. 2009)	
Hood Canal	Total allowable MSY exploitation rate of: 0.65 for ocean age-3 abundance > 41,000; 0.45 for ocean age-3 abundance >19,545 and ≤41,000; 0.20 for ocean age-3 abundance ≤19,545		14,350 (Bowhay et al. 2009)	10,750 (Bowhay et al. 2009)	65% (Bowhay et al. 2009)	
Skagit	Total allowable MSY exploitation rate of: 0.60 for ocean age-3 abundance > 62,500; 0.35 for ocean age-3 abundance >22,857 and ≤62,500; 0.20 for ocean age-3 abundance ≤22,857		25,000 (Bowhay et al. 2009)	14,857 (Bowhay et al. 2009)	60% (Bowhay et al. 2009)	
Stillaguamish	Total allowable MSY exploitation rate of: 0.50 for ocean age-3 abundance > 20,000; 0.35 for ocean age-3 abundance >9,385 and ≤20,000; 0.20 for ocean age-3 abundance ≤9,385		10,000 (Bowhay et al. 2009)	6,100 (Bowhay et al. 2009)	50% (Bowhay et al. 2009)	
Snohomish	Total allowable MSY exploitation rate of: 0.60 for ocean age-3 abundance > 125,000; 0.40 for ocean age-3 abundance >51,667 and ≤125,000; 0.20 for ocean age-3 abundance ≤51,667		50,000 (Bowhay et al. 2009)	31,000 (Bowhay et al. 2009)	60% (Bowhay et al. 2009)	

PINK (odd-numbered years)

Stocks In The Fishery	**Conservation Objective**	S_{MSY}	MSST	MFMT (F_{MSY})	ACL
Puget Sound	900,000 natural spawners or consistent with provisions of the Pacific Salmon Treaty (Fraser River Panel).	900,000	450,000	Undefined	International exception applies, ACLs are not applicable.

a/ Some hatchery goals and ESA consultation standards have been updated relative to the version of this table in the FMP.

TABLE A-2. Allowable fishery impact rate criteria for OCN coho stock components under the Salmon Fishery Management Plan Amendment 13.

		MARINE SURVIVAL INDEX (based on return of jacks per hatchery smolt)		
		Low (<0.0009)	**Medium** (0.0009 to 0.0034)	**High** (>0.0034)
PARENT SPAWNER STATUS		**Allowable Total Fishery Impact Rate**		
High:	Parent spawners achieved Level #2 rebuilding criteria; grandparent spawners achieved Level #1	≤15%	≤30% [a/]	≤35%[a/]
Medium:	Parent spawners achieved Level #1 or greater rebuilding criteria	≤15%	≤20%[a/]	≤25%[a/]
Low:	Parent spawners less than Level #1 rebuilding criteria	≤15% ≤10-13%[b/]	≤15%	≤15%

	OCN Coho Spawners by Stock Component				
Rebuilding Criteria	**Northern**	**North-Central**	**South-Central**	**Southern**	**Total**
Full Seeding at Low Marine Survival:	21,700	55,000	50,000	5,400	132,100
Level #2 (75% of full seeding):	16,400	41,300	37,500	4,100	99,300
Level #1 (50% of full seeding):	10,900	27,500	25,000	2,700	66,100
38% of Level #1 (19% of full seeding):	4,100	10,500	9,500	1,000	25,100

Stock Component (Boundaries)	**Full Seeding of Major Basins at Low Marine Survival (Number of Adult Spawners)**				
Northern: (Necanicum River to Neskowin Creek)	Nehalem 17,500	Tillamook 2,000	Nestucca 1,800	Ocean Tribs. 400	
North-Central: (Salmon River to Siuslaw River)	Siletz 4,300	Yaquina 7,100	Alsea 15,100	Siuslaw 22,800	Ocean Tribs. 5,700
South-Central: (Siltcoos River to Sixes River)	Umpqua 29,400	Coos 7,200	Coquille 5,400	Coastal Lakes 8,000	
Southern: (Elk River to Winchuck River)	Rogue 5,400				

a/ When a stock component achieves a medium or high parent spawner status under a medium or high marine survival index, but a major basin within the stock component is less than 10% of full seeding, (1) the parent spawner status will be downgraded one level to establish the allowable fishery impact rate for that component, and (2) no coho-directed harvest impacts will be allowed within that particular basin.

b/ This exploitation rate criteria applies when (1) parent spawners are less than 38% of the Level #1 rebuilding criteria, or (2) marine survival conditions are projected to be at an extreme low as in 1994-1996 (<0.0006 jack per hatchery smolt). If parent spawners decline to lower levels than observed through 1998, rates of less than 10% would be considered, recognizing that there is a limit to further bycatch reduction opportunities.

TABLE A-3. Fishery impact rate criteria for OCN coho stock components based on the harvest matrix resulting from the OCN work group 2000 review of Amendment 13.

Parent Spawner Status [a/]	Marine Survival Index (based on return of jacks per hatchery smolt): Extremely Low (<0.0008)	Low (0.0008 to 0.0014)	Medium (>0.0014 to 0.0040)	High (>0.0040)
High Parent Spawners > 75% of full seeding	E ≤ 8%	J ≤ 15%	O ≤ 30%	T ≤ 45%
Medium Parent Spawners > 50% & ≤ 75% of full seeding	D ≤ 8%	I ≤ 15%	N ≤ 20%	S ≤ 38%
Low Parent Spawners > 19% & ≤ 50% of full seeding	C ≤ 8%	H ≤ 15%	M ≤ 15%	R ≤ 25%
Very Low Parent Spawners > 4 fish per mile & ≤ 19% of full seeding	B ≤ 8%	G ≤ 11%	L ≤ 11%	Q ≤ 11%
Critical [b/] Parental Spawners ≤ 4 fish per mile	A 0 - 8%	F 0 - 8%	K 0 - 8%	P 0 - 8%

Sub-aggregate and Basin Specific Spawner Criteria Data

Sub-aggregate	Miles of Available Spawning Habitat	100% of Full Seeding	"Critical"		Very Low, Low, Medium & High		
			4 Fish per Mile	12% of Full Seeding	19% of Full Seeding	50% of Full Seeding	75% of full Seeding
Northern	899	21,700	3,596	NA	4,123	10,850	16,275
North - Central	1,163	55,000	4,652	NA	10,450	27,500	41,250
South - Central	1,685	50,000	6,740	NA	9,500	25,000	37,500
Southern	450	5,400	NA	648	1,026	2,700	4,050
Coastwide Total	4,197	132,100	15,636		25,099	66,050	99,075

a/ Parental spawner abundance status for the OCN aggergate assumes the status of the weakest sub-aggregate.

b/ "Critical" parental spawner status is defined as 4 fish per mile for the Northern, North-Central, and South-Central subaggergates. Because the ratio of high quality spawning habitat to total spawning habitat in the Rogue River Basin differs significantly from the rest of the basins on the coast, the spawner density of 4 fish per mile does not represent "Critical" status for that basin. Instead. "Critical" status for the Rogue Basin (Southern Sub-aggergate) is estimated as 12% of full seeding of high quality

TABLE A-4. Fishery impact rate criteria for OCN coho stock components based on the harvest matrix resulting from the OCN work group 2000 review of Amendment 13 including modifications to the marine survival index adopted during the 2012 and 2013 methodology reviews.

Parent Spawner Status[a/]	Marine Survival Index (Wild adult coho salmon survival as predicted by the two-variable GAM ensemble forecast)			
	Extremely Low <2%	Low 2%-4.5%	Medium >4.5%-8%	High >8%
High Parent Spawners > 75% of full seeding	E ≤ 8%	J ≤ 15%	O ≤ 30%	T ≤ 45%
Medium Parent Spawners > 50% & ≤ 75% of full seeding	D ≤ 8%	I ≤ 15%	N ≤ 20%	S ≤ 38%
Low Parent Spawners > 19% & ≤ 50% of full seeding	C ≤ 8%	H ≤ 15%	M ≤ 15%	R ≤ 25%
Very Low Parent Spawners > 4 fish per mile & ≤ 19% of full seeding	B ≤ 8%	G ≤ 11%	L ≤ 11%	Q ≤ 11%
Critical Parent Spawners ≤4 fish per mile	A 0 – 8%	F 0 – 8%	K 0 – 8%	P 0 – 8%

Sub-aggregate and Basin Specific Spawner Criteria Data

Sub-aggregate	Miles of Available Spawning Habitat	100% of Full Seeding	"Critical"		Very Low, Low, Medium & High		
			4 Fish per Mile	12% of Full Seeding	19% of Full Seeding	50% of Full Seeding	75% of Full Seeding
Northern	899	21,700	3,596	NA	4,123	10,850	16,275
North-Central	1,163	55,000	4,652	NA	10,450	27,500	41,250
South-Central	1,685	50,000	6,740	NA	9,500	25,000	37,500
Southern *(Removed per adoption of Amendment 16)*							
Coastwide Total	*3,747*	*126,700*	*14,988*		*24,073*	*63,350*	*95,025*

a/ Parental spawner abundance status for the OCN aggregate assumes the status of the weakest sub-aggregate.

TABLE A-5. Council adopted management objectives for Puget Sound natural coho management units, expressed as exploitation rate ceilings for critical, low and normal abundance based status categories, with runsize breakpoints (abundances expressed as ocean age-3).

	Management Unit				
Status	**Strait of Juan de Fuca**	**Hood Canal**	**Skagit**	**Stillaguamish**	**Snohomish**
Critical/Low Runsize Breakpoint	11,679	19,545	22,857	9,385	51,667
Critical Exploitation Rate	0.2	0.2	0.2	0.2	0.2
Low/normal runsize breakpoint	27,445	41,000	62,500	20,000	125,000
Low Exploitation Rate	0.4	0.45	0.35	0.35	0.4
Normal Exploitation Rate	0.6	0.65	0.6	0.5	0.6

TABLE A-6. Council recommended management objectives for Lower Columbia River natural tule Chinook, expressed as exploitation rate ceilings for abundance based status categories, with runsize forecast bins expressed as adult river mouth return forecasts of Lower Columbia River hatchery tule Chinook.

Runsize Forecast Bins	<30,000	30,000 to 40,000	40,000 to 85,000	>85,000
Maximum Exploitation Rate	0.30	0.35	0.38	0.41

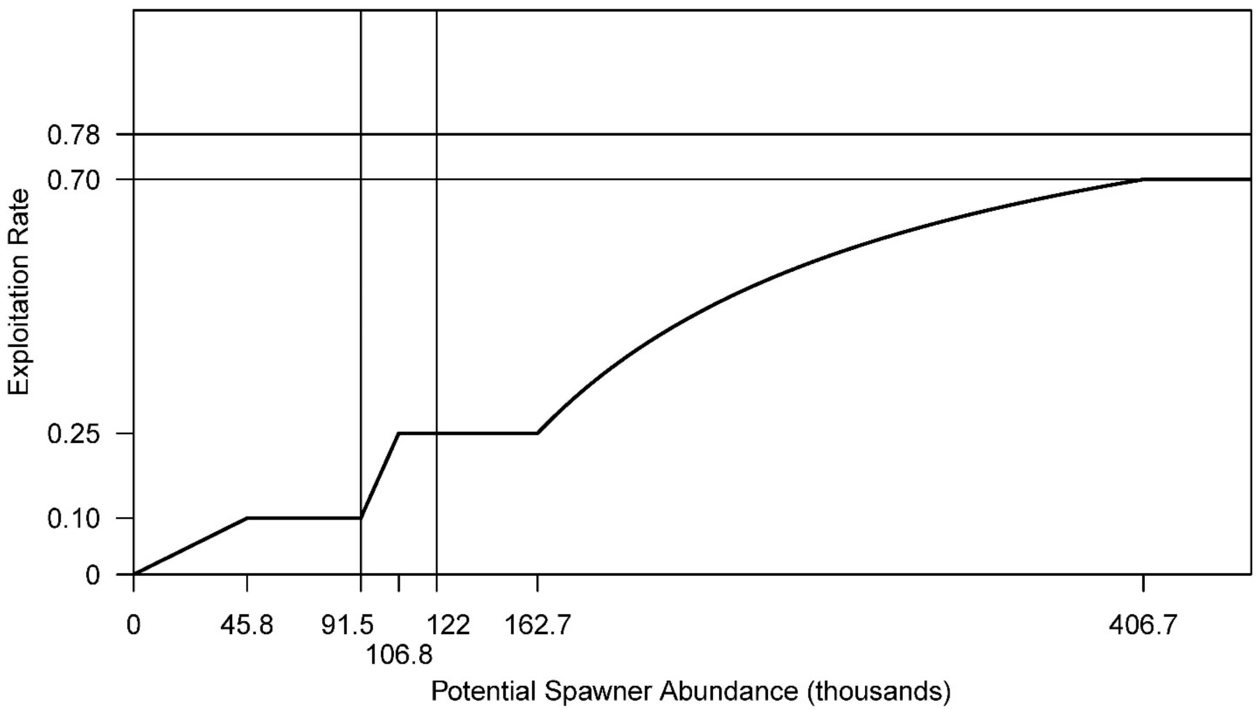

FIGURE A-1. Sacramento River fall Chinook control rule. Potential spawner abundance is the predicted hatchery and natural area adult spawners in the absence of fisheries, which is equivalent to the Sacramento Index. See the salmon FMP, Section 3.3.6, for control rule details.

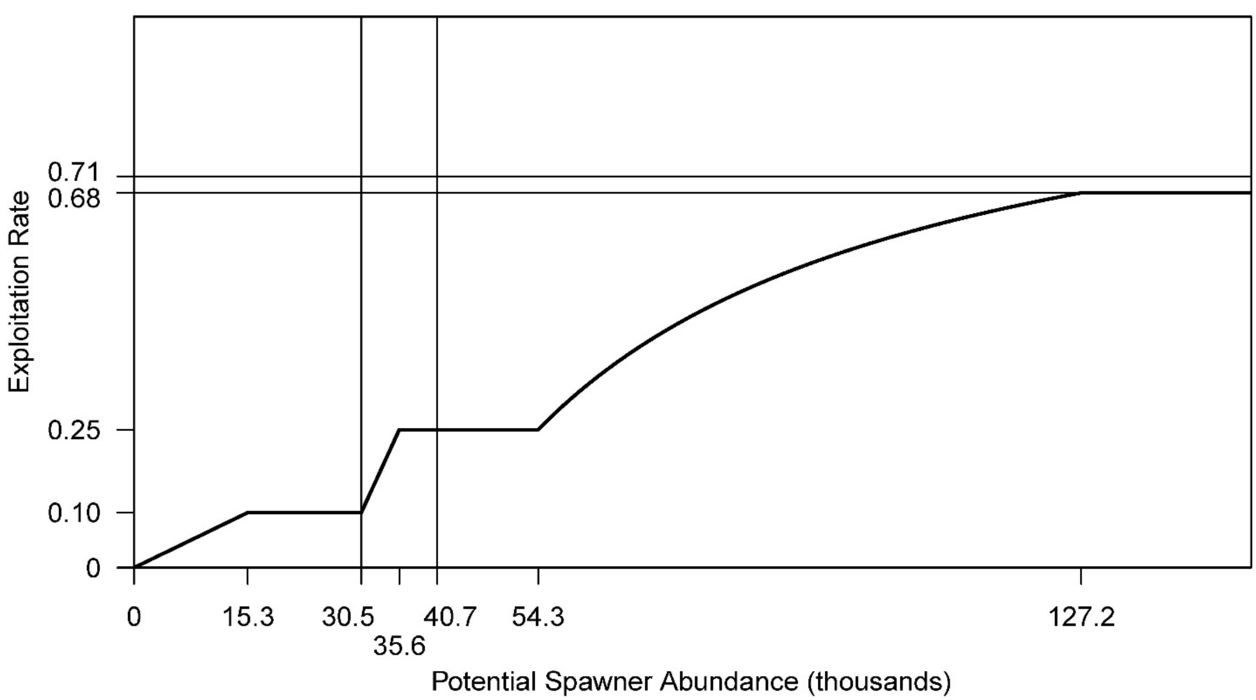

FIGURE A-2. Klamath River fall Chinook control rule. Potential spawner abundance is the predicted natural area adult spawners in the absence of fisheries. See the salmon FMP, Section 3.3.6, for control rule details.

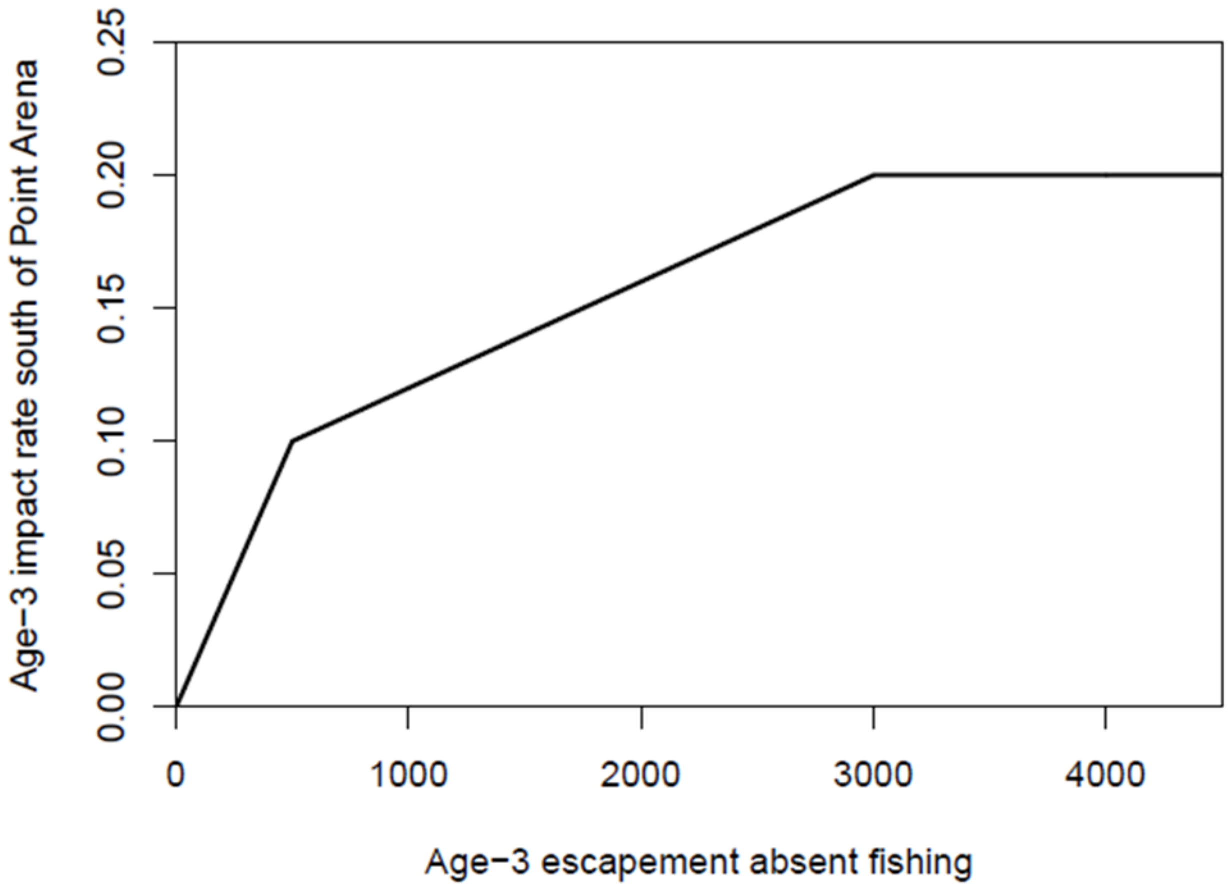

FIGURE A-3. Sacramento River winter Chinook impact rate control rule. The maximum forecast age-3 impact rate for the area south of Point Arena, California, is determined by the forecasted age-3 escapement absent fishing.

APPENDIX B
SALMON HARVEST ALLOCATION SCHEDULES

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5.3 ALLOCATION

> *"A Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges."*
>
> *Magnuson-Stevens Act, National Standard 4*

Harvest allocation is required when the number of fish is not adequate to satisfy the perceived needs of the various fishing industry groups and communities, to divide the catch between non-Indian ocean and inside fisheries and among ocean fisheries, and to provide federally recognized treaty Indian fishing opportunity. In allocating the resource between ocean and inside fisheries, the Council considers both in-river harvest and spawner escapement needs. The magnitude of in-river harvest is determined by the states in a variety of ways, depending upon the management area. Some levels of in-river harvests are designed to accommodate federally recognized in-river Indian fishing rights, while others are established to allow for non-Indian harvests of historical magnitudes. Several fora exist to assist this process on an annual basis. The North of Cape Falcon Forum, a state and tribal sponsored forum, convenes the pertinent parties during the Council's preseason process to determine allocation and conservation recommendations for fisheries north of Cape Falcon. The individual states also convene fishery industry meetings to coordinate their input to the Council.

5.3.1 Commercial (Non-Tribal) and Recreational Fisheries North of Cape Falcon

5.3.1.1 Goal, Objectives, and Priorities

Harvest allocations will be made from a total allowable ocean harvest, which is maximized to the largest extent possible but still consistent with PST and treaty-Indian obligations, state fishery needs, and spawning escapement requirements, including consultation standards for stocks listed under the ESA. The Council shall make every effort to establish seasons and gear requirements that provide troll and recreational fleets a reasonable opportunity to catch the available harvest. These may include single-species directed fisheries with landing restrictions for other species.

The goal of allocating ocean harvest north of Cape Falcon is to achieve, to the greatest degree possible, the objectives for the commercial and recreational fisheries as follows:

- Provide recreational opportunity by maximizing the duration of the fishing season while minimizing daily and area closures and restrictions on gear and daily limits.

- Maximize the value of the commercial harvest while providing fisheries of reasonable duration.

The priorities listed below will be used to help guide establishment of the final harvest allocation while meeting the overall commercial and recreational fishery objectives.

At total allowable harvest levels up to 300,000 coho and 100,000 Chinook:

- Provide coho to the recreational fishery for a late June through early September all-species season. Provide Chinook to allow (1) access to coho and, if possible, (2) a minimal Chinook-only fishery prior to the all-species season. Adjust days per week and/or institute area restrictions to stabilize season duration.

- Provide Chinook to the troll fishery for a May and early June Chinook season and provide coho to (1) meet coho hooking mortality in June where needed and (2) access a pink salmon fishery in odd years. Attempt to ensure that part of the Chinook season will occur after June 1.

At total allowable harvest levels above 300,000 coho and above 100,000 Chinook:

- Relax any restrictions in the recreational all-species fishery and/or extend the all-species season beyond Labor Day as coho quota allows. Provide Chinook to the recreational fishery for a Memorial Day through late June Chinook-only fishery. Adjust days per week to ensure continuity with the all-species season.

- Provide coho for an all-salmon troll season in late summer and/or access to a pink fishery. Leave adequate Chinook from the May through June season to allow access to coho.

5.3.1.2 Allocation Schedule Between Gear Types

Initial commercial and recreational allocation will be determined by the schedule of percentages of total allowable harvest as follows:

TABLE 5-1. Initial commercial/recreational harvest allocation schedule north of Cape Falcon.

Coho			Chinook		
Harvest (thousands of fish)	Percentage[a/]		Harvest (thousands of fish)	Percentage[a/]	
	Troll	Recreational		Troll	Recreational
0-300	25	75	0-100	50	50
>300	60	40	>100-150	60	40
			>150	70	30

a/ The allocation must be calculated in additive steps when the harvest level exceeds the initial tier.

This allocation schedule should, on average, allow for meeting the specific fishery allocation priorities described above. The initial allocation may be modified annually by preseason and inseason trades to better achieve (1) the commercial and recreational fishery objectives and (2) the specific fishery allocation priorities. The final preseason allocation adopted by the Council will be expressed in terms of quotas, which are neither guaranteed catches nor inflexible ceilings. Only the total ocean harvest quota is a maximum allowable catch.

To provide flexibility to meet the dynamic nature of the fisheries and to assure achievement of the allocation objectives and fishery priorities, deviations from the allocation schedule will be allowed as provided below and as described in Section 6.5.3.2 for certain selective fisheries.

1. Preseason species trades (Chinook and coho) that vary from the allocation schedule may be made by the Council based upon the recommendation of the pertinent recreational and commercial SAS representatives north of Cape Falcon. The Council will compare the socioeconomic impacts of any such recommendation to those of the standard allocation schedule before adopting the allocation that best meets FMP management objectives.

2. Inseason transfers, including species trades of Chinook and coho, may be permitted in either direction between recreational and commercial fishery allocations to allow for uncatchable fish in one fishery to be reallocated to the other. Fish will be deemed "uncatchable" by a respective commercial or recreational fishery only after considering all possible annual management actions to allow for their harvest which meet framework harvest management objectives, including single species or exclusive registration fisheries. Implementation of inseason transfers will require (1) consultation with the pertinent recreational and commercial SAS members and the STT, and (2) a clear establishment of available fish and impacts from the transfer.

3. An exchange ratio of four coho to one Chinook shall be considered a desirable guideline for preseason trades. Deviations from this guideline should be clearly justified. Inseason trades and transfers may vary to meet overall fishery objectives. (The exchange ratio of four coho to one Chinook approximately equalizes the species trade in terms of average ex-vessel values of the two salmon species in the commercial fishery. It also represents an average species catch ratio in the recreational fishery.)

4. Any increase or decrease in the recreational or commercial total allowable catch (TAC), resulting from an inseason restructuring of a fishery or other inseason management action, does not require reallocation of the overall north of Cape Falcon non-Indian TAC.

5. The commercial TACs of Chinook and coho derived during the preseason allocation process may be varied by major subareas (i.e., north of Leadbetter Point and south of Leadbetter Point) if there is a need to do so to decrease impacts on weak stocks. Deviations in each major subarea will generally not exceed 50 percent of the TAC of each species that would have been established without a geographic deviation in the distribution of the TAC. Deviation of more than 50 percent will be based on a conservation need to protect weak stocks and will provide larger overall harvest for the entire fishery north of Cape Falcon than would have been possible without the deviation. In addition, the actual harvest of coho may deviate from the initial allocation as provided in Section 6.5.3.2 for certain selective fisheries.

6. The recreational TACs of Chinook and coho derived during the preseason allocation process will be distributed among four major recreational port areas as described for coho and Chinook distribution in Section 5.3.1.3. The Council may deviate from subarea quotas (1) to meet recreational season objectives based on agreement of representatives of the affected ports and/or (2) in accordance with Section 6.5.3.2 with regard to certain selective fisheries. Additionally, based on the recommendations of the SAS members representing the ocean sport fishery north of Cape Falcon, the Council will include criteria in its preseason salmon management recommendations to guide any inseason transfer of coho among the recreational subareas to meet recreational season duration objectives. Inseason redistributions of quotas within the recreational fishery or the distribution of allowable coho catch transfers from the commercial fishery may deviate from the preseason distribution.

5.3.1.3 Recreational Subarea Allocations

Coho

The north of Cape Falcon preseason recreational TAC of coho will be distributed to provide 50 percent to the area north of Leadbetter Point and 50 percent to the area south of Leadbetter Point. The distribution of the allocation north of Leadbetter point will vary, depending on the existence and magnitude of an inside fishery in Area 4B, which is served by Neah Bay.

In years with no Area 4B fishery, the distribution of coho north of Leadbetter Point (50 percent of the total recreational TAC) will be divided to provide 74 percent to the area between Leadbetter Point and the Queets River (Westport), 5.2 percent to the area between Queets River and Cape Flattery (La Push), and 20.8 percent to the area north of the Queets River (Neah Bay). In years when there is an Area 4B (Neah Bay) fishery under state management, the allocation percentages north of Leadbetter Point will be modified to maintain more equitable fishing opportunity among the ports by decreasing the ocean harvest share for Neah Bay. This will be accomplished by adding 25 percent of the numerical value of the Area 4B fishery to the recreational TAC north of Leadbetter Point prior to calculating the shares for Westport and La Push. The increase to Westport and La Push will be subtracted from the Neah Bay ocean share to maintain the same total harvest allocation north of Leadbetter Point. Table 5-2 displays the resulting percentage allocation of the total recreational coho catch north of Cape Falcon among the four recreational port areas (each port area allocation will be rounded to the nearest hundred fish, with the largest quotas rounded downward if necessary to sum to the TAC).

TABLE 5-2. Percentage allocation of total allowable coho harvest among the four recreational port areas north of Cape Falcon.[a/]

Port Area	Without Area 4B Add-on	With Area 4B Add-on	
Columbia River	50.0%	50.0%	
Westport	37.0%	37.0%	plus 17.3% of the Area 4B add-on
La Push	2.6%	2.6%	plus 1.2% of the Area 4B add-on
Neah Bay	10.4%	10.4%	minus 18.5% of the Area 4B add-on

a/ The Council may deviate from these percentages as described under #6 in Section 5.3.1.2.

TABLE 5-3. Example distributions of the recreational coho TAC north of Leadbetter Point.

Sport TAC North of Cape Falcon	Without Area 4B Add-On				With Area 4B Add-On a/					
	Columbia River	Westport	La Push	Neah Bay	Columbia River	Westport	La Push	Neah Bay		
								Ocean	Add-on	Total
50,000	25,000	18,500	1,300	5,200	25,000	19,900	1,400	3,700	8,000	11,700
150,000	75,000	55,500	3,900	15,600	75,000	57,600	4,000	13,600	12,000	25,600
300,000	150,000	111,000	7,800	31,200	150,000	114,500	8,000	27,500	20,000	47,500

a/ The add-on levels are merely examples. The actual numbers in any year would depend on the particular mix of stock abundances and season determinations.

Chinook

Subarea distributions of Chinook will be managed as guidelines and shall be calculated by the STT with the primary objective of achieving all-species fisheries without imposing Chinook restrictions (i.e., area closures or bag limit reductions). Chinook in excess of all-species fisheries needs may be utilized by directed Chinook fisheries north of Cape Falcon or by negotiating a Chinook/coho trade with another fishery sector.

Inseason management actions may be taken by the NMFS NW Regional Administrator to assure that the primary objective of the Chinook harvest guidelines for each of the four recreational subareas north of Cape Falcon are met. Such actions might include closures from 0 to 3, or 0 to 6, or 3 to 200, or 5 to 200 nautical miles from shore; closure from a point extending due west from Tatoosh Island for 5 miles, then south to a point due west of Umatilla Reef Buoy, then due east to shore; closure from North Head at the Columbia

River mouth north to Leadbetter Point; change species that may be landed; or other actions as prescribed in the annual regulations.

5.3.2 Commercial and Recreational Fisheries South of Cape Falcon

The allocation of allowable ocean harvest of coho salmon south of Cape Falcon has been developed to provide a more stable recreational season and increased economic benefits of the ocean salmon fisheries at varying stock abundance levels. When coupled with various recreational harvest reduction measures or the timely transfer of unused recreational allocation to the commercial fishery, the allocation schedule is designed to help secure recreational seasons extending at least from Memorial Day through Labor Day when possible, assist in maintaining commercial markets even at relatively low stock sizes, and fully utilize available harvest. Total ocean catch of coho south of Cape Falcon will be treated as a quota to be allocated between troll and recreational fisheries as provided in Table 5-4.

(Note: The allocation schedule provides guidance only when coho abundance permits a directed coho harvest, not when the allowable impacts are insufficient to allow coho retention south of Cape Falcon. At such low levels, allocation of the allowable impacts will be accomplished during the Council's preseason process.)

TABLE 5-4. Allocation of allowable ocean harvest of coho salmon (thousands of fish) south of Cape Falcon.[a/]

Total Allowable Ocean Harvest	Recreational Allocation		Commercial Allocation	
	Number	Percentage	Number	Percentage
#100	#100[b/c/]	100[b/]	b/	b/
200	167[b/c/]	84[b/]	33[b/]	17[b/]
300	200	67	100	33
350	217	62	133	38
400	224	56	176	44
500	238	48	262	52
600	252	42	348	58
700	266	38	434	62
800	280	35	520	65
900	290	32	610	68
1,000	300	30	700	70
1,100	310	28	790	72
1,200	320	27	880	73
1,300	330	25	970	75
1,400	340	24	1,060	76
1,500	350	23	1,150	77
1,600	360	23	1,240	78
1,700	370	22	1,330	78
1,800	380	21	1,420	79

1,900	390	21	1,510	79
2,000	400	20	1,600	80
2,500	450	18	2,050	82
3,000	500	17	2,500	83

a/ The allocation schedule is based on the following formula: first 150,000 coho to the recreational base (this amount may be reduced as provided in footnote b); over 150,000 to 350,000 fish, share at 2:1, 0.667 to troll and 0.333 to recreational; over 350,000 to 800,000 the recreational share is 217,000 plus 14% of the available fish over 350,000; above 800,000 the recreational share is 280,000 plus 10% of the available fish over 800,000.

Note: The allocation schedule provides guidance only when coho abundance permits a directed coho harvest, not when the allowable impacts are insufficient to allow general coho retention south of Cape Falcon. At such low levels, allocation of the allowable impacts will be determined in the Council's preseason process. Deviations from the allocation may also be allowed to meet consultation standards for ESA-listed stocks (e.g., the 1998 biological opinion for California coastal coho requires no retention of coho in fisheries off California).

b/ If the commercial allocation is insufficient to meet the projected hook-and-release mortality associated with the commercial all-salmon-except-coho season, the recreational allocation will be reduced by the number needed to eliminate the deficit.

c/ When the recreational allocation is 167,000 coho or less, special allocation provisions apply to the recreational harvest distribution by geographic area (unless superseded by requirements to meet a consultation standard for ESA-listed stocks); see text of FMP as modified by Amendment 11 allocation provisions.

The allocation schedule is designed to give sufficient coho to the recreational fishery to increase the probability of attaining no less than a Memorial Day to Labor Day season as stock sizes increase. This increased allocation means that, in many years, actual catch in the recreational fishery may fall short of its allowance. In such situations, managers will make an inseason reallocation of unneeded recreational coho to the south of Cape Falcon troll fishery. The reallocation should be structured and timed to allow the commercial fishery sufficient opportunity to harvest any available reallocation prior to September 1, while still assuring completion of the scheduled recreational season (usually near mid-September) and, in any event, the continuation of a recreational fishery through Labor Day. This reallocation process will occur no later than August 15 and will involve projecting the recreational fishery needs for the remainder of the summer season. The remaining projected recreational catch needed to extend the season to its scheduled closing date will be a harvest guideline rather than a quota. If the guideline is met prior to Labor Day, the season may be allowed to continue if further fishing is not expected to result in any considerable danger of impacting the allocation of another fishery or of failing to meet an escapement goal.

The allocation schedule is also designed to assure there are sufficient coho allocated to the troll fishery at low stock levels to ensure a full Chinook troll fishery. This hooking mortality allowance will have first priority within the troll allocation. If the troll allocation is insufficient for this purpose, the remaining number of coho needed for the estimated incidental coho mortality will be deducted from the recreational share. At higher stock sizes, directed coho harvest will be allocated to the troll fishery after hooking mortality needs for Chinook troll fishing have been satisfied.

The allowable harvest south of Cape Falcon may be further partitioned into subareas to meet management objectives of the FMP. Allowable harvests for subareas south of Cape Falcon will be determined by an annual blend of management considerations including:

1. Abundance of contributing stocks
2. Allocation considerations of concern to the Council
3. Relative abundance in the fishery between Chinook and coho
4. Escapement goals
5. Maximizing harvest potential

Troll coho quotas may be developed for subareas south of Cape Falcon consistent with the above criteria. California recreational catches of coho, including projections of the total catch to the end of the season, would be included in the recreational allocation south of Cape Falcon, but the area south of the Oregon-

California border would not close when the allocation is met; except as provided below when the recreational allocation is at 167,000 or fewer fish.

When the south of Cape Falcon recreational allocation is equal to or less than 167,000 coho:

1. The recreational fisheries will be divided into two major subareas, as listed in #2 below, with independent quotas (i.e., if one quota is not achieved or is exceeded, the underage or overage will not be added to or deducted from the other quota; except as provided under #3 below).

2. The two major recreational subareas will be managed within the constraints of the following impact quotas, expressed as a percentage of the total recreational allocation (percentages based on avoiding large deviations from the historical harvest shares):

   a. Central Oregon (Cape Falcon to Humbug Mountain) - 70 percent

   b. South of Humbug Mountain - 30 percent

   In addition,
   (1) Horse Mountain to Point Arena will be managed for an impact guideline of 3 percent of the south of Cape Falcon recreational allocation, and

   (2) There will be no coho harvest constraints south of Point Arena. However, the projected harvest in this area (which averaged 1,800 coho from 1986-1990) will be included in the south of Humbug Mountain impact quota.

3. Coho quota transfers can occur on a one-for-one basis between subareas if Chinook constraints preclude access to coho.

5.3.3 Tribal Indian Fisheries

5.3.3.1 California

On October 4, 1993 the Solicitor, Department of Interior, issued a legal opinion in which he concluded that the Yurok and Hoopa Valley Indian tribes of the Klamath River Basin have a federally protected right to the fishery resource of their reservations sufficient to support a moderate standard of living or 50 percent of the total available harvest of Klamath-Trinity basin salmon, whichever is less. The Secretary of Commerce recognized the tribes' federally reserved fishing right as applicable law for the purposes of the MSA (58 FR 68063, December 23, 1993). The Ninth Circuit Court of Appeals upheld the conclusion that the Hoopa Valley and Yurok tribes have a federally reserved right to harvest fish in Parravano v. Babbitt and Brown, 70 F.3d 539 (1995) (Cert. denied in Parravano v. Babbitt and Brown 110, S.Ct 2546 [1996]). The Council must recognize the tribal allocation in setting its projected escapement level for the Klamath River.

5.3.3.2 Columbia River

Pursuant to a September 1, 1983 Order of the U.S. District Court, the allocation of harvest in the Columbia River was established under the "Columbia River Fish Management Plan" which was implemented in 1988 by the parties of U.S. v. Oregon. This plan replaced the original 1977 plan (pages 16-20 of the 1978 FMP). Since the Columbia River Fishery Management Plan expired on December 31, 1998, fall Chinook in Columbia River fisheries were managed through 2007 under the guidance of annual management agreements among the U.S. v. Oregon parties. In 2008, a new 10 year management agreement was negotiated through the U.S. v. Oregon process, which included revisions to some in-river objectives. A second 10-year plan was negotiated and is in effect for 2018-2027. The 2018-2027 U.S. v Oregon Management Agreement provides a framework within which the relevant parties may exercise their sovereign powers in a coordinated and systematic manner in order to protect, rebuild, and enhance upper Columbia River fish runs while providing harvest for both treaty Indian and non-Indian fisheries. The parties to the agreement are the United States, the states of Oregon, Washington, and Idaho, and four Columbia River treaty Indian tribes-Warm Springs, Yakama, Nez Perce, and Umatilla.

5.3.3.3 U.S. v. Washington Area

Treaty Indian tribes have a legal entitlement to the opportunity to take up to 50 percent of the harvestable surplus of stocks which pass through their usual and accustomed fishing areas. The treaty Indian troll harvest which would occur if the tribes chose to take their total 50 percent share of the weakest stock in the ocean, is computed with the current version of the Fishery Regulation Assessment Model (FRAM), assuming this level of harvest did not create conservation or allocation problems on other stocks. A quota may be established in accordance with the objectives of the relevant treaty tribes concerning allocation of the treaty Indian share to ocean and inside fisheries. The total quota does not represent a guaranteed ocean harvest, but a maximum allowable catch.

The requirement for the opportunity to take up to 50 percent of the harvestable surplus determines the treaty shares available to the inside/outside Indian and all-citizen fisheries. Ocean coho harvest ceilings off the Washington coast for treaty Indians and all-citizen fisheries are independent within the constraints that (1) where feasible, conservation needs of all stocks must be met; (2) neither group precludes the other from the opportunity to harvest its share, and; (3) allocation schemes may be established to specify outside/inside sharing for various stocks.

6.5 SEASONS AND QUOTAS

For each management area or subarea, the Council has the option of managing the commercial and recreational fisheries for either coho or Chinook using the following methods: (1) fixed quotas and seasons; (2) adjustable quotas and seasons; and (3) seasons only. The Council may also use harvest guidelines within quotas or seasons to trigger inseason management actions established in the preseason regulatory process.

Quotas provide very precise management targets and work best when accurate estimates of stock abundance and distribution are available, or when needed to ensure protection of depressed stocks from potential overfishing. The Council does not view quotas as guaranteed harvests, but rather the maximum allowable harvest, which assures meeting the conservation objective of the species or stock of concern. While time and area restrictions are not as precise as quotas, they allow flexibility for effort and harvest to vary in response to abundance and distribution.

6.5.1 Preferred Course of Action

Because of the need to use both seasons and quotas, depending on the circumstances, the Council will make the decision regarding seasons and quotas annually during the preseason regulatory process, subject to the limits specified below. Fishing seasons and quotas also may be modified during the season as provided under Section 10.2.

6.5.2 Procedures for Calculating Seasons

Seasons will be calculated using the total allowable ocean harvest determined by procedures described in Chapter 5, and further allocated to the commercial and recreational fishery in accordance with the allocation plan presented in Section 5.3, and after consideration of the estimated amount of effort required to catch the available fish, based on past seasons.

Recreational seasons will be established with the goal of encompassing Memorial Day and/or Labor Day weekends in the season, if feasible. Opening dates will be adjusted to provide reasonable assurance that the recreational fishery is continuous, minimizing the possibility of an in-season closure.

Criteria used to establish commercial seasons, in addition to the estimated allowable ocean harvests, the allocation plan, and the expected effort during the season, will be: (1) bycatch mortality; (2) size, poundage, and value of fish caught; (3) effort shifts between fishing areas; (4) harvest of pink salmon in odd-numbered years; and (5) protection for weak stocks when they frequent the fishing areas at various times of the year.

6.5.3 Species-Specific and Other Selective Fisheries

6.5.3.1 Guidelines

In addition to the all-species and single or limited species seasons established for the commercial and recreational fisheries, other species-limited fisheries, such as "ratio" fisheries and fisheries selective for marked or hatchery fish, may be adopted by the Council during the preseason regulatory process. In adopting such fisheries, the Council will consider the following guidelines:

1. Harvestable fish of the target species are available.
2. Harvest impacts on incidental species will not exceed allowable levels determined in the management plan.
3. Proven, documented, selective gear exists (if not, only an experimental fishery should be considered).
4. Significant wastage of incidental species will not occur, or a written economic analysis demonstrates the landed value of the target species exceeds the potential landed value of the wasted species.
5. The selective fishery will occur in an acceptable time and area where wastage can be minimized and target stocks are maximally available.
6. Implementation of selective fisheries for marked or hatchery fish must be in accordance with U.S. v. Washington stipulation and order concerning co-management and mass marking (Case No. 9213, Subproceeding No. 96-3) and any subsequent stipulations or orders of the U.S. District Court, and consistent with international objectives under the PST (e.g., to ensure the integrity of the coded-wire tag program).

6.5.3.2 Selective Fisheries Which May Change Allocation Percentages North of Cape Falcon

As a tool to increase management flexibility to respond to changing harvest opportunities, the Council may implement deviations from the specified port area allocations and/or gear allocations to increase harvest opportunity through mark-selective fisheries. The benefits of any mark-selective fishery will vary from year to year and fishery to fishery depending on stock abundance, the mix of marked and unmarked fish, projected hook-and-release mortality rates, and public acceptance. These factors should be considered on an annual and case-by-case basis when utilizing mark-selective fisheries. The deviations for mark-selective fisheries are subordinate to the allocation priorities in Section 5.3.1.1 and may be allowed under the following management constraints:

1. Mark-Selective fisheries will first be considered during the months of May and/or June for Chinook and July through September for coho. However, the Council may consider mark-selective fisheries at other times, depending on year to year circumstances identified in the preceding paragraph.
2. The total impacts within each port area or gear group on the critical natural stocks of management concern are not greater than those under the original allocation without the mark-selective fisheries.
3. Other allocation objectives (i.e., treaty Indian, or ocean and inside allocations) are satisfied during negotiations in the North of Cape Falcon Forum.
4. The mark-selective fishery is assessed against the guidelines in Section 6.5.3.1.
5. Mark-selective fishery proposals need to be made in a timely manner in order to allow sufficient time for analysis and public comment on the proposal before the Council finalizes its fishery recommendations.

If the Council chooses to deviate from specified port and/or gear allocations, the process for establishing a mark-selective fishery would be as follows:

1. Allocate the TAC among the gear groups and port areas according to the basic FMP allocation process described in Section 5.3.1 without the mark-selective fishery.
2. Each gear group or port area may utilize the critical natural stock impacts allocated to its portion of the TAC to access additional harvestable, marked fish, over and above the harvest share established in step one, within the limits of the management constraints listed in the preceding paragraph.

6.5.4 Procedures for Calculating Quotas

Quotas will be based on the total allowable ocean harvest and the allocation plan as determined by the procedures of Chapter 5.

To the extent adjustable quotas are used, they may be subject to some or all of the following inseason adjustments:

1. For coho, private hatchery contribution to the ocean fisheries in the OPI area.
2. Unanticipated loss of shakers (bycatch mortality of undersized fish or unauthorized fish of another species that have to be returned to the water) during the season. (Adjustment for coho hooking mortality during any all-salmon-except-coho season will be made when the quotas are established.)
3. Any catch that take place in fisheries within territorial waters that are inconsistent with federal regulations in the EEZ.
4. If the ability to update inseason stock abundance is developed in the future, adjustments to total allowable harvest could be made, where appropriate.
5. The ability to redistribute quotas between subareas depending on the performance toward achieving the overall quota in the area.

Changes in the quotas as a result of the inseason adjustment process will be avoided unless the changes are of such magnitude that they can be validated by the STT and Council, given the precision of the original estimates.

The basis for determining the private hatchery contribution in (1) above will be either coded-wire tag analysis or analysis of scale patterns, whichever is determined by the STT to be more accurate, or another more accurate method that may be developed in the future, as determined by the STT and Council.

In reference to (4) and (5) above, if reliable techniques become available for making inseason estimates of stock abundance, and provision is made in any season for its use, a determination of techniques to be applied will be made by the Council through the Salmon Methodology Review process and discussed during the preseason regulatory process.

6.5.5 Procedures for Regulating Ocean Harvests of Pink and Sockeye

Sockeye salmon are only very rarely caught in Council-managed ocean salmon fisheries and no specific procedures have been established to regulate their harvest. Procedures for pink salmon are as follows:

1. All-species seasons will be planned such that harvest of pink salmon can be maximized without exceeding allowable harvests of Chinook and/or coho and within conservation and allocation constraints of the pink stocks.
2. Species specific or ratio fisheries for pink salmon will be considered under the guidelines for species specific fisheries presented in Section 6.5.3, and allocation constraints of the pink stocks.

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OREGON PRODUCTION INDEX DATA

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TABLE C-1. Millions of coho smolts [a/] released annually into the OPI area by geographic area and rearing agency.

Year or Average	Columbia River						Oregon Coast				
		Washington						Private			
	Oregon	Early	Late	Combined	Federal	Total	ODFW[b/]	Yearlings	Total	California	Total OPI
1960-1965	5.6	-	-	6.1	4.5	16.2	2.0	-	2.0	0.4	18.6
1966-1970	6.0	10.2	4.9	15.1	6.5	27.6	2.9	0.0	2.9	1.3	31.8
1971-1975	6.8	10.7	6.8	17.5	4.5	28.8	3.9	0.0	3.9	1.2	33.9
1976-1980	8.0	7.3	10.1	17.4	4.7	30.1	3.8	1.4	5.2	0.7	36.0
1981-1985	7.1	4.3	14.4	18.7	3.2	29.0	3.9	3.3	7.2	0.7	36.9
1986-1990	7.3	3.1	15.6	18.7	4.1	30.1	5.2	1.9	7.1	1.4	38.6
1991-1995	9.8	3.6	13.9	17.5	3.5	30.8	4.9	-	4.9	0.9	36.6
1996-2000	7.2	4.5	10.9	15.4	4.3	26.9	2.0	-	2.0	0.6	29.4
2001	7.6	4.2	9.7	13.9	3.7	25.2	0.9	-	0.9	0.6	26.7
2002	7.5	3.3	8.6	11.9	4.3	23.7	1.0	-	1.0	0.6	25.3
2003	8.2	3.3	8.7	12.0	3.1	23.3	0.8	-	0.8	0.5	24.6
2004	6.7	3.0	8.8	11.8	3.6	22.1	0.8	-	0.8	0.6	23.5
2005	6.1	2.5	9.1	11.6	2.8	20.6	0.8	-	0.8	0.6	22.0
2006	6.1	2.8	9.0	11.7	2.6	20.4	0.8	-	0.8	0.6	21.8
2007	6.2	3.1	9.0	12.1	3.1	21.4	0.7	-	0.7	0.6	22.6
2008	6.9	2.8	9.2	12.0	2.9	21.9	0.4	-	0.4	0.5	22.8
2009	6.9	2.5	8.3	10.8	3.2	20.9	0.4	-	0.4	0.6	21.8
2010	5.9	2.0	7.5	9.5	3.1	18.6	0.3	-	0.3	0.5	19.4
2011	5.8	1.8	8.4	10.2	3.0	19.0	0.4	-	0.4	0.5	19.8
2012	5.9	2.2	7.4	9.7	2.7	18.2	0.4	-	0.4	0.6	19.3
2013	6.0	2.0	7.8	9.8	2.9	18.6	0.4	-	0.4	0.6	19.5
2014	6.5	1.5	7.4	8.9	3.0	18.4	0.4	-	0.4	0.6	19.4
2015	5.7	2.1	7.4	9.5	3.0	18.2	0.3	-	0.3	0.4	18.9
2016	5.7	2.2	6.9	9.1	3.0	17.7	0.3	-	0.3	0.3	18.3
2017	5.5	1.7	7.6	9.2	1.9	16.7	0.3	-	0.3	0.3	17.2
2018	6.1	2.1	7.3	9.4	3.6	19.2	0.3	-	0.3	0.3	19.8
2019	5.3	1.3	7.9	9.2	3.2	17.8	0.3	-	0.3	0.2	18.3
2020	5.6	1.2	8.2	9.4	3.6	18.5	0.3	-	0.3	0.4	19.2
2021	5.9	1.0	7.6	8.6	3.4	17.9	0.3	-	0.3	0.4	18.6
2022	4.7	0.9	8.0	8.9	3.5	17.1	0.3	-	0.3	0.4	17.7
2023[c/]	5.9	1.3	8.3	9.6	4.2	19.7	0.2	-	0.2	0.3	20.2

a/ Defined here as 30 fish per pound or larger and released in February or later.

b/ Beginning in 1989, does not include minor releases from STEP projects.

c/ Preliminary.

TABLE C-2. Data sets used in predicting Oregon production index hatchery (OPIH) adult coho. Adults and jacks shown in thousands of fish and smolts in millions of fish. All environmental data in year of ocean entry (t-1) except WSST-ONDJ, which is January of adult return year (t)

Year (t) or Average	Adults (t) OPIH[a/]	Adults (t) Post-season FRAM[b/]	Jacks (t-1) Total OPI[c/]	Jacks (t-1) Columbia River[d/]	Jacks (t-1) OR Coast/ CA[e/]	Columbia River Smolts (t-1) Total OPI[f/]	Columbia River Smolts (t-1) Normal Timed[g/]	Columbia River Smolts (t-1) Delayed[h/]	Columbia River Smolts (t-1) Delayed Smolt Adjustment[i/]
1970-1975	2,432.6	-	119.0	113.3	5.7	32.7	26.4	1.3	4.7
1976-1980	1,879.5	-	91.7	81.5	10.2	34.9	27.4	2.8	6.4
1981-1985[j/]	867.9	-	47.2	40.6	6.6	33.5	22.6	6.3	8.3
1986-1990	1,486.2	1,459.0	60.6	50.6	10.0	35.9	21.0	8.9	15.5
1991-1995	605.9	581.2	27.7	22.6	5.0	38.1	26.3	5.5	4.5
1996-2000	320.2	329.2	22.4	18.3	4.0	28.9	22.3	3.4	2.5
2001-2005	620.0	865.1	44.6	36.6	8.0	26.4	23.7	1.3	1.9
2006-2010	618.5	674.1	32.3	26.4	5.9	24.4	22.0	1.0	1.1
2011	442.3	454.2	23.3	22.2	1.1	19.3	18.2	0.3	0.4
2012	182.3	183.1	17.9	13.9	4.0	19.9	18.1	0.9	0.7
2013	316.9	335.1	26.3	24.1	2.2	19.2	17.1	1.1	1.5
2014	1,263.6	1,316.5	51.4	49.4	2.0	19.6	18.0	0.6	1.6
2015	251.7	268.9	39.6	37.0	2.6	19.4	16.9	1.5	3.0
2016	233.8	247.7	19.7	18.6	1.0	18.9	16.9	1.3	1.3
2017	284.8	291.8	22.9	22.4	0.4	18.4	16.5	1.3	1.6
2018	149.4	182.8	19.2	18.5	0.7	17.2	16.0	0.7	0.8
2019	300.5	340.7	47.4	46.7	0.8	19.7	18.6	0.5	1.2
2020	369.6	387.7	15.2	14.9	0.3	18.3	16.8	0.2	0.2
2021	-	841.3	92.3	89.1	3.2	19.2	18.1	0.4	1.9
2022	-	695.6	63.7	62.4	1.3	18.6	17.6	0.3	1.0
2023	-	514.2	52.7	51.9	0.8	17.6	16.8	0.3	0.9
2024[k/]	-	403.1	75.0	74.2	0.8	20.1	19.6	0.2	0.7

Year (t) or Average	Environmental Index-Month(s)[l/m/] NPGO (logged, t-1)	PDO (logged, t-1)	WSST-ONDJ	PDO-MJJ	MEI-OND	UWI-JAS	STT-AMJ	SSH-AMJ	UWI-SON
2011	1.29	-0.74	0.09	-0.37	-2.11	34.21	11.68	-32.03	-32.89
2012	0.79	-1.57	-0.12	-0.77	-1.29	29.33	10.70	-29.03	-26.30
2013	1.42	-1.41	-0.08	-0.79	-0.15	53.55	11.02	-16.60	-29.90
2014	0.36	-0.93	-0.40	-0.86	-0.17	35.30	10.66	-88.10	-7.81
2015	-0.20	0.53	1.57	-0.65	0.20	41.26	11.17	-10.87	-40.11
2016	-1.38	0.81	0.89	-0.10	2.00	40.41	10.28	-97.23	-7.85
2017	-0.16	0.63	0.84	0.54	-0.56	47.98	11.58	-107.73	-68.23
2018	-0.86	-0.06	0.40	0.84	-0.63	46.09	11.19	-48.97	-36.18
2019	-1.96	-0.30	0.73	0.67	0.34	41.06	10.83	-103.77	-12.37
2020	-2.28	-0.04	-0.07	0.52	0.36	20.07	10.47	-85.67	4.07
2021	-1.84	-1.04	0.46	0.07	-1.18	25.56	11.40	-70.37	-18.89
2022	-0.91	-1.58	-0.15	-0.42	-1.44	40.85	10.97	-122.27	-64.07
2023	-1.26	-1.78	-0.05	-0.82	-1.65	33.83	11.47	-89.33	-6.61
2024[k/]	-1.72	-1.88	1.20	-1.40	0.60	22.84	10.40	-61.00	-28.15

a/ Adult OPIH = Harvest impacts plus escapement for public hatchery stocks originating in the Columbia River, Oregon coastal rivers, and the Klamath River, California.

b/ Adult post-season FRAM = Harvest impacts plus escapement for public hatchery stocks originating in the Columbia River, Oregon coastal rivers, and the Klamath River. Estimates derived from the post-season FRAM and used for prediction beginning in 2008.

c/ Jack OPI = Total Jack CR and Jack OC.

d/ Jack CR = Columbia River jack returns corrected for small adults.

e/ Jack OC = Oregon coastal and California hatchery jack returns corrected for small adults.

f/ Total OPI = Columbia River (Sm D + Sm CR), Oregon coastal and Klamath Basin.

g/ Sm CR = Total Columbia River smolt releases.

h/ Sm D = Columbia River delayed smolt releases

i/ Correction term for delayed smolts released from Col. R. hatcheries (Col. R. Jacks*(Delayed Smolts/Col. R. Smolts)).

j/ Subsequent to 1983 data not used in predictions due to El Niño impacts.

k/ For Post-season FRAM: Preseason predicted adults.

l/ Beginning in 2024, the OPIH forecast w as derived using an ARIMA MAPE-w eighted ensemble approach that utalized the most recent 15 years of environmental data w ithin the model.

m/ Environmental Index descriptions:

NPGO - North Pacific Gyre Oscillation

PDO - Pacific Decadal Oscillation

WSST - Winter sea surface temperature, average of October - January

MEI - Multivariate ENSO index

UWI - Upw elling w ind index (mean upw elling w inds index in months of ocean migration year at 42º N 125º W)

SST - Sea surface temperature

TABLE C-3. Estimated coho salmon natural spawner abundance in Oregon coastal basins for each OCN coho management component.

Component and Basin[a/]	2001-2005 Ave.	2006-2010 Ave.	2011-2015 Ave.	2016-2020 Ave.	2021[b/]	2022[b/]	2023[d/]
NORTHERN							
Necanicum	2,534	2,102	2,079	639	--	--	1,631
Nehalem	20,159	19,364	11,296	7,402	--	--	14,652
Tillamook	6,563	9,408	9,355	4,006	--	--	12,627
Nestucca	7,287	2,063	3,590	3,145	--	--	3,870
Ind. Tribs.	573	1,132	1,375	446	--	--	1,882
TOTAL	37,116	34,068	27,695	15,638	42,811	52,956	34,662
NORTH CENTRAL							
Salmon	506	672	1,822	456	571	1,324	1,030
Siletz	6,902	11,678	13,392	4,198	15,428	16,466	8,439
Yaquina	10,571	7,618	11,375	3,586	16,721	6,484	6,086
Beaver Ck.	3,487	1,885	2,636	1,143	2,483	2,058	850
Alsea	8,344	8,353	15,626	5,445	13,633	19,141	6,779
Siuslaw	24,138	16,700	20,679	7,197	38,031	24,892	19,060
Ind. Tribs.	3,279	2,017	1,931	839	1,747	1,568	540
TOTAL	57,227	48,922	67,461	22,862	88,614	71,933	42,784
SOUTH CENTRAL							
Umpqua	37,165	39,149	44,750	19,965	49,266	9,632	29,520
Coos	26,572	16,423	13,841	6,974	--	7,370	23,076
Coquille	15,571	19,437	26,046	7,916	--	19,078	8,948
Floras Ck.	3,568	3,352	3,252	792	--	871	500
Sixes R.	157	140	303	130	--	113	20
Coastal Lakes	18,205	22,557	15,920	6,641	19,664	8,049	12,001
Ind. Tribs.	-	224	58	8	--	0	0
TOTAL	101,238	101,282	104,171	42,425	114,897	45,113	74,065
SOUTH							
Rogue[c/]	12,349	3,140	6,066	5,218	8,992	7,865	3,565
COASTWIDE	207,930	187,412	205,393	86,143	255,314	177,867	155,076

a/ The sum of the individual basins may not equal the aggregate totals due to the use of independent estimates at different geographic scales. The average data may include years w hen no data w as available.

b/ (--) Estimates w ere not made due to low survey rates and sampling levels.

c/ Mark recapture estimate based on seining at Huntley Park in the low er Rogue River.

d/ Preliminary.

TABLE C-4. Data set used in predicting Oregon coastal natural river (OCNR) coho ocean recruits with random survey sampling and Mixed Stock Model (MSM) accounting. All environmental data in year of ocean entry (t-1) except SST-J, which is January of adult return year (t). Spawners is parent brood (t-3). Recruits shown in thousands of fish.

	Recruits		Environmental Index-Month(s)[a/]							
Year (t)	Adults	Spawners	PDO-MJJ	UWI-JAS	UWI-SON	SSH-AMJ	SST-AMJ	SST-J	MEI-ON	SPR.TRN
1970-1975	237.5	112.3	-0.7	35.5	-19.7	-94.3	11.6	9.0	-0.7	98.3
1976-1980	204.3	30.7	-0.4	26.4	-29.2	-119.3	11.1	9.9	-0.1	86.0
1981-1985	148.9	26.8	-0.2	28.4	-30.0	-101.8	11.4	10.4	0.3	85.0
1986-1990	153.8	28.9	0.1	29.6	-39.2	-95.4	11.6	10.4	0.2	82.0
1991-1995	150.7	27.0	0.3	29.3	-40.8	-81.6	11.6	10.4	0.4	89.0
1996-2000	131.8	25.2	0.6	31.2	-49.0	-64.7	11.7	10.8	0.4	94.8
2000	156.6	21.5	0.0	35.8	-26.8	-46.5	11.4	10.2	-0.7	72.0
2001	246.1	34.7	-0.7	47.1	-38.2	-115.7	10.7	10.1	-0.3	61.0
2002	227.3	61.0	-0.9	50.5	-25.9	-137.5	10.1	11.0	0.8	80.0
2003	164.0	143.1	-0.4	55.5	-26.4	-51.7	11.1	10.3	0.3	112.0
2004	146.3	236.4	-0.2	27.0	4.3	-50.2	11.9	10.2	0.4	110.0
2005	113.3	213.3	0.2	51.8	-9.0	-12.5	12.5	11.5	-0.7	145.0
2006	64.9	154.1	0.5	53.6	-14.1	-22.6	11.2	9.8	0.8	112.0
2007	157.0	139.9	0.5	27.5	-9.9	-109.3	10.6	8.9	-1.1	74.0
2008	262.9	104.7	0.2	32.7	-10.7	-98.1	9.6	9.4	-1.1	89.0
2009	255.6	57.3	-0.1	24.3	-47.1	-80.2	10.5	10.8	0.8	82.0
2010	352.4	156.1	-0.4	34.2	-32.9	-32.0	11.7	10.1	-2.1	100.0
2011	98.1	245.4	-0.8	29.3	-26.3	-29.0	10.7	9.2	-1.3	100.0
2012	130.2	244.7	-0.8	53.6	-29.9	-16.6	11.0	9.9	-0.1	121.0
2013	377.4	336.0	-0.9	35.3	-7.8	-88.1	10.7	9.1	-0.2	100.0
2014	64.6	80.2	-0.7	41.3	-40.1	-10.9	11.2	12.3	0.2	101.0
2015	74.3	110.8	-0.1	40.4	-7.9	-97.2	10.3	11.0	2.0	92.0
2017	67.4	337.7	0.5	48.0	-68.2	-107.7	11.6	9.9	-0.6	85.0
2018	74.0	52.4	0.8	46.1	-36.2	-49.0	11.2	11.0	-0.6	116.0
2019	99.2	67.9	0.7	41.1	-12.4	-103.8	10.8	11.1	0.3	107.0
2020	100.3	60.1	0.5	20.1	4.1	-85.7	10.5	10.5	0.4	103.0
2021	251.3	67.8	0.1	25.6	-18.9	-70.4	11.4	10.3	-1.2	140.0
2022	190.7	87.7	-0.4	40.8	-64.1	-122.3	11.0	10.2	-1.4	80.0
2023[b/]	171.0	100.2	-0.8	33.8	-6.6	-89.3	11.5	10.6	-1.6	84.0

a/ Environmental Index descriptions:

PDO - Pacific Decadal Oscillation (4-year moving average)

UWI - Upwelling wind index (mean upwelling winds index in months of ocean migration year at 42º N 125º W)

SSH - Sea surface height (South Beach, OR at 44º 37.5´ N, 124 º 02.6´ W)

SST - Sea surface temperature (mean sea surface temperature in January of return year at Charleston, OR)

MEI - Multi-variate ENSO index

SPR.TRN - Spring transition date (Julian)

b/ Adult recruits is a forecasted number.

c/ PDO-MJJ values from 1970-2024 are from ERSST V5. Prior to 2024, data used in OCNR forecasting and published in Preseason Report I was retrieved from UW-JISAO which is no longer being updated.

d/ SSH-AMJ changes minorly every year to account for long term trends in SSH. Further information can be found in Rupp et al., 2012.

TABLE C-5. Models used in the 2024 ensemble Oregon Production Index Hatchery (OPIH) Adult coho forecast model with their predictive ranking, variables included, weight in the ensemble model, and ARIMA structure.

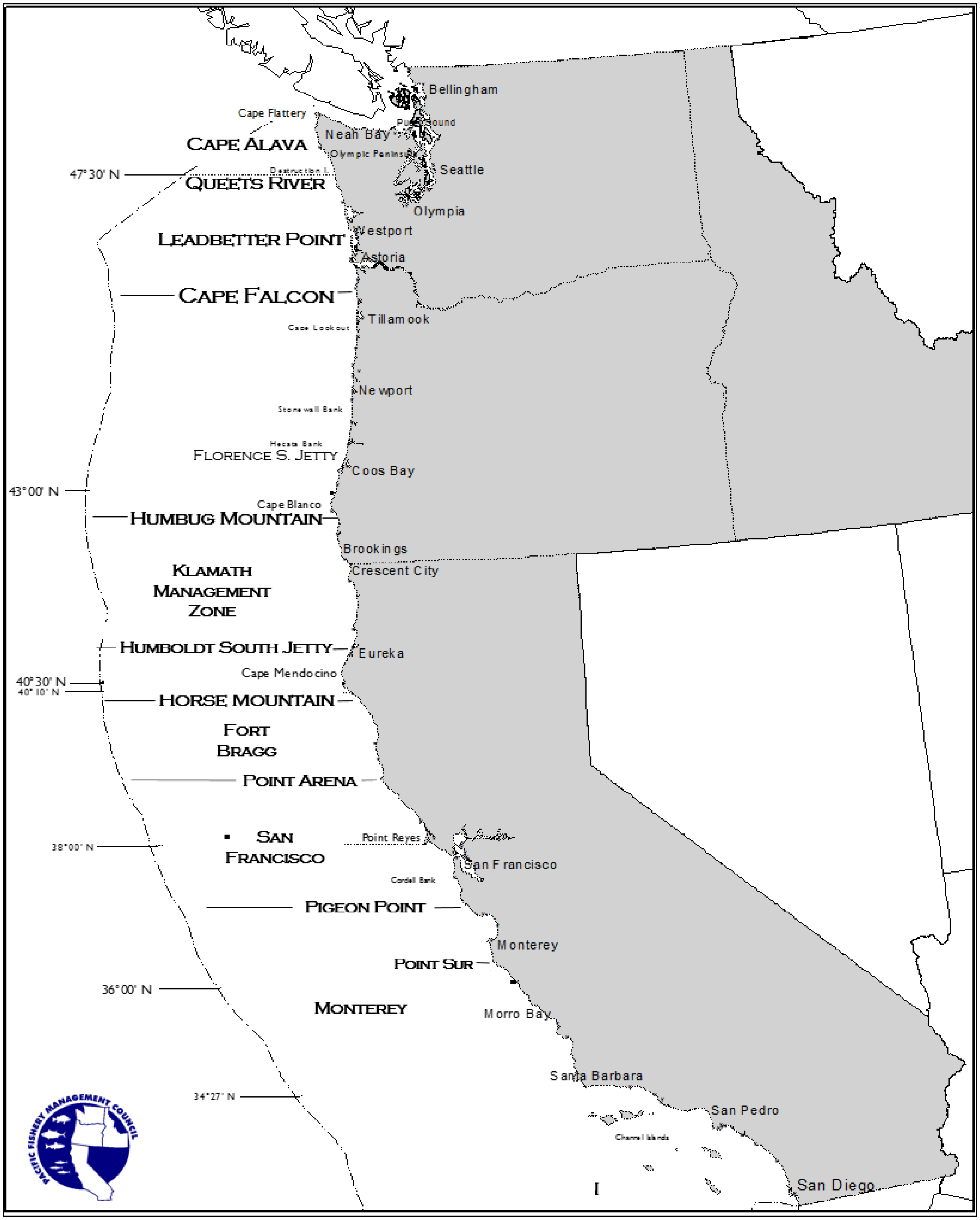
Model Rank	Variables	Weight	ARIMA Order[a/] Auto-regressive	Differ-encing	Moving Average Structure
1	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A + MEI.OND	0.101	1,1	0,0	0,0
2	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A + MEI.OND + SST.AMJ	0.101	1,1	0,0	0,0
3	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A + UWI.JAS + SST.AMJ	0.101	0,0	0,0	1,0
4	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A + PDO.MJJ + MEI.OND	0.100	1,1	0,0	0,0
5	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A + SST.AMJ + UWI.SON	0.100	1,1	0,0	0,0
6	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A + SST.AMJ	0.100	1,1	0,0	0,0
7	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A	0.100	1,1	0,0	0,0
8	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A + UWI.JAS	0.099	0,0	0,0	1,0
9	lag1_log_JackOPI + lag1_NPGO + lag1_PDO + WSST_A + MEI.OND + UWI.JAS	0.099	0,0	0,0	1,0
10	lag1_log_JackOPI + lag1_log_SmAdj + lag1_NPGO + lag1_PDO + WSST_A + SST.AMJ	0.099	1,1	0,0	0,0

a/ The general component is represented by the number before the comma. The seasonal component is represented by the number after the comma. For

TABLE C-6. The 2024 Ensemble Mean of the six predictors based on environmental conditions and spawners used to forecast the Oregon Coast Natural River (OCNR) systems.

Variables			Prediction	r^2	OCV[a/]
PDO	Spring Transition (Julian date; t-1)	Log Spawners (t-3)	242,229	0.54	0.41
PDO	Multivariate ENSO Index (Oct-Dec; t-1)	Upwelling (July-Sept; t-1)	207,238	0.61	0.47
PDO	Spring Transition (Julian date; t-1)	Multivariate ENSO Index (Oct-Dec; t-1)	169,077	0.58	0.48
PDO	Upwelling (July-Sept; t-1)	Sea Surface Temperature (May-Jul; t-1)	309,419	0.57	0.41
PDO	Sea Surface Height (Apr-June; t-1)	Upwelling (July-Sept; t-1)	233,878	0.62	0.43
PDO	Upwelling (Sept-Nov; t-1)	Sea Surface Temperature (Jan; t)	173,322	0.57	0.42
Ensemble Mean			217,702	0.63	0.50
(90% prediction intervals)			(87,781-540,151)		

a/ OCV – ordinary cross-validation score



This map is for reference only and is not intended for use in navigation or fishery regulation.