# PRESEASON REPORT I

## STOCK ABUNDANCE ANALYSIS
## AND
## ENVIRONMENTAL ASSESSMENT PART 1
## FOR 2011 OCEAN SALMON FISHERY REGULATIONS

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| | |
|---|---|
| BY | brood year |
| CDFG | California Department of Fish and Game |
| CoTC | Coho Technical Committee (of the PSC) |
| Council | Pacific Fishery Management Council |
| CRFMP | Columbia River Fishery Management Plan |
| CVI | Central Valley Index |
| 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 |
| FMP | fishery management plan |
| FONSI | Finding of No Significant Impacts |
| FRAM | Fishery Regulatory Assessment Model |
| GAM | generalized additive models |
| ISBM | individual stock-based management |
| 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 brights (bright hatchery fall Chinook released below McNary Dam) |
| MOC | mid Oregon coast |
| MSM | mixed stock model |
| MSA | Magnuson-Stevens Act |
| MSY | maximum sustainable yield |
| NA | not available |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NOC | north Oregon coast |
| OCN | Oregon coast natural (coho) |
| OCNL | Oregon coast natural lake (coho) |
| OCNR | Oregon coast natural river (coho) |
| ODFW | Oregon Department of Fish and Wildlife |
| OPI | Oregon Production Index (coho salmon stock index south of Leadbetter Point) |
| OPIH | Oregon Production Index public hatchery |

## LIST OF ACRONYMS AND ABBREVIATIONS (continued)

| | |
|---|---|
| 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 |
| SCH | Spring Creek Hatchery (tule fall Chinook returning to Spring Creek Hatchery) |
| SHM | Sacramento Harvest Model |
| SI | Sacramento Index |
| SJF | Strait of Juan de Fuca |
| SOC | south Oregon Coast |
| SRFC | Sacramento River fall Chinook |
| SRS | Stratified Random Sampling |
| STEP | Salmon Trout Enhancement Program |
| STT | Salmon Technical Team (formerly the Salmon Plan Development Team) |
| TAC | Technical Advisory Committee (*U.S. v. Oregon*) |
| URB | upper river brights (naturally spawning bright fall Chinook normally 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 salmon fishery management off the coasts of Washington, Oregon, and California The 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 meeting.

This report provides 2011 salmon stock abundance forecasts, and an analysis of the impacts of 2010 management measures, or regulatory procedures, on the projected 2011 abundance. This analysis is intended to give perspective in developing 2011 management measures. This report also constitutes the first part of an Environmental Assessment (EA) to comply with National Environmental Policy Act (NEPA) requirements for the 2011 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 and Council staff 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: Preseason Report II and Preseason Report III. These reports will analyze the impacts of the Council's proposed alternatives and adopted fishery management recommendations. Preseason Report II will constitute the second and final part of the EA, and will include a description of the affected environment relevant to the alternatives management measures considered for 2011 ocean salmon fisheries, a description of the alternatives, and an analysis of the environmental consequences of the alternatives. Preseason Report II will analyze the potential impacts of a reasonable range of alternatives, which will inform the final fishery management measures included in Preseason Report III. Together, these two 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 2010 regulations applied to 2011 abundance forecasts. Three 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 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, implementation of the 2011 ocean salmon fishery management measures, 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 consultation standards established for ESA listed salmon stocks. In achieving this goal, management measures must take into account the allocation of harvest among different user groups and port areas. 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, specified ESA consultation standards, or Council adopted rebuilding plans.

2. Fulfill obligations to provide for Indian harvest opportunity 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. Seek to maintain ocean salmon fishing seasons that support the continuance of established recreational and commercial fisheries, while meeting salmon harvest allocation objectives among ocean and inside recreational and commercial fisheries. These allocations will be fair and equitable, and 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 optimum yield (OY) and bycatch management specifications.

5. Manage and regulate fisheries, so 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 Pacific Salmon Treaty 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 conservation objectives 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 MSA and the National Standards Guidelines.

Implementation of 2011 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.

### *STT Concerns*

Forecast values of the Sacramento Index (SI) exceeded their postseason estimates in both 2009 and 2010. The SI is a combined-age index of adult SRFC ocean abundance, composed primarily of age-3 and age-4 fish. The current forecast model uses escapement of jacks in one year to predict the SI in the following year because of data limitations for this stock. Yet the escapement of jacks only conveys information about the 3-year-old component of the SI in the following year. In years when a strong cohort follows a

weak cohort, the 3-year-old component of the SI should comprise a larger portion of the SI than it did on average during the historic period for which data are available. This means that there is a potential for the SI forecast to be biased high in years when the strength of successive cohorts is increasing.

The 2011 SI forecast has been made under similar conditions as the 2009 and 2010 forecasts, with jack escapement used in making the forecast exceeding jack escapement in the preceding year. Hence there is potential for the 2011 SI forecast to be biased high.

Age-specific escapement and river harvest data can enable the formulation of age-specific abundance forecasts, which will likely reduce the bias associated with forecasting a combined-age index with information from a single year class. The STT strongly encourages the continued development of coded-wire tag (CWT) collection and scale ageing programs in the Sacramento Basin, which will help address some of these concerns.

## CHAPTER I: DESCRIPTION OF THE AFFECTED ENVIRONMENT

The affected environment relevant to establishing the 2011 ocean salmon fishery management measures consists of the following components:

- Target Species – Chinook, coho, and pink salmon
- ESA-listed salmon stocks
- Socioeconomic aspects of coastal communities, federally recognized Tribes, and states

A description of the historical baseline for these components of the affected environment is presented in the Review of 2010 Ocean Salmon Fisheries (PFMC 2011). The current status (2011 ocean abundance forecasts) of the environmental components expected to be affected by the 2011 ocean salmon fisheries regulation alternatives (FMP salmon stocks) are described in this report (Part 1 of the 2011 salmon EA); the Review of 2010 Ocean Salmon Fisheries (STT 2011) 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.

Several components of the environment were determined to not be significantly affected by the proposed actions based on previous NEPA analyses and ESA consultations; they were therefore excluded from further analysis in this EA. These components included:

- Non-target species – Pacific Halibut, groundfish (NMFS 2003, PFMC 2006)
- Marine mammals – pinnipeds, killer whales (NMFS 2003, PFMC 2006, NMFS 2008)
- Seabirds (NMFS 2003, PFMC 2006)
- Ocean and coastal habitats, ESA critical habitat, and essential fish habitat (NMFS 2003, PFMC 2006)
- Biodiversity and ecosystem function (NMFS 2003, PFMC 2006)
- Unique characteristics of the geographic area (NMFS 2003, PFMC 2006)
- Cultural, scientific, or historical resources such as those eligible for listing in the National Register of Historic Places (NMFS 2003, PFMC 2006)
- Public health or safety (NMFS 2003, PFMC 2006)

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 was implemented, which would fail to meet the purpose and need described above. The analysis of the No-Action Alternative does, however, provide perspective that is useful in the planning process for 2011 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 (previously termed “management options”) to the status-quo management measures.

The component of the affected environment that is analyzed in this document consists only of the salmon stocks identified in the FMP (Appendix A). The 2011 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 and the proportion of the stock that succumbs to fishing related mortality is generally referred to as the exploitation rate; 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 2011 ocean salmon fishery regulation alternatives, including socioeconomic components and updated additional information on the biological components of the environment, will be presented in the Preseason Report II, to be issued after the March Council meeting.

## *ABUNDANCE FORECASTS*

Abundance forecasts in 2011 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 I-1 and I-2. More detailed analyses of this subject are covered in Chapter II (Chinook) and III (coho). Information on pink salmon abundance and forecasts, which are only significant in odd-numbered years, is contained in Chapter IV. Council Salmon Fishery Management Plan (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 2011 ocean salmon fishing seasons may be constrained by other stocks, such as those listed under the ESA or subject to the PSC agreement, 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): Sacramento River Winter, Central Valley Spring, California Coastal, Lower Columbia River (LCR) natural tule, and Snake River Fall Chinook; and Central California and Southern Oregon/Northern California coho, as well as Interior Fraser (including Thompson River) coho.

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 1 of 4)

| Production Source and Stock or Stock Group | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Methodology for 2011 Prediction and Source |
|---|---|---|---|---|---|---|---|---|---|---|
| **Sacramento Index** | | | | | | | | | | |
| Fall | - | - | - | - | - | 54.6[a/] | 122.2 | 245.5 | 729.9 | Linear regression analysis of jack escapement on SI of the following year. STT |
| **Klamath River** (Ocean Abundance) | | | | | | | | | | |
| Fall | 310.2 | 216.3 | 239.8 | 110.0 | 546.2 | 190.7 | 505.7 | 331.5 | 371.1 | 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 Rive**r (Ocean Escapement) | | | | | | | | | | |
| Upriver Spring | 145.4 | 360.7 | 254.1[b/] | 88.4 | 78.5 | 269.3 | 298.9 | 470.0 | 198.4 | Age-specific linear regressions of cohort returns in previous run years. WDFW staff. |
| Willamette Spring | 109.8 | 109.4 | 116.9 | 46.5 | 52.0 | 34.0 | 37.6 | 62.7 | 104.1 | Age-specific linear regressions of cohort returns in previous run years. ODFW staff. |
| Sandy Spring | 4.8 | 5.2 | 7.4 | 8.2 | 7.9 | 6.8 | 5.2 | 3.7 | 5.5 | Recent year average. ODFW staff. |
| Cowlitz Spring | 4.9 | 15.9 | 12.7 | 3.0 | 6.4 | 5.2 | 4.1 | 12.5 | 6.6 | Age-specific linear regressions of cohort returns in previous run years. WDFW. |
| Kalama Spring | 3.6 | 6.0 | 4.5 | 1.5 | 4.0 | 3.7 | 0.9 | 0.9 | 0.6 | Age-specific linear regressions of cohort returns in previous run years. WDFW. |
| Lewis Spring | 3.1 | 5.4 | 7.6 | 1.8 | 5.9 | 3.5 | 2.2 | 6.0 | 3.4 | Age-specific linear regressions of cohort returns in previous run years. WDFW. |
| Upriver Summer | 87.6 | 102.8 | 62.4[b/] | 49.0 | 45.6 | 52.0 | 70.7 | 88.8 | 91.9 | Age-specific average cohort ratios/cohort regressions. Columbia River TAC subgroup and WDFW |
| URB Fall | 280.4 | 292.2 | 352.2 | 253.9 | 182.4 | 162.5 | 259.9 | 310.8 | 398.2 | Age-specific average cohort ratios/cohort regressions. Columbia River TAC subgroup and WDFW |
| SCH Fall | 96.9 | 138.0 | 114.1 | 50.0 | 21.8 | 87.2 | 59.3 | 169.0 | 116.4 | Age-specific average cohort ratios/cohort regressions. Columbia River TAC subgroup and WDFW |
| LRW Fall | 24.6 | 24.1 | 20.2 | 16.6 | 10.1 | 3.8 | 8.5 | 9.7 | 12.5 | Age-specific average cohort ratios/cohort regressions. Columbia River TAC subgroup and WDFW |
| LRH Fall | 115.9 | 77.1 | 74.1 | 55.8 | 54.9 | 59.0 | 88.8 | 90.6 | 133.5 | Age-specific average cohort ratios/cohort regressions. Columbia River TAC subgroup and WDFW |
| MCB Fall | 104.8 | 90.4 | 89.4 | 88.3 | 68.0 | 54.0 | 94.5 | 72.6 | 100.0 | Age-specific average cohort ratios/cohort regressions. Columbia River TAC subgroup and WDFW |

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 2 of 4)

| Production Source and Stock or Stock Group | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Methodology for 2011 Prediction and Source |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Washington Coast** (Ocean Escapement) | | | | | | | | | | | |
| Willapa Bay Fall | Natural | 2.4 | 4.1 | 3.2 | 2.0 | 2.0 | 2.5 | 2.0 | 2.0 | 2.0 | Based on average 1999-2007 returns/spawner applied to Brood Years 2005-2008. WDFW |
| | Hatchery | 14.2 | 14.7 | 17.4 | 29.8 | 29.8 | 27.0 | 34.8 | 31.1 | 31.1 | Based on average 1998-2007 returns/release applied to Brood Years 2005-2008, adjusted by model performance. WDFW |
| Quinault Spring/Summer | Natura | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| Quinault Fall | Natural | 2.0 | 2.2 | 3.9 | 8.7 | 7.3 | 3.7 | 6.9 | 7.6 | NA | Return per spawner by age with a 5 year adjusted average adjusted with brood year sibling return. |
| | Hatchery | 1.0 | 2.9 | 6.2 | 7.3 | 8.7 | 1.3 | 7.8 | 5.5 | NA | Recent 5 year average return per spawner |
| Queets Spring/Summer | Natural | 0.5 | 0.4 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | NA | Recent 5 year average |
| Queets Fall | Natural | 4.5 | 4.4 | 4.3 | 3.5 | 2.6 | 3.5 | 4.5 | 4.1 | NA | Return per spawner by age with a 5 year adjusted average adjusted with brood year sibling return. |
| | Hatchery | 0.4 | 0.7 | 1.2 | 1.4 | 1.5 | 7.0 | 1.2 | 9.8 | NA | Recent 5 year average return per spawner |
| Hoh Spring/Summer | Natural | 1.9 | 1.5 | 1.5 | 1.4 | 1.6 | 0.9 | 1.1 | 0.8 | 1.0 | Forecast from returns per spawner using recent 5 year mean. |
| Hoh Fall | Natural | 3.1 | 4.2 | 3.8 | 4.0 | 2.7 | 2.9 | 2.6 | 3.3 | 2.9 | Forecast from returns per spawner using recent 5 year mean. |
| Quillayute Spring | Hatchery | 1.0 | 1.4 | 1.2 | 1.7 | 1.3 | 1.7 | 2.0 | 1.5 | 1.4 | Mean return per release using most recent 4 years, 5 year adjusted means for age-5 and age-6. |
| Quillayute Summer/Fall | Natural | 7.4 | 7.8 | 6.7 | 6.8 | 7.7 | 6.0 | 6.8 | 7.5 | 8.8 | Summer: Recent 5 year mean return per spawner. Fall: Returns per spawner mean recent 5 years. |
| *North Coast Totals* | | | | | | | | | | | |
| Spring/Summer | Natural | 2.4 | 1.9 | 2.0 | 1.9 | 2.0 | 1.3 | 1.5 | 1.2 | NA | |
| Fall | Natural | 17.0 | 18.6 | 18.7 | 23.0 | 20.3 | 16.1 | 20.8 | 22.5 | NA | |
| Spring/Summer | Hatchery | 1.0 | 1.4 | 1.2 | 1.7 | 1.3 | 1.7 | 2.0 | 1.5 | 1.4 | |
| Fall | Hatchery | 1.4 | 3.6 | 7.4 | 8.7 | 10.2 | 8.3 | 9.0 | 15.3 | NA | |
| **Puget Sound summer/fall**[c/] | | | | | | | | | | | |
| Nooksack/Samish | Hatchery | 45.8 | 34.2 | 19.5 | 16.9 | 18.8 | 35.3 | 23.0 | 30.3 | 37.5 | Brood release times average return/release rate (2007-2009 return years). |
| East Sound Bay | Hatchery | 1.6 | 0.8 | 0.4 | 0.4 | 0.4 | 0.8 | 0.1 | 2.3 | 0.4 | Brood release times 50% average return/release rate (2006 - 2009 return years)for Nooksack/Samish. |
| Skagit | Natural | 13.7[d/] | 20.4[d/] | 23.4[d/] | 24.1[d/] | 15.0[d/] | 23.8[d/] | 23.4[d/] | 13.0[d/] | 14.3[d/] | Adjusted age-specific average return rate per spawner. |
| | Hatchery | 0.0[d/] | 0.5[d/] | 0.7[d/] | 0.6[d/] | 1.1[d/] | 0.7[d/] | 0.6[d/] | 0.9[d/] | 1.5[d/] | Age-specific average return rate per smolt and appropriate year smolt releases. |

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 3 of 4)

| Production Source and Stock or Stock Group | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Methodology for 2011 Prediction and Source |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Stillaguamish | Natural | 2.0[e/] | 3.3[e/] | 2.0[e/] | 1.6[e/] | 1.9[e/] | 1.1[e/] | 1.7[e/] | 1.4[e/] | 1.8[e/] | Natural plus supplemental production from average of FRAM CWT reconstruction and an independent environmental model to link to return rates of specific age classes. FRAM CWT reconstruction uses BY 1993-2003 tagged fish survival rates for supplemental forecast, and BY 1986-1993 recruits/spawner for the natural return. |
| Snohomish | Natural | 5.5[e/] | 15.7[e/] | 14.2[e/] | 8.7[e/] | 12.3[e/] | 6.5[e/] | 8.4[e/] | 9.9[e/] | 7.4[e/] | Recent year average brood recruits/spawner applied to the 2006-2009 parent escapements. Hatchery forecasts based on average CWT survival rates (yearlings: BY 1996-97; fingerlings: BY 2000-2003) from Wallace Hatchery applied to releases . |
| | Hatchery | 9.4[e/] | 10.1[e/] | 9.9[e/] | 9.6[e/] | 8.7[e/] | 8.8[e/] | 4.9[e/] | 5.6[e/] | 5.2[e/] | Yearlings based on CWT groups for Wallace Hatchery (BYs 1987 and 1992-1996). Fingerlings based on survival estimate from Tulalip Hatchery 1998-2003. |
| Tulalip | Hatchery | 6.0[e/] | 7.6[e/] | 9.2[e/] | 10.0[e/] | 8.1[e/] | 4.1[e/] | 4.0[e/] | 3.4[e/] | 3.5[e/] | CWT survival rates (1998-2003) multiplied by release numbers for brood years 2006-2009. |
| South Puget Sound | Natural | 19.6 | 17.5 | 17.7 | 21.3 | 17.0 | 21.1 | 17.2 | 12.7 | 8.9 | Puyallup R. recent five year average return per spawner applied to brood years contributing ages 3-6. For Nisqually, recent 5 year average (2004-2009 return years) of runsizes. Green R. spawning escapement in terms of natural origin adults. |
| | Hatchery | 86.6 | 86.5 | 83.1 | 85.8 | 92.1 | 101.3 | 93.0 | 97.4 | 118.6 | Average return at age multiplied by cohort release for Green, Carr Inlet, and Area 10E. Nisqually based on return rates/realease for age-3 -5. |
| Hood Canal | Natural | 3.6[d/] | 2.4[d/] | 3.1[d/] | 2.5[d/] | 3.8[d/] | 2.6[d/] | 2.5[d/] | 2.4[d/] | 2.2[d/] | Natural fish based on the Hood Canal terminal run reconstruction-based relative contribution of the individual Hood Canal management units in the 2007-2010 return years. |
| | Hatchery | 30.2[d/] | 27.2[d/] | 27.5[d/] | 27.7[d/] | 43.6[d/] | 34.2[d/] | 40.1[d/] | 42.6[d/] | 38.4[d/] | Brood 2007 fingerling lbs released from WDFW facilities in 2008, multiplied by the average of postseason estimated terminal area return rates (total terminal run / hatchery fingerling lbs released three years previous) for the last four return years (2007-2010). |
| Hoko | Natural | - | - | - | - | - | 1.1[e/] | 1[e/] | 1.8[e/] | 0.6[e/] | Sibling regressions. |
| Strait of Juan de Fuca Including Dungeness spring run | Natural | 3.4[d/] | 3.6[d/] | 4.2[d/] | 4.2[d/] | 4.4[d/] | 3.2[d/] | 2.4[d/] | 1.9[d/] | 2.5[d/] | Dungeness and Elwha hatchery estimated by four-year average releases times average return rates. Dungeness wild estimated by smolts times average hatchery return rate. Elwha estimate separates hatchery and wild fish based on otolith sampling. |
| | Hatchery | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Hatchery production included in naturals. |

TABLE I-1. Preseason adult Chinook salmon stock forecasts in thousands of fish. (Page 4 of 4)

a/ Does not include the river harvest component. SI forecasts after 2008 include river harvest.
b/ Beginning in 2005, the upriver spring/summer designation was changed, with stream type Snake Basin summer fish being combined with the spring stock.
c/ Unless otherwise noted, forecasts are for Puget Sound run size (4B) available to U.S. net fisheries. Does not include fish caught in troll and recreational fisheries.
d/ Terminal run forecast.
e/ Expected spawning escapement without fishing.

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

| Production Source and Stock or Stock Group | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Methodology for 2011 Prediction and Source |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **OPI Area (Total Abundance) (California and Oregon Coasts and Columbia River)** | | 984.6 | 777.9 | 542.9 | 460.2 | 849.2 | 276.1 | 1,284.7 | 556.0 | 624.5 | Abundance of all OPI components based on cohort reconstruction including all fishery impacts using Mixed Stock Model (MSM); prior to 2008 only fishery impacts south of Leadbetter Point were used (traditional OPI accounting). OPITT, see Chapter III for details. |
| OPI Public | Hatch | 863.1 | 623.9 | 389.9 | 398.8 | 593.6 | 216.1 | 1,073.1 | 408.0 | 375.1 | OPIH: 1969-2009 Columbia River jacks adjusted for delayed smolt releases and total OPI jacks regressed on 1970-2010 adults. Columbia/Coastal proportions based on jacks; Columbia early/late proportions based on jacks; Coastal N/S proportions based on smolts. |
| Columbia River Early | | 440.0 | 313.6 | 284.6 | 245.8 | 424.9 | 110.3 | 672.7 | 245.3 | 216.0 | |
| Columbia River Late | | 377.9 | 274.7 | 78.0 | 113.8 | 139.5 | 86.4 | 369.7 | 144.2 | 146.5 | |
| Coastal N. of Cape Blanco | | 29.3 | 16.6 | 11.5 | 8.6 | 7.0 | 1.7 | 7.3 | 4.4 | 3.6 | |
| Coastal S. of Cape Blanco | | 15.9 | 19.0 | 15.8 | 30.6 | 22.2 | 17.7 | 23.4 | 14.1 | 9.0 | |
| Lower Columbia River | Natura | NA | NA | NA | NA | 21.5 | 13.4 | 32.7 | 15.1 | 22.7 | Oregon: recent three year average; Washington: natural smolt production multiplied by 2008 brood marine survival rate. Abundance is subset of early/late hatchery abundance above. |
| Oregon Coast (OCN) | Natural | 117.9 | 150.9 | 152.0 | 60.8 | 255.4 | 60.0 | 211.6 | 148.0 | 249.4 | Rivers: Generalized additve model (GAM) relating ocean recruits to parental spawners and marine environmental variables. See text in Chapter III for details. Lakes: recent three year average return. |
| STEP[a/] | Hatch | 3.6 | 3.1 | 1.0 | 0.6 | 0.2 | - | - | - | - | No forecast since 2007; releases discontinued. |
| **Washington Coast** | | | | | | | | | | | A variety of methods were used for 2011, primarily based on smolt production and survival. See text in Chapter III for details. |
| Willapa | Natur | 31.8 | 36.7 | 35.9 | 30.3 | 24.4 | 35.1 | 33.5 | 20.4 | 47.8 | |
| | Hatchery | 57.5 | 55.0 | 56.4 | 37.7 | 37.2 | 25.5 | 59.4 | 78.7 | 64.7 | |
| Grays Harbor | Natura | 58.0 | 117.9 | 91.1 | 67.3 | 59.4 | 42.7 | 59.2 | 67.9 | 89.1 | |
| | Hatchery | 64.0 | 67.8 | 54.4 | 52.4 | 74.0 | 53.1 | 63.5 | 33.3 | 44.0 | |
| Quinault | Natur | 47.7 | 50.5 | 44.9 | 28.8 | 18.6 | 17.4 | 16.3 | 16.7 | 22.9 | |
| | Hatchery | 20.6 | 18.2 | 33.6 | 34.5 | 22.7 | 24.5 | 26.2 | 26.6 | 35.5 | |
| Queets | Natur | 24.0 | 18.5 | 17.1 | 8.3 | 13.6 | 10.2 | 31.4 | 21.8 | 13.3 | |
| | Hatchery | 24.9 | 17.1 | 17.4 | 11.9 | 19.1 | 10.3 | 13.5 | 11.9 | 16.3 | |
| | Supplemental[b/] | 1.3 | 2.5 | 2.4 | - | - | - | - | - | - | |
| Hoh | Natur | 12.5 | 8.1 | 7.6 | 6.4 | 5.4 | 4.3 | 9.5 | 7.6 | 11.6 | |

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

| Production Source and Stock or Stock Group | | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Methodology for 2011 Prediction and Source |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Quillayute Fall | Natur | 24.9 | 21.2 | 18.6 | 14.6 | 10.8 | 10.5 | 19.3 | 22.0 | 28.2 | |
| | Hatchery | 15.2 | 20.9 | 22.1 | 10.4 | 18.1 | 13.0 | 39.5 | 17.7 | 31.0 | |
| Quillayute Summer | Natura | 1.8 | 1.1 | 0.8 | 1.1 | 1.0 | 1.1 | 2.2 | 2.8 | 2.8 | |
| | Hatchery | 5.4 | 6.1 | 6.1 | 4.0 | 6.4 | 4.2 | 12.9 | 3.2 | 5.4 | |
| North Coast Independent Tributaries | Natura | 14.8 | 12.7 | 8.5 | 8.1 | 3.2 | 3.2 | 11.1 | 4.2 | 21.6 | |
| | Hatchery | 11.0 | 4.3 | 5.6 | 3.2 | 4.1 | 5.0 | 14.1 | 5.7 | 11.8 | |
| WA Coast Total | Natura | 215.5 | 266.7 | 224.5 | 164.9 | 136.4 | 124.5 | 182.5 | 163.4 | 237.3 | |
| | Hatchery | 199.9 | 191.9 | 198.0 | 154.1 | 181.6 | 135.7 | 229.1 | 177.1 | 208.7 | |
| **Puget Sound** | | | | | | | | | | | A variety of methods were used for 2011, 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. |
| Strait of Juan de Fuca | Natural | 20.1 | 35.7 | 20.7 | 26.1 | 29.9 | 24.1 | 20.5 | 8.5 | 12.3 | |
| | Hatchery | 24.0[b/] | 28.7[b/] | 26.5[b/] | 20.5 | 18.4 | 9.5 | 7.0 | 7.8 | 15.2 | |
| Nooksack-Samish | Natura | 16.4 | 27.5 | 17.0 | 18.3 | 5.2 | 14.8 | 7.0 | 9.6 | 29.5 | |
| | Hatchery | 66.2 | 75.5 | 89.5 | 81.1 | 53.1 | 47.1 | 25.5 | 36.0 | 45.7 | |
| Skagit | Natur | 116.6 | 155.8 | 61.8 | 106.6 | 26.8 | 61.4 | 33.4 | 95.9 | 138.1 | |
| | Hatchery | 10.4 | 22.8 | 9.1 | 22.5 | 8.9 | 18.3 | 11.7 | 9.5 | 16.7 | |
| Stillaguamish | Natur | 37.8 | 38.0 | 56.7 | 45.0 | 69.2 | 31.0 | 13.4 | 25.9 | 66.6 | |
| | Hatchery | 1.3 | 0.5 | 0.2 | 1.2 | 0.0 | 0.1 | 0.0 | 5.4 | 0.6 | |
| Snohomish | Natura | 203.0 | 192.1 | 241.6 | 139.5 | 98.9 | 92.0 | 67.0 | 99.4 | 180.0 | |
| | Hatchery | 35.4 | 48.3 | 59.1 | 96.4 | 25.7 | 53.5 | 53.6 | 24.5 | 8.4 | |
| South Sound | Natura | 103.6 | 61.3 | 45.7 | 45.3 | 18.2 | 27.3 | 53.6 | 25.3 | 98.9 | |
| | Hatchery | 315.6 | 288.4 | 222.2 | 256.1 | 181.7 | 170.0 | 188.8 | 186.4 | 173.3 | |
| Hood Canal | Natura | 32.4 | 98.7 | 98.4 | 59.4 | 42.4 | 30.4 | 48.6 | 33.2 | 74.7 | |
| | Hatchery | 48.0[b/] | 43.1[b/] | 60.6[b/] | 57.9 | 54.8 | 35.0 | 52.0 | 51.2 | 74.9 | |
| Puget Sound Total | Natura | 529.9 | 609.2 | 541.9 | 440.2 | 290.6 | 281.0 | 243.5 | 297.8 | 600.1 | |
| | Hatchery | 501.0 | 507.3 | 465.2 | 535.7 | 342.6 | 333.5 | 338.6 | 320.8 | 334.8 | |

a/ Program ended in 2005.

b/ Strait of Juan de Fuca and Hood Canal Hatchery numbers in 2002-2005 include natural coho from secondary (hatchery) management zones.

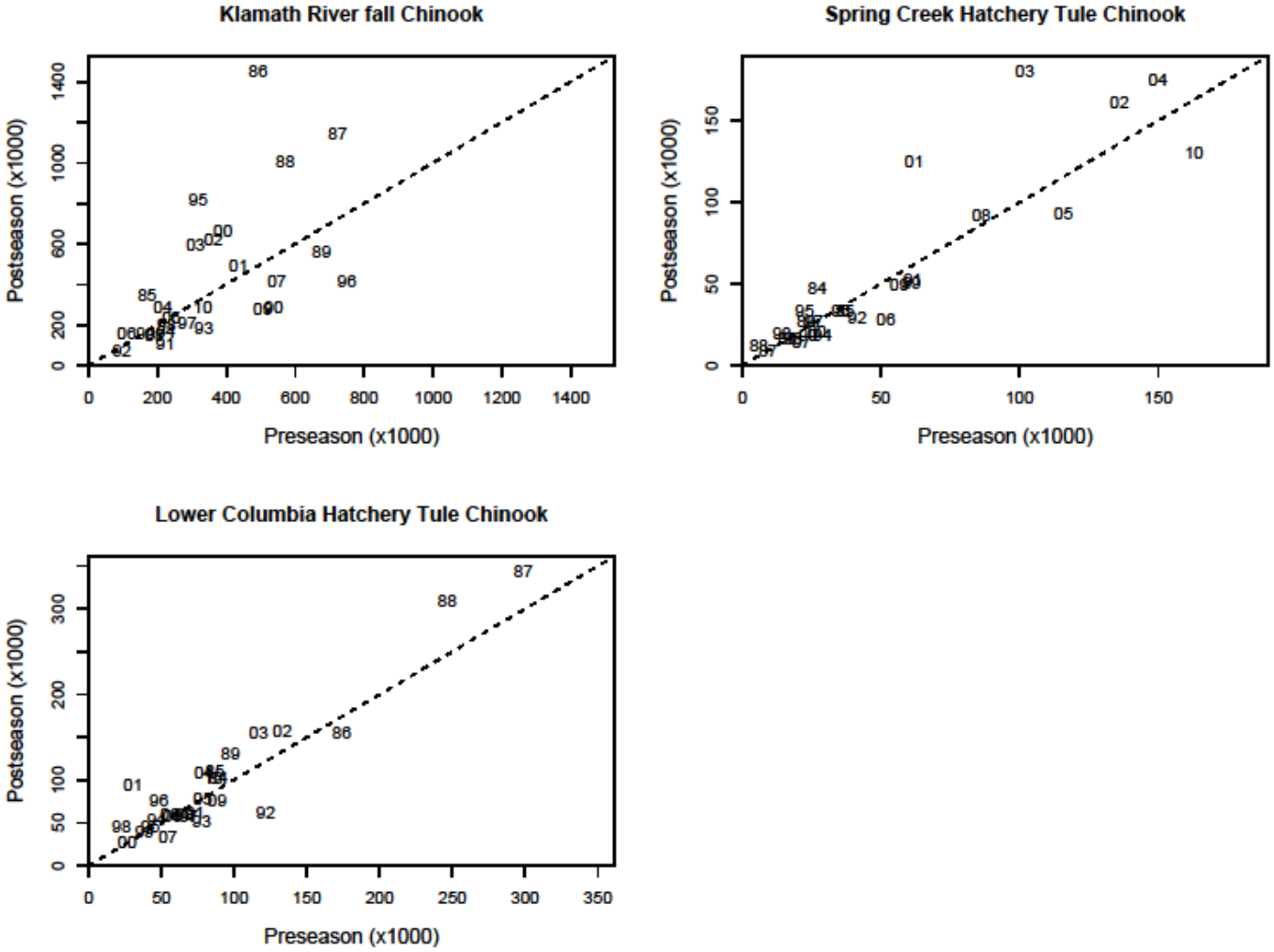


FIGURE I-1. Selected preseason vs. postseason forecasts for Chinook stocks with significant contribution to Council area fisheries.

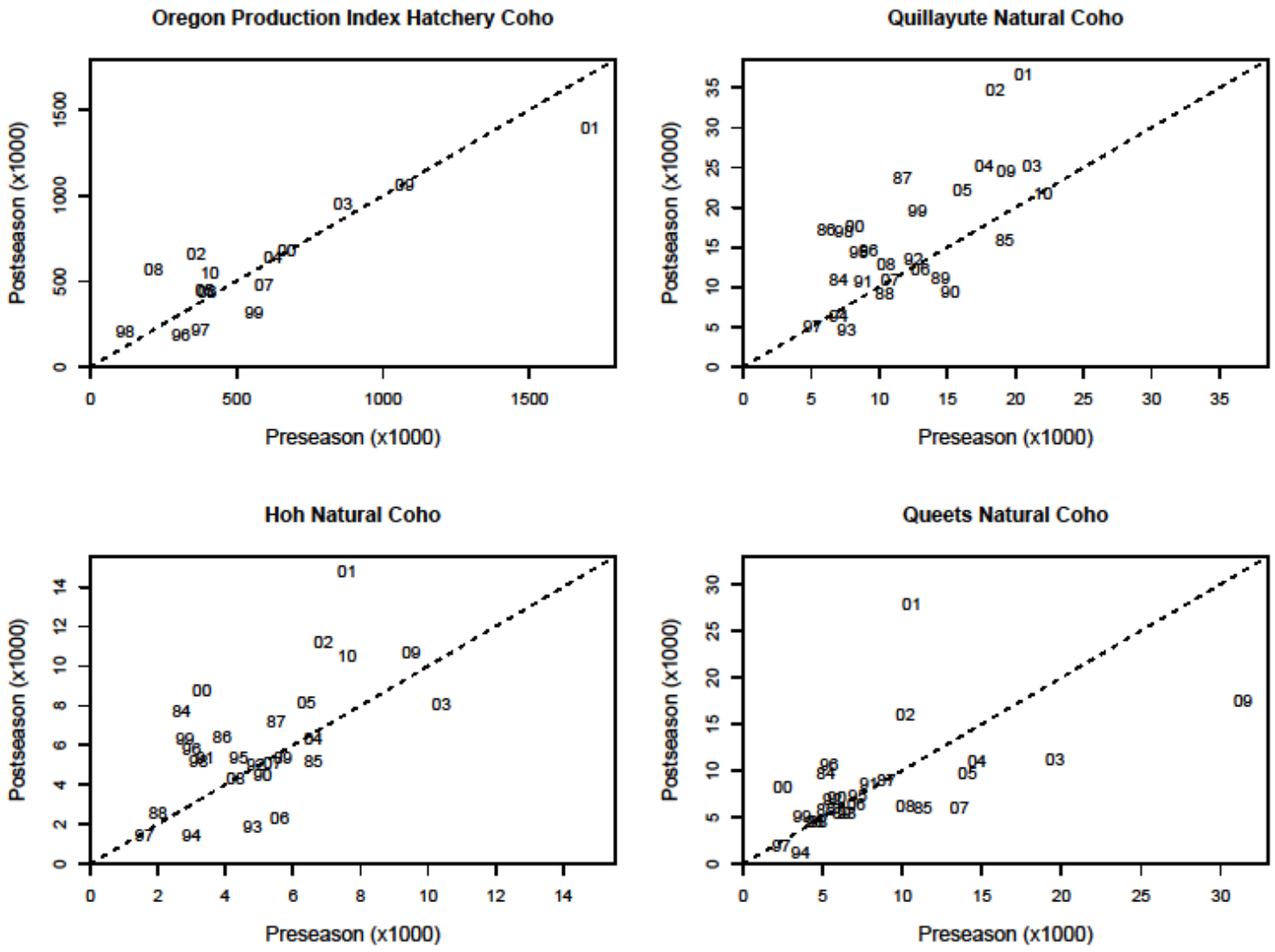


FIGURE I-2a. Selected preseason vs. postseason forecasts for coho stocks with significant contribution to Council area fisheries.

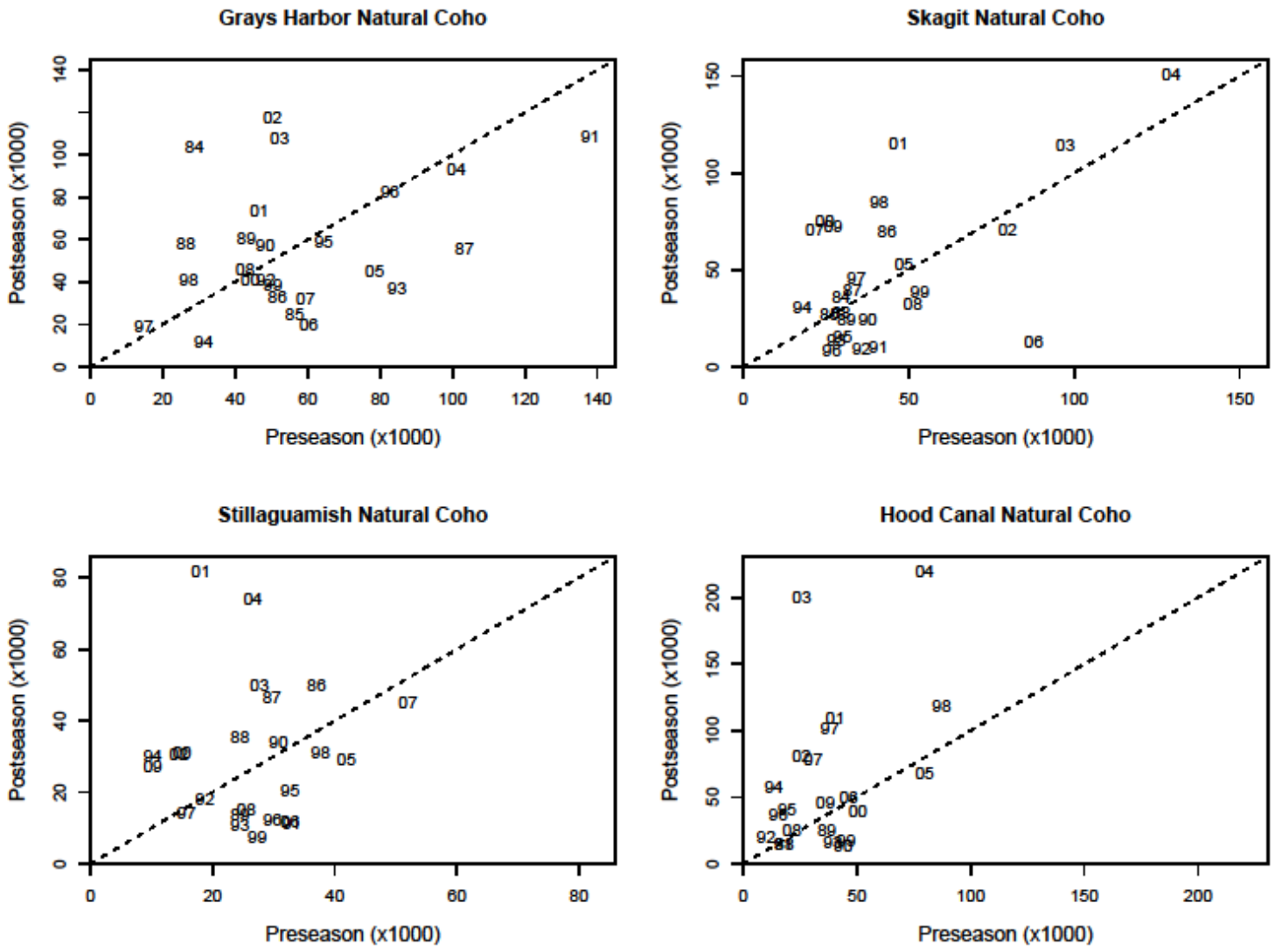


FIGURE I-2b. Selected preseason vs. postseason forecasts for coho stocks with significant contribution to Council area fisheries.

# CHAPTER II: AFFECTED ENVIRONMENT - CHINOOK SALMON ASSESSMENT

## *CHINOOK STOCKS SOUTH OF CAPE FALCON*

### Sacramento River Fall Chinook

#### *Predictor Description*

The Council's Salmon FMP sets the escapement goal for SRFC as a range from 122,000 to 180,000 hatchery and natural area adults. This stock comprises a large proportion of the Chinook spawners returning to Central Valley streams and hatcheries. The Sacramento Index (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 adult spawner escapement (Table II-1, Figure II-1). The SRFC exploitation rate is the ocean and river harvest (and non-retention impacts) divided by the SI, and has varied significantly since 1983 (Table II-1). Since 1990, the SRFC exploitation rate has generally declined over time. In 2010 the SRFC exploitation rate was 18 percent.

The STT based the forecast of the SI on a zero-intercept linear model relating the previous year (*t*-1) SRFC jack escapement to the SI in year *t* (Figure II-2). In addition to the mean SI predictor model, 95 percent prediction intervals for the SI are displayed in Figure II-2. To estimate prediction intervals, errors in the zero-intercept linear model were assumed to be additive and normally distributed. The interpretation of this interval is that a single future observation would be expected to be contained within this interval with 95 percent probability. The additive error structure of this model results in the lower bound of the prediction interval including zero for SI forecasts made at low jack escapement levels. While this may be somewhat unrealistic (one would expect a nonzero SI in year *t* to result from a nonzero jack escapement in year *t*-1), the STT concludes that the error structure used for this model best approximates the true uncertainty in this forecast at the current time.

#### *Predictor Performance*

In 2010 the SI preseason forecast of 245,483 was 1.6 times its postseason value of 152,857.

#### *2011 Stock Status*

A total of 27,483 SRFC jacks were estimated to have escaped to Sacramento River basin hatcheries and natural spawning areas in 2010. The resulting 2011 SI forecast is 729,893 adult SRFC (Figure II-2). For the 2011 SI forecast, the upper bound of the 95 percent prediction interval is 1,228,114 and the lower bound is 231,671.

### Klamath River Fall Chinook

#### *Predictor Description*

For Klamath River fall Chinook, 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-2). Historical abundance estimates were derived from a cohort analysis of CWT information (brood years 1979-2006). 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 small numbers of age-2 KRFC.

### *Predictor Performance*

Since 1985, the preseason ocean abundance forecasts for age-3 fish have ranged from 0.33 to 2.72 times the postseason estimates; for age-4 fish from 0.47 to 2.60 times the postseason estimates; and for the adult stock as a whole from 0.34 to 2.03 times the postseason estimates (Table II-3). The September 1, 2009 age-3 forecast (223,400) was 1.03 times its postseason estimate (217,062). The age-4 forecast (106,300) was 1.60 times its postseason estimate (66,452); and the age-5 forecast (1,800) was 3.51 times its postseason estimate (513) (Table II-3). The preseason forecast of the adult stock as a whole was 1.17 times the postseason estimate.

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-4). 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 Council's FMP conservation objective for KRFC (Amendment 9) permits an average natural spawner reduction rate via fisheries of no more than 0.67, with a minimum escapement of 35,000 natural spawning adults. The plan allows for any ocean and river harvest allocation that meets the spawner reduction rate constraint, provided it also meets the minimum escapement goal. The regulations adopted in 2010 were expected to result in 40,700 natural area spawning adults and an age-4 ocean harvest rate of 12.3 percent. Postseason estimates of these quantities were 37,222 natural area adult spawners and an age-4 ocean harvest rate of 3.9 percent (Table II-5).

### *2011 Stock Status*

The 2011 forecast for the ocean abundance of KRFC as of September 1, 2010 (preseason) is 304,600 age-3 fish, the age-4 forecast is 61,600, and the age-5 forecast is 5,000 fish.

Late-season ocean fisheries in 2010 (September through November) were estimated to have harvested zero adult KRFC; hence, no harvest will be deducted from the ocean fishery's allocation in determining the 2011 allowable ocean harvest.

Amendment 15 to the Salmon FMP (implemented March 26, 2008) provides for potential limited harvest of KRFC in ocean salmon fisheries during years that might otherwise be closed due to a projected shortfall in meeting the 35,000 natural spawner conservation objective, as long as this would not jeopardize the long term capacity of the stock to produce maximum sustainable yield on continuing basis. In 2011, there is no basis for invoking *de minimis* fishing under Amendment 15 because KRFC is not projected to fall short of the 35,000 floor.

KRFC triggered an overfishing concern in 2006, after failing to achieve a minimum of 35,000 natural area adult spawners in 2004, 2005, and 2006. The Council recommended that the overfishing concern be ended when KRFC exceeded 35,000 natural area adult spawners in three out of four consecutive years, or when escapement exceeded 40,700 natural area adults in two consecutive years. In 2010, KRFC satisfied the Council adopted criteria for ending the overfishing concern by exceeding 35,000 natural area adult spawners for the third time in four years (2007, 2009, and 2010).

## 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, Little, Mad, Eel, and Mattole rivers, and Redwood Creek. Except for the Smith River, these stocks 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 Klamath River fall Chinook age-4 ocean harvest rate to no more than 16.0 percent to limit impacts on these stocks. In 2010 the age-4 ocean harvest rate was 4.0 percent.

## 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, Canada, Washington, Oregon, and in terminal area fisheries. Minor catches occur in California fisheries and variable catches have been observed in southeast Alaska troll fisheries.

### *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.

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.

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. Quantitative abundance predictions are not made for these stocks.

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.

### Predictor Description and 2011 Stock Status for NOC and MOC Groups

Quantitative abundance predictions are made for all three of the coastal Chinook groups (NOC, MOC, and SOC), but are not used in annual development of Council area fishery regulations. Quantitative forecasts of abundance are based on sibling regression analyses from individual basin's escapement assessment data and scale sampling, which occurs coast-wide. Forecast data for the NOC are used in the PSC management process in addition to terminal area management actions.

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 (PFMC 2011, Chapter II, Table II-4 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, Alsea, and Elk rivers.

Basin-specific forecasts constitute 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.

### *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 annual spawner counts decreased from 2002 through 2008 despite excellent parental escapements indices in 2001 to 2004. The 2010 spawner counts were a 45 percent increase from 2009 (PFMC 2011, Appendix B, Table B-11). The 2011 NOC stock abundance is expected to be greater than the 2010 abundance.

Based on the density index of total spawners, the generalized expectation for NOC stocks in 2011 is above recent year's average abundance. Specifically, the 2010 spawner density in standard survey areas for the NOC averaged 87 spawners per mile.

### *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. Age specific ocean abundance forecasts for 2011 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.

The 2010 MOC density from standard survey areas was 92 adult spawners per mile, the highest since 2003 (PFMC 2011, Appendix B, Table B-11). Fall Chinook escapement goals are currently under development for the South Umpqua and Coquille basins of the MOC.

## Predictor Description and 2011 Stock Status for South/Local Migrating Chinook

Quantitative abundance predictions are not made for all of these stocks, although an abundance index for Rogue River fall Chinook has been developed. General trends in stock abundance for SOC Chinook stocks are assessed through escapement indices (PFMC 2011, Chapter II, Table II-4 and Figure II-3).

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). The 2010 Huntley Park escapement estimate and the resulting 2011 ROPI forecast was then scaled to the historical carcass survey-based ROPI. The 2011 ROPI forecast (16,800) consisting of age-3 (9,500), age-4 (6,300) and age-5 (1,000) are based on the average annual age-class strengths of the carcass-based ROPIs from 1991-2005. This data-set was truncated at 1991 because significant harvest restrictions that could affect age structure began that year. The 2011 ROPI is slightly higher than the recent three-year average of 13,400 (Table II-6).

### *Other Stocks*

Fall Chinook escapement goals and forecasts are currently under development for stocks south of the Elk 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). The average density from standard survey areas was 52 adult spawners per mile, the second highest observed since 2004 (PFMC 2011, Appendix B, Table B-8).

## *CHINOOK STOCKS NORTH OF CAPE FALCON*

### Columbia River Fall Chinook

#### *Predictor Description and Past Performance*

Columbia River fall Chinook stocks typically 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. 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 significant hatchery component. The lower river hatchery (LRH) tule, Spring Creek Hatchery (SCH) tule, and mid-Columbia brights (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 stocks generally mature at an earlier age than the bright fall stocks and do not migrate as far north. Minor stocks include the Select Area brights (SAB), a stock originally from the Rogue River.

Preseason forecasts of Columbia River fall 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 (return 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 results of planned ocean fisheries.

The 2011 return of 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 1980's). Typically, only the more recent broods are used in the current predictions. 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 2010 Ocean Salmon Fisheries* (Appendix B, Tables B-15 through B-20). The 2010 returns for the five fall Chinook stocks listed in this report may differ somewhat from those provided in the *Review of 2010 Ocean Salmon Fisheries*, since ocean escapement estimates may have been updated after that report was printed.

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-7). The recent 10-year average March preliminary preseason forecasts as a percentage of the postseason estimates for the URB, LRW, LRH, SCH, and MCB are 1.01, 1.09, 0.93, 1.06, and 0.94 respectively. None of the stocks had a bias in the recent time series of March preliminary forecasts.

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-7) 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.

### *2011 Stock Status*

The preliminary forecast for 2011 URB fall Chinook ocean escapement is 398,200 adults, about 123 percent of last year's return and about 153 percent of the recent 10-year average of 259,610.

The preliminary forecast for 2011 ocean escapement of ESA-listed Snake River wild fall Chinook is 17,500, about 114 percent of last year's preliminary return estimate.

Ocean escapement of LRW fall Chinook in 2011 is forecast at 12,500 adults, about 115 percent of last year's forecast, and about 81 percent of the recent 10-year average return of 15,360. The forecast is greater than last year's actual return and the spawning escapement goal of 5,700 in the North Fork Lewis River should be achieved this year depending on fishing regulations.

The preliminary forecast for 2011 ocean escapement of LRH fall Chinook is for a return of 133,500 adults, about 130 percent of last year's return and 144 percent of the recent 10-year average of 92,500.

The preliminary ocean escapement forecast of SCH fall Chinook in 2011 is 116,400 adults, about 89 percent of last year's return and 111 percent of the 10-year average of 104,900.

The preliminary forecast for the 2011 ocean escapement of MCB fall Chinook is 100,000 adults, about 127 percent of last year's return and about 110 percent of the recent 10-year average of 90,560.

## Washington Coast Chinook

### *Predictor Description and Past Performance*

Council fisheries have negligible impacts on Washington coast Chinook stocks, and except for Willapa Bay fall Chinook, Hoh River Chinook and Quillayute River Chinook, forecast data is unavailable in time for publication of this report; therefore, preseason abundance estimates are not presented. However, abundance estimates are provided for Washington Coastal fall stocks in subsequent preseason fishery impact assessment reports prepared by the STT.

### *2011 Stock Status*

The 2011 Willapa Bay hatchery fall Chinook ocean escapement forecast is 32,476, which is higher than the 2010 prediction of 31,135. The 2011 natural fall Chinook ocean escapement forecast is 4,341, which is higher than last year's prediction of 2,023, but still slightly less than the WDFW spawning escapement goal of 4,350.

For the Hoh River, the 2011 natural spring/summer Chinook ocean escapement forecast is 1,037, above the FMP conservation objective of 900. The natural fall Chinook forecast is 2,880, above the FMP conservation objective of 1,200.

The 2011 Quillayute hatchery spring Chinook ocean escapement forecast is 1,399 and the natural summer/fall Chinook forecast is 8,842 (1,299 summer and 7,543 fall). The FMP conservation objectives are spawning escapements of 1,200 summer Chinook and 3,000 fall Chinook.

## Puget Sound Chinook

Run-size expectations for various Puget Sound stock management units are listed in Table I-1. A comparison of preseason and postseason forecasts for recent years is detailed in Table II-8. The STT has not undertaken a review of the methods employed by state and tribal staffs in preparing these abundance forecasts. 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. Puget Sound Chinook were listed as threatened under the ESA in March 1999. Southern U.S. fisheries that impact Puget Sound Chinook are constrained by terms of a Resource Management Plan (RMP), and are exempted from ESA Section 9 take prohibitions under Limit 6 of the 4(d) rule.

### *2011 Stock Status*

#### Spring Chinook

Spring Chinook originating in Puget Sound are expected to remain depressed. Runs in the Nooksack, Skagit, White, and Dungeness rivers are of particular concern.

#### Summer/Fall Chinook

The 2011 preliminary forecast for Puget Sound summer/fall stocks is for a return of 244,377 Chinook, slightly higher than the 2010 preseason forecast of 225,664. The 2011 natural Chinook return forecast of 39,333 (includes supplemental category forecasts) is lower than the 2010 forecast of 42,981.

Since ESA listing and development of the 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.

## *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 from June 12 through June 30, 2010 in the recreational fishery north of Cape Falcon. As in 2010, selective fishing options for non-Indian fisheries are under consideration in the ocean area from Cape Falcon, Oregon to the U. S./Canada border. Observed mark rates on Chinook in 2010 ocean fisheries in this area ranged from 50 to 70 percent. Based on preseason abundance forecasts, the expected mark rate for Chinook in this area for 2011 should be similar to those observed in 2010.

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

| | 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 | 248.0 | 86.7 | 0.0 | 334.7 | 18.1 | 91.4 | 18.8 | 110.2 | 463.0 | 76 |
| 1984 | 266.9 | 87.2 | 0.0 | 354.1 | 26.1 | 119.5 | 39.5 | 159.0 | 539.1 | 71 |
| 1985 | 359.5 | 160.2 | 0.0 | 519.7 | 39.3 | 209.5 | 29.9 | 239.3 | 798.3 | 70 |
| 1986 | 620.6 | 138.4 | 0.0 | 759.0 | 39.4 | 216.3 | 23.8 | 240.1 | 1,038.5 | 77 |
| 1987 | 687.9 | 176.3 | 0.0 | 864.2 | 32.0 | 174.8 | 20.3 | 195.1 | 1,091.3 | 82 |
| 1988 | 1,163.2 | 188.8 | 0.0 | 1,352.0 | 37.3 | 198.0 | 29.5 | 227.5 | 1,616.8 | 86 |
| 1989 | 606.5 | 160.1 | 0.0 | 766.5 | 25.0 | 126.7 | 25.9 | 152.6 | 944.1 | 84 |
| 1990 | 508.0 | 152.4 | 0.0 | 660.4 | 17.2 | 83.2 | 21.9 | 105.1 | 782.7 | 87 |
| 1991 | 301.0 | 90.8 | 0.0 | 391.8 | 26.0 [e/] | 91.4 | 27.5 | 118.9 | 536.6 | 78 |
| 1992 | 233.3 | 70.5 | 0.0 | 303.8 | 13.3 [e/] | 59.5 | 22.1 | 81.5 | 398.7 | 80 |
| 1993 | 342.8 | 115.8 | 0.0 | 458.6 | 27.7 [e/] | 110.6 | 26.8 | 137.4 | 623.6 | 78 |
| 1994 | 303.4 | 165.7 | 0.0 | 469.1 | 28.9 [e/] | 133.0 | 32.6 | 165.6 | 663.6 | 75 |
| 1995 | 730.7 | 390.3 | 0.0 | 1,121.1 | 48.5 | 253.5 | 41.8 | 295.3 | 1,464.8 | 80 |
| 1996 | 426.8 | 157.1 | 0.0 | 584.0 | 49.5 | 267.1 | 34.6 | 301.6 | 935.1 | 68 |
| 1997 | 582.4 | 219.5 | 0.0 | 801.9 | 56.6 | 279.6 | 65.2 | 344.8 | 1,203.3 | 71 |
| 1998 | 293.7 | 117.5 | 0.0 | 411.1 | 69.8 [e/] | 168.1 | 77.8 | 245.9 | 726.8 | 66 |
| 1999 | 308.8 | 78.0 | 0.0 | 386.8 | 68.9 [e/] | 353.7 | 46.1 | 399.8 | 855.4 | 53 |
| 2000 | 432.8 | 154.6 | 0.0 | 587.4 | 59.5 [e/] | 369.2 | 48.3 | 417.5 | 1,064.4 | 61 |
| 2001 | 285.8 | 95.8 | 0.0 | 381.6 | 97.9 | 537.4 | 59.4 | 596.8 | 1,076.3 | 45 |
| 2002 | 458.2 | 194.6 | 0.0 | 652.8 | 89.2 [e/] | 682.7 | 87.2 | 769.9 | 1,511.9 | 49 |
| 2003 | 508.3 | 109.0 | 0.0 | 617.3 | 85.8 | 413.4 | 109.6 | 523.0 | 1,226.1 | 57 |
| 2004 | 622.3 | 214.0 | 0.0 | 836.4 | 47.1 | 203.5 | 83.4 | 286.9 | 1,170.3 | 75 |
| 2005 | 370.4 | 128.0 | 0.0 | 498.3 | 65.0 | 210.7 | 185.3 | 396.0 | 959.3 | 59 |
| 2006 | 150.0 | 107.9 | 0.0 | 257.9 | 45.1 | 195.1 | 79.9 | 275.0 | 578.1 | 52 |
| 2007 | 120.0 | 32.2 | 0.0 | 152.1 | 14.3 [e/] | 70.0 | 21.4 | 91.4 | 257.8 | 65 |
| 2008 | 3.2 | 0.9 | 0.0 | 4.1 | 0.1 [e/] | 46.9 | 18.5 | 65.4 | 69.6 | 6 |
| 2009 | 0.0 | 0.2 | 0.1 | 0.3 | 0.0 [e/] | 23.3 | 17.5 | 40.9 | 41.2 | 1 |
| 2010[f/] | 12.7 | 12.5 | 0.3 | 25.5 | 2.0 [e/] | 85.7 | 39.7 | 125.4 | 152.9 | 18 |

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).

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 adult spawner escapement.

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

e/ Estimates derived from CDFG 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. Klamath River fall Chinook ocean abundance (thousands), harvest rate, and river run size estimates (thousands) by age.

| | 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 | 781.2 | 341.9 | 1,123.1 | 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 | 161.6 | 0.03 | 0.09 | 14.4 | 37.0 | 26.0 | 1.0 | 64.0 |
| 1995 | 784.3 | 28.7 | 813.0 | 0.04 | 0.14 | 22.8 | 201.9 | 18.3 | 2.6 | 222.8 |
| 1996 | 192.3 | 225.5 | 417.8 | 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 | 0.2 | 187.4 |
| 2002 | 513.6 | 98.9 | 612.5 | 0.02 | 0.15 | 9.2 | 94.6 | 62.5 | 3.7 | 160.8 |
| 2003 | 400.2 | 192.2 | 592.4 | 0.08 | 0.21 | 3.8 | 94.3 | 96.8 | 0.9 | 191.9 |
| 2004 | 159.6 | 105.1 | 264.6 | 0.12 | 0.34 | 9.7 | 33.2 | 40.7 | 5.3 | 79.2 |
| 2005 | 190.0 | 38.1 | 228.1 | 0.02 | 0.20 | 2.3 | 43.8 | 17.5 | 3.9 | 65.2 |
| 2006 | 90.6 | 63.4 | 154.0 | 0.01 | 0.10 | 26.9 | 18.5 | 41.6 | 1.3 | 61.4 |
| 2007 | 376.8 | 33.6 | 410.5 | 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 | 248.2[a/] | 21.1 | 269.3 | 0.00[a/] | 0.00 | 11.9 | 78.6 | 16.4 | 5.6 | 100.6 |
| 2010 | 217.1[b/] | 66.5[a/] | 283.5 | NA[c/] | 0.04[a/] | 16.7 | 46.2 | 44.4 | 0.4 | 91.0 |

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-3. 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 | 276,000 | 0.41 |
| 1986 | 426,000[b/] | 1,304,409 | 0.33 |
| 1987 | 511,800 | 781,198 | 0.66 |
| 1988 | 370,800 | 756,261 | 0.49 |
| 1989 | 450,600 | 369,828 | 1.22 |
| 1990 | 479,000 | 176,133 | 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 | 119,913 | 1.15 |
| 1995 | 269,000 | 784,260 | 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 | 617,098 | 0.57 |
| 2001 | 187,200 | 356,128 | 0.53 |
| 2002 | 209,000 | 513,561 | 0.41 |
| 2003 | 171,300 | 400,242 | 0.43 |
| 2004 | 72,100 | 159,560 | 0.45 |
| 2005 | 185,700 | 189,976 | 0.98 |
| 2006 | 44,100 | 90,606 | 0.49 |
| 2007 | 515,400 | 376,841 | 1.37 |
| 2008 | 31,600 | 67,993 | 0.46 |
| 2009 | 474,900 | 248,170 | 1.91 |
| 2010[c/] | 223,400 | 217,062 | 1.03 |
| 2011 | 304,600 | - | - |

TABLE II-3. Comparisons of preseason forecast 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 | 56,875 | 57,500 | 0.99 |
| 1986 | 66,250 | 140,823 | 0.47 |
| 1987 | 206,125 | 341,875 | 0.60 |
| 1988 | 186,375 | 234,772 | 0.79 |
| 1989 | 215,500 | 177,245 | 1.22 |
| 1990 | 50,125 | 103,951 | 0.48 |
| 1991 | 44,625 | 37,172 | 1.20 |
| 1992 | 44,750 | 28,169 | 1.59 |
| 1993 | 39,125 | 15,037 | 2.60 |
| 1994 | 86,125 | 41,736 | 2.06 |
| 1995 | 47,000 | 28,725 | 1.64 |
| 1996 | 268,500 | 225,521 | 1.19 |
| 1997 | 53,875 | 62,820 | 0.86 |
| 1998 | 46,000 | 44,733 | 1.03 |
| 1999 | 78,750 | 30,456 | 2.59 |
| 2000 | 38,875 | 44,176 | 0.88 |
| 2001 | 247,000 | 133,801 | 1.85 |
| 2002 | 143,800 | 98,928 | 1.45 |
| 2003 | 132,400 | 192,156 | 0.69 |
| 2004 | 134,500 | 105,051 | 1.28 |
| 2005 | 48,900 | 38,079 | 1.28 |
| 2006 | 63,700 | 63,383 | 1.00 |
| 2007 | 26,100 | 33,615 | 0.78 |
| 2008 | 157,200 | 81,366 | 1.93 |
| 2009 | 25,200 | 21,118 | 1.19 |
| 2010[c/] | 106,300 | 66,452 | 1.60 |
| 2011 | 61,600 | - | - |

TABLE II-3. 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 | 5,250 | 19,414 | 0.27 |
| 1988 | 13,250 | 14,632 | 0.91 |
| 1989 | 10,125 | 9,612 | 1.05 |
| 1990 | 7,625 | 7,767 | 0.98 |
| 1991 | 1,500 | 2,774 | 0.54 |
| 1992 | 1,250 | 1,444 | 0.87 |
| 1993 | 1,125 | 1,759 | 0.64 |
| 1994 | 500 | 1,468 | 0.34 |
| 1995 | 2,000 | 3,805 | 0.53 |
| 1996 | 1,125 | 787 | 1.43 |
| 1997 | 7,875 | 8,859 | 0.89 |
| 1998 | 3,250 | 2,382 | 1.36 |
| 1999 | 2,000 | 2,106 | 0.95 |
| 2000 | 1,375 | 1,051 | 1.31 |
| 2001 | 1,250 | 258 | 4.84 |
| 2002 | 9,700 | 6,933 | 1.40 |
| 2003 | 6,500 | 1,915 | 3.39 |
| 2004 | 9,700 | 17,170 | 0.56 |
| 2005 | 5,200 | 6,857 | 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[c/] | 1,800 | 513 | 3.51 |
| 2011 | 5,000 | - | - |

TABLE II-3. Comparisons of preseason forecast 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 | 169,875[d/] | 344,613 | 0.49 |
| 1986 | 492,250[d/] | 1,451,608 | 0.34 |
| 1987 | 723,175 | 1,142,487 | 0.63 |
| 1988 | 570,425 | 1,005,665 | 0.57 |
| 1989 | 676,225 | 556,685 | 1.21 |
| 1990 | 536,750 | 287,851 | 1.86 |
| 1991 | 222,325 | 109,370 | 2.03 |
| 1992 | 96,000 | 69,115 | 1.39 |
| 1993 | 334,650 | 185,269 | 1.81 |
| 1994 | 224,625 | 163,117 | 1.38 |
| 1995 | 318,000 | 816,790 | 0.39 |
| 1996 | 749,425 | 418,580 | 1.79 |
| 1997 | 286,350 | 211,832 | 1.35 |
| 1998 | 225,250 | 201,914 | 1.12 |
| 1999 | 165,550 | 161,628 | 1.02 |
| 2000 | 389,850 | 662,325 | 0.59 |
| 2001 | 435,450 | 490,187 | 0.89 |
| 2002 | 362,500 | 619,422 | 0.59 |
| 2003 | 310,200 | 594,313 | 0.52 |
| 2004 | 216,300 | 281,781 | 0.77 |
| 2005 | 239,800 | 234,912 | 1.02 |
| 2006 | 110,000 | 159,225 | 0.69 |
| 2007 | 546,200 | 413,367 | 1.32 |
| 2008 | 190,700 | 152,259 | 1.25 |
| 2009 | 505,700 | 276,347 | 1.83 |
| 2010[c/] | 331,500 | 284,027 | 1.17 |
| 2011 | 371,100 | - | - |

a/ Original preseason forecasts for years 1985-2001 were for May 1 (t); converted to Sept. 1 (t-1) forecasts by dividing the assumed May 1 (t) number by the 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 was applied to the jack count to produce the forecast because, (1) most jacks returned to the Trinity River, and (2) the jack count was outside the database range.

c/ Postseason estimates are preliminary.

d/ Does not include age-5 adults.

TABLE II-4. Summary of management objectives and predictor performance for Klamath River fall Chinook.

| | Preseason Ocean Abundance Forecast[a/] Sept. 1 (t-1) | | Postseason Ocean Abundance Estimate Sept. 1 (t-1) | | Preseason Age-4 Harvest Rate Forecast[b/] | | Postseason Age-4 Harvest Rate Estimate[c/] | | Preseason Adult Harvest Forecast | | Postseason Adult Harvest Estimate | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year(t) | Age-3 | Age-4 | Age-3 | Age-4 | Ocean | River | Ocean | River | Ocean | River | Ocean | River |
| 1986 | 426,000 | 66,250 | 1,304,409 | 140,823 | 0.28 | 0.50 | 0.46 | 0.67 | 72,000 | 37,700 | 301,999 | 46,154 |
| 1987 | 511,800 | 206,125 | 781,198 | 341,875 | 0.28 | 0.53 | 0.43 | 0.44 | 121,200 | 78,200 | 277,224 | 73,265 |
| 1988 | 370,800 | 186,375 | 756,261 | 234,772 | 0.31 | 0.53 | 0.39 | 0.52 | 114,100 | 65,400 | 253,905 | 73,854 |
| 1989 | 450,600 | 215,500 | 369,828 | 177,245 | 0.30 | 0.49 | 0.36 | 0.70 | 128,100 | 67,600 | 125,117 | 54,340 |
| 1990 | 479,000 | 50,125 | 176,133 | 103,951 | 0.30 | 0.49 | 0.55 | 0.36 | 85,100 | 31,200 | 114,786 | 11,459 |
| 1991 | 176,200 | 44,625 | 69,424 | 37,172 | 0.13 | 0.28 | 0.18 | 0.45 | 16,700 | 12,800 | 9,872 | 13,581 |
| 1992 | 50,000 | 44,750 | 39,502 | 28,169 | 0.06 | 0.15 | 0.07 | 0.27 | 4,200 | 4,200 | 3,142 | 6,787 |
| 1993 | 294,400 | 39,125 | 168,473 | 15,037 | 0.12 | 0.43 | 0.16 | 0.49 | 20,100 | 22,500 | 11,355 | 12,808 |
| 1994 | 138,000 | 86,125 | 119,913 | 41,736 | 0.07 | 0.20 | 0.09 | 0.29 | 10,400 | 14,300 | 7,961 | 13,524 |
| 1995 | 269,000 | 47,000 | 784,260 | 28,725 | 0.07 | 0.32 | 0.14 | 0.19 | 13,500 | 18,500 | 32,233 | 21,637 |
| 1996 | 479,800 | 268,500 | 192,272 | 225,521 | 0.17 | 0.66 | 0.16 | 0.39 | 88,400 | 129,100 | 45,155 | 69,241 |
| 1997 | 224,600 | 53,875 | 140,153 | 62,820 | 0.10 | 0.43 | 0.06 | 0.26 | 17,600 | 26,500 | 8,656 | 17,764 |
| 1998 | 176,000 | 46,000 | 154,799 | 44,733 | 0.07 | 0.29 | 0.09 | 0.30 | 10,200 | 14,800 | 4,891 | 17,897 |
| 1999 | 84,800 | 78,750 | 129,066 | 30,456 | 0.10 | 0.28 | 0.09 | 0.45 | 12,300 | 18,100 | 5,116 | 16,942 |
| 2000 | 349,600 | 38,875 | 617,098 | 44,176 | 0.11 | 0.53 | 0.10 | 0.25 | 24,000 | 32,400 | 42,050 | 35,066 |
| 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 | 513,561 | 98,928 | 0.13 | 0.57 | 0.15 | 0.26 | 30,000 | 70,900 | 28,895 | 35,069 |
| 2003 | 171,300 | 132,400 | 400,242 | 192,156 | 0.16 | 0.50 | 0.21 | 0.28 | 30,600 | 52,200 | 70,684 | 39,715 |
| 2004 | 72,100 | 134,500 | 159,560 | 105,051 | 0.15 | 0.38 | 0.34 | 0.48 | 26,500 | 35,800 | 63,885 | 29,807 |
| 2005 | 185,700 | 48,900 | 189,976 | 38,079 | 0.08 | 0.16 | 0.20 | 0.19 | 7,100 | 9,600 | 12,826 | 10,001 |
| 2006 | 44,100 | 63,700 | 90,606 | 63,383 | 0.11 | 0.23 | 0.10 | 0.18 | 10,000 | 10,000 | 10,401 | 10,345 |
| 2007 | 515,400 | 26,100 | 376,841 | 33,615 | 0.16 | 0.63 | 0.21 | 0.56 | 30,200 | 51,400 | 30,244 | 33,884 |
| 2008 | 31,600 | 157,200 | 67,993 | 81,366 | 0.02 | 0.43 | 0.10 | 0.38 | 4,500 | 49,500 | 8,679 | 24,180 |
| 2009 | 474,900 | 25,200 | 248,170 | 21,118 | 0.00 | 0.57 | 0.00 | 0.40 | 100 | 61,700 | 52 | 34,040 |
| 2010[d/] | 223,400 | 106,300 | 217,062 | 66,452 | 0.12 | 0.49 | 0.04 | 0.40 | 22,600 | 46,600 | 4,235 | 33,031 |
| 2011 | 304,600 | 61,600 | - | - | - | - | - | - | - | - | - | - |

a/ Original preseason forecasts for years 1986-2001 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 assumed 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), 1986-2001, 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 (the 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.

TABLE II-5. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 1 of 4)

| | Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t) ) | | | | | | | River Fisheries (t) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KMZ | | | North of | South of | | | | | |
| Year (t) | Troll | Sport | Subtotal | KMZ | KMZ | Subtotal | Ocean Total | Net | Sport | Total |
| | | | | | **HARVEST (numbers of fish)** | | | | | |
| **Age-3** | | | | | | | | | | |
| 1986 | 35,632 | 4,876 | 40,508 | 73,777 | 122,913 | 196,690 | 237,198 | 8,100 | 18,100 | 26,200 |
| 1987 | 17,240 | 5,083 | 22,323 | 43,439 | 56,378 | 99,817 | 122,140 | 11,400 | 11,400 | 22,800 |
| 1988 | 15,999 | 5,165 | 21,164 | 24,317 | 107,971 | 132,288 | 153,452 | 12,500 | 15,600 | 28,100 |
| 1989 | 6,456 | 11,783 | 18,239 | 15,315 | 23,729 | 39,044 | 57,283 | 2,700 | 900 | 3,600 |
| 1990 | 81 | 4,357 | 4,438 | 36,579 | 11,006 | 47,585 | 52,023 | 1,300 | 1,400 | 2,700 |
| 1991 | 0 | 1,022 | 1,022 | 344 | 810 | 1,154 | 2,176 | 2,123 | 1,277 | 3,400 |
| 1992 | 0 | 0 | 0 | 972 | 0 | 972 | 972 | 970 | 251 | 1,221 |
| 1993 | 0 | 822 | 822 | 833 | 6,424 | 7,257 | 8,079 | 5,426 | 2,917 | 8,343 |
| 1994 | 42 | 604 | 646 | 0 | 3,387 | 3,387 | 4,033 | 4,543 | 965 | 5,508 |
| 1995 | 0 | 999 | 999 | 12,213 | 14,810 | 27,023 | 28,022 | 11,840 | 5,536 | 17,376 |
| 1996 | 0 | 0 | 0 | 0 | 9,314 | 9,314 | 9,314 | 12,363 | 3,661 | 16,024 |
| 1997 | 0 | 232 | 232 | 620 | 1,215 | 1,835 | 2,067 | 2,166 | 2,736 | 4,902 |
| 1998 | 0 | 6 | 6 | 298 | 466 | 764 | 770 | 2,231 | 5,781 | 8,012 |
| 1999 | 63 | 180 | 243 | 1,262 | 433 | 1,695 | 1,938 | 4,981 | 1,748 | 6,729 |
| 2000 | 404 | 3,282 | 3,686 | 8,604 | 25,203 | 33,807 | 37,493 | 22,458 | 4,893 | 27,351 |
| 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 | 9,915 | 11,416 | 12,420 | 11,734 | 6,258 | 17,992 |
| 2003 | 173 | 679 | 852 | 1,885 | 27,309 | 29,194 | 30,046 | 6,996 | 5,061 | 12,057 |
| 2004 | 402 | 971 | 1,373 | 9,719 | 7,331 | 17,050 | 18,423 | 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 | 477 | 477 | 32 | 341 | 373 | 850 | 2,388 | 13 | 2,401 |
| 2007 | 770 | 8,099 | 8,869 | 4,193 | 9,365 | 13,558 | 22,427 | 17,543 | 5,734 | 23,277 |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,225 | 608 | 3,833 |
| 2009[a/] | 0 | 52 | 52 | 0 | 0 | 0 | 52 | 19,820 | 4,715 | 24,535 |
| 2010[a/] | 84 | 23 | 107 | 0 | 1,335 | 1,335 | 1,442 | 13,190 | 1,884 | 15,074 |

TABLE II-5. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 2 of 4)

| | Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t)) | | | | | | | River Fisheries (t) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KMZ | | | North of | South of | | | | | |
| Year (t) | Troll | Sport | Subtotal | KMZ | KMZ | Subtotal | Ocean Total | Net | Sport | Total |
| | | | | | **HARVEST (numbers of fish)** | | | | | |
| **Age-4** | | | | | | | | | | |
| 1986 | 7,745 | 1,113 | 8,858 | 23,486 | 31,913 | 55,399 | 64,257 | 17,000 | 2,900 | 19,900 |
| 1987 | 21,736 | 4,427 | 26,163 | 70,645 | 48,832 | 119,477 | 145,640 | 41,000 | 8,500 | 49,500 |
| 1988 | 11,870 | 3,596 | 15,466 | 26,381 | 50,296 | 76,677 | 92,143 | 38,600 | 6,200 | 44,800 |
| 1989 | 6,064 | 9,735 | 15,799 | 32,116 | 16,608 | 48,724 | 64,523 | 41,000 | 7,700 | 48,700 |
| 1990 | 3,997 | 2,919 | 6,916 | 39,627 | 10,624 | 50,251 | 57,167 | 6,000 | 2,200 | 8,200 |
| 1991 | 0 | 1,001 | 1,001 | 1,513 | 4,135 | 5,648 | 6,649 | 7,593 | 2,016 | 9,609 |
| 1992 | 171 | 55 | 226 | 1,783 | 12 | 1,795 | 2,021 | 4,360 | 723 | 5,083 |
| 1993 | 0 | 0 | 0 | 849 | 1,616 | 2,465 | 2,465 | 3,786 | 243 | 4,029 |
| 1994 | 0 | 1,124 | 1,124 | 1,168 | 1,499 | 2,667 | 3,791 | 6,666 | 818 | 7,484 |
| 1995 | 0 | 242 | 242 | 1,879 | 1,771 | 3,650 | 3,892 | 2,957 | 480 | 3,437 |
| 1996 | 773 | 3,464 | 4,237 | 10,337 | 20,741 | 31,078 | 35,315 | 43,959 | 9,080 | 53,039 |
| 1997 | 3 | 172 | 175 | 463 | 2,994 | 3,457 | 3,632 | 8,734 | 2,586 | 11,320 |
| 1998 | 0 | 105 | 105 | 3,942 | 0 | 3,942 | 4,047 | 7,164 | 1,822 | 8,986 |
| 1999 | 15 | 381 | 396 | 1,657 | 696 | 2,353 | 2,749 | 8,789 | 494 | 9,283 |
| 2000 | 117 | 895 | 1,012 | 2,327 | 1,076 | 3,403 | 4,415 | 6,733 | 756 | 7,489 |
| 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 | 918 | 1,752 | 7,855 | 30,007 | 37,862 | 39,614 | 22,754 | 4,592 | 27,346 |
| 2004 | 1,421 | 1,215 | 2,636 | 11,504 | 21,949 | 33,453 | 36,089 | 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 | 1,991 | 2,472 | 4,463 | 7,069 | 8,987 | 502 | 9,489 |
| 2008 | 6,376 | 1,105 | 7,481 | 546 | 113 | 659 | 8,140 | 17,891 | 1,260 | 19,151 |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,831 | 706 | 6,537 |
| 2010[a/] | 37 | 114 | 151 | 924 | 1,547 | 2,471 | 2,622 | 16,682 | 1,134 | 17,816 |

TABLE II-5. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 3 of 4)

| | Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t) ) | | | | | | | River Fisheries (t) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KMZ | | | North of | South of | | | | | |
| Year (t) | Troll | Sport | Subtotal | KMZ | KMZ | Subtotal | Ocean Total | Net | Sport | Total |
| | | | | | **HARVEST RATE**[b/] | | | | | |
| **Age-3** | | | | | | | | | | |
| 1986 | 0.03 | 0.00 | 0.03 | 0.06 | 0.09 | 0.15 | 0.18 | 0.05 | 0.11 | 0.16 |
| 1987 | 0.02 | 0.01 | 0.03 | 0.06 | 0.07 | 0.13 | 0.16 | 0.13 | 0.13 | 0.25 |
| 1988 | 0.02 | 0.01 | 0.03 | 0.03 | 0.14 | 0.17 | 0.20 | 0.12 | 0.15 | 0.28 |
| 1989 | 0.02 | 0.03 | 0.05 | 0.04 | 0.06 | 0.11 | 0.15 | 0.05 | 0.02 | 0.07 |
| 1990 | 0.00 | 0.02 | 0.03 | 0.21 | 0.06 | 0.27 | 0.30 | 0.11 | 0.12 | 0.23 |
| 1991 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.02 | 0.03 | 0.21 | 0.13 | 0.34 |
| 1992 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.02 | 0.02 | 0.14 | 0.04 | 0.18 |
| 1993 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.05 | 0.11 | 0.06 | 0.17 |
| 1994 | 0.00 | 0.01 | 0.01 | 0.00 | 0.03 | 0.03 | 0.03 | 0.12 | 0.03 | 0.15 |
| 1995 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.03 | 0.04 | 0.06 | 0.03 | 0.09 |
| 1996 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.05 | 0.05 | 0.32 | 0.09 | 0.41 |
| 1997 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.06 | 0.08 | 0.14 |
| 1998 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.10 | 0.14 |
| 1999 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.02 | 0.17 | 0.06 | 0.23 |
| 2000 | 0.00 | 0.01 | 0.01 | 0.01 | 0.04 | 0.05 | 0.06 | 0.12 | 0.03 | 0.15 |
| 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[a/] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | 0.06 | 0.31 |
| 2010[a/] | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.29 | 0.04 | 0.33 |

TABLE II-5. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 4 of 4)

| | Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t)) | | | | | | | River Fisheries (t) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | KMZ | | | North of | South of | | | | | |
| Year (t) | Troll | Sport | Subtotal | KMZ | KMZ | Subtotal | Ocean Total | Net | Sport | Total |
| | | | | | **HARVEST RATE**[b/] | | | | | |
| **Age-4** | | | | | | | | | | |
| 1986 | 0.05 | 0.01 | 0.06 | 0.17 | 0.23 | 0.39 | 0.46 | 0.57 | 0.10 | 0.67 |
| 1987 | 0.06 | 0.01 | 0.08 | 0.21 | 0.14 | 0.35 | 0.43 | 0.36 | 0.08 | 0.44 |
| 1988 | 0.05 | 0.02 | 0.07 | 0.11 | 0.21 | 0.33 | 0.39 | 0.45 | 0.07 | 0.52 |
| 1989 | 0.03 | 0.05 | 0.09 | 0.18 | 0.09 | 0.27 | 0.36 | 0.59 | 0.11 | 0.70 |
| 1990 | 0.04 | 0.03 | 0.07 | 0.38 | 0.10 | 0.48 | 0.55 | 0.26 | 0.10 | 0.36 |
| 1991 | 0.00 | 0.03 | 0.03 | 0.04 | 0.11 | 0.15 | 0.18 | 0.35 | 0.09 | 0.45 |
| 1992 | 0.01 | 0.00 | 0.01 | 0.06 | 0.00 | 0.06 | 0.07 | 0.23 | 0.04 | 0.27 |
| 1993 | 0.00 | 0.00 | 0.00 | 0.06 | 0.11 | 0.16 | 0.16 | 0.46 | 0.03 | 0.49 |
| 1994 | 0.00 | 0.03 | 0.03 | 0.03 | 0.04 | 0.06 | 0.09 | 0.26 | 0.03 | 0.29 |
| 1995 | 0.00 | 0.01 | 0.01 | 0.07 | 0.06 | 0.13 | 0.14 | 0.16 | 0.03 | 0.19 |
| 1996 | 0.00 | 0.02 | 0.02 | 0.05 | 0.09 | 0.14 | 0.16 | 0.32 | 0.07 | 0.39 |
| 1997 | 0.00 | 0.00 | 0.00 | 0.01 | 0.05 | 0.06 | 0.06 | 0.20 | 0.06 | 0.26 |
| 1998 | 0.00 | 0.00 | 0.00 | 0.09 | 0.00 | 0.09 | 0.09 | 0.24 | 0.06 | 0.30 |
| 1999 | 0.00 | 0.01 | 0.01 | 0.05 | 0.02 | 0.08 | 0.09 | 0.43 | 0.02 | 0.45 |
| 2000 | 0.00 | 0.02 | 0.02 | 0.05 | 0.02 | 0.08 | 0.10 | 0.22 | 0.02 | 0.25 |
| 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 | 0.34 | 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[a/] | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.04 | 0.04 | 0.38 | 0.03 | 0.40 |

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-6. Rogue River fall Chinook inriver run and ocean population indices.

| Return Year | Inriver Run Index in Thousands of Fish[a/] | | | | | Ocean Impact Rate by Age[b/] | | Rogue Ocean Population Index (ROPI) in Thousands of Fish[c/] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Age-2 | Age-3 | Age-4 | Age-5 | Total[d/] | Age-3 | Age-4-5 | Age-3 | Age-4 | Age-5 | Total |
| 1980 | 0.4 | 0.2 | 0.9 | 0.6 | 2.1 | 0.23 | 0.55 | 5.2 | 4.0 | 1.4 | 10.6 |
| 1981 | 1.1 | 3.3 | 1.0 | 0.3 | 5.7 | 0.21 | 0.53 | 9.2 | 3.0 | 0.7 | 12.9 |
| 1982 | 0.7 | 1.3 | 1.3 | 0.1 | 3.4 | 0.30 | 0.52 | 9.8 | 2.9 | 0.3 | 13.0 |
| 1983 | 0.3 | 1.1 | 1.5 | 0.0 | 2.9 | 0.19 | 0.60 | 8.6 | 4.4 | 0.1 | 13.1 |
| 1984 | 0.4 | 1.2 | 1.8 | 0.1 | 3.5 | 0.08 | 0.38 | 9.9 | 4.7 | 0.2 | 14.8 |
| 1985 | 2.5 | 1.3 | 3.5 | 0.6 | 7.9 | 0.11 | 0.25 | 9.7 | 6.3 | 0.9 | 16.9 |
| 1986 | 3.1 | 12.5 | 2.3 | 0.5 | 18.4 | 0.18 | 0.46 | 71.3 | 5.9 | 1.0 | 78.2 |
| 1987 | 2.6 | 7.8 | 18.1 | 0.4 | 28.9 | 0.16 | 0.43 | 80.3 | 36.3 | 0.6 | 117.2 |
| 1988 | 1.4 | 4.8 | 25.2 | 1.5 | 32.9 | 0.20 | 0.39 | 17.3 | 47.9 | 2.5 | 67.7 |
| 1989 | 0.5 | 1.3 | 4.0 | 2.0 | 7.8 | 0.15 | 0.36 | 8.4 | 7.2 | 3.2 | 18.8 |
| 1990 | 0.0 | 0.3 | 1.4 | 0.2 | 1.9 | 0.30 | 0.55 | 6.0 | 4.7 | 0.5 | 11.2 |
| 1991 | 0.2 | 0.4 | 1.9 | 0.5 | 3.0 | 0.03 | 0.18 | 3.5 | 3.2 | 0.6 | 7.3 |
| 1992 | 0.5 | 0.3 | 1.5 | 0.5 | 2.8 | 0.02 | 0.07 | 4.4 | 2.4 | 0.6 | 7.4 |
| 1993 | 0.3 | 3.5 | 1.5 | 0.5 | 5.8 | 0.05 | 0.16 | 16.1 | 3.2 | 0.6 | 19.9 |
| 1994 | 0.5 | 0.8 | 5.8 | 0.9 | 8.0 | 0.03 | 0.09 | 3.0 | 9.5 | 0.9 | 13.4 |
| 1995 | 0.2 | 0.6 | 1.4 | 2.0 | 4.2 | 0.04 | 0.13 | 4.3 | 1.7 | 2.3 | 8.3 |
| 1996 | 0.1 | 0.4 | 1.8 | 0.1 | 2.4 | 0.05 | 0.16 | 2.4 | 2.8 | 0.1 | 5.3 |
| 1997 | 0.1 | 0.3 | 1.0 | 0.3 | 1.7 | 0.01 | 0.06 | 5.2 | 1.5 | 0.3 | 7.0 |
| 1998 | 0.0 | 0.5 | 2.8 | 0.3 | 3.6 | 0.00 | 0.09 | 3.8 | 3.9 | 0.3 | 8.0 |
| 1999 | 0.2 | 0.3 | 1.6 | 0.5 | 2.6 | 0.01 | 0.09 | 1.5 | 2.7 | 0.6 | 4.8 |
| 2000 | 0.2 | 2.0 | 0.8 | 0.6 | 3.6 | 0.06 | 0.10 | 9.9 | 0.9 | 0.6 | 11.4 |
| 2001 | 0.8 | 2.3 | 4.2 | 0.0 | 7.3 | 0.03 | 0.09 | 14.1 | 5.9 | 0.0 | 20.0 |
| 2002 | 0.9 | 4.0 | 7.1 | 0.8 | 12.7 | 0.02 | 0.15 | 32.2 | 9.1 | 0.9 | 42.2 |
| 2003 | 0.9 | 2.3 | 12.0 | 0.4 | 15.6 | 0.08 | 0.21 | 14.4 | 22.1 | 0.5 | 37.0 |
| 2004 | 0.4 | 0.6 | 4.9 | 2.9 | 8.8 | 0.12 | 0.34 | 3.9 | 9.7 | 4.4 | 18.0 |
| 2005[f/] | NA | NA | NA | NA | NA | 0.02 | 0.20 | 7.6 | 5.0 | 0.8 | 13.4 |
| 2006[f/] | NA | NA | NA | NA | NA | 0.01 | 0.10 | 4.9 | 3.2 | 0.5 | 8.6 |
| 2007[f/] | NA | NA | NA | NA | NA | 0.06 | 0.21 | 5.8 | 3.8 | 0.6 | 10.2 |
| 2008[f/] | NA | NA | NA | NA | NA | 0.00 | 0.10 | 6.9 | 4.6 | 0.7 | 12.2 |
| 2009[f/] | NA | NA | NA | NA | NA | 0.00 | 0.00 | 6.1[e/] | 4.0 | 0.7 | 10.7[e/] |
| 2010[f/] | NA | NA | NA | NA | NA | NA | 0.04 | 9.8[e/] | 6.5[e/] | 1.1 | 17.3[e/] |
| 2011[f/] | NA | NA | NA | NA | NA | - | - | 9.5[g/] | 6.3[g/] | 1.0[g/] | 16.8[g/] |

a/ Index based on carcass counts in spawning survey index areas. Carcass counts in 1978, 1979, and 1980 adjusted for prespawning mortality. Age composition developed from carcass scale sampling.

b/ Exploitation rates since 1981 are based on Klamath River fall Chinook cohort analysis, 1977-1980 based on 1981-1983 average.

c/ Based on cohort reconstruction methods. Index values for 2011 predicted from regression equations; postseason estimates are not available.

d/ Excludes age-6 fish.

e/ Preliminary, complete cohort not available, mean maturity rate used to derive estimate.

f/ Spawning surveys were discontinued 2005.

g/ Preseason forecast.

TABLE II-7. Predicted and postseason returns of Columbia River adult fall Chinook in thousands of fish. (Page 1 of 3)

| Year | March Preseason Forecast[a/] | April STT Modeled Forecast[b/] | Postseason Return | March Pre/Postseason | April Pre/Postseason |
|---|---|---|---|---|---|
| | | | **URB** | | |
| 1984 | 90.10 | 93.00 | 131.40 | 0.69 | 0.71 |
| 1985 | 159.10 | 159.10 | 196.40 | 0.81 | 0.81 |
| 1986 | 285.90 | 286.10 | 281.60 | 1.02 | 1.02 |
| 1987 | 436.40 | 436.40 | 420.70 | 1.04 | 1.04 |
| 1988 | 450.70 | 446.50 | 339.90 | 1.33 | 1.31 |
| 1989 | 234.00 | 231.80 | 261.30 | 0.90 | 0.89 |
| 1990 | 127.20 | 126.90 | 153.60 | 0.83 | 0.83 |
| 1991 | 88.80 | 88.90 | 103.30 | 0.86 | 0.86 |
| 1992 | 68.40 | 66.30 | 81.00 | 0.84 | 0.82 |
| 1993 | 84.50 | 82.70 | 102.90 | 0.82 | 0.80 |
| 1994 | 85.40 | 94.70 | 132.80 | 0.64 | 0.71 |
| 1995 | 103.70 | 125.00 | 106.50 | 0.97 | 1.17 |
| 1996 | 88.90 | 94.20 | 143.20 | 0.62 | 0.66 |
| 1997 | 166.40 | 158.00 | 161.70 | 1.03 | 0.98 |
| 1998 | 150.80 | 141.80 | 142.30 | 1.06 | 1.00 |
| 1999 | 147.50 | 102.10 | 166.10 | 0.89 | 0.61 |
| 2000 | 171.10 | 208.20 | 155.70 | 1.10 | 1.34 |
| 2001 | 127.20 | 132.70 | 232.60 | 0.55 | 0.57 |
| 2002 | 281.00 | 273.80 | 276.90 | 1.01 | 0.99 |
| 2003 | 280.40 | 253.20 | 373.20 | 0.75 | 0.68 |
| 2004 | 292.20 | 287.00 | 367.90 | 0.79 | 0.78 |
| 2005 | 352.20 | 354.60 | 268.70 | 1.31 | 1.32 |
| 2006 | 253.90 | 249.10 | 230.40 | 1.10 | 1.08 |
| 2007 | 182.40 | 185.20 | 112.60 | 1.62 | 1.64 |
| 2008 | 162.50 | 165.90 | 196.90 | 0.83 | 0.84 |
| 2009 | 259.90 | 269.80 | 212.00 | 1.23 | 1.27 |
| 2010[c/] | 310.80 | 319.10 | 324.90 | 0.96 | 0.98 |
| 2011 | 398.20 | - | - | - | - |
| | | | **LRW** | | |
| 1984 | 16.70 | NA | 13.30 | 1.26 | NA |
| 1985 | 12.90 | NA | 13.30 | 0.97 | NA |
| 1986 | 15.70 | NA | 24.50 | 0.64 | NA |
| 1987 | 29.20 | NA | 37.90 | 0.77 | NA |
| 1988 | 43.30 | 42.10 | 41.70 | 1.04 | 1.01 |
| 1989 | 27.30 | 26.90 | 38.60 | 0.71 | 0.70 |
| 1990 | 23.70 | 23.40 | 20.30 | 1.17 | 1.15 |
| 1991 | 12.70 | 12.70 | 19.80 | 0.64 | 0.64 |
| 1992 | 17.40 | 16.70 | 12.50 | 1.39 | 1.34 |
| 1993 | 12.50 | 11.90 | 13.30 | 0.94 | 0.89 |
| 1994 | 14.70 | 13.20 | 12.20 | 1.20 | 1.08 |
| 1995 | 12.40 | 11.50 | 16.00 | 0.78 | 0.72 |
| 1996 | 8.80 | 8.10 | 14.60 | 0.60 | 0.55 |
| 1997 | 7.50 | 7.20 | 12.30 | 0.61 | 0.59 |
| 1998 | 8.10 | 7.00 | 7.30 | 1.11 | 0.96 |
| 1999 | 2.60 | 2.50 | 3.30 | 0.79 | 0.76 |
| 2000 | 3.50 | 2.70 | 10.20 | 0.34 | 0.26 |
| 2001 | 16.70 | 18.50 | 15.70 | 1.06 | 1.18 |
| 2002 | 18.70 | 18.30 | 24.90 | 0.75 | 0.73 |
| 2003 | 24.60 | 23.40 | 26.00 | 0.95 | 0.90 |
| 2004 | 24.10 | 24.20 | 22.30 | 1.08 | 1.09 |
| 2005 | 20.20 | 21.40 | 16.80 | 1.20 | 1.27 |
| 2006 | 16.60 | 16.60 | 18.10 | 0.92 | 0.92 |
| 2007 | 10.10 | 10.00 | 4.30 | 2.35 | 2.33 |
| 2008 | 3.80 | 3.80 | 7.10 | 0.54 | 0.54 |
| 2009 | 8.50 | 8.60 | 7.50 | 1.13 | 1.15 |
| 2010[c/] | 9.70 | 10.00 | 10.90 | 0.89 | 0.92 |
| 2011 | 12.50 | - | - | - | - |

TABLE II-7. Predicted and postseason returns of Columbia River adult 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 | 70.40 | 89.00 | 102.40 | 0.69 | 0.87 |
| 1985 | 81.50 | 86.70 | 111.00 | 0.73 | 0.78 |
| 1986 | 171.60 | 173.90 | 154.80 | 1.11 | 1.12 |
| 1987 | 294.90 | 298.70 | 344.10 | 0.86 | 0.87 |
| 1988 | 267.70 | 246.50 | 309.90 | 0.86 | 0.80 |
| 1989 | 104.90 | 97.50 | 130.90 | 0.80 | 0.74 |
| 1990 | 68.50 | 65.50 | 60.00 | 1.14 | 1.09 |
| 1991 | 71.40 | 73.10 | 62.70 | 1.14 | 1.17 |
| 1992 | 113.20 | 121.50 | 62.60 | 1.81 | 1.94 |
| 1993 | 79.30 | 77.70 | 52.30 | 1.52 | 1.49 |
| 1994 | 36.10 | 46.50 | 53.60 | 0.67 | 0.87 |
| 1995 | 35.80 | 42.40 | 46.40 | 0.77 | 0.91 |
| 1996 | 37.70 | 48.30 | 75.50 | 0.50 | 0.64 |
| 1997 | 54.20 | 68.70 | 57.40 | 0.94 | 1.20 |
| 1998 | 19.20 | 22.50 | 45.30 | 0.42 | 0.50 |
| 1999 | 34.80 | 38.20 | 40.00 | 0.87 | 0.96 |
| 2000 | 23.70 | 26.40 | 27.00 | 0.88 | 0.98 |
| 2001 | 32.20 | 30.50 | 94.30 | 0.34 | 0.32 |
| 2002 | 137.60 | 133.00 | 156.40 | 0.88 | 0.85 |
| 2003 | 115.90 | 116.90 | 155.00 | 0.75 | 0.75 |
| 2004 | 77.10 | 79.00 | 108.90 | 0.71 | 0.73 |
| 2005 | 74.10 | 78.44 | 78.30 | 0.95 | 1.00 |
| 2006 | 55.80 | 57.50 | 58.30 | 0.96 | 0.99 |
| 2007 | 54.90 | 54.40 | 32.70 | 1.68 | 1.66 |
| 2008 | 59.00 | 55.90 | 60.30 | 0.98 | 0.93 |
| 2009 | 88.80 | 88.20 | 76.70 | 1.16 | 1.15 |
| 2010[c/] | 90.60 | 85.60 | 103.00 | 0.88 | 0.83 |
| 2011 | 133.50 | - | - | - | - |
| | | | **SCH** | | |
| 1984 | 21.30 | 27.00 | 47.50 | 0.45 | 0.57 |
| 1985 | 34.90 | 37.10 | 33.20 | 1.05 | 1.12 |
| 1986 | 16.00 | 16.20 | 16.60 | 0.96 | 0.98 |
| 1987 | 9.10 | 9.20 | 9.10 | 1.00 | 1.01 |
| 1988 | 6.50 | 5.90 | 12.00 | 0.54 | 0.49 |
| 1989 | 29.50 | 23.00 | 26.80 | 1.10 | 0.86 |
| 1990 | 27.30 | 23.70 | 18.90 | 1.44 | 1.25 |
| 1991 | 56.30 | 61.40 | 52.40 | 1.07 | 1.17 |
| 1992 | 40.90 | 41.30 | 29.50 | 1.39 | 1.40 |
| 1993 | 19.90 | 18.20 | 16.80 | 1.18 | 1.08 |
| 1994 | 20.20 | 28.90 | 18.50 | 1.09 | 1.56 |
| 1995 | 17.50 | 22.50 | 33.80 | 0.52 | 0.67 |
| 1996 | 27.60 | 35.40 | 33.10 | 0.83 | 1.07 |
| 1997 | 21.90 | 25.70 | 27.40 | 0.80 | 0.94 |
| 1998 | 14.20 | 14.20 | 20.20 | 0.70 | 0.70 |
| 1999 | 65.80 | 61.00 | 50.20 | 1.31 | 1.22 |
| 2000 | 21.90 | 26.90 | 20.50 | 1.07 | 1.31 |
| 2001 | 56.60 | 61.90 | 125.00 | 0.45 | 0.50 |
| 2002 | 144.40 | 136.00 | 160.80 | 0.90 | 0.85 |
| 2003 | 96.90 | 101.90 | 180.60 | 0.54 | 0.56 |
| 2004 | 138.00 | 150.00 | 175.30 | 0.79 | 0.86 |
| 2005 | 114.10 | 115.79 | 93.10 | 1.23 | 1.24 |
| 2006 | 50.00 | 51.80 | 27.90 | 1.79 | 1.86 |
| 2007 | 21.80 | 21.30 | 14.60 | 1.49 | 1.46 |
| 2008 | 87.20 | 86.20 | 91.90 | 0.95 | 0.94 |
| 2009 | 59.30 | 56.50 | 49.00 | 1.21 | 1.15 |
| 2010[c/] | 169.00 | 162.90 | 130.80 | 1.29 | 1.25 |
| 2011 | 116.40 | - | - | - | - |

TABLE II-7. Predicted and postseason returns of Columbia River adult 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** | | |
| 1990 | 69.50 | 69.30 | 58.90 | 1.18 | 1.18 |
| 1991 | 48.40 | 48.50 | 35.40 | 1.37 | 1.37 |
| 1992 | 42.50 | 40.70 | 31.10 | 1.37 | 1.31 |
| 1993 | 33.00 | 32.30 | 27.50 | 1.20 | 1.17 |
| 1994 | 23.90 | 26.70 | 33.70 | 0.71 | 0.79 |
| 1995 | 25.00 | 30.00 | 34.20 | 0.73 | 0.88 |
| 1996 | 40.80 | 43.20 | 59.70 | 0.68 | 0.72 |
| 1997 | 72.10 | 61.90 | 59.00 | 1.22 | 1.05 |
| 1998 | 47.80 | 44.90 | 36.80 | 1.30 | 1.22 |
| 1999 | 38.30 | 27.70 | 50.70 | 0.76 | 0.55 |
| 2000 | 50.60 | 61.60 | 36.80 | 1.38 | 1.67 |
| 2001 | 43.50 | 45.30 | 76.40 | 0.57 | 0.59 |
| 2002 | 96.20 | 91.80 | 108.40 | 0.89 | 0.85 |
| 2003 | 104.80 | 94.60 | 150.20 | 0.70 | 0.63 |
| 2004 | 90.40 | 88.80 | 117.60 | 0.77 | 0.76 |
| 2005 | 89.40 | 89.73 | 98.00 | 0.91 | 0.92 |
| 2006 | 88.30 | 86.60 | 80.40 | 1.10 | 1.08 |
| 2007 | 68.00 | 69.10 | 46.90 | 1.45 | 1.47 |
| 2008 | 54.00 | 55.10 | 75.50 | 0.72 | 0.73 |
| 2009 | 94.40 | 97.90 | 73.10 | 1.29 | 1.34 |
| 2010[c/] | 79.00 | 74.60 | 79.00 | 1.00 | 0.94 |
| 2011 | 100.00 | - | - | - | - |

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 adequately 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-8. Comparison of preseason forecasts and postseason estimates of Puget Sound run size for summer/fall Chinook in thousands of fish.[a/] (Page 1 of 4)

| Year | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Nooksack-Samish Hatchery and Natural** | | | **East Sound Bay Hatchery** | | | **Skagit Hatchery** | | | **Skagit Natural** | | |
| 1993 | 50.4 | 32.3 | 1.53 | 3.2 | 3.8 | 0.84 | 1.0 | 1.4 | 0.71 | 14.0 | 6.9 | 2.00 |
| 1994 | 46.6 | 28.1 | 1.66 | 3.2 | 0.7 | 4.00 | 1.3 | 5.5 | 0.30 | 8.4 | 5.9 | 1.27 |
| 1995 | 38.5 | 22.3 | 1.73 | 3.5 | 0.2 | 17.50 | 1.6 | 3.4 | 0.48 | 5.0 | 9.2 | 0.52 |
| 1996 | 27.0 | 29.2 | 0.92 | 1.7 | 0.5 | 2.43 | 1.0 | 1.2 | 0.83 | 7.1 | 10.9 | 0.58 |
| 1997 | 34.0 | 41.7 | 0.99 | 1.2 | 1.2 | 1.00 | 0.1 | 0.0 | - | 6.4 | 6.1 | 1.03 |
| 1998 | 28.0 | 31.5 | 0.95 | 0.5 | 0.3 | 1.67 | 0.0 | 0.0 | - | 6.6 | 15.0 | 0.44 |
| 1999 | 27.0 | 42.1 | 0.66 | 2.3 | 0.3 | 7.67 | 0.0 | 0.0 | - | 7.6 | 5.3 | 1.46 |
| 2000 | 19.0 | 32.6 | 0.57 | 5.0 | 0.1 | 50.00 | 0.0 | 0.0 | - | 7.3 | 17.3 | 0.42 |
| 2001 | 34.9 | 64.7 | 0.55 | 1.6 | 0.9 | 16.00 | 0.0 | 0.0 | - | 9.1 | 14.1 | 0.65 |
| 2002 | 52.8 | 54.3 | 0.99 | 1.6 | 0.9 | 2.29 | 0.0 | 0.1 | - | 13.8 | 20.0 | 0.69 |
| 2003 | 45.8 | 30.0 | 1.51 | 1.6 | 0.2 | 8.00 | 0.0 | 0.3 | - | 13.7 | 10.3 | 1.38 |
| 2004 | 34.2 | 17.9 | 1.83 | 0.8 | 0.0 | 200.00 | 0.5 | 0.0 | - | 20.3 | 24.3 | 0.83 |
| 2005 | 14.5 | 15.9 | 1.07 | 0.4 | 0.0 | 13.33 | 0.7 | 0.4 | 3.50 | 23.4 | 23.4 | 0.99 |
| 2006 | 16.9 | 30.7 | 0.55 | 0.4 | 0.0 | 25.00 | 0.6 | 0.4 | 1.51 | 24.1 | 22.5 | 1.07 |
| 2007 | 18.8 | 32.7 | 0.57 | 0.4 | 0.0 | 66.67 | 1.1 | 0.4 | 2.75 | 15.0 | 13.0 | 1.15 |
| 2008 | 35.3 | 34.2 | 1.03 | 0.8 | 0.0 | 0.00 | 0.7 | 0.2 | 3.50 | 23.8 | 15.0 | 1.59 |
| 2009 | 23.0 | 25.7 | 0.89 | 0.1 | 0.0 | 25.00 | 0.6 | 0.1 | 6.00 | 23.4 | 12.5 | 1.87 |
| 2010[b/] | 30.3 | NA | NA | 2.3 | NA | NA | 0.9 | NA | NA | 13.0 | NA | NA |
| 2011 | 37.5 | - | - | 0.4 | - | - | 1.5 | - | - | 14.3 | - | - |

TABLE II-8. Comparison of preseason forecasts and postseason estimates of Puget Sound run size for summer/fall Chinook in thousands of fish.[a/] (Page 2 of 4)

| Year | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Stillaguamish [c/] Natural** | | | **Snohomish [c/] Hatchery** | | | **Snohomish [c/] Natural** | | | **Tulalip [c/] Hatchery** | | |
| 1993 | NA | 1.3 | - | 1.6 | 2.7 | 0.58 | 4.9 | 5.5 | 0.89 | 2.8 | 1.4 | 2.03 |
| 1994 | NA | 1.3 | - | 1.8 | 5.4 | 0.33 | 4.5 | 5.0 | 0.90 | 2.8 | 1.8 | 1.59 |
| 1995 | 1.8 | 0.9 | 1.92 | 2.2 | 4.0 | 0.54 | 4.3 | 4.0 | 1.08 | 2.3 | 8.5 | 0.27 |
| 1996 | 1.3 | 1.2 | 1.04 | 6.7 | 4.6 | 1.47 | 4.2 | 5.9 | 0.71 | 2.7 | 11.5 | 0.24 |
| 1997 | 1.6 | 1.2 | 1.36 | 7.7 | 12.0 | 0.64 | 5.2 | 4.4 | 1.19 | 4.0 | 8.7 | 0.46 |
| 1998 | 1.6 | 1.6 | 1.03 | 6.5 | 4.7 | 1.37 | 5.6 | 6.4 | 0.88 | 2.5 | 7.2 | 0.35 |
| 1999 | 1.5 | 1.1 | 1.36 | 7.8 | 4.7 | 1.65 | 5.6 | 4.8 | 1.16 | 4.5 | 15.2 | 0.30 |
| 2000 | 2.0 | 1.7 | 1.21 | 6.2 | 1.9 | 3.20 | 6.0 | 6.1 | 0.98 | 5.0 | 8.3 | 0.60 |
| 2001 | 1.7 | 1.4 | 1.22 | 4.1 | 0.9 | 4.57 | 5.8 | 8.4 | 0.69 | 5.5 | 5.1 | 1.08 |
| 2002 | 2.0 | 1.6 | 1.25 | 6.8 | 2.6 | 2.66 | 6.7 | 7.3 | 0.92 | 5.8 | 5.2 | 1.12 |
| 2003 | 2.0 | 1.0 | 1.98 | 9.4 | 5.8 | 1.63 | 5.5 | 5.6 | 0.99 | 6.0 | 8.7 | 0.69 |
| 2004 | 1.9 | 1.6 | 1.19 | 3.3 | 6.4 | 0.52 | 10.6 | 11.2 | 0.95 | 6.8 | 6.5 | 1.05 |
| 2005 | 1.7 | 1.2 | 1.42 | 4.4 | 4.0 | 1.10 | 14.1 | 5.0 | 2.82 | 6.4 | 7.4 | 0.86 |
| 2006 | 1.0 | 1.3 | 0.77 | 2.8 | 4.3 | 0.65 | 11.0 | 8.8 | 1.25 | 9.3 | 5.8 | 1.60 |
| 2007 | 1.0 | 0.8 | 1.27 | 3.5 | 6.6 | 0.53 | 12.7 | 4.0 | 3.18 | 8.4 | 6.1 | 1.38 |
| 2008 | 0.6 | 1.8 | 0.34 | 3.8 | 6.2 | 0.61 | 7.4 | 8.4 | 0.88 | 2.7 | 3.9 | 0.69 |
| 2009 | 1.7 | 1.3 | 1.29 | 4.9 | 2.0 | 2.45 | 8.4 | 2.3 | 3.65 | 4.0 | 0.8 | 5.00 |
| 2010[b/] | 1.4 | NA | NA | 5.6 | NA | NA | 9.9 | NA | NA | 3.4 | NA | NA |
| 2011 | 1.9 | - | - | 5.2 | - | - | 7.4 | - | - | 3.5 | - | - |

TABLE II-8. Comparison of preseason forecasts and postseason estimates of Puget Sound run size for summer/fall Chinook in thousands of fish.[a/] (Page 3 of 4)

| Year | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **South Puget Sound Hatchery** | | | **South Puget Sound Natural** | | | **Strait of Juan de Fuca Hatchery** | | | **Strait of Juan de Fuca Natural** | | |
| 1993 | 61.8 | 43.1 | 1.68 | 26.5 | 9.6 | 1.34 | 0.7 | 1.0 | 3.50 | 3.1 | 1.6 | 1.29 |
| 1994 | 52.7 | 49.9 | 1.08 | 18.0 | 10.5 | 0.60 | 3.9 | 1.2 | 2.44 | 1.0 | 1.0 | 2.00 |
| 1995 | 49.6 | 75.4 | 0.67 | 21.7 | 24.9 | 0.63 | 3.0 | 0.7 | 30.00 | 0.9 | 2.3 | 0.33 |
| 1996 | 51.9 | 53.2 | 0.89 | 19.0 | 16.5 | 0.53 | 2.8 | 1.4 | 14.00 | 0.9 | 2.0 | 0.29 |
| 1997 | 65.1 | 38.3 | 1.40 | 18.2 | 15.9 | 0.88 | 2.2 | 1.0 | 7.33 | 0.8 | 2.9 | 0.23 |
| 1998 | 67.8 | 49.6 | 1.24 | 21.8 | 14.6 | 0.79 | 1.7 | 1.7 | 1.00 | 0.9 | 2.1 | 0.47 |
| 1999 | 59.4 | 67.3 | 0.71 | 19.6 | 33.5 | 1.15 | 1.9 | 0.7 | 2.71 | 0.9 | 2.7 | 0.33 |
| 2000 | 77.5 | 47.4 | 1.39 | 17.5 | 39.5 | 1.26 | 2.0 | 1.2 | 1.67 | 1.1 | 1.7 | 0.65 |
| 2001 | 73.7 | 76.6 | 0.76 | 16.2 | 44.6 | 0.80 | 0.0 | 1.7 | 0.00 | 3.5 | 2.0 | 1.75 |
| 2002 | 90.8 | 69.2 | 1.07 | 16.9 | 58.5 | 0.79 | 0.0 | 1.6 | 0.00 | 3.6 | 2.2 | 0.97 |
| 2003 | 86.6 | 56.6 | 1.14 | 19.6 | 31.0 | 1.28 | 0.0 | 1.3 | 0.00 | 3.4 | 2.8 | 0.72 |
| 2004 | 86.5 | 66.4 | 1.16 | 17.5 | 24.5 | 0.61 | 0.0 | 1.4 | 0.00 | 3.5 | 4.1 | 0.85 |
| 2005 | 83.1 | 73.9 | 0.95 | 17.7 | 19.1 | 0.46 | 0.0 | 1.4 | 0.00 | 4.2 | 2.0 | 2.00 |
| 2006 | 85.8 | 105.1 | 0.82 | 21.3 | 42.2 | 0.50 | 0.0 | 1.2 | 0.00 | 4.2 | 3.0 | 1.39 |
| 2007 | 83.0 | 147.1 | 0.56 | 17.0 | 29.7 | 0.57 | 0.0 | 0.8 | 0.00 | 4.4 | 1.3 | 3.38 |
| 2008 | 101.6 | 95.1 | 1.07 | 21.1 | 30.9 | 0.68 | 0.0 | 0.7 | 0.00 | 4.5 | 1.2 | 3.75 |
| 2009 | 93.0 | 77.3 | 1.20 | 17.2 | 13.0 | 1.32 | 0.0 | 1.5 | 0.00 | 3.4 | 1.3 | 2.62 |
| 2010[b/] | 97.4 | NA | NA | 12.7 | NA | NA | 0.0 | NA | NA | 3.7 | NA | NA |
| 2011 | 118.6 | - | - | 8.9 | - | - | 0.0 | - | - | 4.5 | - | - |

TABLE II-8. Comparison of preseason forecasts and postseason estimates of Puget Sound run size for summer/fall Chinook in thousands of fish.[a/] (Page 4 of 4)

| Year | Preseason Forecast | Postseason Return | Pre/Postseason |
|---|---|---|---|
| | | **Hood Canal Hatchery and Natural** | |
| 1993 | NA | 9.2 | - |
| 1994 | 11.7 | 8.1 | 1.44 |
| 1995 | 11.5 | 7.8 | 1.47 |
| 1996 | 3.9 | 16.2 | 0.24 |
| 1997 | 9.0 | 30.2 | 0.30 |
| 1998 | 2.7 | 20.9 | 0.13 |
| 1999 | 6.7 | 30.4 | 0.22 |
| 2000 | 14.0 | 34.4 | 0.41 |
| 2001 | 19.2 | 38.8 | 0.49 |
| 2002 | 25.3 | 36.9 | 0.69 |
| 2003 | 24.0 | 59.4 | 0.40 |
| 2004 | 29.6 | 47.0 | 0.63 |
| 2005 | 30.5 | 39.3 | 0.78 |
| 2006 | 30.2 | 40.9 | 0.74 |
| 2007 | 47.5 | 44.0 | 1.08 |
| 2008 | 36.8 | 41.0 | 0.90 |
| 2009 | 42.6 | 44.0 | 0.97 |
| 2010[b/] | 45.0 | 41.0 | 1.10 |
| 2011 | 40.6 | - | - |

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 are preliminary.

c/ These numbers 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, the Stillaguamish and Snohomish Rivers; harvest in sport fisheries in Area 8D and the Stillaguamish and Snohomish Rivers; and escapement.

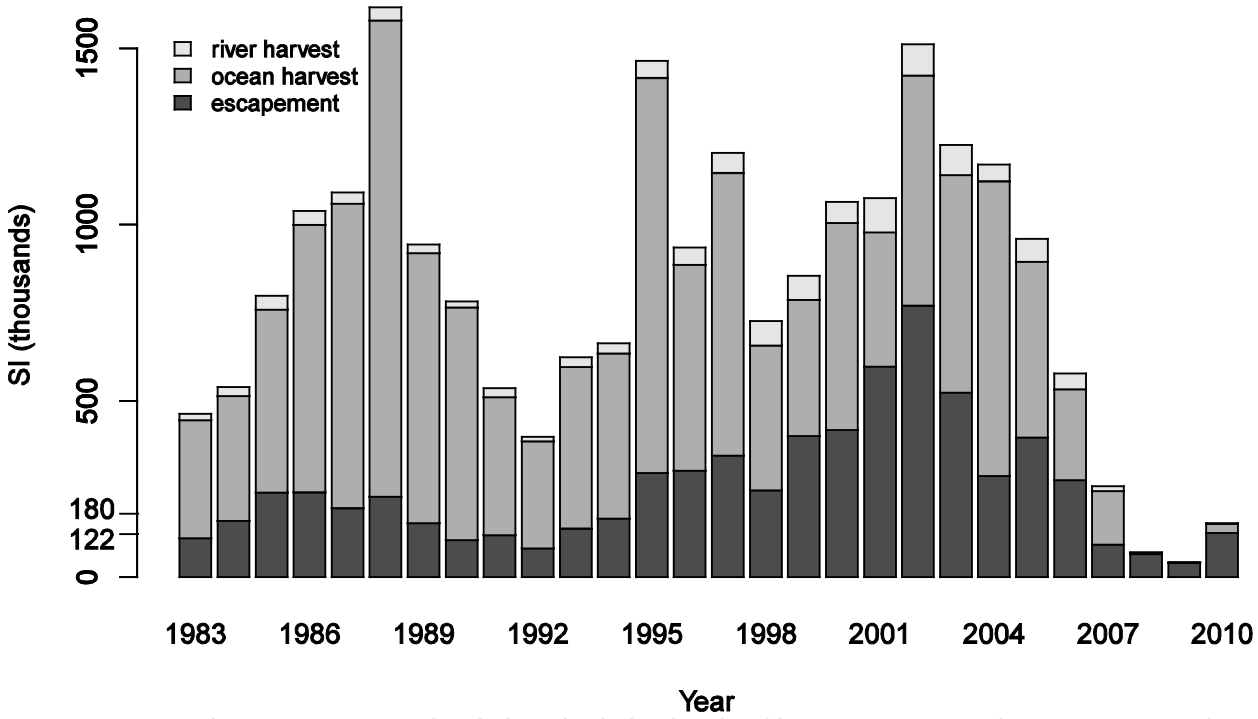


FIGURE II-1. The Sacramento Index (SI) and relative levels of its components. The Sacramento River fall Chinook escapement goal range of 122,000-180,000 adult spawners is noted on the vertical axis.

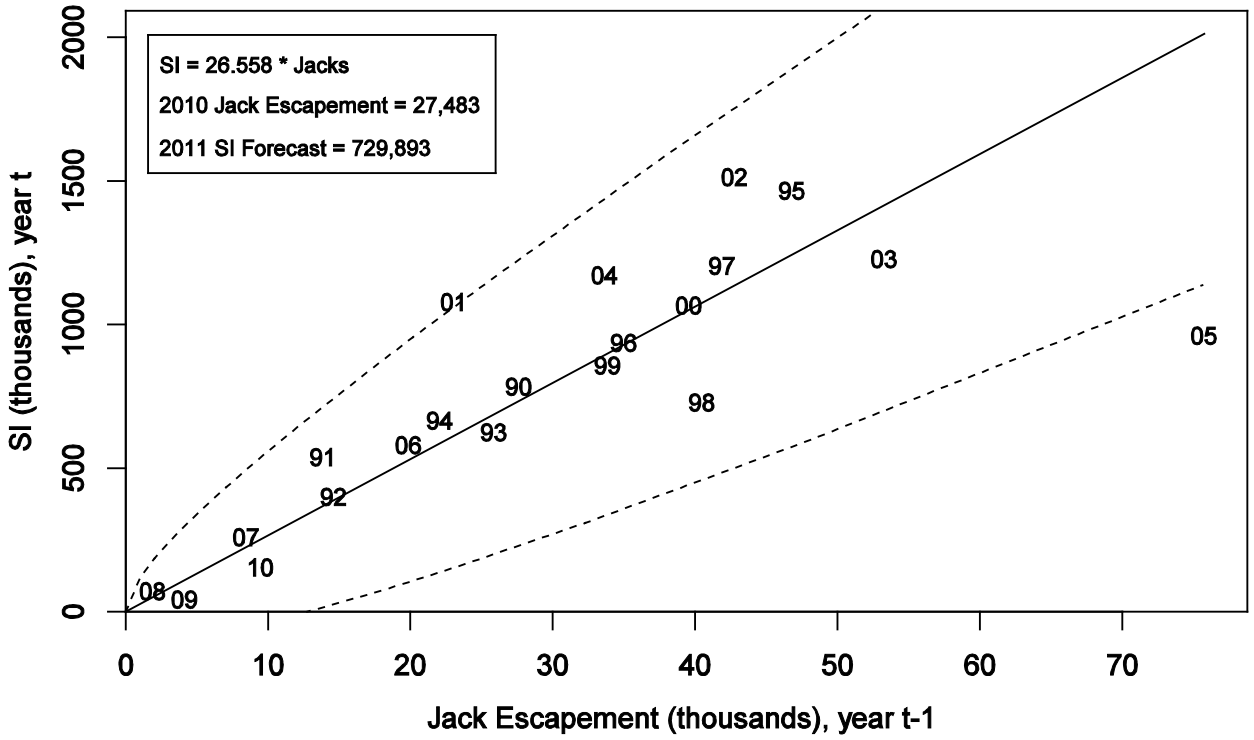


FIGURE II-2. Regression estimator for the SI based on previous year's escapement of Sacramento River fall Chinook jacks, 1990-2010. Years shown are SI years.

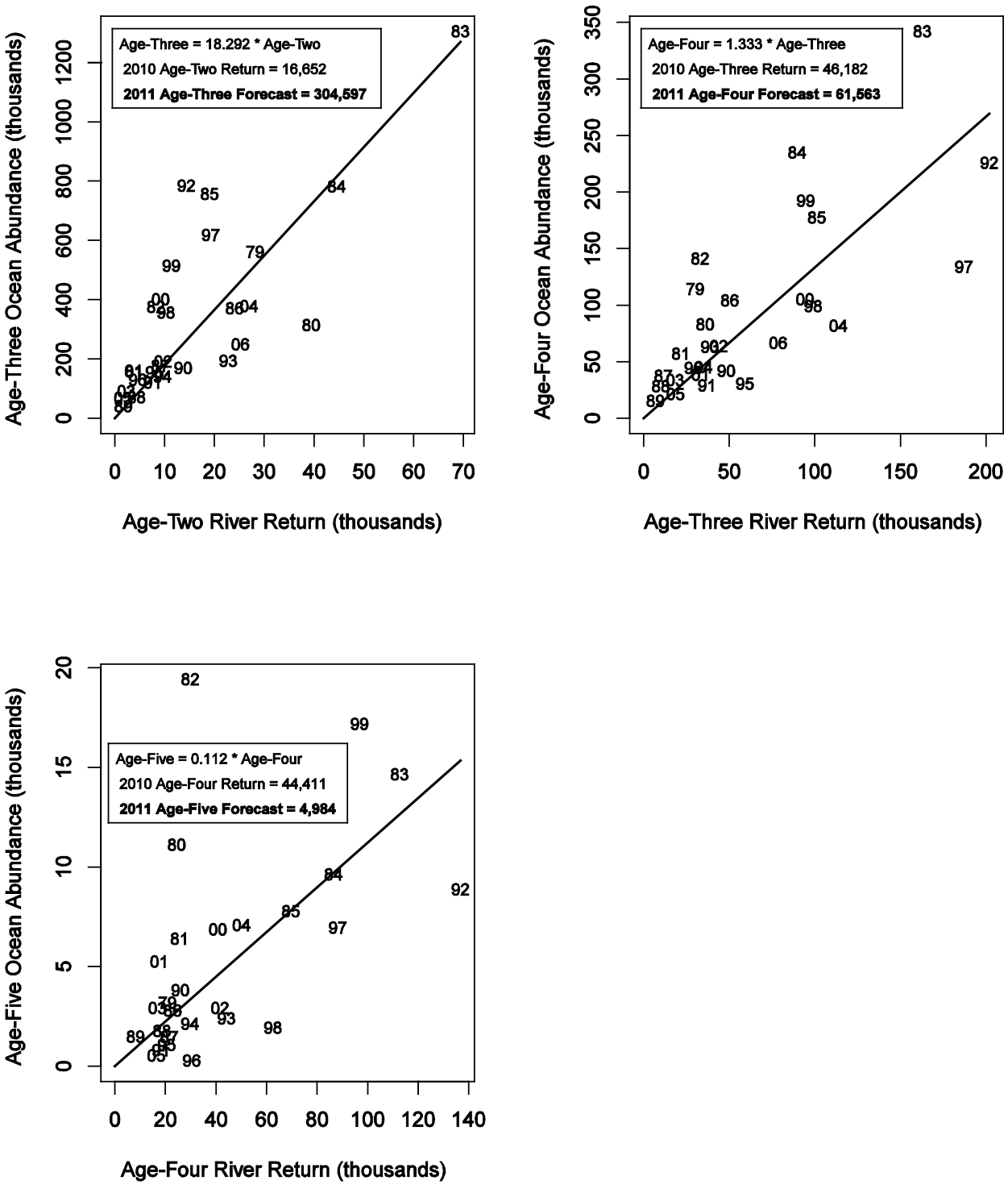


FIGURE II-3. Regression estimators for Klamath River fall Chinook ocean abundance (September 1) based on that year's river return of same cohort. Numbers in plots denote brood years.

## CHAPTER III - COHO SALMON ASSESMENT

### *COLUMBIA RIVER AND OREGON/CALIFORNIA COAST COHO*

### *(OREGON PRODUCTION INDEX AREA)*

The majority of coho harvested in the 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) public hatchery (OPIH), (2) Oregon coastal natural (OCN), including river and lake components, (3) Lower Columbia natural (LCN), and (4) natural and hatchery stocks south of Cape Blanco, Oregon, which include the Rogue, Klamath, and Northern California coastal stocks.

A stratified random sampling (SRS) study implemented in 1990 indicated an overestimation of annual OCN spawner escapement, which had previously been based on nonrandom standard index surveys. Because the stock composition of the OPI area ocean impacts is based on the proportions of the OPI ocean escapements, a reduction in OCN spawner escapement meant that traditional OCN ocean impacts and abundances were overestimated, while traditional ocean impact and abundance estimates for other OPI area stocks had been underestimated. Starting in 1992, the Council adopted an abundance adjustment procedure for use in assessing fishery impacts. This procedural change, based on improved estimates of OCN spawner escapements, adjusted traditional index abundances of the other OPI area stocks. To achieve targeted exploitation rates and spawner escapement goals, the various OPI area stock abundance index predictions were scaled in the Coho FRAM to reflect the results of the ongoing OCN spawner study and are referred to as SRS abundances. In 1998, after eight years of SRS abundance estimates, the historic OPI data set was rescaled to reflect the revised OCN abundance estimates. Beginning in 1998, a random site selection procedure based on the Environmental Protection Agency's Environmental Monitoring and Assessment Program (EMAP) has been used instead of the SRS methodology. The random survey sampling provides abundance estimates consistent with SRS estimates.

Beginning in 1998, with the availability of a long-term data set in SRS values and the random survey sampling values, all OPI area stock abundances were projected using random sampling accounting. Direct comparisons of 2011 abundance forecasts with recent year preseason abundance forecasts and postseason estimates, are reported in Table III-1. All fishery impacts and escapements from Coho FRAM are reported in random sampling values.

Beginning in 2008, a new method was developed to estimate coho abundances for both the natural and hatchery components of the Columbia River and the Oregon coast. The traditional method of stock abundance estimation used only catch data from Leadbetter Point, Washington, to the U.S./Mexico border. The assumption in the SRS accounting 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 recent years, fisheries to the south have been more restrictive 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) used 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 and was based on CWT recoveries and associated tag rates. The MSM 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. The new run size estimates are based on the 1986-1997 base period and backwards FRAM run reconstructions for more recent years. The Oregon Production Index Technical Team (OPITT) decided to use the MSM run reconstruction database for future accounting and

forecasts. The MSM estimates were refined for use in 2009, with particular attention to the base period reconstruction for OCN coho. In 2010 the relationship between the SRS and MSM time series was reconsidered. The changes in fishery effort patterns that resulted in biased harvest estimates began in the mid- to late-1990s, so the first few years of the MSM time series should be equivalent to the SRS time series. This was used as justification to use the MSM data set as a continuation of the SRS time series starting in 1986. In 2011 the OPI hatchery and OCN predictors used the longer, merged time series. This results in a higher level of statistical significance for the predictors and lower residuals in most recent years.

## Public 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. OPI area smolt releases since 1960 are reported by geographic area in Appendix C, Table C-1.

### *Predictor Description*

Prior to 2008, the OPIH stock predictor was a multiple linear regression with the following variables: (1) Columbia River jacks (Jack CR), (2) Oregon coastal and Klamath River Basin jacks (Jack OC), and (3) a correction term for the proportion of delayed smolts released from Columbia River hatcheries (Jack CR * [SmD/SmCR]).

In 2008 the stock predictor was modified slightly from that used in previous years. Because of the shorter data set (1986-2007 vs. 1970-2007) and the near-total phase-out of coastal coho salmon hatcheries, the factor for Oregon and California jacks (Jack OC) was not significant in the regression. A simplified model with all OPI jacks combined into one term (Jack OPI) was used, and all parameters were significant. In 2011 the longer (1970-2010) time series was used with the simplified model.

The OPIH stock predictor is partitioned into Columbia River early and late stocks based on the proportion of the 2010 jack returns of each stock adjusted for stock specific maturation rates. The coastal hatchery stock is partitioned into northern and southern coastal stock components. The northern OPIH coastal stock is comprised of hatchery production from the central Oregon Coast. The southern OPIH coastal stock is comprised of hatchery production from the Rogue River basin in southern Oregon and the Klamath and Trinity basins in northern California. The 2011 partition was based on the proportion of the smolt releases in 2010.

For the 2011 abundance forecast, the data base includes 1970-2010 recruits and 1969-2009 jack returns (in thousands of fish). The model was:

$$OPIH(t) = a + b ( Jack\ OPI(t-1) + c ( (Jack\ CR(t-1) ( [SmD(t-1)/SmCR(t-1)])$$

Where:

a = -87.98
b = 19.48
c = 25.69
adjusted $r^2$ = 0.94

The OPIH stock data set and a definition of the above terms are presented in Appendix C, Table C-2.

### *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. The 2010 preseason abundance prediction of 408,000 OPIH coho was 74 percent of the preliminary postseason estimate of 551,300 coho.

Since 1983, the OPIH predictor has performed well. The years with the highest variations were due principally to high interannual variability in the jack-to-adult ratios.

### *2011 Stock Status*

Using the appropriate values from Appendix C, Table C-2, the OPIH abundance forecast for 2011 is 375,100 coho, 92 percent of the 2010 prediction and 68 percent of the preliminary 2010 postseason estimate.

## 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.

### *Predictor Description*

#### Oregon Coastal Natural Rivers

From 1988-1993, the abundance of OCNR index coho was forecasted using a modified Ricker spawner-recruit model. The predictor related OCNR recruits to the parent brood stock size incorporating an adjustment for ocean survival based on OPI hatchery smolt to jack survival the previous year. Due to a tendency to over-predict abundances, the database in the predictor was shortened from 1970-1991 to 1980-1991 in 1992 and 1993.

Because of concern that the adopted OCNR model did not adequately incorporate environmental variability, an alternative model was used to predict the 1994 and 1995 index abundances. The model used ocean upwelling, sea surface temperatures, and year to predict OCNR index coho abundance. The year term was included in the model to reflect an observed decline in stock productivity.

For 1996-1998, the environmental based model without the year component was used in predicting OCNR stock abundances. In addition, the predictions were in SRS rather than traditional index accounting. The OCNR environmental variables were annual deviation from the mean April-June Bakun upwelling index at 42° N latitude (UpAnom), and annual deviation from the mean January sea surface temperature at Charleston, Oregon (JanAnom).

For 1999-2002, the environmental-based model with the year component included was used to predict OCNR stock abundances.

For 2003-2007, the same environmental-based model without the year component that was used for 1996-1998 was used in predicting OCNR abundance.

In 2008, OPITT adopted a new abundance time series based on MSM run reconstructions and backwards FRAM modeling. This time series starts in 1986, in contrast to the SRS time series, which starts in 1970. There is much less contrast in the environmental variables in the shorter time period than there was in the longer period. In addition, there appears to be a weaker relationship between abundance and the environmental variables in recent years.

For 2008, several models using the MSM time series were considered. These all tended to predict higher abundances than what would reasonably be expected and none were statistically significant. In the absence of a satisfactory model, OPITT examined patterns in ocean conditions and hatchery jack returns and determined that the 2007 postseason abundance estimate of 50,000 coho was the most appropriate forecast for 2008.

In 2009 the MSM base period estimates for OCN coho were revised to resolve some of the issues raised in 2008. As the new estimates were not available until the day before the prediction was due, there was little time to explore predictive relationships. There were indications that the revised data set was better correlated with environmental data, and the new environmental indicators looked promising. For 2009 and 2010, however, a variation on the adopted predictor was chosen. The adopted predictor was based on JanAnom in the return year and UpAnom in the year of ocean entry. In some years, an additional variable, Year, was added to capture a long-term downward trend in the data that was not represented in the environmental time series. With the recent shift in ocean conditions this linear trend was no longer apparent, but the pattern in residual errors of the predictor matched the regime shifts in 1990 and 2000. Until a more objective index of regime changes could be incorporated in the predictor, an index variable called RegInd (Regime Index) was used for the 2009 and 2010 predictor. This variable flags the cold regimes (1986-1989, 2001 - 2009) with a 0 and the warm regimes (1990 – 2000) with a 1, and by itself explains over 50 percent of the variability of the time series.

For 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.

The GAM with 3 predictor variables 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 $\varepsilon$ 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.

GAM Model Predictor used for 2011 forecast was:

Ensemble Mean of six forecasts based on environmental conditions and spawners.

| Variables | | | Prediction | $r^2$ | OCV[a/] |
|---|---|---|---|---|---|
| PDO | Spring Transition (Julian date; t-1) | Log Spawners (t-3) | 234,400 | 0.77 | 0.70 |
| PDO | Multivariate ENSO Index (Oct-Dec; t-1) | Upwelling (July-Sept; t-1) | 277,700 | 0.78 | 0.69 |
| PDO | Spring Transition (Julian date; t-1) | Multivariate ENSO Index (Oct-Dec; t-1) | 240,200 | 0.76 | 0.69 |
| PDO | Upwelling (July-Sept; t-1) | Sea Surface Temperature (May-Jul; t-1) | 208,400 | 0.78 | 0.69 |
| PDO | Sea Surface Height (Apr-June; t-1) | Upwelling (July-Sept; t-1) | 181,400 | 0.77 | 0.68 |
| PDO | Upwelling (Sept-Nov; t-1) | Sea Surface Temperature (Jan; t) | 200,200 | 0.76 | 0.67 |
| Ensemble Mean<br>(90% prediction intervals) | | | 221,600<br>(117,600-418,600) | 0.81 | 0.74 |

a/ OCV – ordinary cross-validation score

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

### 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). Production from these systems has declined substantially from the levels observed during 1950-1973, but has steadily increased in recent years. 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 2011, OPITT chose to use the most recent three-year average adult stock abundance which predicts 27,800 coho.

#### *Predictor Performance*

Recent year OCN preseason abundance predictions are compared to postseason estimates in Table III-1. Since 2000 the OCN predictor has under estimated abundance except for 2005 and 2007. The 2010 preseason abundance prediction of 148,000 OCN coho was 55 percent of the preliminary postseason estimate of 266,800 coho.

#### *2011 Stock Status*

The 2011 preseason prediction for OCN (river and lake systems combined) is 249,400 coho, 169 percent of the 2010 preseason prediction and 93 percent of the 2010 postseason estimate (Table III-1). The 2011 preseason prediction for OCNR and OCNL components are 221,600 and 27,800 coho, respectively.

### Private Hatchery Coho

There have been no Oregon coastal PRIH coho smolt releases since 1990.

### Salmon Trout Enhancement Hatchery Coho Smolt Program

#### *Predictor Description*

From 1988 to 2007, preseason abundance predictions for Oregon coastal STEP index coho smolt production facilities were based on the Council-approved procedure, which involved multiplying the average smolt to adult survival rate by the ratio of the current OPI jack survival to the previous year's OPI jack survival.

### *Predictor Performance*

Recent year STEP preseason abundance predictions are compared to postseason estimates in Table III-1.

### *2011 Stock Status*

Due to changes with the STEP program, releases were discontinued after the 2004 brood and forecasts were discontinued in 2008 (Table III-1).

## Lower Columbia River Natural

### *Predictor Description*

The 2011 prediction for the Clackamas River is based on the recent 3-year cohort average counts at North Fork dam. The Clackamas forecast for 2011 is 800 wild fish at North Fork dam. The forecast for other Oregon lower Columbia natural (LCN) populations, including the Sandy River, are 3-year averages of recent year abundances based on spawning ground counts. The 2011 ocean abundance forecast for all Oregon areas combined is 4,600 coho.

The 2011 prediction for the Washington LCN coho populations are derived by combining estimates of natural smolt production based on watershed area and a predicted 2008 brood year marine survival rate of 3.3 percent. The 2011 adult ocean abundance forecast for Washington LCN coho is 18,100 coho.

### *Predictor Performance*

The LCN stock predictor methodology was developed in 2007. The preseason abundance compared to the postseason estimate is presented in Table III-1. The 2010 preseason abundance prediction of 15,100 LCN coho was 49 percent of the preliminary postseason estimate of 30,800 coho.

### *2011 Stock Status*

The 2011 prediction for LCN coho is 22,700 coho (Table III-1). This ocean abundance estimate includes both Oregon and Washington LCN components.

## Oregon Production Index Area Summary of 2011 Stock Status

The 2011 combined OPI area stock abundance is predicted to be 624,500 coho, which is 112 percent of the 2010 preseason prediction of 556,000 coho and 76 percent of the 2010 preliminary postseason estimate of 818,100 coho. The 2011 OPI area forecasts are compared to historical abundances in Table III-2.

# *WASHINGTON COAST AND PUGET SOUND COHO STOCKS*

## Predictor Description and Past Performance

A variety of preseason abundance estimators currently are employed for Washington coastal and Puget Sound coho stocks (Table I-2). These estimators are used to forecast preseason abundance of adult ocean (age-3) recruits.

The performance of preseason abundance forecasts (adult ocean recruits) cannot be evaluated at this time because postseason run reconstructions for U.S. and Canadian coho production units have not been completed. A comparison of expected preseason and postseason ocean escapements for Washington coastal and Puget Sound stocks in recent years is presented in Tables III-3 and III-4. Postseason estimates of 2010 ocean escapements for some of these stocks were not available. The comparison of preseason and postseason estimates of ocean escapement reflects annual errors in abundance estimates, deviations in ocean fisheries from preseason expectations, and variations in ocean distributions of stocks as described

in the introduction. Fishery impact levels anticipated preseason may be substantially different than those that actually occur.

## 2010 Stock Status

### *Washington Coastal Coho*

#### Willapa Bay

The 2011 Willapa Bay hatchery coho abundance forecast is 64,658 ocean recruits compared to a 2010 preseason forecast of 78,700. The natural coho forecast is 47,788 ocean recruits, compared to a 2010 preseason forecast of 20,400. Both the hatchery and natural forecasts are based on a regression of hatchery or natural jacks on terminal adult hatchery or natural returns for the 1994-2007 brood years

#### 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. The abundance forecast for Grays Harbor natural stock coho for 2011 is 89,097 ocean age-3 recruits. The forecast for hatchery stock ocean abundance is 43,958 ocean age-3 recruits.

The natural coho forecast consists of an estimate of smolt production in the Humptulips and Chehalis basins multiplied by a PDO based marine survival rate.

The 2011 hatchery coho forecast of 43,958 is an estimate of smolt releases from on- and off-station sites, multiplied by the average return per release for four years (2004-2007 BY) and then expanded to ocean recruit abundance based on CWT recoveries for 2000-2001 return years.

#### Quinault River

The 2011 forecast for Quinault natural coho is 22,947 ocean recruits, an increase of 37 percent from the 2010 forecast of 16,706. This forecast is based on the mean estimate of recent ocean recruits for 2004 through 2009. All natural coho are unmarked.

The Quinault hatchery coho forecast is 35,545 ocean recruits. This return is from an estimated release of 643,592 smolts, and is based on a recent 5-year average smolt return rate of 5.52 percent for the Quinault National Fish Hatchery. The number of marked coho is estimated at 30,811 and unmarked coho at 4,733.

#### Queets River

The 2011 Queets natural coho forecast is 13,279 ocean recruits, a decrease of 39 percent compared to the 2010 forecast level of 21,823. This forecast represents the estimated smolt production (238,055) multiplied by an expected survival rate of 5.6 percent. The survival rate estimate is based on a binomial logistic regression model developed by Quinault Fisheries Department. This model consists of a regression of Queets survival rates from return years 1993-2007 as estimated using backward FRAM run reconstructions, and the standardized monthly mean Pacific Decadal Oscillation (PDO) values from January through August for the corresponding years the smolts entered salt water.

The 2011 Queets hatchery (Salmon River) coho forecast is 16,331 ocean recruits, an increase of 27 percent compared to the 2010 forecast of 11,900. This forecast is based on a smolt release of 712,685 multiplied by the recent 10 year average marine survival rate (2.3 percent). Approximately 89 percent of the fish released from the Salmon River facility were marked with an adipose fin clip.

### Hoh River

The 2011 Hoh River natural coho forecast is 11,625 ocean recruits, an increase of 53 percent compared to the 2010 forecast of 7,608. This forecast is based on estimated smolt production per square mile of watershed from the Clearwater tributary to the Queets River (648 smolts/square mile), multiplied by the size of the Hoh watershed (299 square miles), for a total of 193,752 smolts. The total natural smolt production estimate was then multiplied by an expected survival rate of 6.0 percent. Because freshwater production is measured directly in the Queets River, marine survival estimates for the Queets are used when forecasting Hoh wild coho marine survival. The Queets PDO model developed by the Quinault Fisheries Department estimates a 5.6 percent marine survival rate for Queets wild coho. This was used as the base rate and then increased according to the pattern of increasing marine survival moving north on the coast. This base rate of 5.6 percent was increased to 6.0 percent for the Hoh River.

No hatchery production is projected for the Hoh system for 2011.

### Quillayute River

The 2011 Quillayute River summer natural and hatchery coho forecasts are 2,796 and 5,403 ocean recruits, respectively. The natural component run size is based on the estimated total summer coho smolt production (39,947) and a projected ocean survival rate of 7.0 percent. This is a higher ocean survival rate than the 5.0 percent used in 2010. The Queets PDO model and Elwha jack returns result in a 5.6 percent marine survival estimate.

An examination of the return rates of both hatchery releases and natural smolts indicates that hatchery return rates are 1.5 to 2.0 percent below natural returns. Thus, for the hatchery component, an ocean survival rate of 5.0 percent was selected. The survival rate of 5.0 percent was multiplied by a release of 108,054 smolts. Approximately 99 percent of the fish were marked with an adipose fin clip; an additional 853 unmarked smolts were released. The 2011 forecast abundance of natural summer coho is essentially the same as the 2010 forecast, while the hatchery forecast is 69 percent higher than the 2010 forecast.

The 2011 Quillayute River fall natural and hatchery coho forecasts are 28,191 and 31,042 ocean recruits, respectively. The 2011 forecast abundance of natural Quillayute fall coho is 28 percent higher, and the hatchery forecast is 75 percent higher, than their respective 2010 forecasts. The forecast for the natural component is based on the estimated total fall coho smolt production (402,728) multiplied by an expected marine survival rate of 7.0 percent, which was the same as used for the summer natural returns above. The fall hatchery production forecast was based on the same prediction of marine survival (5.0 percent) used for the summer hatchery coho forecast, multiplied by a release of 620,841 smolts. Approximately 86.9 percent of the hatchery fish were marked with an adipose fin clip.

The basin total coho smolt production estimate (summer and fall stocks) was derived using the estimated coho smolt production in the Clearwater Basin of 90,737, which is 1.43 times its average production during the years a smolt trap was operated on the Bogachiel River (1987, 1988 and 1990) and 1.49 times its average production during the years a trap was operated on the Dickey River (1992-1994). Using 1.43 as a multiplier of the estimated average smolt production of the Quillayute system excluding the Dickey (217,257) yields an estimated production of 311,263 coho smolts. The Dickey production yields an additional 131,410 smolts to the system. The total freshwater production for the basin is estimated to be 442,674 smolts. Smolt production was apportioned according to brood year natural spawning escapements of summer and fall coho to yield the smolt estimates for each natural population.

### North Washington Coast Independent Tributaries

Production from several smaller rivers and streams along the North Washington Coast (Waatch River, Sooes River, Ozette River, Goodman Creek, Mosquito Creek, Cedar Creek, Kalaloch Creek, Raft River, Camp Creek, Duck Creek, Moclips River, Joe Creek, Copalis River, Conner Creek), which flow directly into the Pacific Ocean, is forecast as an aggregate. Generally, stock assessment programs on these systems are minimal. The 2011 forecast of natural coho production for these independent streams is 21,590 ocean recruits, based on a prediction of 600 smolts per square mile of watershed drainage, 424 square miles of watershed, and an expected marine survival rate of 8.5 percent. This rate was the average of the jack-based and the PDO models.

The hatchery forecast of 11,815 ocean recruits is developed from linear regression model estimates of marine survival, predicted by the jack return rate for coho from the Makah National Fish Hatchery. The predicted marine survival of 8.98 percent for the brood year 2008 was multiplied by the 2008 brood year smolt release (248,891) from the Makah National Fish Hatchery. For the 2008 brood year release, 83 percent were marked with an adipose fin clip.

## *Puget Sound*

The 2011 total hatchery and natural coho ocean recruit forecast for the Puget Sound region of 981,000 38.5 compared to a 2010 forecast of 613,930. The hatchery coho forecast is 380,900 compared to the 2010 forecast of 316,133, and the natural coho forecast for 2011of 600,100 is much higher than the 2010 forecast of 297,797.

Puget Sound hatchery forecasts for 2011 were generally the product of 2008 brood year (BY) smolt releases from each facility, and a predicted marine survival rate for each program. Marine survival rates were typically based on recent year average survival rates derived from CWT recovery information and/or run reconstructions, and review of relationships between jack returns and adult marine survival rates at selected hatcheries. 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, adult recruits/smolt data generated from the WDFW Deschutes River Research Station, and a natural coho CWT tagging program at Baker Lake (Skagit River basin), or other information.

### Strait of Juan de Fuca

The 2011 forecasts for Strait of Juan de Fuca (SJF) natural and hatchery coho ocean recruits are 12,317 and 15,244, respectively. As in past years, this forecast includes both Eastern and Western SJF drainages. The natural coho forecast was derived by multiplying the estimated 2008 brood natural smolt production for the region by a predicted ocean marine survival rate developed by two different models. One of the predictive models was based on a relationship between an index of the PDO and observed survival rates, and the other a relationship of Elwha Hatchery jack returns to observed survival rates. The forecasted abundances developed by each model were averaged to produce the final forecast. The hatchery forecasts were based on applying hatchery-specific ocean recruitment rate predictions (1.29 percent for Dungeness, 0.29 percent for Elwha) to the 2008 BY smolt releases for each hatchery. The recruitment rate predictions for the hatchery stocks were based on recent 3-year averages of cohort reconstruction-based recruits/smolts released in each hatchery production unit.

The preliminary preseason forecast of 12,317 age-3 ocean recruits places SJF natural coho in the low abundance based status category, which results in an allowable total exploitation rate of no more than 40 percent under the Council adopted exploitation rate matrix (Appendix A, Table A-4).

### Nooksack-Samish

The 2011 forecasts for Nooksack-Samish natural and hatchery coho ocean recruits are 29,507 and 45,745 respectively. The natural coho forecast is the product of projected natural smolt production from each stream basin in the region, multiplied by a marine survival rate expectation of 6.0 percent. The hatchery forecasts are based on the 2004-2006 BY average recruits/smolt rate

### Skagit

The 2011 forecasts for Skagit River natural and hatchery coho ocean recruits are 138,117 and 16,176 (14,712 from in-river hatchery production, 1,464 from Oak Harbor net-pens), respectively. The natural coho forecast is the product of measured smolt production from the Skagit basin multiplied by a marine survival rate expectation of 9.5 percent. The natural coho marine survival rate is based on the average of the 1988-2006 BY (even years only) Skagit natural recruits/smolt rate. The hatchery forecasts are based on an average marine survival rate of the 1988-2006 BY (even years only) Cascade Hatchery CWT-based recruits/smolt rate of 4.9 percent.

The preliminary preseason forecast of 138,117 age-3 ocean recruits places Skagit natural coho in the normal abundance based status category, which results in an allowable total exploitation rate of no more than 60 percent under the Council adopted exploitation rate matrix (Appendix A, Table A-4).

### Stillaguamish

The 2011 forecast for Stillaguamish River natural coho ocean recruits is 66,600. The natural coho forecast is derived from the estimated smolt production from the basin for brood year 2008, multiplied by a 12.0 percent marine survival rate expectation, which was based on correlations with the PDO, the Vancouver Island boreal copepod anomaly, and September trawl survey coho catch.

The preliminary preseason forecast of 66,600 age-3 ocean recruits places Stillaguamish natural coho in the normal abundance based status category, which results in an allowable total exploitation rate of no more than 50 percent under the Council adopted exploitation rate matrix (Appendix A, Table A-4).

### Snohomish

The 2011 forecast for Snohomish River natural coho ocean recruits is180,000. The Snohomish regional hatchery coho forecast is 54,978; 8,400for Skykomish River/Wallace River Hatchery facility releases and 46,578 for the Tulalip Bay facility. The natural coho forecast used the estimated smolt production from the basin for brood year 2006, multiplied by a 12.0 percent marine survival rate expectation based, which was based on correlations with the PDO, the Vancouver Island boreal copepod anomaly, and September trawl survey coho catch.

The preliminary preseason forecast of 180,000 age-3 ocean recruits places Snohomish natural coho in the normal abundance based status category, which results in an allowable total exploitation rate of no more than 60 percent under the Council adopted exploitation rate matrix (Appendix A, Table A-4).

### South Sound

The 2011 forecasts for South Sound region natural and hatchery coho ocean recruits are 98,947 and 173,348 respectively. The natural coho forecast is the product of projected smolt production from each of the stream basins in the region multiplied by variable marine survival rate expectations of 6.2 to 16.1 percent for natural coho in the region. The marine survival prediction was first derived for Big Beef Creek coho and then extrapolated to other regions of Puget Sound based on assumed differences in survival among regions. The hatchery coho forecasts are typically based on the 2004-2005 BY average CWT-based recruits/smolt rate for each facility, applied to the 2008 BY smolt releases. The expected survival rates range from 0.8 to 6.2 percent

### Hood Canal

The 2011 forecasts for Hood Canal region natural and hatchery coho ocean recruits are 74,741 and 74,897 respectively. The natural coho forecast is based on a regression of Big Beef Creek jacks on Hood Canal natural coho run sizes. The hatchery coho forecasts are based on the 1997-2006 BY average cohort reconstruction-based recruits/smolt for each facility, applied to the 2008 BY smolt releases for each facility.

The marine survival rates used for these forecasts were 7.3 percent for George Adams Hatchery, 2.5 percent for Port Gamble Net Pens, 8.2percent for the Quilcene National Fish Hatchery, and 3.2percent for the Quilcene Bay Net Pens.

The preliminary preseason forecast of 74,741 age-3 ocean recruits places Hood Canal natural coho in the normal abundance based status category, which results in an allowable total exploitation rate of no more than 65 percent under the Council adopted exploitation rate matrix (Appendix A, Table A-4).

## *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. Table III-5 summarizes estimates of mass mark rates for coho stocks from Southern British Columbia, Canada to the Oregon Coast, based on preseason abundance forecasts. Agencies have released coho mass marked with adipose fin clips from the 2008 brood, making these fish available to 2011 fisheries (Table III-6).

TABLE III-1. Preliminary 1996-2011 preseason and postseason coho stock abundance estimates for Oregon production index area stocks in thousands of fish. (Page 1 of 2)

| Stock | Year | Preseason | Postseason[a/] | Preseason/Postseason[a] |
|---|---|---|---|---|
| **Oregon Production Index Area Hatchery Total** | 1996 | 309.2 | 182.6 | 1.69 |
| | 1997 | 376.1 | 215.3 | 1.75 |
| | 1998 | 118.4 | 203.6 | 0.58 |
| | 1999 | 559.2 | 319.6 | 1.75 |
| | 2000 | 671.4 | 677.1 | 0.99 |
| | 2001 | 1,707.6 | 1,395.5 | 1.22 |
| | 2002 | 361.7 | 660.1 | 0.55 |
| | 2003 | 863.1 | 952.5 | 0.91 |
| | 2004 | 623.9 | 634.6 | 0.98 |
| | 2005 | 389.9 | 443.1 | 0.88 |
| | 2006 | 398.8 | 440.6 | 0.91 |
| | 2007 | 593.6 | 476.5 | 1.25 |
| | 2008 | 216.1 | 565.4 | 0.38 |
| | 2009 | 1,073.1 | 1,066.2 | 1.01 |
| | 2010 | 408.0 | 551.3 | 0.74 |
| | 2011 | 375.1 | - | - |
| Columbia River Early | 1996 | 142.2 | 98.0 | 1.45 |
| | 1997 | 206.9 | 129.8 | 1.59 |
| | 1998 | 63.8 | 126.4 | 0.50 |
| | 1999 | 325.5 | 174.9 | 1.86 |
| | 2000 | 326.3 | 378.0 | 0.86 |
| | 2001 | 1,036.5 | 815.9 | 1.27 |
| | 2002 | 161.6 | 324.7 | 0.50 |
| | 2003 | 440.0 | 645.7 | 0.68 |
| | 2004 | 313.6 | 389.0 | 0.81 |
| | 2005 | 284.6 | 282.7 | 1.01 |
| | 2006 | 245.8 | 251.4 | 0.98 |
| | 2007 | 424.9 | 291.0 | 1.46 |
| | 2008 | 110.3 | 333.9 | 0.33 |
| | 2009 | 672.7 | 681.4 | 0.99 |
| | 2010 | 245.3 | 274.3 | 0.89 |
| | 2011 | 216.0 | - | - |
| Columbia River Late | 1996 | 114.4 | 30.8 | 3.71 |
| | 1997 | 86.5 | 53.7 | 1.61 |
| | 1998 | 24.9 | 47.3 | 0.53 |
| | 1999 | 140.9 | 120.7 | 1.17 |
| | 2000 | 278.0 | 260.1 | 1.07 |
| | 2001 | 491.8 | 488.3 | 1.01 |
| | 2002 | 143.5 | 271.8 | 0.53 |
| | 2003 | 377.9 | 248.0 | 1.52 |
| | 2004 | 274.7 | 203.0 | 1.35 |
| | 2005 | 78.0 | 111.6 | 0.70 |
| | 2006 | 113.8 | 156.3 | 0.73 |
| | 2007 | 139.5 | 171.0 | 0.82 |
| | 2008 | 86.4 | 207.6 | 0.42 |
| | 2009 | 369.7 | 374.1 | 0.99 |
| | 2010 | 144.2 | 263.6 | 0.55 |
| | 2011 | 146.5 | - | - |

TABLE III-1. Preliminary 1996-2011 preseason and postseason coho stock abundance estimates for Oregon production index area stocks in thousands of fish. (Page 2 of 3)

| Stock | Year | Preseason | Postseason[a/] | Preseason/Postseason[a] |
|---|---|---|---|---|
| Oregon Coastal North of Cape Blanco | 1996 | 38.5 | 28.0 | 1.38 |
| | 1997 | 60.4 | 19.0 | 3.18 |
| | 1998 | 21.6 | 19.7 | 1.10 |
| | 1999 | 59.4 | 14.4 | 4.13 |
| | 2000 | 48.5 | 23.4 | 2.07 |
| | 2001 | 127.3 | 46.9 | 2.71 |
| | 2002 | 36.6 | 41.6 | 0.88 |
| | 2003 | 29.3 | 34.5 | 0.85 |
| | 2004 | 16.6 | 21.7 | 0.77 |
| | 2005 | 11.5 | 10.7 | 1.07 |
| | 2006 | 8.6 | 7.9 | 1.09 |
| | 2007 | 7.0 | 1.3 | 5.38 |
| | 2008 | 1.7 | 7.1 | 0.24 |
| | 2009 | 7.3 | 7.5 | 0.97 |
| | 2010 | 4.4 | 8.6 | 0.51 |
| | 2011 | 3.6 | - | - |
| Oregon and California Coastal South of Cape Blanco | | | | |
| | 1996 | 14.2 | 25.8 | 0.55 |
| | 1997 | 22.3 | 12.8 | 1.74 |
| | 1998 | 8.1 | 10.2 | 0.79 |
| | 1999 | 33.4 | 9.6 | 3.48 |
| | 2000 | 18.6 | 15.6 | 1.19 |
| | 2001 | 52.0 | 46.0 | 1.13 |
| | 2002 | 20.0 | 22.0 | 0.91 |
| | 2003 | 15.9 | 24.3 | 0.65 |
| | 2004 | 19.0 | 29.9 | 0.64 |
| | 2005 | 15.8 | 38.1 | 0.41 |
| | 2006 | 30.6 | 25.0 | 1.22 |
| | 2007 | 22.2 | 13.2 | 1.68 |
| | 2008 | 17.7 | 16.8 | 1.05 |
| | 2009 | 23.4 | 3.1 | 7.55 |
| | 2010 | 14.1 | 4.8 | 2.94 |
| | 2011 | 9.0 | - | - |
| **Lower Columbia River Natural** | 2007 | 21.5 | 19.4 | 1.11 |
| | 2008 | 13.4 | 27.2 | 0.49 |
| | 2009 | 32.7 | 40.4 | 0.81 |
| | 2010 | 15.1 | 30.8 | 0.49 |
| | 2011 | 22.7 | - | - |
| **Oregon Coastal Natural** | 1996 | 63.2 | 86.1 | 0.73 |
| (Rivers and Lakes) | 1997 | 86.4 | 27.8 | 3.11 |
| | 1998 | 47.2 | 29.2 | 1.62 |
| | 1999 | 60.7 | 51.9 | 1.17 |
| | 2000 | 55.9 | 69.0 | 0.81 |
| | 2001 | 50.1 | 163.2 | 0.31 |
| | 2002 | 71.8 | 304.5 | 0.24 |
| | 2003 | 117.9 | 278.8 | 0.42 |
| | 2004 | 150.9 | 197.0 | 0.77 |
| | 2005 | 152.0 | 150.1 | 1.01 |
| | 2006 | 60.8 | 116.4 | 0.52 |
| | 2007 | 255.4 | 60.0 | 4.26 |
| | 2008 | 60.0 | 170.9 | 0.35 |
| | 2009 | 211.6 | 257.0 | 0.82 |
| | 2010 | 148.0 | 266.8 | 0.55 |
| | 2011 | 249.4 | - | - |

TABLE III-1. Preliminary 1996-2011 preseason and postseason coho stock abundance estimates for Oregon production index area stocks in thousands of fish. (Page 3 of 3)

| Stock | Year | Preseason | Postseason[a/] | Preseason/Postseason[a] |
|---|---|---|---|---|
| **Salmon Trout Enhancement Program[b/]** | 1996 | 0.4 | 1.2 | 0.33 |
| | 1997 | 1.3 | 0.3 | 4.33 |
| | 1998 | 0.2 | 0.3 | 0.67 |
| | 1999 | 0.7 | 0.4 | 1.75 |
| | 2000 | 0.6 | 0.5 | 1.20 |
| | 2001 | 1.0 | 1.4 | 0.71 |
| | 2002 | 0.6 | 3.0 | 0.20 |
| | 2003 | 3.6 | 3.6 | 1.00 |
| | 2004 | 3.1 | 1.0 | 3.10 |
| | 2005 | 1.0 | 0.4 | 2.50 |
| | 2006 | 0.6 | 0.1 | 6.00 |
| | 2007 | 0.2 | 0.0 | - |
| | 2008 | - | - | - |
| | 2009 | - | - | - |
| | 2010 | - | - | - |
| | 2011 | - | - | - |

a/ Postseason estimates are based on preliminary data, and not all stocks have been updated with final estimates.
b/ 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[d/] | Ocean Exploitation Rate Based on OPI Abundance[e/] | OCN Exploitation Rate Based on Postseason FRAM |
|---|---|---|---|---|---|---|---|---|---|
| | Troll | Sport | Hatcheries and Freshwater Harvest[c/] | OCN Spawners | 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 | 0.83 | - |
| 1981-1985 | 451.2 | 274.0 | 37.2 | 56.0 | 176.8 | 305.3 | 1,328.6 | 0.60 | - |
| 1986 | 638.9 | 320.6 | 79.3 | 70.0 | 453.7 | 1,549.1 | 3,026.7 | 0.34 | - |
| 1987 | 468.2 | 296.2 | 45.1 | 30.1 | 119.3 | 316.5 | 1,377.9 | 0.60 | - |
| 1988 | 844.7 | 297.2 | 61.1 | 56.8 | 116.1 | 670.9 | 1,989.2 | 0.57 | - |
| 1989 | 645.1 | 425.5 | 61.1 | 46.4 | 46.9 | 709.0 | 1,871.2 | 0.57 | - |
| 1990 | 275.9 | 357.1 | 28.7 | 22.5 | 35.6 | 196.7 | 1,128.5 | 0.69 | - |
| 1991 | 448.4 | 469.9 | 77.8 | 38.1 | 35.1 | 955.1 | 1,823.2 | 0.45 | - |
| 1992 | 67.4 | 256.5 | 51.0 | 44.2 | - | 216.1 | 610.0 | 0.51 | - |
| 1993 | 13.1 | 140.8 | 38.6 | 55.7 | - | 114.2 | 342.1 | 0.42 | - |
| 1994 | 2.7 | 3.0 | 28.2 | 48.5 | - | 169.2 | 250.5 | 0.02 | 0.07 |
| 1995 | 5.4 | 43.5 | 37.5 | 57.3 | - | 74.8 | 215.9 | 0.22 | 0.12 |
| 1996 | 7.0 | 31.8 | 45.8 | 79.3 | - | 113.0 | 297.3 | 0.14 | 0.08 |
| 1997 | 5.5 | 22.4 | 27.0 | 31.6 | - | 148.1 | 204.6 | 0.12 | 0.12 |
| 1998 | 3.5 | 12.8 | 29.4 | 34.3 | - | 168.4 | 265.2 | 0.06 | 0.08 |
| 1999 | 3.6 | 36.5 | 22.6 | 51.2 | - | 274.1 | 414.0 | 0.10 | 0.08 |
| 2000 | 25.2 | 74.6 | 33.3 | 81.1 | - | 547.6 | 901.0 | 0.13 | 0.07 |
| 2001 | 38.1 | 216.8 | 75.9 | 185.2 | - | 1,108.3 | 1,438.6 | 0.16 | 0.07 |
| 2002 | 15.0 | 118.7 | 54.0 | 269.0 | - | 499.9 | 990.5 | 0.14 | 0.12 |
| 2003 | 28.8 | 252.4 | 45.2 | 235.3 | - | 677.3 | 1,183.6 | 0.23 | 0.14 |
| 2004 | 26.2 | 159.3 | 38.5 | 197.2 | - | 442.5 | 826.8 | 0.22 | 0.15 |
| 2005 | 10.5 | 58.2 | 42.9 | 164.6 | - | 341.0 | 592.1 | 0.12 | 0.11 |
| 2006 | 4.5 | 47.5 | 29.6 | 132.8 | - | 386.4 | 557.1 | 0.09 | 0.06 |
| 2007 | 26.2 | 128.5 | 11.1 | 71.5 | - | 331.1 | 536.5 | 0.28 | 0.11 |
| 2008 | 0.6 | 26.4 | 15.6 | 180.1 | - | 493.8 | 736.3 | 0.04 | 0.02 |
| 2009 | 27.7 | 201.2 | 16.2 | 265.3 | - | 729.8 | 1,323.2 | 0.19 | 0.07 |
| 2010[f/] | 5.8 | 48.8 | 19.4 | 256.8 | - | 441.1 | 818.1 | 0.07 | 0.05 |

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

b/ Includes estimated nonretention mortality: troll fishery--hook-and-release mortality for 1982-2005 and drop-off mortality for all years; sport fishery--hook-and-release mortality for 1994-2005 and drop-off mortality for all years.

c/ Includes returns from Salmon-Trout Enhancement Program (STEP) smolt releases through the 2007 return year, after which the program was terminated.

d/ Not equal to the sum of previous columns due to stock and fishery accounting north and south of Leadbetter Point.

e/ Ocean fishery impacts on private hatchery stock and returns to private hatcheries are excluded in calculating the OPI area stock aggregate ocean exploitation rate index.

f/ Preliminary.

TABLE III-3. Preseason forecasts and postseason estimates of ocean escapements for selected Washington coastal adult natural coho stocks in thousands of fish.

| Year | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Quillayute River Fall** | | | **Hoh River** | | | **Queets River** | | | **Grays Harbor**[a/] | | |
| 1984 | 7.0 | 11.0 | 0.64 | 2.7 | 7.7 | 0.35 | 5.2 | 9.7 | 0.54 | 28.7 | 103.8 | 0.28 |
| 1985 | 19.2 | 15.8 | 1.22 | 6.6 | 5.2 | 1.27 | 11.3 | 6.0 | 1.88 | 56.4 | 25.1 | 2.25 |
| 1986 | 6.1 | 17.1 | 0.36 | 3.9 | 6.4 | 0.61 | 5.2 | 5.8 | 0.90 | 51.6 | 33.3 | 1.55 |
| 1987 | 11.7 | 23.8 | 0.49 | 5.5 | 7.2 | 0.76 | 9.0 | 8.9 | 1.01 | 103.3 | 55.7 | 1.85 |
| 1988 | 10.4 | 9.1 | 1.14 | 2.0 | 2.6 | 0.77 | 4.7 | 4.5 | 1.04 | 26.4 | 58.0 | 0.46 |
| 1989 | 14.5 | 11.1 | 1.31 | 5.7 | 5.4 | 1.06 | 6.2 | 5.4 | 1.15 | 43.0 | 60.9 | 0.71 |
| 1990 | 15.2 | 9.5 | 1.60 | 5.1 | 4.5 | 1.13 | 5.9 | 7.1 | 0.83 | 48.3 | 57.3 | 0.84 |
| 1991 | 8.8 | 10.6 | 0.83 | 3.4 | 5.4 | 0.63 | 7.9 | 8.6 | 0.92 | 138.0 | 108.7 | 1.27 |
| 1992 | 12.5 | 13.6 | 0.92 | 4.9 | 5.0 | 0.98 | 5.6 | 7.0 | 0.80 | 48.4 | 40.9 | 1.18 |
| 1993 | 7.6 | 4.7 | 1.62 | 4.8 | 1.9 | 2.53 | 6.5 | 5.4 | 1.20 | 84.7 | 37.3 | 2.27 |
| 1994 | 7.0 | 6.4 | 1.09 | 3.0 | 1.4 | 2.14 | 3.6 | 1.2 | 3.00 | 31.3 | 11.8 | 2.65 |
| 1995 | 8.5 | 14.3 | 0.59 | 4.4 | 5.4 | 0.81 | 7.2 | 7.3 | 0.99 | 64.4 | 58.9 | 1.09 |
| 1996 | 9.2 | 14.6 | 0.63 | 3.0 | 5.8 | 0.52 | 5.4 | 10.7 | 0.50 | 82.7 | 87.9 | 0.94 |
| 1997 | 5.1 | 5.0 | 1.02 | 1.6 | 1.4 | 1.14 | 2.4 | 2.0 | 1.20 | 14.8 | 19.3 | 0.77 |
| 1998 | 7.4 | 17.0 | 0.44 | 3.2 | 5.2 | 0.62 | 4.5 | 4.6 | 0.98 | 27.1 | 40.4 | 0.67 |
| 1999 | 12.8 | 19.5 | 0.66 | 2.8 | 6.3 | 0.44 | 3.7 | 5.1 | 0.73 | 50.3 | 38.0 | 1.32 |
| 2000 | 8.2 | 17.7 | 0.46 | 3.3 | 8.8 | 0.38 | 2.5 | 8.7 | 0.29 | 44.2 | 43.4 | 1.02 |
| 2001 | 20.6 | 36.7 | 0.56 | 7.6 | 14.8 | 0.51 | 10.6 | 28.4 | 0.37 | 46.6 | 76.4 | 0.61 |
| 2002 | 18.5 | 34.7 | 0.53 | 6.9 | 11.2 | 0.62 | 10.2 | 16.1 | 0.63 | 50.3 | 111.0 | 0.45 |
| 2003 | 21.2 | 25.2 | 0.84 | 10.4 | 8.1 | 1.28 | 19.6 | 13.2 | 1.48 | 52.3 | 94.8 | 0.55 |
| 2004 | 17.7 | 25.1 | 0.71 | 6.6 | 6.3 | 1.05 | 14.7 | 10.0 | 1.47 | 101.1 | 64.4 | 1.57 |
| 2005 | 16.1 | 22.1 | 0.73 | 6.4 | 8.2 | 0.78 | 14.1 | 9.7 | 1.45 | 78.5 | 43.7 | 1.80 |
| 2006 | 13.0 | 12.2 | 1.07 | 5.6 | 2.3 | 2.43 | 7.1 | 6.4 | 1.11 | 60.3 | 20.4 | 2.96 |
| 2007 | 10.8 | 10.9 | 0.99 | 5.4 | 5.1 | 1.06 | 13.6 | 6.1 | 2.23 | 59.4 | 32.5 | 1.83 |
| 2008 | 10.5 | 12.9 | 0.81 | 4.3 | 4.3 | 1.00 | 10.2 | 6.2 | 1.65 | 42.7 | 47.1 | 0.91 |
| 2009 | 19.3 | 24.5 | 0.79 | 9.5 | 10.7 | 0.89 | 31.4 | 17.4 | 1.80 | 59.2 | 88.4 | 0.67 |
| 2010[b/] | 22.0 | 21.7 | 1.01 | 7.6 | 10.5 | 0.72 | 21.8 | NA | NA | 67.9 | NA | NA |

a/ The source for postseason return estimates is Washington Department of Fish and Wildlife.

b/ Postseason returns are preliminary.

TABLE III-4. Preseason forecasts and postseason estimates of ocean escapements for selected Puget Sound adult natural coho stocks in thousands of fish.

| Year | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason | Preseason Forecast | Postseason Return | Pre/Postseason |
|---|---|---|---|---|---|---|---|---|---|
| | | **Skagit River** | | | **Stilliguamish River** | | | **Hood Canal** | |
| 1984 | 29.6 | 36.0 | 0.82 | NA | 26.9 | NA | NA | 57.5 | NA |
| 1985 | 26.1 | 27.4 | 0.95 | NA | 34.4 | NA | NA | 38.5 | NA |
| 1986 | 43.5 | 69.7 | 0.62 | 37.0 | 49.9 | 0.74 | NA | 82.2 | NA |
| 1987 | 33.0 | 39.4 | 0.84 | 29.7 | 46.3 | 0.64 | NA | 71.7 | NA |
| 1988 | 29.6 | 28.4 | 1.04 | 24.5 | 35.4 | 0.69 | 18.2 | 15.5 | 1.17 |
| 1989 | 31.2 | 24.4 | 1.28 | 24.5 | 13.5 | 1.81 | 36.8 | 25.5 | 1.44 |
| 1990 | 37.6 | 24.3 | 1.55 | 30.8 | 34.1 | 0.90 | 43.9 | 14.2 | 3.09 |
| 1991 | 40.8 | 10.3 | 3.96 | 32.9 | 11.3 | 2.91 | 17.6 | 15.3 | 1.15 |
| 1992 | 35.7 | 9.4 | 3.80 | 18.7 | 18.0 | 1.04 | 10.1 | 19.9 | 0.51 |
| 1993 | 28.1 | 14.2 | 1.98 | 24.5 | 10.6 | 2.31 | 39.5 | 16.7 | 2.37 |
| 1994 | 17.9 | 30.3 | 0.59 | 10.2 | 30.3 | 0.34 | 13.5 | 57.0 | 0.24 |
| 1995 | 30.0 | 15.8 | 1.90 | 32.7 | 20.4 | 1.60 | 19.3 | 41.1 | 0.47 |
| 1996 | 26.7 | 8.6 | 3.09 | 29.8 | 12.5 | 2.38 | 15.4 | 37.2 | 0.41 |
| 1997 | 34.2 | 45.7 | 0.75 | 15.7 | 14.1 | 1.12 | 38.1 | 101.8 | 0.37 |
| 1998 | 41.1 | 85.2 | 0.48 | 37.7 | 31.1 | 1.21 | 87.3 | 118.5 | 0.74 |
| 1999 | 53.4 | 38.3 | 1.39 | 27.3 | 7.5 | 3.64 | 45.2 | 17.6 | 2.57 |
| 2000 | 24.7 | 75.1 | 0.33 | 15.0 | 31.2 | 0.48 | 50.4 | 39.7 | 1.27 |
| 2001 | 46.9 | 115.6 | 0.41 | 18.1 | 81.8 | 0.22 | 40.5 | 110.0 | 0.37 |
| 2002 | 79.9 | 70.8 | 1.13 | 14.5 | 30.4 | 0.48 | 25.6 | 81.0 | 0.32 |
| 2003 | 97.4 | 114.4 | 0.85 | 27.7 | 49.8 | 0.56 | 25.7 | 199.9 | 0.13 |
| 2004 | 129.4 | 151.0 | 0.86 | 26.6 | 73.9 | 0.36 | 79.8 | 219.7 | 0.36 |
| 2005 | 48.6 | 53.1 | 0.92 | 41.9 | 29.1 | 1.44 | 79.8 | 68.3 | 1.17 |
| 2006 | 87.8 | 12.8 | 6.86 | 32.7 | 11.8 | 2.77 | 46.4 | 49.7 | 0.93 |
| 2007[b/] | 21.7 | 71.2 | 0.30 | 52.0 | 45.2 | 1.15 | 30.9 | 78.6 | 0.39 |
| 2008[b/] | 51.3 | 32.1 | 1.60 | 25.5 | 15.3 | 1.67 | 21.5 | 25.8 | 0.83 |
| 2009[b/] | 27.2 | 72.7 | 0.37 | 10.2 | 27.4 | 0.37 | 36.1 | 45.7 | 0.79 |
| 2010 | 60.3 | NA | - | 16.3 | NA | - | 19.0 | NA | - |

a/ Preseason forecasts are Puget Sound (4B) runsizes which are defined as the spawning escapement plus Puget Sound net fishery catch. Puget Sound runsize does not include Puget Sound troll and recreational catch. Postseason returns are Puget Sound runsizes from 1984-1995 and total terminal runsize thereafter. Total terminal runsize includes spawning and recreational catch within the terminal fisheries.

b/ Preliminary.

TABLE III-5. Mass marked 2008 brood coho available to 2011 Council fisheries. The mark used is an adipose fin clip.

| | Ocean Recruits | | |
|---|---|---|---|
| Region | Natural | Hatchery | Percent Mass Marked |
| **PUGET SOUND STOCKS:** | | | |
| Nooksack-Samish and 7/7A Independent | 29,507 | 45,744 | 59.3% |
| Skagit | 138,117 | 16,176 | 9.0% |
| Stillaguamish | 66,600 | 600 | 0.9% |
| Snohomish | 180,000 | 54,977 | 19.1% |
| South Puget Sound Normal | 98,947 | 171,001 | 61.0% |
| South Puget Sound Delayed | 0 | 2,308 | 97.9% |
| Hood Canal | 74,741 | 74,897 | 42.3% |
| Strait of Juan de Fuca and Area 9 | 12,317 | 15,243 | 43.9% |
| Puget Sound Total | 600,229 | 380,946 | 35.3% |
| **WASHINGTON COASTAL STOCKS:** | | | |
| North Coast Independent Tributaries | 21,590 | 11,904 | 29.5% |
| Quillayute Summer | 2,796 | 5,403 | 65.6% |
| Quillayute Fall | 28,191 | 31,042 | 45.5% |
| Hoh | 11,625 | 0 | 0.0% |
| Queets | 13,279 | 16,331 | 49.0% |
| Quinault | 21,723 | 35,544 | 53.8% |
| Grays Harbor | 89,097 | 43,957 | 25.5% |
| Willapa Bay | 47,788 | 64,658 | 54.1% |
| Washington Coastal Total | 236,089 | 208,839 | 41.0% |
| **COLUMBIA RIVER STOCKS:** | | | |
| Columbia River Early | 10,946 | 205,294 | 70.1% [a/] |
| Columbia River Late | 11,793 | 134,468 | 77.9% [a/] |
| Columbia River Total | 22,739 | 339,762 | 73.2% [a/] |
| **OREGON COASTAL** | 148,000 | 18,499 | 4.7% |
| **SOUTHERN BRITISH COLUMBIA STOCKS[b/]:** | | | |
| Georgia Strait Mainland | 10,674 | 13,914 | 23.2% |
| Georgia Strait Vancouver Island | 25,602 | 7,014 | 14.4% |
| Johnstone Strait | 13,624 | 7,138 | 24.8% |
| Southwest Vancouver Island | 3,242 | 40,907 | 31.5% |
| Northwest Vancouver Island | 2,066 | 3,494 | 0.0% |
| Lower Fraser River | 1,162 | 35,513 | 81.4% |
| Interior Fraser River | 15,625 | 324 | 0.5% |
| Southern British Columbia Total | 71,995 | 108,304 | 29.5% |

a/ Columbia River estimate of percent mass marked includes natural production.

b/ For this assessment, the percent mass marked was assumed to be the same as in 2010.

TABLE III-6. Projected coho mark rates for 2011 fisheries under base period fishing patterns (percent marked).

| Area | Fishery | June | July | August | Sept |
|---|---|---|---|---|---|
| Canada | | | | | |
| Johnstone Strait | Recreational | - | 19% | 17% | - |
| West Coast Vancouver Island | Recreational | 31% | 28% | 27% | 31% |
| North Georgia Strait | Recreational | 31% | 30% | 30% | 26% |
| South Georgia Strait | Recreational | 32% | 33% | 24% | 27% |
| Juan de Fuca Strait | Recreational | 33% | 35% | 37% | 36% |
| Johnstone Strait | Troll | 40% | 29% | 22% | 28% |
| NW Vancouver Island | Troll | 35% | 32% | 33% | 31% |
| SW Vancouver Island | Troll | 40% | 38% | 39% | 40% |
| Georgia Strait | Troll | 40% | 42% | 43% | 38% |
| Puget Sound | | | | | |
| Strait of Juan de Fuca (Area 5) | Recreational | 42% | 39% | 38% | 38% |
| Strait of Juan de Fuca (Area 6) | Recreational | 40% | 36% | 37% | 34% |
| San Juan Island (Area 7) | Recreational | 30% | 34% | 35% | 28% |
| North Puget Sound (Areas 6 & 7A) | Net | - | 32% | 30% | 34% |
| Council Area | | | | | |
| Neah Bay (Area 4/4B) | Recreational | 28% | 42% | 40% | 45% |
| LaPush (Area 3) | Recreational | 50% | 45% | 50% | 44% |
| Westport (Area 2) | Recreational | 57% | 55% | 54% | 48% |
| Columbia River (Area 1) | Recreational | 68% | 65% | 62% | 65% |
| Tillamook | Recreational | 56% | 51% | 44% | 28% |
| Newport | Recreational | 51% | 45% | 41% | 26% |
| Coos Bay | Recreational | 38% | 34% | 23% | 12% |
| Brookings | Recreational | 31% | 21% | 18% | 7% |
| Neah Bay (Area 4/4B) | Troll | 42% | 41% | 41% | 41% |
| LaPush (Area 3) | Troll | 45% | 48% | 43% | 44% |
| Westport (Area 2) | Troll | 43% | 46% | 51% | 51% |
| Columbia River (Area 1) | Troll | 57% | 56% | 54% | 59% |
| Tillamook | Troll | 52% | 49% | 49% | 45% |
| Newport | Troll | 49% | 46% | 42% | 39% |
| Coos Bay | Troll | 38% | 35% | 29% | 17% |
| Brookings | Troll | 25% | 28% | 30% | 48% |
| Columbia River | | | | | |
| Buoy 10 | Recreational | - | - | - | 68% |

## CHAPTER IV - FRASER RIVER AND PUGET SOUND PINK SALMON ASSESSMENTS

Two major runs comprise the pink salmon population available to Council fisheries during odd-numbered years: the Fraser River (British Columbia) run, which is more abundant, and the Puget Sound run. The 2009 run size forecast for Fraser pinks was 17.54 million fish; actual run size was estimated at 19.5 million. The 2009 Puget Sound pink salmon run size forecast was 5.47 million, with 5.14 million natural and 3,300 hatchery fish. The actual run size was estimated at 9,837, 251.

Table IV-1 provides a summary of recent run sizes and forecasts.

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 | 19.10 |
| 1987 | NA | 1.57 | NA | 7.17 |
| 1989 | NA | 1.93 | NA | 16.63 |
| 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 | 3.59 |
| 2001 | 2.92 | 3.56 | 5.47 | 21.17 |
| 2003 | 2.32 | 2.90 | 17.30 | 26.00 |
| 2005 | 1.98 | 1.23 | 16.30 | 10.00 |
| 2007 | 3.34 | 2.45 | 19.60 | 11.00 |
| 2009 | 5.47 | 9.84 | 17.54 | 19.50 |
| 2011[b/] | 5.98 | - | 17.50 | - |

a/ Total run size.

b/ Preliminary forecast.

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

## *DESCRIPTION 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 2010 ocean salmon management 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 2010 preseason management measures and analyses of their projected effects on the biological and socioeconomic environment are presented in Preseason Report III (PFMC 2010). A description of the 2010 management measures as implemented, including inseason modifications, and an analysis of their effects on the environment, including an historical perspective, is presented in the Review of 2010 Ocean Salmon Fisheries (PFMC 2011).

## *ANALYSIS OF EFFECTS ON THE ENVIRONMENT OF THE NO-ACTION ALTERNATIVE*

### Overview

Table V-4 provides a summary of Salmon FMP stock spawning escapement and exploitation rate projections for 2011 under the No-Action Alternative (2010 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 2010 Ocean Salmon Fisheries was published. A preliminary determination of stock status under the FMP Overfishing Criteria was available for some of these stocks in time for this report; however, some estimates are still unavailable. The STT will report to the Council on stocks not meeting conservation objectives at the March 2011 Council meeting, and may further update the status of stocks present in Table V-4 at that time.

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

Coho escapements and fishery impacts were estimated using coho FRAM. Abundance forecasts for 2011 were updated for Washington and Oregon stocks, but forecasts for Canadian stocks are unchanged from those employed for 2010 planning. Updated forecasts for Canadian stocks are expected to become available in March 2011. To provide information on the effect of changes in abundance forecasts, the final 2010 pre-season regulatory package for ocean and inside fisheries was applied to 2011 projections of abundance.

A number of stocks are not subject to the FMP Overfishing Criteria, including ESA listed stocks and stocks minimally impacted (exploitation rate less than 5 percent) by Council-area ocean fisheries. However, the status of several stocks listed in Table V-4 that are subject to the FMP Overfishing Criteria should be noted at this stage of the management process. In particular:

- Western SJF natural coho failed to meet its FMP conservation objective for four consecutive years (2005-2008). In 2009 its escapement remained below the goal of 11.9 thousand spawners. However, escapement for the aggregate SJF stock, which is the current FMP management unit, was above the aggregate escapement goal.

- SRFC failed to meet the FMP conservation objective in 2007, 2008, and 2009, triggering an Overfishing Concern under the terms of the Salmon FMP. Escapement in 2010 was above the lower end of the conservation objective escapement goal range.
- KRFC spawning escapement exceeded the floor of 35,000 natural area adults in three of the last four years, which satisfies the criteria for ending the overfishing concern triggered in 2006.

### Sacramento River Fall Chinook

A repeat of 2010 regulations, which included a Sacramento River Basin recreational quota of 8,200 SRFC, would be expected to result in an escapement of 572,600 natural and hatchery SRFC adults, which is well above the 122,000 to 180,000 natural and hatchery adult escapement goal range.

### Klamath River Fall Chinook

A repeat of 2010 fishery regulations, which included a river recreational harvest quota of 12,000 adults and a tribal allocation of 50 percent (of the overall adult harvest), would be expected to result in 39,700 natural area adult spawners. This projection exceeds the spawner floor of 35,000 natural area adults. If the ocean fisheries were closed from January through August 2011 between Cape Falcon and Point Sur, and the Klamath River fisheries (tribal and recreational) were closed in 2011, the expected number of natural area adult spawners would be 75,800.

### Other California Coastal Chinook Stocks

The NMFS ESA consultation standard restricts the Klamath River fall Chinook age-4 ocean harvest rate to no more than 16.0 percent to limit impacts on these stocks. As indicated in the Chapter II, the postseason estimate of this rate for 2010 is 3.9 percent. Applying 2010 regulations to the 2011 abundance results in an age-4 ocean harvest rate forecast of 10.3 percent. If the ocean fisheries were closed from January through August 2011 between Cape Falcon and Point Sur, the expected age-4 ocean harvest rate for 2011 would be zero (zero age-4 KRFC were harvested during the September through November 2010 period).

### Oregon Coast Chinook Stocks

The FMP conservation objective for Oregon coast Chinook is 150,000 to 200,000 natural adult spawners; and attainment of this goal is assessed using peak spawner counts of 60 to 90 fish per mile in nine standard index reaches. The aggregate stock had been meeting or exceeding this goal since 1984 and had been generally increasing until 2003. Beginning in 2004 the escapement declined until 2009. In 2007 and 2008, the stock failed to meet its goal for the first time since 1983. In 2009 and 2010 the goal was achieved with 62 and 79 fish per mile, respectively. No forecast is available for this stock, but given recent trends, it seems likely that it would meet its goal again in 2011 under 2010 fishing seasons.

### Columbia River Chinook Stocks

Applying 2010 regulations to the forecasted 2011 abundance of Columbia River fall Chinook would result in ocean escapements meeting spawning escapement goals for all major stocks. Compared to both 2010 forecast ocean escapement and actual returns, the 2011 forecasts are higher for all major stocks except SCH.

### Washington Coastal and Puget Sound Chinook Stocks

Council fisheries north of Cape Falcon have only a minor impact on most stocks that originate in Washington coastal and Puget Sound rivers. These stocks have northerly marine distribution patterns and are therefore impacted primarily by Canadian and Alaskan fisheries. An evaluation of 2010 Council area

management measures on projected 2011 abundance would not provide a useful comparison of fishery impacts in relation to conservation objectives.

## Oregon Production Index Area Coho Stocks

Ocean fisheries were modeled with 2010 Council regulations and 2010 expectations for non-Council area fisheries. Under this scenario, expected exploitation rates are 9.8 percent on OCN coho and 8.4 percent on Rogue/Klamath hatchery coho. Expected spawner escapement is 230,800 for OCN coho (Tables V-5 and V-6). For Columbia River hatchery coho stocks, the predicted ocean exploitation rate (excluding Buoy 10) is 23.9 percent on the Columbia River early stock and 31.5 percent on the Columbia River late stock. Predicted ocean escapements (after Buoy 10) into the Columbia River in 2011 under this exercise show that under 2010 ocean regulations, Columbia River early and late coho would be expected to meet egg take goals.

Based on parent escapement levels and observed OPI smolt-to-jack survival for 2008 brood OPI smolts, the total allowable OCN coho exploitation rate for 2011 fisheries is no greater than 20 percent under FMP Amendment 13 and no greater than 15 percent under the matrix developed by the OCN work group (Table V-7; Appendix A, Tables A-2 and A-3). The total allowable R/K hatchery coho marine exploitation rate is 13.0 percent (NMFS ESA consultation standard).

Lower Columbia River natural (LCN) coho were listed as Endangered under the Oregon state ESA in 1999 and have been managed under a state Recovery Plan harvest rate matrix since 2001. LCN coho were listed as threatened under the Federal ESA in 2005. From 2001 through 2005, Oregon coast hatchery stocks were used as a surrogate in FRAM; beginning in 2006 unmarked Columbia River hatchery stocks were used as a surrogate in FRAM. In 2010, NMFS allowed a 15.0 percent exploitation rate in marine area and mainstem Columbia River fisheries combined; the 2011 consultation standard is again 15.0 percent. Under 2010 fishery regulations and 2011 abundance forecasts, the exploitation rate is predicted to be 11.2 percent for marine fisheries (excluding the Buoy 10 fishery) using combined unmarked Columbia River hatchery stocks as the proxy. Given the 2010 inriver sharing arrangement, the total exploitation rate on LCN coho would be 15.5 percent.

## Washington Coast, Puget Sound, and Canadian Coho Stocks

Exploitation rate and ocean escapement expectations in relation to management goals for selected naturally-spawning coho stocks, given 2011 preseason abundance forecasts and 2010 preseason projections for fishing patterns, are presented in Table V-5. The 2011 forecasts for Canadian coho stocks are not available, but are assumed to be at 2010 levels for this analysis. More detailed fishery management goals for Council area coho stocks are listed in Appendix A.

Under 2010 regulations, 2011 exploitation rates are expected to meet the allowable 2011 FMP conservation objectives for Puget Sound coho stocks. Ocean escapements for Washington Coast natural coho stocks are expected to be at levels that would permit attainment of FMP spawning escapement conservation objectives. In addition, all annual management objectives for stocks subject to the PSC agreement would be met. The exploitation rate by U.S. fisheries south of the Canadian border on Interior Fraser coho is projected to be 8.2 percent, which is under the anticipated 10.0 percent allowable exploitation rate under the 2002 PST Coho Agreement. The Council area fisheries portion would be 4.2 percent.

Coho bycatch during Puget Sound fisheries directed at chum and sockeye salmon will also be a consideration for preseason planning.

## Conclusion

The No-Action Alternative would not meet the Purpose and Need for the proposed action because the 2011 ESA consultation standard of no more than 15.0 percent exploitation rate on LCN coho in marine and Columbia River mainstem fisheries would not be satisfied. In addition, recreational opportunity and commercial value would not be optimized because surplus production of KRFC and SRFC would be forgone as a result of unnecessarily conservative management measures south of Cape Falcon. Thus, the No-Action Alternative will not be considered further as a viable alternative for 2011 ocean salmon fishery management measures.

TABLE V-1. Commercial troll management measures adopted by the Council for non-Indian ocean salmon fisheries, 2010. (Page 1 of 5)

**A. SEASON DESCRIPTIONS**

**North of Cape Falcon**

**Supplemental Management Information**

1. Overall non-Indian TAC: 117,000 (non-mark-selective equivalent of 110,000) Chinook and 80,000 coho marked with a healed adipose fin clip (marked).
2. Non-Indian commercial troll TAC: 56,000 Chinook and 12,800 marked coho (including 1,000 incidental contact mortalities).
3. No preseason trade with recreational fishery.

**U.S./Canada Border to Cape Falcon**

- May 1 through earlier of June 30 or 42,000 Chinook quota.

Seven days per week (C.1). All salmon except coho (C.7). Cape Flattery, Mandatory Yelloweye Rockfish Conservation Area, and Columbia Control Zones closed (C.5). See gear restrictions and definitions (C.2, C.3).
An inseason conference call will occur when it is projected that 35,000 Chinook have been landed to consider modifying the open period and adding landing and possession limits to extend the fishery through the end of June.

**U.S./Canada Border to Cape Falcon**

- July 1 through earlier of September 14 or 14,000 Chinook preseason quota (C.8) or a landed catch quota of 11,800 marked coho (C.8.d).

Open July 1-6, then Friday through Tuesday through July 27, then Saturday through Tuesday thereafter. Landing and possession limit of 150 Chinook and 50 coho per vessel per open period north of Leadbetter Point or 150 Chinook and 50 coho south of Leadbetter Point (C.1). All Salmon except no chum retention north of Cape Alava, Washington in August and September (C.7). All coho must be marked (C.8.d). See gear restrictions and definitions (C.2, C.3). Cape Flattery, Mandatory Yelloweye Rockfish Conservation Area, and Columbia Control Zones closed (C.5).

Oregon State regulations require that fishers south of Cape Falcon, OR intending to fish within this area notify Oregon Department of Fish and Wildlife before transiting the Cape Falcon, OR line (45º46'00" N. lat.) at the following number: 541-867-0300 Ext. 271. Vessels must land and deliver their fish within 24 hours of any closure of this fishery. Under state law, vessels must report their catch on a state fish receiving ticket. Vessels fishing or in possession of salmon while fishing north of Leadbetter Point must land and deliver their fish within the area and north of Leadbetter Point. Vessels fishing or in possession of salmon while fishing south of Leadbetter Point must land and deliver their fish within the area and south of Leadbetter Point, except that Oregon permitted vessels may also land their fish in Garibaldi, Oregon. Oregon State regulations require all fishers landing salmon into Oregon from any fishery between Leadbetter Point, Washington and Cape Falcon, Oregon must notify ODFW within one hour of delivery or prior to transport away from the port of landing by calling 541-867-0300 Ext. 271. 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).

TABLE V-1. Commercial troll management measure**s** adopted by the Council for non-Indian ocean salmon fisheries, 2010 (Page 2 of 5)

**A. SEASON DESCRIPTIONS**

**South of Cape Falcon**

**Supplemental Management Information**

1. Sacramento River Basin recreational fishery catch assumption: quota of 8,200 adult Sacramento River fall Chinook (12.6% of the total allowable harvest).
2. Sacramento River fall Chinook spawning escapement of 180,000 adults.
3. Klamath River recreational fishery allocation: 12,000 adult Klamath River fall Chinook.
4. Klamath tribal allocation: 34,600 adult Klamath River fall Chinook.
5. Klamath River fall Chinook spawning escapement of 40,700 adults.

**Cape Falcon to Humbug Mt.**

- May 1-July 6, July 9-13, 16-20, 23-27, August 1-25 (C.9).

All salmon except coho (C.7). All vessels fishing in the area must land their fish in the State of Oregon. See gear restrictions and definitions (C.2, C.3) and Oregon State regulations for a description of special regulations at the mouth of Tillamook Bay.

- September 1-30

Sufficient impacts to conduct an experimental genetic stock identification study. All salmon must be released after collection of biological samples.

In 2011, the season will open March 15 for all salmon except coho. This opening could be modified following Council review at its March 2011 meeting.

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

- May 1-31;
- July 1 through earlier of July 31, or a 1,500 Chinook quota;
- Aug. 1 through earlier of Aug. 31, or a 1,500 Chinook quota (C.9).

All salmon except coho (C.7). Chinook 28 inch total length minimum size limit (B). Prior to June 1, landing and possession limit of 100 Chinook per vessel per calendar week; all vessels fishing in the area must land their fish in the area or Port Orford. July 1 through August 31, landing and possession limit of 30 Chinook per vessel per day and 90 Chinook per vessel per calendar week; all vessels fishing in this area must land and deliver all fish within this area or Port Orford, within 24 hours of any closure in this fishery, and prior to fishing outside of this area. Oregon State regulations require all fishers landing salmon from any quota managed season within this area to notify Oregon Dept. of Fish and Wildlife (ODFW) within 1 hour of delivery or prior to transport away from the port of landing by calling (541) 867-0300 ext. 252. Notification shall include vessel name and number, number of salmon by species, port of landing and location of delivery, and estimated time of delivery. See gear restrictions and definitions (C.2, C.3).

- June 1-30; September 1-30

Sufficient impacts to conduct an experimental genetic stock identification study. All salmon must be released after collection of biological samples.

In 2011, the season will open March 15 for all salmon except coho, with a 28 inch Chinook minimum size limit. This opening could be modified following Council review at its March 2011 meeting.

**OR/CA Border to Humboldt South Jetty (California KMZ)**

Closed except for sufficient impacts to conduct an experimental genetic stock identification study May 1 through September 30. All salmon must be released after collection of biological samples.

**Humboldt South Jetty to Horse Mt.**

Closed.

TABLE V-1. Commercial troll management measures adopted by the Council for non-Indian ocean salmon fisheries, 2010 (Page 3 of 5)

**A. SEASON DESCRIPTIONS**

**South of Cape Falcon**

**Horse Mt. to Point Arena (Fort Bragg)**

- July 1-4, 8-11,
- July 15 through the earlier of July 29 or an 18,000 Chinook quota.
- August 1 through the earlier of August 31 or a 9,375 Chinook preseason quota (C.8, C.9).

All salmon except coho (C.7). Chinook minimum size limit of 27 inches total length (B). All vessels fishing in the area must land their fish in the area when the fishery is managed under a quota; all fish must be offloaded within 24 hours of any closure of the fishery (C1). See gear restrictions and definitions (C.2, C.3).

- May 1 through June 30; September 1-30

Sufficient impacts to conduct an experimental genetic stock identification study. All salmon must be released after collection of biological samples.

**Pt. Arena to U.S./Mexico Border**

- July 1-4, 8-11 (C.9).

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

- May 1 through June 30; July 13 through September 30

Sufficient impacts to conduct an experimental genetic stock identification study. All salmon must be released after collection of biological samples.

**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 | 28.0 | 21.5 | 16.0 | 12.0 | None |
| Cape Falcon to Horse Mt. | 28.0 | 21.5 | - | - | None |
| Horse Mt. to U.S./Mexico Border | 27.0 | 20.5 | - | - | None |

**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. Salmon may be landed in an area that has been closed more than 96 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 be landed in an area that has been closed less than 96 hours only if they meet the minimum size, landing/possession limit, or other special requirements for the areas in which they were caught and landed.

States may require fish landing/receiving tickets be kept on board the vessel for 90 days 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.

TABLE V-1. Commercial troll management measures adopted by the Council for non-Indian ocean salmon fisheries, 2010 (Page 4 of 5)

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

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. In that portion of the fishery management area (FMA) 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 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. Transit Through Closed Areas with Salmon on Board: It is unlawful for a vessel to have troll or recreational gear in the water while transiting 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.

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. *Mandatory 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. *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. *Bandon High Spot Control Zone* - The area west of a line between 43º07'00" N. lat.; 124º37'00" W. long. and 42º40'30" N. lat; 124º 52'0" W. long. extending to the western edge of the exclusive economic zone (EEZ).

e. *Klamath Control Zone* - The ocean area at the Klamath River mouth bounded on the north by 41°38'48" N. lat. (approximately six 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 six nautical miles south of the Klamath River mouth).

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 amount of salmon (by species) on board, and the estimated time of arrival.

C.7. Incidental Halibut Harvest: During authorized periods, the operator of a vessel that has been issued an incidental halibut harvest license may retain Pacific halibut caught incidentally in Area 2A while trolling for salmon. Halibut retained must be no less than 32 inches in total length, measured from the tip of the lower jaw with the mouth closed to the extreme end of the middle of the tail, and must be landed with the head on. License applications for incidental harvest must be obtained from the International Pacific Halibut Commission (phone: 206-634-1838). Applicants must apply prior to April 1 of each year. Incidental harvest is authorized only during May and June troll seasons and after June 30 if quota remains and if announced on the NMFS hotline (phone: 800-662-9825). ODFW and Washington Department of Fish and Wildlife (WDFW) will monitor landings. If the landings are projected to exceed the 25,035 pound preseason allocation 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.

Beginning May 1, license holders may land no more than one Pacific halibut per each three Chinook, except one Pacific halibut may be landed without meeting the ratio requirement, and no more than 35 halibut may be landed per trip. Pacific halibut retained must be no less than 32 inches in total length (with head on).

TABLE V-1. Commercial troll management measures adopted by the Council for non-Indian ocean salmon fisheries, 2010 (Page 5 of 5)

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

A "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.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 on a fishery impact equivalent basis.
b. NMFS may transfer fish between the recreational and commercial fisheries north of Cape Falcon on a fishery impact equivalent basis if there is agreement among the areas' representatives on the Salmon Advisory Subpanel (SAS).
c. At the March 2011 meeting, the Council will consider inseason recommendations for special regulations for any experimental fisheries (proposals must meet Council protocol and be received in November 2010).
d. If retention of unmarked coho is permitted by inseason action, the allowable coho quota will be adjusted to ensure preseason projected mortality of critical stocks is not exceeded.
e. Landing limits may be modified inseason to sustain season length and keep harvest within overall quotas.
f. Chinook remaining from the Horse Mt. to Point Arena commercial troll quota in July may be transferred to the August preseason quota on a fishery impact equivalent basis.

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.

Check state regulations for details.

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

TABLE V-2. Recreational management measures adopted by the Council for non-Indian ocean salmon fisheries, 2010. (Page 1 of 4)

**A. SEASON DESCRIPTIONS**

**North of Cape Falcon**

**Supplemental Management Information**

1. Overall non-Indian TAC: 117,000 (non-mark-selective equivalent of 110,000) Chinook and 80,000 coho marked with a healed adipose fin clip (marked).
2. Recreational TAC: 61,000 (non-mark selective equivalent of 54,000) Chinook and 67,200 marked coho; all retained coho must be marked.
3. No preseason trade with recreational fishery.
4. No Area 4B add-on fishery.
5. Buoy 10 fishery opens Aug. 1 with an expected landed catch of 12,000 marked coho.

**U.S./Canada Border to Cape Falcon**

- June 12 through earlier of June 30 or a **marked Chinook quota of 12,000** (C.5).

Seven days per week. Two fish per day, all salmon except coho, **all Chinook must be marked with a healed adipose fin clip (C.1)**. There will be a conference call no later than June 23 to consider changing bag limits. Chinook 24-inch total length minimum size limit (B). See gear restrictions (C.2). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

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

- July 1 through earlier of September 19 or 6,990 marked coho subarea quota with a subarea guideline of 5,400 Chinook (C.5).

Tuesday through Saturday. All salmon except no chum beginning August 1. Two fish per day, only one of which can be a Chinook; there will be a conference call no later than July 14 to consider removing the one Chinook bag limit restriction. All retained coho must be marked (C.1). See gear restrictions and definitions (C.2, C.3). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

**Cape Alava to Queets River (La Push Subarea)**

- July 1 through earlier of September 19 or 1,700 marked coho subarea quota with a subarea guideline of 2,450 Chinook (C.5).
- September 25 through earlier of October 10 or 50 marked coho quota or 50 Chinook quota (C.5) in the area north of 47°50'00 N. lat. and south of 48°00'00" N. lat.

Tuesday through Saturday through September 19, seven days per week beginning September 25. All salmon, two fish per day, only one of which can be a Chinook; there will be a conference call no later than July 14 to consider removing the one Chinook bag limit restriction. All retained coho must be marked (C.1). See gear restrictions and definitions (C.2, C.3). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

**Queets River to Leadbetter Point (Westport Subarea)**

- July 4 through earlier of September 19 or 24,860 marked coho subarea quota with a subarea guideline of 28,000 Chinook (C.5).

Sunday through Thursday. All salmon, two fish per day, only one of which can be a Chinook; there will be a conference call no later than July 14 to consider removing the one Chinook bag limit restriction. All retained coho must be marked (C.1). See gear restrictions and definitions (C.2, C.3). Grays Harbor Zone closed beginning August 1 (C.4.b). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

**Leadbetter Point to Cape Falcon (Columbia River Subarea)**

- July 1 through earlier of September 30 or 33,600 marked coho subarea quota with a subarea guideline of 13,100 Chinook (C.5).

Seven days per week. All salmon, two fish per day, only one of which can be a Chinook; there will be a conference call no later than July 14 to consider removing the one Chinook bag limit restriction. All retained coho must be marked (C.1). See gear restrictions and definitions (C.2, C.3). Columbia Control Zone closed (C.4.c). Inseason management may be used to sustain season length and keep harvest within the overall Chinook recreational TAC for north of Cape Falcon (C.5).

TABLE V-2. Recreational management measures adopted by the Council for non-Indian ocean salmon fisheries, 2010. (Page 2 of 4)

**A. SEASON DESCRIPTIONS**

**South of Cape Falcon**

**Supplemental Management Information**

Sacramento River Basin recreational fishery catch assumption: quota of 8,200 adult Sacramento River fall Chinook (12.6% of the total allowable harvest).
2. Sacramento River fall Chinook spawning escapement of 180,000 adults.
3. Klamath River recreational fishery allocation: 12,000 adult Klamath River fall Chinook.
4. Klamath tribal allocation: 34,600 adult Klamath River fall Chinook.
5. Klamath River fall Chinook spawning escapement of 40,700 adults.
6. Overall recreational TAC: 26,000 marked coho.

**Cape Falcon to OR/CA Border**

- Except as provided below during the all-salmon mark-selective coho fishery, the season will be May 29 through September 6 (C.6).

Seven days per week. All salmon except coho; two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3).

- All-salmon mark-selective coho fishery: June 26 through earlier of Sept. 6 or a landed catch of 26,000 marked coho. The all salmon except coho season may reopen upon attainment of the coho quota.

Seven days per week, all salmon, two fish per day. All retained coho must be marked (C.1). Fishing in the Stonewall Bank groundfish 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). Open days may be adjusted inseason to utilize the available quota (C.5).

In 2011, the season between Cape Falcon and Humbug Mt. will open March 15 for all salmon except coho, two fish per day (B, C.1, C.2, C.3).

**OR/CA Border to Horse Mt. (California KMZ)**

- May 29 through September 6 (C.6).

Seven days per week. All salmon except coho; two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3). Klamath Control Zone closed in August (C.4.e). See California State regulations for additional closures adjacent to the Smith, Eel, and Klamath rivers.

**Horse Mt. to Point Arena (Fort Bragg)**

- April 3-30

Seven days per week. All salmon except coho; two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3).

- May 1 through September 6.

Seven days per week. All salmon except coho; two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3).

Inseason action may be taken to open the fishery in April 2011 pending review at the March 2011 Council meeting of information on 2010 spawning escapements, 2011 abundance forecasts, annual management objectives, or other relevant issues.

**Point Arena to U.S./Mexico Border**

- April 3-30

Seven days per week. All salmon except coho; two fish per day (C.1). Chinook minimum size limit of 20 inches total length (B). See gear restrictions and definitions (C.2, C.3).

- May 1 through September 6.

Thursday through Monday. All salmon except coho; two fish per day (C.1). Chinook minimum size limit of 24 inches total length (B). See gear restrictions and definitions (C.2, C.3).

Inseason action may be taken to open the fishery in April 2011 pending review at the March 2011 Council meeting of information on 2010 spawning escapements, 2011 abundance forecasts, annual management objectives, or other relevant issues.

TABLE V-2. Recreational management measures adopted by the Council for non-Indian ocean salmon fisheries, 2010. (Page 3 of 4)

**C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS**

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

| Area (when open) | | Chinook | Coho | Pink |
|---|---|---|---|---|
| North of Cape Falcon | | 24.0 | 16.0 | None |
| Cape Falcon to OR/CA Border | | 24.0 | 16.0 | None |
| OR/CA Border to Horse Mountain | | 24.0 | - | 24.0 |
| Horse Mt. to U.S./Mexico Border: | Apr. 3-30 | 20.0 | - | 20.0 |
| | May 1-Sep. 6 | 24.0 | - | 24.0 |

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.

*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 salmon for all licensed and juvenile anglers aboard has 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 Point 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. [Note: ODFW regulations in the state-water fishery off Tillamook Bay may allow the use of barbed hooks to be consistent with inside regulations.]

b. *Horse Mt., California, to Point 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.3. Gear Definitions:

a. *Recreational fishing gear defined*: Angling tackle consisting of a line with no more than one artificial lure or natural bait attached. Off Oregon and Washington, the line 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 Point 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.

| TABLE V-2. Recreational management measures adopted by the Council for non-Indian ocean salmon fisheries, 2010. (Page 4 of 4) |
|---|
| **C. REQUIREMENTS, DEFINITIONS, RESTRICTIONS, OR EXCEPTIONS** |

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°28'00" N. lat., 124°45'00" W. long.), then in a straight line to Bonilla Point (48°35'30" N. lat., 124°43'00" 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° 36'00" 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 Groundfish 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 six 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.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 on an fishery impact equivalent basis 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.

c. Chinook and coho may be transferred between the recreational and commercial fisheries north of Cape Falcon on a fishery impact equivalent basis if there is agreement among the representatives of the Salmon Advisory Subpanel (SAS).

d. If retention of unmarked coho is permitted in the area from the U.S./Canada border to Cape Falcon, Oregon, by inseason action, the allowable coho quota will be adjusted to ensure preseason projected mortality of critical stocks is not exceeded.

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. Treaty Indian ocean troll management measures adopted by the Council for ocean salmon fisheries, 2010**.**
(Page 1 of 1)

**A. SEASON DESCRIPTIONS**

**Supplemental Management Information**

1. Overall Treaty-Indian TAC: 55,000 Chinook and 41,500 coho.

• May 1 through the earlier of June 30 or 27,500 Chinook quota.
All salmon except coho. If the Chinook quota for the May-June fishery is not fully utilized, the excess fish cannot be transferred into the later all-salmon season. If the Chinook quota is exceeded, the excess will be deducted from the later all-salmon season. See size limit (B) and other restrictions (C).

• July 1 through the earlier of September 15, or 27,500 preseason Chinook quota, or 41,500 coho quota.
All Salmon. See size limit (B) and other restrictions (C).

**B. MINIMUM SIZE (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 (All).

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 - That portion of the FMA between 48°07'36" N. lat. (Sand Pt.) and 47°31'42" N. lat. (Queets River) and east of 125°44'00" W. long.

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 - That portion of the FMA between 47°40'06" N. lat. (Destruction Island) and 46°53'18"N. lat. (Point Chehalis) and east of 125°44'00" W. long.

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 will continue a ceremonial and subsistence fishery during the time frame of September 15 through October 15 in the same manner as in 2004-2009. Fish taken during this fishery are to be counted against treaty troll quotas established for the 2010 season (estimated harvest during the October ceremonial and subsistence fishery: 100 Chinook; 200 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.

TABLE V-4. Achievement of conservation objectives for key stocks listed in Table 3-1 of the Pacific Coast Salmon Plan. Bolded numbers indicate a failure to meet the conservation objective. Stocks listed under the Endangered Species Act are not included. (Page 1 of 3)

| **Stock and FMP Conservation Objective** (thousands of spawners; spawners per mile; impact or replacement rate) | **Year** | | | | | | | | | **Overfishing Criteria** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CHINOOK** | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 [a/] | 2011 [b/] | Alert [c/] | Concern [d/] | Exception [e/] |
| **Sacramento River Fall** 122.0 - 180.0 adult spawners | 523.0 | 286.9 | 396.0 | 275.0 | **91.4** | **65.4** | **40.9** | 125.4 | 572.6 | No | **Yes** | No |
| **Klamath River Fall** - < 67% avg. spawner reduction rate but no less than 35.0 natural area adult spawners annually | 87.6 | **24.1** | **26.8** | **30.2** | 60.7 | **30.9** | 44.4 | 37.2 | 39.7 | No | No | No |
| **Southern, Central and Northern Oregon Coast Spring and Fall** No less than 60 adult spawners/mile [f/] | 230.6 | 171.7 | 89.1 | 63.8 | **39.2** | **34.1** | 62.0 | 78.8 | NA | No | No | No |
| **Upper Columbia River Bright Fall** 43.5 adults over McNary Dam (60.0 *U.S. v. Oregon* goal) Council area base period impacts <4% | 180.0 | 170.6 | 134.8 | 91.0 | 58.7 | 101.9 | 104.5 | 146.9 | >43.5 | No | No | Exp. Rate |
| **Columbia River Summer Chinook** 80.0 to 90.0 adults over Bonneville Dam Council area base period impacts <2% | 114.8 | NA | NA | NA | NA | NA | NA | NA | NA | - | - | - |
| In 2004 state and tribal co-managers changed the stock definition from Chinook passing Bonneville Dam after May 31 to Chinook passing Bonneville Dam after June 14, with a goal of 29,000 at the river mouth | 83.1 | 65.5 | 60.4 | 77.9 | 37.0 | 55.5 | 53.9 | 72.3 | >29.0 | No | No | Exp. Rate |
| **Grays Harbor Fall** - 14.6 adult spawners (MSP) | 17.8 | 29.5 | 17.0 | 16.0 | **11.3** | 13.6 | 7.2 | NA [g/] | NA [g/] | No | No | Exp. Rate |
| **Grays Harbor Spring** - 1.4 adult spawners | 1.9 | 5.0 | 2.1 | 2.5 | **0.7** | **1.0** | 1.1 | NA [g/] | NA [g/] | No | No | Exp. Rate |
| **Queets Fall** - no less than 2.5 adult spawners (MSY) | 5.0 | 5.1 | 4.6 | 3.1 | **0.9** | 3.1 | NA [g/] | NA [g/] | NA [g/] | No | No | Exp. Rate |
| **Queets Spring/Summer** - no less than 0.7 adult spawners | **0.2** | **0.6** | **0.3** | **0.3** | **0.4** | **0.3** | **0.5** | NA [g/] | NA [g/] | Limited [e/] | No | Exp. Rate |
| **Hoh Fall** - no less than 1.2 adult spawners (MSY) | 1.6 | 3.2 | 4.2 | 1.5 | 1.6 | 2.8 | 2.1 | 2.3 | NA [g/] | No | No | Exp. Rate |
| **Hoh Spring/Summer** - no less than 0.9 adult spawners | 1.2 | 1.8 | 1.2 | 0.9 | **0.8** | **0.7** | 0.9 | **0.8** | NA [g/] | No | No | Exp. Rate |
| **Quillayute Fall** - no less than 3.0 adult spawners (MSY) | 7.4 | 3.8 | 6.4 | 5.6 | 3.1 | 3.6 | 3.1 | 4.4 | NA [g/] | No | No | Exp. Rate |
| **Quillayute Spring/Summer** - 1.2 adult spawners (MSY) | 1.2 | **1.1** | **0.9** | **0.6** | **0.5** | **0.9** | **0.6** | **0.7** | NA [g/] | Limited [e/] | No | Exp. Rate |

TABLE V-4. Achievement of conservation objectives for key stocks listed in Table 3-1 of the Pacific Coast Salmon Plan. Bolded numbers indicate a failure to meet the conservation objective. Stocks listed under the Endangered Species Act are not included. (Page 2 of 3)

| **Stock and FMP Conservation Objective** (thousands of spawners; spawners per mile; impact or replacement rate) | **Year** | | | | | | | | | **Overfishing Criteria** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COHO** | | | | | | | | | | | | |
| **Oregon Coast (OCN)** - Total exploitation rate set annually;≤15% in 2010, ≤15% in 2011. | 14% | 15% | 11% | 6.0% | 11.0% | 2.0% | 7.0% | 5.0% | 9.7% | No | No | No |
| **Grays Harbor** - 35.4 adult spawners (MSP) | 85.0 | 60.7 | 38.6 | **17.8** | **25.1** | **34.1** | 69.7 | >35.4 | >35.4 | No | No | No |
| **Queets** - 5.8 to 14.5 adult spawners (MSY range) Includes supplemental adults prior to 2006. | 9.8 | 7.5 | 6.5 | **5.7** | **4.7** | **4.6** | 9.2 | >5.8 | >5.8 | No | No | No |
| **Hoh** - 2.0 to 5.0 adult spawners (MSY range) | 6.3 | 4.7 | 4.7 | **1.3** | 3.1 | 2.5 | 4.6 | 7.9 | >2.0 | No | No | No |
| **Quillayute Fall** - 6.3 to 15.8 adult spawners (MSY range) | 14.8 | 13.4 | 11.5 | **5.2** | **6.2** | 6.9 | 7.9 | 9.3 | >6.3 | No | No | No |
| **Strait of Juan de Fuca**[h/] | 21.0 | 21.0 | **11.1** | **3.9** | **8.0** | **3.3** | 14.1 | NA | i/ | No | No | No |
| Western Strait of Juan de Fuca - 11.9 adult spawners <2010 | 13.8 | 12.0 | **6.8** | **2.0** | **4.4** | **2.4** | **10.9** | - | - | - | - | - |
| Eastern Strait of Juan de Fuca - 0.95 adult spawners <2010 | 3.2 | 7.8 | 3.4 | 1.8 | 3.1 | 1.2 | 3.9 | - | - | - | - | - |
| **Hood Canal** - 21.5 adult spawners (MSP) <2010 | 171.2 | 146.9 | 38.1 | **13.7** | 46.7 | **11.8** | 26.9 | NA | i/ | No | No | No |
| **Skagit** - 30.0 adult spawners (MSP) <2010 | 88.7 | 118.5 | 34.7 | **7.7** | 52.0 | **24.1** | 60.8 | NA | i/ | No | No | No |
| **Stillaguamish** - 17.0 adult spawners (MSP) <2010 | 45.7 | 59.2 | 25.8 | **8.5** | 38.7 | **12.9** | 22.2 | NA | i/ | No | No | No |
| **Snohomish** - 70.0 adult spawners (MSP) <2010 | 182.7 | 252.8 | 109.0 | 75.8 | **18.6** | **35.1** | 99.0 | NA | i/ | No | No | No |

TABLE V-4. Achievement of conservation objectives for key stocks listed in Table 3-1 of the Pacific Coast Salmon Plan. Bolded numbers indicate a failure to meet the conservation objective. Stocks listed under the Endangered Species Act are not included. (Page 3 of 3)

a/ Preliminary.

b/ Preliminary approximations based on preseason abundance projections and last year's regulations or season structures.

c/ Conservation Alert - triggered during the annual preseason process if a natural stock or stock complex, listed in Table 3-1 of the salmon FMP, is projected to fall short of its conservation objective (MSY, MSY proxy, MSP, or floor in the case of some harvest rate objectives [e.g., 35,000 natural area adult Klamath River fall Chinook spawners]).

**Actions for Stocks that are not Exceptions** - The Council will close salmon fisheries within its jurisdiction which impact the stocks, except in the case of Washington coastal and Puget Sound salmon stocks and fisheries managed under U.S. District Court orders. In these cases, the Council may allow fisheries which meet annual spawner targets developed through relevant U.S. v. Washington, Hoh v. Baldrige, and subsequent U.S. District Court ordered processes and plans, that may vary from the MSY or MSP conservation objectives. For all natural stocks that meet the conservation alert criteria, the Council will notify pertinent fishery and habitat managers, advising that the stock may be temporarily depressed or approaching an overfishing concern (depending on its recent conservation status), and request state and tribal fishery managers to identify the probable causes, if known. If the stock has not met its conservation objective in the previous two years, the Council will request state and tribal managers to do a formal assessment of the primary factors leading to the shortfalls and report to the Council no later than the March meeting prior to the next salmon season.

d/ Overfishing concern - triggered if, in three consecutive years, the postseason estimates indicate a natural stock, listed in Table 3-1 of the salmon FMP, has fallen short of its conservation objective (MSY, MSP, or spawner floor as noted for some harvest rate objectives).

**Actions required for Stocks that are not Exceptions** - Within one year, the STT to recommend and the Council to adopt management measures to end the overfishing concern and recover the stock in as short a time as possible, preferably within ten years or less. The HC to provide recommendations for habitat restoration and enhancement measures within a suitable time frame.

e/ Exception-application of the conservation alert and overfishing criteria and subsequent Council actions do not apply for (1) hatchery stocks, (2) natural stocks with a cumulative adult equivalent exploitation rate of less than 5% in ocean fisheries under Council jurisdiction during the FRAM base periods, and (3) stocks listed under the ESA.

**Conservation Alert and Overfishing Concern Actions for Natural Stocks that are Exceptions** (those with exploitation rates limited to less than 5% in base period Council-area ocean fisheries) - Use the expertise of STT and HC to confirm negligible impacts of proposed Council fisheries, identify factors which have led to the decline or low abundance (e.g., fishery impacts outside Council jurisdiction, or degradation or loss of essential fish habitat) and monitor abundance trends and total harvest impact levels. Council action will focus on advocating measures to improve stock productivity, such as reduced interceptions in non-Council managed fisheries, and improvements in spawning and rearing habitat, fish passage, flows, and other factors affecting overall stock survival.

f/ Based on the sum of south/local and north migrating spawners per mile weighted by the total number of miles surveyed for each of the two components (2.2 miles for south/local and 7.5 miles for northern stocks).

g/ Preseason forecasts are not available for some of Washington coastal Chinook stocks.

h/ As a result of Council action in 2009, the Eastern and Western Strait of Juan de Fuca stocks have been combined into a single stock beginning in 2010.

i/ As a result of Council action in 2009, this stock will be managed consistent with the allowable exploitation rates for Puget Sound coho management units beginning in 2010. Conservation objectives for this stock for the purpose of determining an overfishing concern are under review, and will likely be modified during 2011.

TABLE V-5. Estimated ocean escapements and exploitation rates for critical natural and Columbia River hatchery coho stocks (thousands of fish) based on preliminary 2011 preseason abundance forecasts and 2010 Council management measures.[a/]

| | Ocean Escapement and ER Estimates Under 2010 Regulations[b/] | | | | |
|---|---|---|---|---|---|
| | 2011 Preseason | | 2010 Preseason | | |
| Stock | Abundance | Exploitation Rate | Abundance | Exploitation Rate | 2011 FMP Conservation Objective[c/] |
| **Natural Coho Stocks** | | | | | |
| Skagit | 117.1 | 35.2% | 60.3 | 37.4% | Exploitation Rate ≤60.0%[d/] |
| Stillaguamish | 54.0 | 30.9% | 16.3 | 37.4% | Exploitation Rate ≤50.0%[d/] |
| Snohomish | 143.7 | 27.8% | 67.5 | 32.4% | Exploitation Rate ≤60.0%[d/] |
| Hood Canal | 62.0 | 35.7% | 19.0 | 43.0% | Exploitation Rate ≤65.0%[d/] |
| Strait of Juan de Fuca | 11.4 | 8.9% | 7.5 | 11.2% | Exploitation Rate ≤40.0%[d/] |
| Quillayute Fall | 26.5 | | 20.5 | | 6.3 - 15.8 Spawners |
| Hoh | 10.1 | | 6.5 | | 2.0 - 5.0 Spawners |
| Queets | 10.5 | | 17.1 | | 5.8 - 14.5 Spawners |
| Grays Harbor | 82.1 | | 61.9 | | 35.4 Spawners |
| LCN | 19.9 | 15.5% | 13.2 | 15.0% | Exploitation Rate ≤15.0% |
| OCN | 230.8 | 9.8% | 136.0 | 11.2% | Exploitation Rate ≤15.0% |
| R/K | NA | 8.4% | NA | 10.0% | Exploitation Rate ≤13.0% |
| **Hatchery Coho Stocks** | | | | | |
| Columbia Early | 154.3 | | 176.7 | | 18.6 Hatchery Escapement |
| Columbia Late | 98.7 | | 96.7 | | 11.9 Hatchery Escapement |

a/ Quota levels include harvest and hooking mortality estimates used in planning the Council's 2010 ocean fisheries and a coho catch for the Canadian troll fishery off the West Coast of Vancouver Island (WCVI).

b/ 2010 preseason regulations include the following coho quota fisheries: U.S. Canada Border to Cape Falcon: Treaty Indian troll - 41,500 non-selective; non-Indian troll - 11,800 selective; recreational - 67,200 selective; Cape Falcon to OR/CA border: recreational - 26,000 selective; troll - none. Ocean escapement is generally the estimated number of coho escaping ocean fisheries and entering freshwater. For Puget Sound stocks, ocean escapement is the estimated number of coho entering Puget Sound (Area 4B) which are available for U.S. net fisheries in Puget Sound and spawning escapement after impacts associated with the Canadian and Puget Sound troll and recreational fisheries have been deducted. For the OCN coho stock, this value represents the estimated spawner escapement in SRS accounting. For Columbia River hatchery and LCN stocks, ocean escapement represents the number of coho before the Buoy 10 fishery; the LCN exploitation rate shown is the Council fisheries exploitation rate, which had an ER forecast of 11.2% and an ESA limit of 15% including mainstem Columbia River fisheries.

c/ Goals represent Salmon FMP conservation objectives, ESA consultation standards, or hatchery escapement needs. Spawning escapement goals are not directly comparable to ocean escapement because the latter occur before inside fisheries.

d/ Assumed exploitation rate based on preliminary abundance forecasts.

TABLE V-6. Comparison of Lower Columbia natural (LCN), Oregon coastal natural (OCN), and Rogue/Klamath (RK) coho projected harvest mortality and exploitation rates by fishery under Council-adopted 2010 management measures and preliminary 2011 preseason abundance estimates.

| | Projected Harvest Mortality and Exploitation Rate | | | | | |
|---|---|---|---|---|---|---|
| | LCN | | OCN | | Rk[a/] | |
| Fishery | Number | Percent | Number | Percent | Number | Percent |
| **SOUTHEAST ALASKA** | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| **BRITISH COLUMBIA** | 7 | 0.0% | 287 | 0.1% | 2 | 0.0% |
| **PUGET SOUND/STRAITS** | 36 | 0.2% | 201 | 0.1% | 0 | 0.0% |
| **NORTH OF CAPE FALCON** | | | | | | |
| Recreational | 1,025 | 4.5% | 1,993 | 0.8% | 3 | 0.0% |
| Treaty Indian Troll | 467 | 2.1% | 1,262 | 0.5% | 0 | 0.0% |
| Non-Indian Troll | 397 | 1.8% | 1,078 | 0.4% | 1 | 0.0% |
| **SOUTH OF CAPE FALCON** | | | | | | |
| Recreational: | 414 | 1.8% | | | | |
| Cape Falcon to Humbug Mt. | | | 6,513 | 2.6% | 22 | 0.3% |
| Humbug Mt. to Horse Mt. (KMZ) | | | 2,694 | 1.0% | 273 | 4.2% |
| Fort Bragg | | | 1,220 | 0.5% | 76 | 1.2% |
| South of Pt. Arena | | | 741 | 0.3% | 47 | 0.7% |
| Troll: | 173 | 0.7% | | | | |
| Cape Falcon to Humbug Mt. | | | 2,064 | 0.8% | 7 | 0.1% |
| Humbug Mt. to Horse Mt. (KMZ) | | | 297 | 0.1% | 22 | 0.4% |
| Fort Bragg | | | 1,086 | 0.4% | 71 | 1.1% |
| South of Pt. Arena | | | 99 | 0.0% | 3 | 0.0% |
| **BUOY 10** | 234 | 1.0% | 181 | 0.1% | 0 | 0.0% |
| **ESTUARY/FRESHWATER** | NA | 3.4% | 4,949 | 2.0% | 15 | 0.2% |
| **TOTAL** | 2,753 | 15.5% | 24,665 | 9.7% | 542 | 8.2% |

a/ Unmarked hatchery production used as a surrogate for Rogue/Klamath natural stock coho.

TABLE V-7 Maximum allowable fishery impact rate for OCN coho under Amendment 13 matrix (Appendix A, Table A-2) and the OCN work group matrix (Appendix A, Table A-3) based on parent escapement levels by stock component and marine survival category.[a/]

| | Estimated OCN Coho Spawners by Stock Component | | | | | Hatchery | Amendment 13 Matrix | | | OCN Work Group Matrix[b/] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fishery Year (t) | Parent Spawner Year (t-3) | Northern | North-Central | South-Central | Southern | Jack Survival Rate (t-1) | Marine Survival Category | Parental Spawner Category | Maximum Allowable Impacts | Marine Survival Category | Parental Spawner Category | Maximum Allowable Impacts |
| 1998 | 1995 | 3,900 | 13,600 | 36,500 | 3,400 | 0.04% | Low | Very Low | ≤10-13% | Extremely Low | Very Low | ≤8% |
| 1999 | 1996 | 3,300 | 18,100 | 52,600 | 5,200 | 0.10% | Med | Very Low | ≤15% | Low | Critical | 0-8% |
| 2000 | 1997 | 2,100 | 2,800 | 18,400 | 8,200 | 0.12% | Med | Very Low | ≤15% | Low | Critical | 0-8% |
| 2001 | 1998 | 2,600 | 3,300 | 25,900 | 2,300 | 0.27% | Med | Very Low | ≤15% | Medium | Critical | 0-8% |
| 2002 | 1999 | 8,900 | 11,800 | 29,100 | 1,400 | 0.09% | Med | Low | ≤15% | Low | Low | ≤15% |
| 2003 | 2000 | 17,900 | 14,300 | 36,500 | 11,000 | 0.20% | Med | Low | ≤15% | Med | Low | ≤15% |
| 2004 | 2001 | 33,500 | 25,200 | 112,000 | 12,600 | 0.14% | Med | Low | ≤15% | Med | Low | ≤15% |
| 2005 | 2002 | 52,500 | 104,000 | 104,100 | 8,400 | 0.11% | Med | High | ≤20% | Low | High | ≤15% |
| 2006 | 2003 | 59,600 | 68,900 | 99,800 | 6,800 | 0.12% | Med | High | ≤20% | Low | High | ≤15% |
| 2007 | 2004 | 28,800 | 42,100 | 101,900 | 24,500 | 0.17% | Med | Med | ≤20% | Med | Med | ≤20% |
| 2008 | 2005 | 16,500 | 51,400 | 86,700 | 10,000 | 0.07% | Low | High | ≤15% | Extremely Low | High | ≤8% |
| 2009 | 2006 | 24,100 | 21,200 | 83,500 | 3,900 | 0.27% | Med | Low | ≤15% | Med | Low | ≤15% |
| 2010 | 2007 | 17,500 | 12,300 | 36,500 | 5,200 | 0.12% | Med | Low | ≤15% | Low | Low | ≤15% |
| 2011 | 2008 | 25,600 | 68,100 | 86,000 | 400 | 0.12% | Med | High | ≤20% | Low | High | ≤15% |
| 2012 | 2009 | 48,100 | 86,400 | 128,200 | 2,600 | - | - | High | - | - | High | - |
| 2013 | 2010 | 53,200 | 53,500 | 147,100 | 3,100 | - | - | High | - | - | High | - |

a/ Under the NMFS ESA consultation standards, the southern stock component is managed for a total allowable Marine Exploitation rate of 13%, as represented by Rogue/Klamath hatchery stocks, which is separate from these OCN coho impact rates.

b/ Developed by the OCN work group as a result of the 2000 Review of Amendment 13.

## CHAPTER VI: REFERENCES

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## APPENDIX A
## SUMMARY OF COUNCIL STOCK MANAGEMENT GOALS

### LIST OF TABLES

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 1 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | **- - - CHINOOK - - -** | | |
| **CALIFORNIA CENTRAL VALLEY** - All fall, late-fall, winter, and spring stocks of the Sacramento and San Joaquin Rivers and their tributaries. Management of this stock complex is based primarily on Sacramento River fall Chinook, which includes a large hatchery component and natural Sacramento River winter Chinook, which are listed as endangered. The San Joaquin system has been severely degraded by water development projects and pollution. Natural populations of spring Chinook there have been extirpated, and remaining spawning areas are utilized primarily by fall Chinook, which have comprised <10% of the total Central Valley fall run. | | | |
| **Sacramento River Fall** | 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). | Yes. A conservation alert or overfishing concern will be based on a failure to meet 122,000 adult spawners. | Below conservation objective in 2007-2009; above the lower bound of the conservation objective in 2010; near average abundance in 2011. Contributes to ocean fisheries off California, southern and central Oregon, Washington, and British Columbia. Council management actions on this stock are directed at fisheries south of Cape Falcon. |
| **Sacramento River Spring** Threatened (1999) | Listed as threatened under ESA. NMFS ESA consultation standard/recovery plan. Present level of ocean fishery impacts limited by measures constraining harvest on Sacramento River winter and Klamath River fall Chinook. | No. NMFS ESA consultation standard provides interim rebuilding program MSY criteria undefined. | Contributes to ocean fisheries off California, but also known to occur off Oregon. Ocean fishery impacts primarily incidental to harvest of Sacramento River fall Chinook and may be lower due to differences in run timing. Stock has been affected by man-caused loss and deterioration of freshwater habitat. |
| **Sacramento River Winter** Endangered (1994) | Listed as endangered under ESA. NMFS ESA consultation standard specifies duration and timing of commercial and recreational fisheries south of Pt. Arena. | No. NMFS ESA consultation standard provides interim rebuilding program. | Believed to contribute predominantly to ocean fisheries south of Pt. Arena. Ocean fishery impacts incidental to harvest of Sacramento River fall Chinook. |
| **NORTHERN CALIFORNIA COAST** - All fall and spring stocks of California streams north of the entrance to San Francisco Bay. Management of this stock complex is based primarily on meeting spawning escapements for natural fall Chinook. Limited data is available except for the Klamath River. An assessment and monitoring program is under consideration by CDFG for stocks originating from the Smith, Eel, Mattole, and Mad Rivers, which might provide a more thorough management basis for the future. There are significant water diversion problems in several drainages. In the Klamath River Basin, there is significant hatchery production of fall Chinook, and less so of spring Chinook, resulting primarily from mitigation programs for dams constructed in both Upper Klamath and Trinity Rivers. | | | |
| **Eel, Mattole, Mad, and Smith Rivers** (Fall and Spring) Eel, Mattole, and Mad River stocks - Threatened (1999) | Eel, Mattole, and Mad River stocks listed as threatened under ESA. Data insufficient to define MSY criteria. Indices of spawning abundance limited to one tributary of the Mad River and two tributaries of the Eel River. NMFS ESA consultation standard/recovery plan for Eel, Mattole, and Mad River stocks requires that the projected ocean harvest rates on age-4 Klamath River fall Chinook not exceed 16.0%. | Eel, Mattole, and Mad - No. NMFS ESA consultation standard provides interim rebuilding program. MSY criteria undefined. Smith - Indirectly. Data insufficient to define MSY criteria. CDFG developing an assessment and monitoring program. | Very limited management data available. Believed to occur in ocean fisheries off northern California and southern Oregon. Ocean fishery impacts incidental to fisheries for Sacramento and Klamath Rivers fall Chinook. No preseason or postseason abundance estimates available. |

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 2 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | | **- - - CHINOOK - - -** | |
| **Klamath River Fall** (Klamath and Trinity Rivers) | 33% to 34% of potential adult natural spawners, but no fewer than 35,000 naturally spawning adults in any one year. Brood escapement rate must average 33% to 34% over the long-term, but an individual brood may vary from this range to achieve the required tribal/nontribal annual allocation. Objective designed to allow a wide range of spawner escapements from which to develop an MSY objective or proxy while protecting the stock during prolonged periods of reduced productivity. Adopted 1988 based on Hubbell and Boydstun (1985); KRTT (1986); PFMC (1988); minor technical modifications in 1989 and 1996 (Table I-1). Natural spawners to maximize recruitment are estimated at 41,000 to 106,000 adults (Hubbell and Boydstun 1985), and 40,700 (STT 2005). | Yes. A conservation alert or overfishing concern will be based on a failure to meet the 35,000 floor. The response to a conservation alert was modified by Amendment 15 (2007) to allow *de minimis* fishing impacts under certain circumstances. | Above conservation objective in 2010; near average abundance in 2011. Contributes primarily to ocean fisheries from Humbug Mt., Oregon to Horse Mt., California (the KMZ) and to Klamath River tribal and recreational fisheries. Coastwide impacts are considered in meeting allocation requirements for Indian tribes with federally recognized fishing rights and the inland fishery. Specific management measures for this stock generally are implemented from Pt. Sur, California to Cape Falcon, Oregon. Rebuilding plan raised annual natural area spawning escapement objective to 40,700 adults beginning in 2008 until overfishing concern is ended (two consecutive years ≥40,700 or 3 of 4 consecutive years ≥ 35,000). |
| **Klamath River Spring** (Klamath and Trinity Rivers) | Undefined. Productive potential believed to be protected by fishery management objective for Klamath River fall Chinook, which includes an inside allocation to tribal and sport fisheries. | Indirectly. MSY criteria undefined. | Little information available on ocean distribution. Believed to occur in ocean fisheries off northern California and southern Oregon (based on Trinity River Hatchery fish). |
| **OREGON COAST** - All fall and spring stocks from Oregon streams south of the Columbia River. No preseason abundance estimates available. Management based primarily on an aggregate objective of 150,000 to 200,000 natural adult spawners (attainment of objective based on a postseason estimate of 60 to 90 natural adult spawners per mile in nine standard index streams). This objective is based on optimal escapement estimates for individual coastal rivers at habitat capacity (Thompson 1977). Lower end of the objective range is nearly twice the estimated MSY spawning escapement of 79,000 fall Chinook adults based on stock recruit analysis (McGie 1982). Significant hatchery production also exists within the coastal streams. Far-north migrating, naturally spawning stocks are also subject to the 1999 Chinook agreement of the Pacific Salmon Commission and may be subject to exploitation rate constraints in U.S. fisheries south of the Canada/Washington border. | | | |
| **Southern Oregon** (Aggregate of fall and spring stocks in all streams south of Elk River; Rogue River fall stock is used to indicate relative abundance and ocean contribution rates) | Unspecified portion of an aggregate 150,000 to 200,000 natural adult spawners for Oregon coast (Thompson 1977 and McGie 1982). ODFW developing specific conservation objectives for spring and fall stocks that may be implemented without plan amendment upon approval by the Council. | Yes, based on postseason estimates of <60 natural adult spawners per mile. Conservation promoted by the objective for Klamath River fall Chinook, which includes a large inside allocation component that reduces ocean fishery exploitation rate in areas inhabited by these fish, and by ESA consultation standard for California coastal Chinook, which limits projected ocean harvest rates on age-4 Klamath River fall Chinook to ≤ 16.0%. | Medium abundance. Data limited except for Rogue River fall stock. Stocks migrate southerly or remain local, and fall Chinook contribute to ocean fisheries off northern California and Oregon, less so for spring stocks. |
| **Central and Northern Oregon** (Aggregate of fall and spring stocks in all streams from the Elk River to just south of the Columbia River) | Unspecified portion of an aggregate 150,000 to 200,000 natural adult spawners for Oregon coast (Thompson 1977 and McGie 1982). ODFW developing specific conservation objectives for spring and fall stocks that may be implemented without plan amendment upon approval by the Council. | Yes, based on postseason estimates of <60 natural adult spawners per mile. | Below conservation objective in 2007-2008. Stocks migrate northward and contribute to ocean fisheries off British Columbia and southeast Alaska, and to a lesser degree, off Washington and Oregon. Nehalem, Siletz, and Siuslaw stocks are subject to the PSC ISBM harvest limitations. |

TABLE A-1. Conservation objectives and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 3 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | **- - - CHINOOK - - -** | | |
| **COLUMBIA RIVER BASIN** - All pertinent fall, summer, and spring stocks of the Columbia River and its tributaries. Stocks within this complex are noted by area of origin: lower river (below Bonneville Dam), mid-river (Bonneville to McNary Dams), and upper river (above McNary Dam). Spawner escapement goals for these stocks are set through procedures of the U.S. District Court in *U.S. v. Oregon* and subsequent court orders. These goals are set forth in the Columbia River Fishery Management Plan and are recognized in the Council's conservation objectives. Annual inside fishery management planning activities are conducted within the Columbia River Compact and other state and tribal management forums. The Columbia River Compact, initially established by Oregon and Washington to jointly administer commercial fisheries within the Columbia River, takes into account the impacts from other state and tribal fisheries (e.g., recreational, ceremonial, subsistence, etc.) authorized under *U.S. v. Oregon*. The majority of ocean Chinook harvest north of Cape Falcon is provided by Columbia River salmon stocks, primarily hatchery production of tule fall Chinook from the Bonneville Pool (Spring Creek) and lower river hatcheries, smaller numbers of upper river bright hatchery and natural fall Chinook, and some lower river hatchery spring Chinook (Cowlitz). Hatchery objectives are based on long-range production programs and/or mitigation requirements associated with displaced natural stocks. Threatened Snake River fall Chinook, which suffer from severe dam passage mortalities and extreme loss of freshwater habitat, are of prime concern in limiting ocean exploitation rates in all ocean fisheries north of Pigeon Pt., California. These limits act to provide considerable protection to other weak natural stocks subject to ocean fishery impacts. Naturally spawning stocks are also subject to the 1999 Chinook agreement of the Pacific Salmon Commission and may be subject to exploitation rate constraints in U.S. fisheries south of the Canada/Washington border. | | | |
| **North Lewis River Fall** Threatened (1999) | NMFS ESA consultation standard/recovery plan (not established at time of printing). McIsaac (1990) stock-recruit analysis supports MSY objective of 5,700 natural adult spawners. | No. Listed stock. NMFS ESA consultation standard provides interim rebuilding program. Base period Council-area ocean fishery impacts around 7%. | Below conservation objective in 2007-2009; below average abundance in 2011. Present in ocean fisheries north of Cape Falcon to SE Alaska. Subject to the PSC ISBM harvest limitations. |
| **Lower River Hatchery Fall** | 12,600 adults to meet egg-take goal or as determined by management entities. Total RER for ESA listed lower Columbia River natural tule fall Chinook estimated from Cowlitz, Washougal, Kalama and Big Creek hatchery fall Chinook, as determined by NMFS analysis. | No (hatchery exception or listed stock). NMFS ESA consultation standard provides interim rebuilding program. | Greater than 10 year average in 2011. Major contributor to ocean fisheries north of Cape Falcon to central British Columbia. |
| **Lower River Hatchery** (Spring) | 2,700 adults to meet Cowlitz, Kalama, and Lewis Rivers broodstock needs. | No (hatchery exception). | 2011 is forecasted to be less than 2010. Present in ocean fisheries north of Cape Falcon to southeast Alaska. |
| **Upper Willamette** (Spring) Threatened (1999) | NMFS ESA consultation standard/recovery plan (ODFW FMEP). Willamette River Management Plan provides an MSY proxy of 30,000 to 45,000 hatchery and natural adults over Willamette River falls, depending on run size. | No. Listed stock. NMFS ESA consultation standard provides interim rebuilding program. Base period Council-area ocean fishery exploitation rate of <5% prevents effective Council fishery management and rebuilding. | 2011 forecast to be slightly less than 2010.. Present in fisheries north of Cape Falcon to southeast Alaska. |
| **Mid-Columbia Bright Hatchery** (Fall) | None for ocean fishery management. | No (hatchery exception). | Greater than 10 year average abundance in 2011. Contributor to ocean fisheries off Washington, British Columbia, and southeast Alaska. |
| **Spring Creek Hatchery** (Fall) | 7,000 adults to meet hatchery egg-take goal. | No (hatchery exception). | Greater than 10 year average abundance in 2011. Major contributor to ocean fisheries north of Cape Falcon to southern British Columbia. |

TABLE A-1. Conservation objectives and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 4 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | | **- - - CHINOOK - - -** | |
| **COLUMBIA RIVER BASIN** (continued) | | | |
| **Klickitat, Deschutes, John Day, and Yakima Rivers** (Spring) | Hold ocean fishery impacts at or below base period (<1%) and recognize CRFMP objective - MSY proxy of 115,000 adults above Bonneville Dam, including upper and mid-Columbia and Snake River stocks (state and tribal management entities considering separate conservation objectives for these stocks). | Limited. Base period Council-area ocean fishery exploitation rate of <1% prevents effective Council fishery management and rebuilding. Major habitat restoration addressing water withdrawals and dam passage and blockages is necessary for rebuilding. | No significance to ocean fisheries, infrequent occurrence in fisheries north of Cape Falcon to Alaska. |
| **Snake River Fall** Threatened (1992) | NMFS ESA consultation/recovery standard. Since 1995, Council has met a standard of limiting its fisheries so that the total exploitation rate on age-3 and age-4 Lyons Ferry Hatchery fall Chinook (representing Snake River fall Chinook) for all ocean fisheries (including Canada) has been #70.0% of the 1988-1993 average adult equivalent exploitation rate. Prior to listing, managed within objectives for upper Columbia River bright fall Chinook. | No. Listed stock, MSY criteria undefined. NMFS ESA consultation standard provides interim rebuilding program. Recovering historic abundance unlikely, as dams block former primary spawning area. | Depressed. Large return of wild age 3 in 2010 may lead to large return of wild age 4 in 2011. Present in ocean fisheries from central California to southeast Alaska with greatest contribution to Canadian fisheries. Primary impacts in Council fisheries north of Cape Falcon, but also extending to Pigeon Pt., California. |
| **Snake River Spring/Summer** Threatened (1992) | Not applicable for ocean fisheries. | No. Listed stock. Base period Council-area ocean fishery impacts rare (unmeasurable). Dam passage mortality must be reduced to allow stock recovery. | Depressed, recent upward trend. Rare occurrence in ocean fisheries from Washington to southeast Alaska. |
| **Upper River Bright** (Fall) | 40,000 natural bright adults above McNary Dam (MSY proxy) adopted in 1984 based on CRFMP. The management goal was increased to 45,000 by Columbia River managers between 1986 and 1993. Since 1994, inriver fisheries management based on *U.S. v. Oregon* annual management agreements, including a McNary Dam count goal of 60,000 since 2008. | Limited. Base period Council-area ocean fishery exploitation rate <4% prevents effective Council fishery management and rebuilding. | 2011 forecast may be second largest return since 1964. Major contributor to ocean fisheries off Canada, and to a lesser extent, Washington and Oregon. Primary impact area north of Cape Falcon. Subject to the PSC ISBM harvest limitations. |
| **Upper River Summer** | Hold ocean fishery impacts at or below base period (<2%); recognize *U.S. v. Oregon* objective - MSY proxy of 29,300 adults to river mouth destined to for areas above Priest Rapids Dam (excludes Snake River stocks). | Limited. Base period Council-area ocean fishery exploitation rate <2% prevents effective Council fishery management and rebuilding. Dam passage mortalities must be reduced to allow rebuilding. | Improved abundance since 2002. 2011 forecast is slightly more than 2010 Present in ocean fisheries north of Cape Falcon to southeast Alaska. Subject to the PSC ISBM harvest limitations. |
| **Upper Columbia River Spring** Endangered (1999) | None applicable to ocean fisheries. Ensure ocean fishery impacts remain rare and recognize CRFMP objective - MSY proxy of 115,000 adults above Bonneville Dam, including upper and mid-Columbia and Snake River stocks (state/tribal management entities considering separate objectives for these stocks). | No. Listed stock. Base period Council-area ocean fishery impacts rare (not measurable), making Council management and rebuilding ineffective. Reduce dam passage mortalities to allow rebuilding. | Improved abundance since 2000. However, . 2011 is forecast to be about half of 2010 return. Captive broodstock programs started in 1997. No significance to ocean fisheries. Rare occurrence in ocean fisheries north of Cape Falcon to Canada. |

TABLE A-1. Conservation objectives and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 5 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | **- - - CHINOOK - - -** | | |
| **WASHINGTON COAST** - All pertinent fall, summer and spring stocks from coastal streams north of the Columbia River through the western Strait of Juan de Fuca (west of the Elwha River). This stock complex consists of several natural stocks, generally of small to medium sized populations, and some hatchery production (Willapa Bay and the Quinault River). Stocks in this complex tend to range further north than most Columbia River stocks and, while present in fisheries from Cape Falcon to southeast Alaska, are not significantly impacted by Council-area ocean fisheries. These stocks qualify as exceptions to the Council's overfishing criteria, due to very low fishery impacts. Spawning escapement goals for stocks managed within this complex, established in U.S. District Court by WDFW and the treaty tribes, are recognized in the Council's conservation objectives below. Objectives for Grays Harbor and the north coast river systems have been established pursuant to the U.S. District Court order in *Hoh v. Baldrige*. However, annual natural spawning escapement targets may vary from the conservation objectives below if agreed to by WDFW and the treaty tribes under the provisions of *Hoh v. Baldrige* and subsequent U.S. District Court orders. After agreement is reached on the annual targets, ocean fishery escapement objectives are established for each river, or region of origin, which include provisions for treaty allocation and inside, non-Indian fishery needs. Naturally spawning stocks are also subject to the 1999 Chinook agreement of the Pacific Salmon Commission and may be subject to exploitation rate constraints in U.S. fisheries south of the Canada/Washington border. | | | |
| **Willapa Bay Fall** (Natural) | No FMP objective. WDFW goal of 4,400 natural spawners. | Limited (exploitation rate exception). | |
| **Willapa Bay Fall** (Hatchery) | 9,800 adult return to hatchery. | No (hatchery exception). | |
| **Grays Harbor Fall** | 14,600 natural adult spawners--MSP based on full seeding of spawning and rearing habitat (WDF 1979). | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Grays Harbor Spring** | 1,400 natural adult spawners. | Limited (exploitation rate exception). | |
| **Quinault Fall** | Hatchery production. | No (hatchery exception). | |
| **Queets Fall** | Manage terminal fisheries for 40% harvest rate, but no less than 2,500 natural adult spawners, the MSY level estimated by Cooney (1984). | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Queets Spring/Summer** | Manage terminal fisheries for 30% harvest rate, but no less than 700 natural adult spawners. | Limited (exploitation rate exception). | |
| **Hoh Fall** | Manage terminal fisheries for 40% harvest rate, but no less than 1,200 natural adult spawners, the MSY level estimated by Cooney (1984). | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Hoh Spring/Summer** | Manage terminal fisheries for 31% harvest rate, but no less than 900 natural adult spawners. | Limited (exploitation rate exception). | |
| **Quillayute Fall** | Manage terminal fisheries for 40% harvest rate, but no less than 3,000 natural adult spawners, the MSY level estimated by Cooney (1984). | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Quillayute Spring/Summer** | 1,200 natural adult spawners for summer component (MSY). | Limited (exploitation rate exception). | |
| **Hoko Summer/Fall** (Western Strait of Juan de Fuca) | 850 natural adult spawners, the MSP level estimated by Ames and Phinney (1977). May include adults used for supplementation program. | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 6 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | **- - - CHINOOK - - -** | | |
| **PUGET SOUND** - All fall, summer, and spring stocks originating from U.S. tributaries to Puget Sound and the eastern Strait of Juan de Fuca (east of Salt Creek). This stock complex consists of numerous natural Chinook stocks of small to medium sized populations and significant hatchery production. Puget Sound stocks contribute to fisheries off British Columbia and are present into southeast Alaska, but are impacted to a minor degree by Council-area ocean fisheries. Base period, Council-area ocean fishery exploitation rates (adult equivalent) of 2% or less are below a management threshold which allows effective Council management of these stocks and they qualify as **exceptions** to the Council's overfishing criteria. The naturally spawning stocks within this complex are listed as threatened under the ESA. Naturally spawning stocks are also subject to the 1999 Chinook agreement of the Pacific Salmon Commission and may be subject to exploitation rate constraints in U.S. fisheries south of the Canada/Washington border. Management objectives for hatchery stocks are based on hatchery escapement needs. Fisheries in Puget Sound conducted under a Resource Management Plan (RMP) are exempted from ESA Section 9 take prohibitions under Limit 6 of the 4(d) rule. This RMP will expire on May 1 of this year. A new RMP is currently under review by NOAA Fisheries but this review will not be completed prior to the March Council meeting. | | | |
| **Eastern Strait of Juan de Fuca Summer/Fall** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | |
| **Skokomish Summer/Fall** (Hood Canal) Threatened (1999) | NMFS ESA consultation standard. Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | |
| **Nooksack Spring (early)** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Skagit Summer/Fall** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Skagit Spring** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Stillaguamish Summer/Fall** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Snohomish Summer/Fall** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Cedar River Summer/Fall** (Lake Washington) Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). The preliminary 2004 consultation standard is an RER constraint total mortality in all fisheries not to exceed 31%. | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 7 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| **PUGET SOUND** (continued) | | | |
| **White River Spring** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | |
| **Puyallup Summer/Fall** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | |
| **Green River Summer/Fall** Threatened (1999) | NMFS ESA consultation standard. Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | Subject to the PSC ISBM harvest limitations. |
| **Nisqually River Summer/Fall** (South Puget Sound) Threatened (1999) | NMFS ESA consultation standard. Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | |
| **Mid Hood Canal Fall** Threatened (1999) | NMFS ESA consultation standard is expressed in terms of Recovery Exploitation Rate (RER). Guidance will be provided prior to the March Council meeting. | Limited (exploitation rate exception). | |
| **SOUTHERN BRITISH COLUMBIA** - Fall and spring stocks of British Columbia coastal streams and the Fraser River. Management based primarily on natural and hatchery fall Chinook. Base period, Council-area ocean fishery exploitation rates (adult equivalent) on the coastal stocks of 1% or less are below a management threshold which allows effective Council management of these stocks, and they qualify as **exceptions** to the Council's overfishing criteria. | | | |
| **Coastal Stocks** | Undefined for Council fisheries. Manage consistent with the Pacific Salmon Treaty. | No. Under Canadian authority and would also be an exploitation rate exception. | Medium abundance. Major contributors to ocean fisheries off British Columbia; significant contributors north into southeast Alaska and present off northern Washington. |
| **Fraser River** | Undefined for Council fisheries. Manage consistent with the Pacific Salmon Treaty. | No. Under Canadian authority. | Medium abundance. Major contributors to ocean fisheries off British Columbia; contributors off northern Washington; and present north into southeast Alaska. Harrison River stock subject to the PSC ISBM harvest limitations. |

TABLE A-1. Conservation objectives and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 8 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | **- - - COHO - - -** | | |
| **OREGON PRODUCTION INDEX AREA -** All Washington, Oregon, and California natural and hatchery coho stocks from streams south of Leadbetter Pt. Significant production from Columbia River and Oregon coastal hatcheries provide harvest in ocean fisheries throughout the Council management area. Ocean fisheries are usually limited primarily to meet natural escapement objectives. Treaty Indian obligations, non-Indian harvest opportunity, and hatchery requirements must also be factored in for the Columbia River stocks. Natural components have been severely depressed for several yeas due to a combination of previously high fishery impacts, major losses or degradation of freshwater habitat, and long-term marine conditions unfavorable to coho survival. | | | |
| **Central California Coast** Endangered (1996) | NMFS ESA consultation standard/recovery plan. Since 1998, no retention of coho in commercial and recreational fisheries off California in conjunction with total marine fishery impacts of no more than 13% on Rogue/Klamath hatchery coho (surrogate stock). Objective undefined prior to listing. | No. Listed stock, MSY criteria undefined. NMFS ESA consultation standard provides interim protection of productive capacity. Recovery limited by deterioration of significant portions of freshwater habitat, distribution at southern edge of coho range, and ongoing unfavorable marine conditions. | Very minor component of OPI area fisheries, limited potential for significant contribution to ocean and inland fisheries. Current impacts incidental in ocean fisheries off California. Development of monitoring and assessment program considered for Ten Mile River, Noyo River, Gualala River, Lagunitas Creek, and Scott Creek. Rogue/Klamath coho are believed to have a similar, but more northerly distribution. |
| **Northern California** Threatened (1997) | NMFS ESA consultation standard/recovery plan. Since 1998, total marine fishery impacts limited to no more than 13.0% on Rogue/Klamath hatchery coho (surrogate stock) and no retention of coho in California ocean fisheries. Objective undefined prior to listing. | No. Listed stock, MSY criteria undefined. NMFS ESA consultation standard provides interim protection of productive capacity. Recovery may last more than 10 years even with no fishery impacts, due to loss or deterioration of significant portions of freshwater habitat and ongoing unfavorable marine conditions. | Depressed and listed. Very minor natural component of OPI area fisheries, potential for minor contribution to ocean fisheries off California and southern Oregon, and inland California fisheries. Current impacts incidental in ocean and inland fisheries (total non-retention south of Cape Falcon since 1994). CDFG considering monitoring to provide data for the Smith, Trinity, Eel, Mattole, and Klamath Rivers. |
| **Oregon Coastal Natural** Comprised of Southern, South-Central, North-Central, and Northern Oregon stocks. | An allowable marine and freshwater exploitation rate of no more than 13% to 35%, depending on parent escapement and ocean survival trends, based on Amendment 13 of the Salmon FMP, or no more than 8% to 45% based on the OCN workgroup review of Amendment 13. Standard is ≤15.0% in 2010 | No. Listed stock, rebuilding program initiated in 1998. The annual conservation objective should allow component stocks to rebuild when environmental conditions are favorable. Recovery for some components may last more than 10 years even with no fishery impacts, due to loss or deterioration of significant portions of freshwater habitat and ongoing unfavorable marine conditions. | General increase in abundance since 2000 after long term decline. Major natural component of OPI area and freshwater fisheries in Oregon coastal streams. Current impacts are primarily incidental in ocean fisheries under nonretention regulations south of Cape Falcon since 1994 (except 2007 and 2009). |

TABLE A-1. Conservation objectives and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 9 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | | **- - - COHO - - -** | |
| **OREGON PRODUCTION INDEX** (continued) | | | |
| **Columbia River Late** (Hatchery) | Hatchery rack return goal of 17,200 adults. | No (hatchery exception). | Major component of ocean fisheries north of Cape Falcon. When abundant, significant contributors to ocean fisheries off Oregon north into Canada and Columbia River fisheries. |
| **Columbia River Early** (Hatchery) | Hatchery rack return goal of 18,800 adults. | No (hatchery exception). | Major component of OPI area fisheries. When abundant, significant contributors to ocean fisheries off California and north to Leadbetter Pt., Washington and to Columbia River fisheries. Current ocean fishery impacts from very limited retention fisheries north of Cape Falcon and incidental hook-and-release mortality in fisheries south of Cape Falcon. |
| **Columbia River** (Natural) Threatened, 2005 | NMFS ESA consultation standard. Guidance will be provided at the March Council meeting.. | No. Listed stock. NMFS ESA consultation standard provides interim rebuilding program. | Extinct above the Dalles Dam, small populations in Clackamas, and Sandy rivers in Oregon, and Cedar Creek (Lewis River) Washington. Lower river coho are also listed under the Oregon State ESA. |
| **WASHINGTON COASTAL** - All pertinent natural and hatchery stocks originating in Washington coastal streams north of the Columbia River and west of the Sekiu River. Management goals for Grays Harbor and Olympic Peninsula coho stocks include achieving natural spawning escapement objectives and treaty allocation requirements, although Grays Harbor also contains a significant amount of hatchery production. The conservation objectives for these stocks are based on MSY spawner escapements established pursuant to the U.S. District Court order in Hoh v. Baldrige. Annual natural spawning escapement targets and total escapement objectives are established by the Washington Department of Fish and Wildlife and treaty tribes under the provisions of U.S. v. Washington and subsequent U.S. District Court orders. After agreement to annual targets is reached by the parties in this litigation, ocean fishery escapement objectives are established for each river, or region of origin, which include provisions for providing treaty allocation requirements and inside, non-Indian fishery needs. The conservation objectives for the Queets, Hoh, and Quillayute rivers were developed as ranges intended to bracket the current best estimates of MSY escapement. The range of each objective reflects the degree of uncertainty inherent by using the high estimate of recruits-per-spawner and low estimate of carrying capacity for the lower bound, and the low estimate of recruits-per-spawner with the high estimate of smolt carrying capacity for the upper end of the range. The ranges were subsequently adjusted upward by 26% to 184% for risk aversion and again for habitat considerations (Lestelle et al 1984). | | | |
| **Willapa Bay** (Hatchery) | Meet WDFW program objectives. | No (hatchery exception). | Contributes to ocean fisheries off northern Oregon north into Canada. Significant contributor to inside non-Indian commercial net and recreational fisheries. WDFW critically reviewing current management to determine if objectives for natural stocks are warranted. |
| **Grays Harbor** | 35,400 natural adult spawners (MSP based on WDF [1979]) or annual target agreed to by WDFW and the Quinault Indian Nation. | Yes. Conservation alert or overfishing concern based on fewer than 35,400 natural spawners. | Below conservation objective in 2006-2007. Ocean distribution from Oregon to northern British Columbia. Harvested by treaty Indian, non-Indian commercial, and recreational fisheries in Grays Harbor and tributary rivers. |

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 10 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | | **- - - COHO - - -** | |
| **WASHINGTON COAST** (continued) | | | |
| **Queets** | MSY range of 5,800 to 14,500 natural adult spawners (Lestelle *et al.* 1984) or annual target agreed to by WDFW and the Quinault Indian Nation. | Yes. Conservation alert or overfishing concern based on fewer than 5,800 natural spawners. | Below conservation objective in 2006-2008. Ocean distribution from south-central Oregon to northwest Vancouver Island off British Columbia. Harvested by treaty Indian gillnet and non-treaty recreational fisheries inriver. Coho supplementation project conducted since the late 1970s. |
| **Hoh** | MSY range of 2,000 to 5,000 natural adult spawners (Lestelle *et al.* 1984) or annual target agreed to by WDFW and Hoh Tribe. | Yes. Conservation alert or overfishing concern based on fewer than 2,000 natural spawners. | Ocean distribution from south-central Oregon to northwest Vancouver Island off British Columbia. Harvested by treaty Indian gillnet and non-treaty recreational fisheries inriver. |
| **Quillayute Fall** | MSY range of 6,300 to 15,800 natural adult spawners (Lestelle *et al.* 1984) or annual target agreed to by WDFW and the Quillayute Tribe. | Yes. Conservation alert or overfishing concern based on fewer than 6,300 natural spawners. | Ocean distribution from south-central Oregon to northwest Vancouver Island off British Columbia. Harvested by treaty Indian gillnet and non-treaty recreational fisheries inriver. |
| **Quillayute Summer** (Hatchery) | Meet hatchery program objectives. | No (hatchery exception). | Early river entry timing. Contributor to ocean fisheries off Washington north into British Columbia; present south to central Oregon. |
| | | **- - -COHO- - -** | |
| **PUGET SOUND** - All pertinent natural and hatchery stocks originating from U.S. tributaries to Puget Sound and the Strait of Juan de Fuca (east of Salt Creek through the Seiku River). Conservation objectives for specific stocks are currently based on MSY exploitation rate and abundance matrices for stocks managed primarily for natural production, consistent with the Pacific Salmon Treaty's Southern Coho Management Plan or upon hatchery escapement needs for stocks managed for artificial production. The exploitation rate matrices for natural stocks consist of age-3 ocean abundance (stock status) break points and associated annual total allowable exploitation rates. The normal exploitation rate represents the MSY exploitation rate under average survival. The spawning escapement associated with the low/normal ocean abundance breakpoint and the normal exploitation rate represents MSY spawning under low survival conditions (10$^{th}$ percentile). The critical exploitation rate represents *de minimis* fishing levels that will not appreciably reduce spawning escapement if a stock becomes depressed, while allowing some level of access to harvestable stocks. The low exploitation rate is intermediate between the normal and critical exploitation rates. The spawning escapement associated with the critical/low abundance breakpoint and the low exploitation rate represent an escapement level below which production is expected to decrease. Annual management targets for these coho stocks may be developed through procedures established in U.S. District Court. Puget Sound management procedures are outlined in a Memorandum Adopting Salmon Management Plan (U.S. v. Washington, 626 F. Supp. 1405 [1985]). | | | |
| **Strait of Juan de Fuca** (Streams east of Salt Creek through Sekiu River) | 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 or annual target agreed to in fixed procedures set by U.S. District Court.<br><br>Preliminary 2011: 40% (low status) total exploitation rate. | Yes. Formal language for FMP overfishing criteria to be consistent with Council intent is being reviewed by the co-managers. | Little information on ocean distribution. |

TABLE A-1. Conservation objectives and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 11 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | | **- - - COHO - - -** | |
| **PUGET SOUND** (continued) | | | |
| **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 or annual target agreed to in fixed procedures set by U.S. District Court.<br><br>Preliminary 2011: 65% (normal status) total exploitation rate. | Yes. Formal language for FMP overfishing criteria to be consistent with Council intent is being reviewed by the co-managers. | Ocean distribution from Cape Falcon, Oregon to British Columbia. |
| **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 or annual target agreed to in fixed procedures set by U.S. District Court.<br><br>Preliminary 2011: 60% (normal status) total exploitation rate. | Yes. Formal language for FMP overfishing criteria to be consistent with Council intent is being reviewed by the co-managers. | Ocean distribution from Cape Falcon, Oregon to British Columbia. |
| **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 or annual target agreed to in fixed procedures set by U.S. District Court.<br><br>Preliminary 2011: 50% (normal status) total exploitation rate. | Yes. Formal language for FMP overfishing criteria to be consistent with Council intent is being reviewed by the co-managers. | Ocean distribution from Cape Falcon, Oregon to British Columbia. |
| **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 or annual target agreed to in fixed procedures set by U.S. District Court.<br><br>Preliminary 2010: 60% (normal status) total exploitation rate. | Yes. Formal language for FMP overfishing criteria to be consistent with Council intent is being reviewed by the co-managers. | Ocean distribution from Cape Falcon, Oregon to British Columbia. |
| **South Puget Sound** (Hatchery) | Hatchery rack return goal of 52,000 adults. Natural production goals under development. | No (hatchery exception). | Ocean distribution from Cape Falcon, Oregon to British Columbia. |
| **SOUTHERN BRITISH COLUMBIA COAST** - Stocks of southern British Columbia coastal streams (including Vancouver Island) and the Fraser River. | | | |
| **Coastal Stocks** | Manage Council fisheries that impact Canadian stocks consistent with provisions of the Pacific Salmon Treaty. | No. Not under Council management authority. | Contributes to ocean fisheries off British Columbia, north into southeast Alaska and present off northern Washington. |
| **Fraser River** | Manage Council fisheries that impact Canadian stocks consistent with provisions of the Pacific Salmon Treaty. For 2008, southern U.S. fisheries total exploitation rate of ≤10.0%. | No. Not under Council management authority. | Contributes to ocean fisheries off British Columbia and Washington, and to Strait of Juan de Fuca and Puget Sound fisheries. |

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries. Abundance information is based on recent year information. (Page 12 of 12).

| Stock | Conservation Objective (to be met annually, unless noted otherwise) | Subject to Council Actions to Prevent Overfishing | Other Management Information |
|---|---|---|---|
| | **- - - PINK (odd-numbered years) - - -** | | |
| The Fraser River Panel of the PSC manages fisheries for pink salmon in the Fraser River Panel Area (U.S.) north of 48E N latitude to meet Fraser River natural spawning escapement and U.S./Canada allocation requirements. The Council manages pink salmon harvests in that portion of the EEZ, which is not in the Fraser River Panel Area (U.S.) waters consistent with Fraser River Panel management intent. Pink salmon management objectives must address meeting natural spawning escapement objectives, allowing ocean pink harvest within fixed constraints of coho and Chinook harvest ceilings and providing for treaty allocation requirements. | | | |
| **Puget Sound** | 900,000 natural spawners or consistent with provisions of the Pacific Salmon Treaty (Fraser River Panel). | No. Minor impacts in Council fisheries and not under Council management authority. | Contributes to ocean fisheries off British Columbia and in Puget Sound. Present south into Oregon. Rare off California. |
| **Fraser River** | Manage Council fisheries that impact Canadian stocks consistent with provisions of the Pacific Salmon Treaty (Fraser River Panel). | No. Minor impacts in Council fisheries and not under Council management authority. | Contributes to ocean fisheries off British Columbia; present into southeast Alaska and off Washington and northern Oregon. Rare off California. |

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

| PARENT SPAWNER STATUS | MARINE SURVIVAL INDEX (based on return of jacks per hatchery smolt) Low (<0.0009) | Medium (0.0009 to 0.0034) | High (>0.0034) |
|---|---|---|---|
| | 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% | #15% | #15% |
| | #10-13% [b/] | | |

| Rebuilding Criteria | OCN Coho Spawners by Stock Component: 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:** | Nehalem | Tillamook | Nestucca | Ocean Tribs. | |
| (Necanicum River to Neskowin Creek) | 17,500 | 2,000 | 1,800 | 400 | |
| **North-Central:** | Siletz | Yaquina | Alsea | Siuslaw | Ocean Tribs. |
| (Salmon River to Siuslaw River) | 4,300 | 7,100 | 15,100 | 22,800 | 5,700 |
| **South-Central:** | Umpqua | Coos | Coquille | Coastal Lakes | |
| (Siltcoos River to Sixes River) | 29,400 | 7,200 | 5,400 | 8,000 | |
| **Southern:** | Rogue | | | | |
| (Elk River to Winchuck River) | 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. 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).

| Status | Management Unit | | | | |
|---|---|---|---|---|---|
| | 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 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Low/normal runsize breakpoint | 27,445 | 41,000 | 62,500 | 20,000 | 125,000 |
| Low exploitation rate | 0.40 | 0.45 | 0.35 | 0.35 | 0.40 |
| Normal exploitation rate | 0.60 | 0.65 | 0.60 | 0.50 | 0.60 |

## APPENDIX B
## SALMON HARVEST ALLOCATION SCHEDULES

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# HARVEST ALLOCATION -- SECTION 5.3 OF THE PACIFIC COAST SALMON PLAN

## 5.3 ALLOCATION

> *"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 treaty Indian fishing opportunity. In allocating the resource between ocean and inside fisheries, the Council considers both inriver harvest and spawner escapement needs. The magnitude of inriver harvest is determined by the states in a variety of ways, depending upon the management area. Some levels of inriver harvests are designed to accommodate federally recognized inriver Indian fishing rights, while others are established to allow for non-Indian harvests of historic 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 Klamath Fishery Management Council fulfills much the same roll with regard to Klamath River salmon stocks. 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 treaty obligations, state fishery needs and spawning escapement requirements, including jeopardy standards for stocks listed under the ESA. The Council shall make every effort to establish seasons and gear requirements which 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) which 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 which 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 quotas 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 (a) consultation with the pertinent recreational and commercial SAS members and the STT and (b) 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% 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% will be based on a conservation need to protect the 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 in the coho and Chinook distribution sections below. 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. The Council may also deviate from subarea quotas to (1) meet recreational season objectives based on agreement of representatives of the affected ports and (2) in accordance with Section 6.5.3.2 with regard to certain selective fisheries.

#### 5.3.1.3 Recreational Subarea Allocations

**Coho**

The north of Cape Falcon preseason recreational TAC of coho will be distributed to provide 50% to the area north of Leadbetter Point and 50% 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% of the total recreational TAC) will be divided to provide 74% to the area between Leadbetter Point and the Queets River (Westport), 5.2% to the area between Queets River and Cape Flattery (La Push), and 20.8% 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% 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.

| 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 |

Example distributions of the recreational coho TAC north of Leadbetter Point would be as follows:

| Sport TAC North of Cape Falcon | Without Area 4B Add-On | | | | With Area 4B Add-On [a/] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Neah Bay | | |
| | Columbia River | Westport | La Push | Neah Bay | Columbia River | Westport | La Push | 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 participant group.

Inseason management actions may be taken by NMFS Regional Director to assure that the primary objective of the Chinook harvest guidelines for each of the three recreational subareas north of Cape Falcon are met. Such actions might include: closure 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 which may be landed; or other actions as prescribed in the annual management measures.

### 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, 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 5-3.

(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 5-3. 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 significant 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%

    b. South of Humbug Mountain - 30%

    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.

**SELECTIVE FISHERY GUIDELINES – SECTION 6.5 OF THE PACIFIC COAST SALMON PLAN**

## 6.5 SEASONS AND QUOTAS

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### 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 a fishery, the Council will consider the following guidelines:

Harvestable fish of the target species are available.

Harvest impacts on incidental species will not exceed allowable levels determined in the management plan.

Proven, documented, selective gear exists (if not, only an experimental fishery should be considered).

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.

The species specific or ratio fishery will occur in an acceptable time and area where wastage can be minimized and target stocks are maximally available.

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 Pacific Salmon Treaty (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 fisheries that are selective for marked salmon stocks (e.g., marked hatchery salmon). The benefits of any 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 selective fisheries. The deviations for selective fisheries are subordinate to the allocation priorities in Section 5.3.1.1 and may be allowed under the following management constraints:

Selective fisheries will first be considered during the months of August and/or September. However, the Council may consider selective fisheries at other times, depending on year to year circumstances identified in the preceding paragraph.

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 selective fisheries.
Other allocation objectives (i.e., treaty Indian, or ocean and inside allocations) are satisfied during negotiations in the North of Cape Falcon Forum.

The selective fishery is assessed against the guidelines in Section 6.5.3.1.

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 the specified port and/or gear allocations, the process for establishing a selective fishery would be as follows:

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 selective fishery.

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.

## APPENDIX C
## OREGON PRODUCTION INDEX DATA

### LIST OF TABLES

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 | 10.4 | 3.7 | 15.3 | 19.0 | 5.9 | 35.2 | 5.3 | - | 5.3 | 1.5 | 42.0 |
| 1992 | 11.5 | 4.3 | 14.3 | 18.6 | 2.7 | 32.8 | 6.2 | - | 6.2 | 0.7 | 39.7 |
| 1993 | 11.1 | 4.3 | 14.8 | 19.1 | 4.1 | 34.3 | 4.3 | - | 4.3 | 0.8 | 39.4 |
| 1994 | 9.1 | 2.5 | 12.0 | 14.5 | 3.0 | 26.6 | 5.2 | - | 5.2 | 0.6 | 32.4 |
| 1995 | 7.1 | 3.4 | 12.9 | 16.3 | 1.7 | 25.1 | 3.7 | - | 3.7 | 0.7 | 29.5 |
| 1996 | 8.4 | 3.4 | 12.9 | 16.3 | 3.4 | 28.1 | 3.3 | - | 3.3 | 0.3 | 31.7 |
| 1997 | 6.1 | 3.2 | 7.8 | 11.0 | 3.9 | 21.0 | 2.9 | - | 2.9 | 0.7 | 24.6 |
| 1998 | 6.1 | 5.8 | 11.4 | 17.2 | 3.6 | 26.8 | 1.7 | - | 1.7 | 0.6 | 29.1 |
| 1999 | 7.6 | 4.0 | 11.5 | 15.5 | 4.8 | 27.9 | 1.0 | - | 1.0 | 0.7 | 29.6 |
| 2000 | 7.8 | 6.2 | 10.8 | 17.0 | 5.9 | 30.7 | 0.9 | - | 0.9 | 0.6 | 32.2 |
| 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[c/] | 5.9 | 2.0 | 7.5 | 9.5 | 3.1 | 18.5 | 0.3 | - | 0.3 | 0.5 | 19.4 |

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 set used in predicting Oregon production index hatchery (OPIH) adult coho. Adults and jacks shown in thousands of fish and smolts in millions of fish.

| | Adults (t) | | Jacks (t-1) | | | Columbia River Smolts (t-1) | | |
|---|---|---|---|---|---|---|---|---|
| Year (t) | OPIH[a/] | MSM[b/] | Total OPI[c/] | Columbia River[d/] | OR Coast/ CA[e/] | Delayed[f/] | Normal Timed[g/] | Adjustment Proportion[h/] |
| 1970 | 2,765.1 | - | | | | | | |
| 1971 | 3,365.0 | - | 179.4 | 172.8 | 6.6 | 0.0 | 24.0 | 0.0000 |
| 1972 | 1,924.8 | - | 103.7 | 100.8 | 2.9 | 0.0 | 28.3 | 0.0000 |
| 1973 | 1,817.0 | - | 91.4 | 85.7 | 5.7 | 1.8 | 29.9 | 5.1592 |
| 1974 | 3,071.1 | - | 144.1 | 132.0 | 12.1 | 2.9 | 28.5 | 13.4316 |
| 1975 | 1,652.8 | - | 76.2 | 75.1 | 1.1 | 1.8 | 27.8 | 4.8626 |
| 1976 | 3,885.3 | - | 171.5 | 146.2 | 25.3 | 2.0 | 29.0 | 10.0828 |
| 1977 | 987.5 | - | 53.8 | 46.3 | 7.5 | 0.2 | 28.9 | 0.3204 |
| 1978 | 1,824.1 | - | 103.2 | 99.2 | 4.0 | 0.0 | 31.4 | 0.0000 |
| 1979 | 1,476.7 | - | 72.5 | 64.1 | 8.4 | 5.0 | 32.6 | 9.8313 |
| 1980 | 1,224.0 | - | 57.6 | 51.6 | 6.0 | 6.7 | 28.9 | 11.9626 |
| 1981 | 1,064.5 | - | 48.7 | 40.6 | 8.1 | 5.6 | 28.1 | 8.0911 |
| 1982 | 1,266.8 | - | 61.3 | 55.0 | 6.3 | 6.8 | 32.4 | 11.5432 |
| 1983[i/] | 599.2 | - | 68.2 | 61.0 | 7.2 | 5.0 | 27.7 | 11.0108 |
| 1984 | 691.3 | - | 31.6 | 28.0 | 3.6 | 5.1 | 27.0 | 5.2889 |
| 1985 | 717.5 | - | 26.0 | 18.2 | 7.8 | 9.1 | 29.2 | 5.6719 |
| 1986 | 2,435.8 | 2,412.0 | 77.5 | 64.6 | 12.9 | 12.2 | 28.8 | 27.3653 |
| 1987 | 887.2 | 779.4 | 32.9 | 24.2 | 8.7 | 9.0 | 32.9 | 6.6201 |
| 1988 | 1,669.3 | 1,467.8 | 82.6 | 69.7 | 12.9 | 7.7 | 28.8 | 18.6351 |
| 1989 | 1,720.2 | 1,922.0 | 60.8 | 55.0 | 5.8 | 7.2 | 29.5 | 13.4237 |
| 1990 | 718.4 | 713.6 | 46.7 | 37.1 | 9.6 | 8.5 | 29.6 | 10.6537 |
| 1991 | 1,874.8 | 1,816.5 | 68.7 | 60.8 | 7.9 | 7.1 | 30.3 | 14.2469 |
| 1992 | 543.6 | 512.6 | 25.6 | 19.9 | 5.7 | 6.0 | 35.3 | 3.3824 |
| 1993 | 261.7 | 223.3 | 27.1 | 19.6 | 7.5 | 5.5 | 32.8 | 3.2866 |
| 1994 | 202.3 | 214.3 | 5.2 | 3.9 | 1.3 | 6.0 | 34.4 | 0.6802 |
| 1995 | 147.2 | 139.4 | 11.5 | 8.8 | 2.7 | 3.1 | 26.6 | 1.0256 |
| 1996 | 185.2 | 176.5 | 17.3 | 14.1 | 3.2 | 4.2 | 25.2 | 2.3500 |
| 1997 | 200.7 | 195.6 | 20.4 | 15.8 | 4.6 | 3.4 | 28.0 | 1.9186 |
| 1998 | 207.5 | 228.1 | 9.8 | 6.8 | 3.0 | 2.5 | 21.0 | 0.8095 |
| 1999 | 334.5 | 372.7 | 29.2 | 23.3 | 5.9 | 3.0 | 26.8 | 2.6082 |
| 2000 | 673.2 | 703.6 | 34.7 | 31.2 | 3.5 | 4.1 | 27.9 | 4.5849 |
| 2001 | 1,417.1 | 1,478.7 | 86.8 | 71.1 | 15.7 | 2.0 | 30.6 | 4.6471 |
| 2002 | 649.8 | 708.1 | 25.2 | 18.9 | 6.3 | 1.4 | 23.5 | 1.1260 |
| 2003 | 936.6 | 1,029.8 | 50.4 | 42.2 | 8.2 | 0.3 | 23.7 | 0.5342 |
| 2004 | 622.1 | 693.6 | 35.4 | 29.4 | 6.0 | 2.0 | 23.2 | 2.5345 |
| 2005 | 443.2 | 604.4 | 25.9 | 21.2 | 4.7 | 0.8 | 22.0 | 0.7709 |
| 2006 | 440.6 | 519.9 | 26.3 | 20.9 | 5.4 | 0.4 | 20.6 | 0.4058 |
| 2007 | 476.6 | 546.2 | 36.7 | 34.2 | 2.5 | 0.1 | 20.4 | 0.1676 |
| 2008 | 565.3 | 565.3 | 15.4 | 14.0 | 1.4 | 0.6 | 21.4 | 0.3925 |
| 2009 | . | 917.2 | 61.0 | 58.4 | 2.6 | 1.1 | 21.9 | 2.9333 |
| 2010 | . | 551.3 | 25.3 | 23.8 | 1.5 | 0.2 | 21.3 | 0.2235 |
| 2011 | . | 375.1[j/] | 23.3 | 22.2 | 1.1 | 0.3 | 18.5 | 0.3600 |

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. (Page 2 of 2)

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 MSM = Harvest impacts plus escapement for public hatchery stocks originating in the Columbia River, Oregon coastal rivers, and the Klamath River. Estimates derived from the MSM 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/ Sm D = Columbia River delayed smolt releases from the previous year expected to return as adults in the year listed.

g/ Sm CR = Columbia River smolt release from the previous year expected to return as adults in the year listed.

h/ Correction term for delayed smolts released from Columbia River hatcheries (proportion).

i/ Data not used in subsequent predictions due to El Niño impacts.

j/ Preseason predicted adults.

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

| Component and Basin[a/] | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 1995-2010 Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NORTHERN | | | | | | | | | | | | | | | | | |
| Necanicum | 211 | 768 | 253 | 946 | 728 | 474 | 5,247 | 2,896 | 3,068 | 2,198 | 1,218 | 750 | 431 | 1,055 | 3,827 | 3,183 | 1,703 |
| Nehalem | 1,463 | 1,057 | 1,173 | 1,190 | 3,713 | 14,285 | 22,310 | 20,903 | 33,059 | 18,736 | 10,451 | 11,614 | 14,033 | 17,205 | 21,753 | 29,375 | 13,895 |
| Tillamook | 289 | 661 | 388 | 271 | 2,175 | 1,983 | 1,883 | 15,715 | 14,584 | 2,532 | 1,995 | 8,774 | 2,295 | 4,828 | 16,251 | 14,243 | 5,554 |
| Nestucca | 1,811 | 519 | 271 | 169 | 2,201 | 1,171 | 3,940 | 13,003 | 8,929 | 4,695 | 686 | 1,876 | 394 | 1,844 | 4,252 | 5,103 | 3,179 |
| Ind. Tribs. | 108 | 275 | 61 | 0 | 47 | 0 | 71 | 16 | 0 | 661 | 2,116 | 1,121 | 376 | 639 | 2,052 | 1,256 | 550 |
| TOTAL | 3,882 | 3,280 | 2,146 | 2,576 | 8,864 | 17,913 | 33,451 | 52,533 | 59,640 | 28,822 | 16,466 | 24,135 | 17,529 | 25,571 | 48,135 | 53,160 | 24,881 |
| NORTH CENTRAL | | | | | | | | | | | | | | | | | |
| Salmon | 212 | 271 | 237 | 8 | 175 | 0 | 310 | 372 | 0 | 1,642 | 79 | 513 | 59 | 652 | 753 | 1,346 | 414 |
| Siletz | 607 | 763 | 336 | 394 | 706 | 3,553 | 1,437 | 2,252 | 9,736 | 8,179 | 14,567 | 5,205 | 2,197 | 20,634 | 24,070 | 5,814 | 6,278 |
| Yaquina | 5,668 | 5,127 | 384 | 365 | 2,588 | 647 | 3,039 | 23,981 | 13,254 | 5,539 | 3,441 | 4,247 | 3,158 | 10,913 | 11,182 | 8,727 | 6,391 |
| Beaver Ck. | - | 1,340 | 425 | 1,041 | 3,366 | 738 | 5,274 | 8,754 | 5,812 | 4,569 | 2,264 | 1,950 | 611 | 1,218 | 3,575 | 2,442 | 2,892 |
| Alsea | 681 | 1,637 | 680 | 213 | 2,050 | 2,465 | 3,339 | 6,170 | 8,957 | 5,233 | 13,907 | 1,972 | 2,146 | 13,320 | 14,638 | 8,218 | 5,352 |
| Siuslaw | 6,089 | 7,625 | 668 | 1,089 | 2,724 | 6,767 | 11,024 | 57,129 | 29,257 | 8,729 | 16,907 | 5,869 | 3,552 | 17,491 | 30,607 | 24,594 | 14,383 |
| Ind. Tribs. | 348 | 1,364 | 112 | 173 | 150 | 91 | 816 | 5,308 | 1,852 | 8,179 | 242 | 1,468 | 547 | 3,910 | 1,610 | 2,370 | 1,784 |
| TOTAL | 13,605 | 18,127 | 2,842 | 3,283 | 11,759 | 14,261 | 25,239 | 103,966 | 68,868 | 42,070 | 51,407 | 21,224 | 12,270 | 68,138 | 86,435 | 53,511 | 37,313 |
| SOUTH CENTRAL | | | | | | | | | | | | | | | | | |
| Umpqua | 12,809 | 10,824 | 2,960 | 9,153 | 7,685 | 12,233 | 35,702 | 37,591 | 29,607 | 29,900 | 42,532 | 18,092 | 11,783 | 37,868 | 57,984 | 58,627 | 25,959 |
| Coos | 10,351 | 12,128 | 1,127 | 3,167 | 4,945 | 5,386 | 43,301 | 35,688 | 29,559 | 23,337 | 17,048 | 11,266 | 1,329 | 14,881 | 26,979 | 27,034 | 16,720 |
| Coquille | 2,116 | 16,169 | 5,720 | 2,466 | 3,001 | 6,130 | 13,310 | 8,610 | 23,909 | 22,138 | 11,806 | 28,577 | 13,968 | 8,791 | 22,286 | 16,374 | 12,836 |
| Floras Ck. | - | - | - | 252 | 164 | 1,440 | 1,945 | 20 | 310 | 7,446 | 506 | 1,104 | 340 | 786 | 3,203 | 5,629 | 1,780 |
| Sixes R. | - | - | - | - | - | - | - | - | - | 403 | 105 | 294 | 97 | 43 | 176 | 104 | 175 |
| Coastal Lakes | 11,216 | 13,493 | 8,603 | 11,107 | 12,710 | 12,747 | 19,669 | 22,162 | 16,688 | 18,642 | 14,725 | 24,127 | 8,955 | 23,608 | 17,349 | 38,859 | 17,166 |
| Ind. Tribs. | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 188 | 474 | 221 |
| TOTAL | 36,492 | 52,614 | 18,410 | 26,145 | 28,505 | 37,936 | 113,927 | 104,071 | 100,073 | 101,866 | 86,722 | 83,460 | 36,472 | 85,977 | 128,165 | 147,101 | 74,246 |
| SOUTH | | | | | | | | | | | | | | | | | |
| Rogue[b/] | 3,359 | 5,241 | 8,213 | 2,257 | 1,389 | 10,978 | 12,579 | 8,403 | 6,754 | 24,486 | 9,957 | 3,937 | 5,242 | 414 | 2,566 | 3,073 | 6,803 |
| COASTWIDE | 57,338 | 79,262 | 31,611 | 34,261 | 50,517 | 81,088 | 185,196 | 268,973 | 235,335 | 197,244 | 158,532 | 134,061 | 66,685 | 182,252 | 269,579 | 256,338 | 143,017 |

a/ The sum of the individual basins may not equal the aggregate totals due to the use of independent estimates at different geographic scales.

b/ Mark recapture estimate based on seining at Huntley Park in the lower Rogue River.

TABLE C-4. Data set used in predicting 2011 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 | 183.1 | 204.7 | -0.37 | 51.67 | -16.67 | -144.37 | 10.91 | - | -1.09 | 78 |
| 1971 | 416.3 | 198.9 | -1.77 | 32.33 | -10.33 | -63.70 | 11.69 | 8.67 | -1.31 | 106 |
| 1972 | 185.5 | 129.2 | -1.42 | 42.33 | -3.67 | -57.13 | 11.85 | 8.44 | 1.73 | 107 |
| 1973 | 235.0 | 51.2 | -0.77 | 60.67 | -15.33 | -150.47 | 12.23 | 9.46 | -1.52 | 80 |
| 1974 | 196.4 | 65.6 | -0.22 | 41.33 | -8.00 | -71.40 | 10.96 | 9.30 | -1.25 | 102 |
| 1975 | 208.4 | 24.1 | -0.86 | 48.67 | -29.67 | -148.50 | 10.86 | 9.49 | -1.78 | 83 |
| 1976 | 451.7 | 37.8 | -0.25 | 18.00 | -5.67 | -110.63 | 10.72 | 9.07 | 0.47 | 103 |
| 1977 | 161.2 | 28.1 | 0.31 | 40.33 | -22.33 | -134.93 | 11.22 | 9.78 | 0.98 | 74 |
| 1978 | 111.6 | 34.8 | -0.06 | 33.33 | -1.33 | -86.07 | 11.58 | 11.24 | 0.19 | 97 |
| 1979 | 188.8 | 39.2 | 0.70 | 20.33 | -45.00 | -91.17 | 11.24 | 8.74 | 0.74 | 73 |
| 1980 | 108.3 | 13.7 | 0.40 | 69.33 | -43.67 | -63.87 | 12.05 | 10.50 | 0.24 | 78 |
| 1981 | 174.5 | 18.2 | 1.43 | 48.67 | -36.33 | -81.37 | 12.14 | 11.72 | -0.05 | 88 |
| 1982 | 185.7 | 38.4 | -0.26 | 33.67 | -26.67 | -68.67 | 11.01 | 9.86 | 2.45 | 109 |
| 1983 | 96.0 | 25.6 | 2.56 | 26.00 | -47.33 | -4.97 | 12.12 | 11.10 | -0.16 | 126 |
| 1984 | 94.7 | 30.1 | 0.43 | 53.67 | -52.00 | -63.27 | 11.44 | 10.65 | -0.35 | 112 |
| 1985 | 124.9 | 68.3 | 0.42 | 47.00 | 0.00 | -80.43 | 10.98 | 9.99 | -0.06 | 48 |
| 1986 | 114.3 | 19.4 | 1.14 | 53.33 | -4.33 | -82.03 | 11.52 | 10.04 | 0.86 | 89 |
| 1987 | 77.8 | 59.7 | 1.53 | 50.33 | -23.00 | -80.23 | 11.43 | 10.58 | 1.26 | 81 |
| 1988 | 152.5 | 66.3 | 0.86 | 51.33 | -25.00 | -62.70 | 11.49 | 9.89 | -1.47 | 68 |
| 1989 | 114.9 | 57.2 | 0.55 | 46.00 | 5.00 | -65.23 | 11.62 | 9.43 | -0.05 | 97 |
| 1990 | 63.3 | 25.3 | 0.38 | 54.00 | -3.00 | -63.93 | 12.00 | 9.97 | 0.38 | 81 |
| 1991 | 84.1 | 45.7 | -0.69 | 54.67 | 7.33 | -110.40 | 10.95 | 8.96 | 1.20 | 99 |
| 1992 | 107.6 | 40.7 | 1.57 | 53.33 | -11.00 | -30.20 | 12.69 | 10.11 | 0.59 | 123 |
| 1993 | 74.9 | 16.9 | 2.27 | 57.00 | 13.00 | 59.37 | 13.19 | 9.38 | 0.84 | 161 |
| 1994 | 41.0 | 30.4 | 0.58 | 57.33 | -6.00 | -64.10 | 11.45 | 11.04 | 1.23 | 87 |
| 1995 | 47.8 | 40.2 | 1.48 | 33.33 | -24.33 | -64.50 | 11.19 | 10.57 | -0.51 | 95 |
| 1996 | 64.5 | 45.2 | 1.35 | 83.67 | 4.67 | -47.30 | 11.44 | 11.66 | -0.11 | 120 |
| 1997 | 16.3 | 38.3 | 2.31 | 20.00 | -38.00 | -14.50 | 12.10 | 10.76 | 2.30 | 146 |
| 1998 | 22.4 | 42.8 | 0.35 | 73.67 | -37.33 | -41.17 | 11.37 | 12.26 | -1.12 | 105 |
| 1999 | 38.3 | 60.5 | -0.88 | 70.33 | -17.33 | -110.77 | 10.67 | 9.54 | -1.08 | 91 |
| 2000 | 58.7 | 14.8 | -0.38 | 45.00 | -11.00 | -54.67 | 11.35 | 10.00 | -0.74 | 72 |
| 2001 | 156.5 | 20.9 | -0.69 | 60.67 | -29.67 | -124.50 | 10.68 | 10.17 | -0.25 | 61 |
| 2002 | 246.1 | 36.4 | -0.43 | 72.67 | -26.00 | -146.90 | 10.11 | 10.07 | 0.97 | 80 |
| 2003 | 227.3 | 57.4 | 0.84 | 65.33 | -7.33 | -61.67 | 11.15 | 11.01 | 0.53 | 112 |
| 2004 | 164.0 | 152.9 | 0.45 | 30.33 | 6.33 | -60.73 | 11.86 | 10.30 | 0.80 | 110 |
| 2005 | 129.6 | 238.4 | 1.23 | 73.33 | 6.00 | -23.67 | 12.54 | 10.21 | -0.42 | 145 |
| 2006 | 100.4 | 211.9 | 0.62 | 84.00 | -14.00 | -34.30 | 11.15 | 11.46 | 1.26 | 112 |
| 2007 | 64.3 | 156.7 | 0.26 | 23.67 | 5.00 | -121.53 | 10.62 | 9.85 | -1.17 | 74 |
| 2008 | 144.7 | 139.4 | -1.46 | 33.33 | -2.33 | -110.93 | 9.62 | 8.92 | -0.60 | 89 |
| 2009 | 262.9 | - | -0.57 | 36.33 | -39.67 | -93.63 | 10.45 | 9.37 | 1.03 | 82 |
| 2010 | 225.9 | - | -0.22 | 57.00 | -15.33 | -46.03 | 11.67 | 10.76 | -1.61 | 100 |
| 2011[b/] | 221.6 | - | - | - | - | - | - | 10.14 | - | - |

a/ Environmental Index descriptions:

PDO - Pacific Decadal Oscillation

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/ Forecast