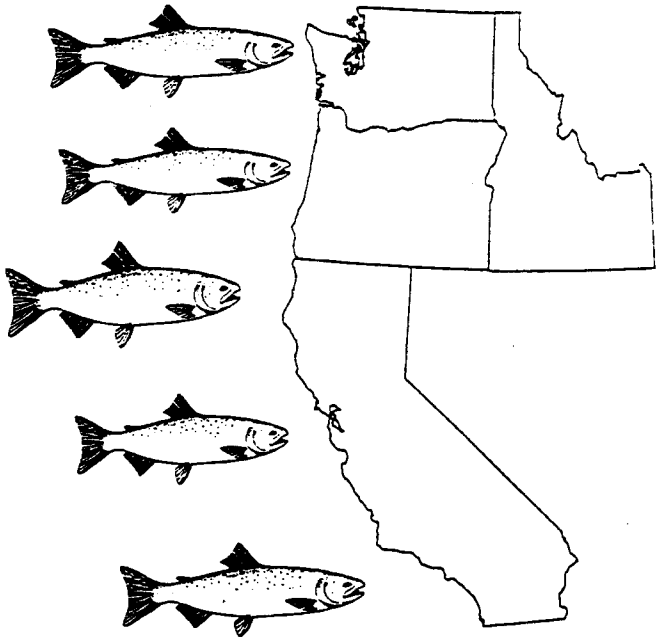
PRESEASON REPORT I

STOCK ABUNDANCE ANALYSIS FOR 2001 OCEAN SALMON FISHERIES



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LIST OF ACRONYMS AND ABBREVIATIONS

CDFG	California Department of Fish and Game
Council	Pacific Fishery Management Council
CRTAC	Columbia River Technical Advisory Committee
CVI	Central Valley index
CWT	coded-wire tag
DA2	December age-two (coho ocean recruits)
ESA	Endangered Species Act
FMP	fishery management plan
FRAM	Fishery Regulation Assessment Model
GSI	genetic stock identification
HRM	Harvest Rate Model
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
KRTAT	Klamath River Technical Advisory Team
LRB	lower Columbia River brights (bright fall chinook of upriver origin spawning naturally in the mainstem Columbia downstream from Bonneville Dam)
LRH	lower Columbia River hatchery (tule fall chinook returning to hatcheries below Bonneville Dam)
LRW	lower Columbia River wild (native bright fall chinook spawning naturally in tributaries below Bonneville Dam)
MCB	mid-Columbia River brights (bright hatchery fall chinook released in the mid-Columbia River)
MOC	mid-Oregon Coast
MSY	maximum sustainable yield
NA	not available
NMFS	National Marine Fisheries Service
NOC	North Oregon Coast
OCN	Oregon coastal natural (coho)
OCNL	Oregon coastal natural (coho) lake component
OCNR	Oregon coastal natural (coho) river component
ODFW	Oregon Department of Fish and Wildlife
OPI	Oregon production index (coho salmon stock index south of Leadbetter Point)
OPIH	Oregon production index area hatchery (adult coho)
OPITT	Oregon Production Index Technical Team
PRIH	Oregon coastal private hatchery (adult coho)
PSC	Pacific Salmon Commission
SAB	Select Area brights (hatchery fall chinook originally from Rogue River stock that is currently propagated in lower Columbia River hatcheries for release in Youngs Bay)
SCH	Spring Creek Hatchery (tule fall chinook returning to Spring Creek Hatchery)
SRS	Stratified random sampling
SSC	Scientific and Statistical Committee
STEP	Salmon Trout Enhancement Program (Oregon)
STT	Salmon Technical Team (formerly the Salmon Plan Development Team)
TAC	total allowable catch
URB	upper river brights (naturally spawning bright fall chinook returning to areas upstream from McNary Dam and the Deschutes River, Oregon)
USFWS	U.S. Fish and Wildlife Service
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. This report will be formally reviewed at the Council's March meeting. The third and fourth reports in this series will be developed at the close of the March and April Council meetings, respectively. They will analyze the impacts of the Council's proposed and final ocean salmon fishery management recommendations for 2001.

This report provides year 2001 salmon stock abundance projections and an analysis of the impacts of 2000 regulations, or regulatory procedures, on the projected 2001 abundance. The report focuses on chinook and coho stocks that have been important in determining Council fisheries in recent years and on stocks listed under the Endangered Species Act which have established jeopardy standards.

Chapter I provides a summary of stock abundance projections. Chapters II and III provide detailed stock-by-stock analyses of abundance and a description of prediction methodology and accuracy of past abundance predictions for chinook and coho salmon, respectively. Chapter IV summarizes abundance information for pink salmon. Four appendices provide supplementary information as follows: Appendix A provides a summary of Council stock management goals; Appendix B contains pertinent data for Oregon production index (OPI) area coho; Appendix C provides historical salmon catch data for the Cape Flattery and Strait of Juan de Fuca areas; and Appendix D contains the Council's current harvest allocation schedules.

The STT notes that differences between preseason and postseason estimates are caused by a number of factors, including: (1) inaccuracies in abundance forecasts for these and other stocks which are exploited by mixed stock fisheries, (2) deviations of actual catches and fishery patterns from preseason expectations, (3) anomalies in stock distribution and migration patterns, and (4) for the Puget Sound coho stocks, differences in assessment methodologies (postseason estimates are based on run reconstruction assumptions which differ substantially from those represented in the Fishery Regulatory Assessment Model).

CHAPTER I
ABUNDANCE PROJECTIONS AND CONCERNS

ABUNDANCE PROJECTIONS

Abundance expectations in 2001 are summarized for key chinook and coho salmon stocks in Tables I-1 and I-2, respectively. Information on pink salmon abundance, which is only significant in odd-numbered years, is contained in Chapter IV. Overall Council salmon management goals, as developed for Amendment 14, are presented in Table 1-3 and Appendix A, Table A-1.

In addition to the key stocks with abundance projections listed in Tables I-1 and I-2, Council management decisions for the 2001 ocean salmon fishing seasons may be constrained by other stocks listed under the Endangered Species Act (ESA) which may not have abundance projections made, or do not have abundance projections available in time for inclusion in this report. These include Sacramento River winter, Central Valley spring, California coastal, and Snake River fall chinook; and central California and southern Oregon/northern California coho.

SALMON TECHNICAL TEAM CONCERNS

The STT is concerned about the lack of a preseason forecast for Sacramento River winter chinook salmon. The jeopardy standard for winter chinook is to achieve an adult cohort replacement rate of 1.77. This jeopardy standard has not been met in the past two years, and the STT cannot evaluate proposed fishery management measures with respect to achieving this jeopardy standard without a preseason forecast.

TABLE I-1. Preliminary preseason **adult chinook** salmon stock forecasts in thousands of fish. (Page 1 of 2)

Production Area, Type of Prediction and/or Stock or Stock Grouping	Preseason Estimates of Adults (Postseason Estimates in Parentheses) 2001	2000	1999	1998	1997	1996	Methodology for 2001 Prediction and Source
California Central Valley (Index) Sacramento and San Joaquin Basins, Fall, Late Fall, Spring, and Winter Run	649.4	790.4 (1,044.5)	847.7 (672.3)	1,051.0 (628.4)	849.0 (1,059.1)	533.0 (742.2)	Linear regression analysis of inriver age-2 jacks on CVI of the following year. CDFG.
Klamath River (Ocean Abundance) Fall Run	292.1	207.1 (515.5)	107.0 (103.4)	127.4 (127.2)	161.7 (142.9)	455.6 (284.9)	Linear regression analysis of age-specific ocean abundance estimates on inriver runs of same cohort. KRTAT.
Oregon Coast							
North and South/Local Migrating	---------- Preseason Estimates Not Made ----------						None.
Columbia River (Ocean Escapement)							
Upriver Spring	364.6	134.0 (178.6)	24.6 (38.6)	36.2 (38.3)	67.8 (114.1)	37.2 (51.5)	Age-specific linear regressions of cohort returns in previous run years. WDFW staff.
Willamette Spring	61.0	59.9 (57.5)	46.0 (52.6)	32.8 (43.5)	27.4 (34.5)	38.7 (33.4)	Age-specific linear regressions of cohort returns in previous run years. ODFW staff.
Sandy Spring	4.0	3.8 (3.8)	4.3 (3.3)	3.9 (4.2)	3.8 (5.2)	3.3 (4.1)	Recent year average. ODFW staff.
Cowlitz Spring	1.0	2.0 (1.7)	2.1 (1.6)	1.5 (1.1)	1.4 (1.9)	1.9 (1.8)	Age-specific linear regressions of cohort returns in previous run years. WDFW staff.
Kalama Spring	1.0	1.4 (1.4)	0.3 (1.0)	0.5 (0.4)	0.7 (0.6)	0.6 (0.6)	Age-specific linear regressions of cohort returns in previous run years. WDFW staff.
Lewis Spring	2.2	2.6 (2.8)	1.5 (1.7)	0.9 (1.6)	2.4 (2.2)	1.9 (1.7)	Age-specific linear regressions of cohort returns in previous run years. WDFW staff.
Upriver Summer	24.5	33.3 (30.7)	16.5 (26.2)	17.3 (21.5)	16.7 (28.0)	16.8 (16.1)	Age-specific average cohort ratios/cohort regressions. Columbia River TAC.
URB Fall	127.2	171.1 (152.5)	147.5 (166.7)	150.8 (142.3)	166.4 (164.9)	88.9 (143.2)	Age-specific average cohort ratios/cohort regressions. Columbia River Joint WDFW-ODFW Staff.
SCH Fall	56.6	21.9 (19.6)	65.8 (49.3)	14.2 (20.2)	21.9 (27.4)	27.6 (33.1)	Age-specific average cohort ratios/cohort regressions. Columbia River Joint WDFW-ODFW Staff.
LRW Fall	16.7	3.5 (11.4)	2.6 (3.3)	8.1 (7.3)	7.5 (12.3)	8.8 (14.6)	Age-specific average cohort ratios/cohort regressions. Columbia River Joint WDFW-ODFW Staff.
LRH Fall	32.2	23.7 (16.5)	34.8 (37.4)	19.2 (45.3)	54.2 (57.4)	37.7 (75.5)	Age-specific average cohort ratios/cohort regressions. Columbia River Joint WDFW-ODFW Staff.
MCB Fall	43.5	50.6 (39.7)	38.3 (49.9)	47.8 (36.8)	72.1 (59.7)	40.8 (59.7)	Age-specific average cohort ratios/cohort regressions. Columbia River Joint WDFW-ODFW Staff.
Washington Coast (Ocean Escapement)							
Willapa Bay — Natural	4.3	4.2	4.2 (3.6)	-	-	-	
Willapa Bay — Hatchery	17.8	18.9 (4.7)	15.5 (5.0)	64.5 (20.9)	49.0 (31.7)	34.6 (53.1)	Mean return per release by age class.
Other Coastal Stocks	---------- Not Available ----------						WDFW and tribes.

TABLE I-1. Preliminary preseason **adult chinook** salmon stock forecasts in thousands of fish. (Page 2 of 2)

Production Area, Type of Prediction and/or Stock or Stock Grouping		Preseason Estimates of Adults (Postseason Estimates in Parentheses) 2001	2000	1999	1998	1997	1996	Methodology for 2001 Prediction and Source
Puget Sound[a/]								WDFW and tribes.
Nooksack/Samish	Hatchery	34.9	19.0	27.0 (30.6)	28.0 (18.5)	34.0 (22.8)	27.0 (26.6)	Brood release times average return-at-age/release.
East Sound Bay	Hatchery	1.6	5.0	2.3	0.5	1.2	1.7	1991-2000 average return rate of Nooksack/Samish fall chinook multiplied by 1997 Glenwood spring release.
Skagit	Natural	9.1	7.3	7.6	6.6	6.4	7.1	Age specific average cohort rates.
	Hatchery	0.0	0.0	0.0	0.0	0.1	1.0	Average return/release of 85-95 broods multiplied by brood year release.
Stillaguamish	Natural	1.7	2.0	1.5	1.6	1.6	1.3	Estimate based on spawner-recruit information
Snohomish	Natural	5.8	6.0	5.6	5.6	5.2	4.2	Estimates based on spawner-recruit information.
	Hatchery	4.1	6.2	7.8	6.5	7.7	6.7	Lbs. released multiplied by average return per lb. released.
Tulalip	Hatchery	5.5	5.0	4.5	2.5	4.0	2.7	1996 brood release multiplied by average return per release. CWT survival rates multiplied by release numbers for brood years 1996-1999.
South Puget Sound	Natural	16.2	17.5	19.6	21.8	18.2	19.0	Average return/spawner multiplied by 1996 escapement for Puyallup. Same for Nisqually but 1995-1999 average return/spawner.
	Hatchery	73.7	77.5	59.4	67.8	65.1[b/]	51.9	Average return at age multiplied by cohort release for Green, McAllister, and 10E. Average of two different methods for Carr Inlet: (1) 1980-1998 average run size and (2) average return/lb released multiplied by 1997 brood lbs released.
Hood Canal	Natural and Hatchery	2.7 22.6	19.2	14.0 (29.6)	6.7 (16.3)	2.7 (7.9)	9.0 (0.2)	Hatchery lbs. released multiplied by 1996-2000 average return per lb., and 1996-1999 natural run reconstruction contributions.
Strait of Juan de Fuca	Natural	3.5	1.1	0.9 (2.7)	0.9 (1.9)	0.8 (3.5)	0.9 (3.1)	1996-2000 mean return at age for Hoko. 1996-1999 mean run size for Elwha. For 2001, estimate is combined hatchery and wild fish.
	Hatchery	0.0	2.0	1.9 (0.7)	1.7 (1.7)	2.2 (0.3)	2.8 (0.2)	For 2001, the estimate is combined hatchery and natural fish.

a/ Forecast is Puget Sound run size available to U.S. net fisheries. Does not include fish caught in troll and recreational fisheries.

b/ The Muckleshoot Tribe's Green River Hatchery chinook forecast is 10,857 based on the 1990-1995 average hatchery return to Area 10A. This results in a South Sound hatchery estimate of 58,000 fish.

TABLE I-2. Preliminary, preseason **adult coho** salmon stock ocean abundance forecasts in thousands of fish. (Page 1 of 2)

Production Source and Stock or Stock Group		Preseason Estimates of Adults (Postseason Estimates in Parentheses) 2001	2000	1999	1998	1997	1996	Methodology for 2001 Prediction
OPI Area (Total Abundance) (California and Oregon Coasts and Columbia River)		1,758.7	727.9 (746.6)	620.6 (371.9)	165.8 (233.1)	463.8 (239.7)	372.8 (286.6)	Sum of stock component estimates.
OPI Public Hatchery		1,707.6	671.4 (677.1)	559.2 (319.6)	118.4 (203.6)	376.1 (215.3)	309.2 (182.6)	Multiple linear regression of OPI public hatchery jacks to adults adjusted for Columbia River delayed smolt release; 1970-1999 SRS accounting database. Public hatchery prediction is partitioned into Columbia River early and late, and coastal stocks based on the percent of jacks observed and recent year average stock specific maturation rates.
Columbia River Early		1,036.5	326.3 (378.0)	325.5 (174.9)	63.8 (126.4)	206.9 (129.8)	142.2 (98.0)	
Columbia River Late		491.8	278.0 (260.1)	140.9 (120.7)	24.9 (47.3)	86.5 (53.7)	114.4 (30.8)	
Coastal		179.3	67.1 (39.0)	92.8 (24.0)	29.7 (29.9)	82.7 (31.8)	52.7 (53.8)	
OCN		50.1	55.9 (69.0)	60.7 (51.9)	47.2 (29.2)	86.4 (24.1)	63.2 (102.9)	For river production, relates ocean recruits (SRS accounting) to upwelling, sea surface temperature; data base 1970-1999. Most recent 3-year average abundance for lake production.
STEP		1.0	0.6 (0.5)	0.7 (0.4)	0.2 (0.3)	1.3 (0.3)	0.4 (1.2)	Smolt production with 1998 smolt to adult survival rates adjusted by changes in OPI public hatchery jacks per smolt between 1999 and 1998 release years.
Washington Coast								
Willapa	Natural	21.6	9.9	8.3	3.3	-	-	1998-2000 average terminal run.
	Hatchery	36.1	19.6	40.5	20.8	72.5	72.1	1992-1997 average brood year survival applied to 1998 brood year releases.
Grays Harbor	Natural	51.3	47.8	57.7	30.1	26.1	121.4	1998 brood escapement multiplied by average return per spawner.
	Hatchery	67.1	75.8	30.4	25.6	104.3	95.7	Smolt releases multiplied by average ocean recruits per release.
Quinault	Natural	8.7	4.4	7.3	6.5	2.0	4.9	1991-1995 brood year average ocean recruits per spawner, adjusted for expected survival.
	Hatchery	10.8	7.4	8.2	3.9	5.1	14.0	1992-1995 average adult survival rate applied to release.
Queets	Natural	12.0	2.7	4.3	4.2	4.3	8.3	1992-1996 brood year average survival rate to ocean recruit, for CWT and unmarked smolts applied to 1998 brood smolt production.
	Hatchery	10.0	11.8	13.8	4.6	16.9	28.1	1992-1996 brood year average survival rate to ocean recruit applied to smolt release. Includes supplementation releases, using same method.
Hoh	Natural	8.5	3.5	3.2	3.4	2.8	4.2	Average Queets smolts per square mile multiplied by 299 square miles of Hoh River watershed and recent year marine survivals for Bingham Creek and Queets.

TABLE I-2. Preliminary, preseason **adult coho** salmon stock ocean abundance forecasts in thousands of fish. (Page 2 of 2)

Production Source and Stock or Stock Group		Preseason Estimates of Adults (Postseason Estimates in Parentheses) 2001	2000	1999	1998	1997	1996	Methodology for 2001 Prediction
Quillayute Fall Run	Natural	23.0	8.7	14.5	8.0	8.9	13.0	Estimated smolt production multiplied by average predicted survival rate from sea surface temperature and Bingham Creek jack models.
	Hatchery	15.3	13.9	9.4	4.4	9.1	13.9	Mean ocean recruits per release, multiplied by releases.
Quillayute Summer Run	Natural	0.6	1.6	1.2	1.3	1.6	0.9	Estimated smolt production multiplied by average predicted survival rate from sea surface temperature and Bingham Creek jack models.
	Hatchery	5.3	5.4	3.5	1.8	3.6	5.1	Average ocean recruits per release, multiplied by the number of smolts released.
WA Coast Total	Natural	125.7	78.6	96.5	56.8	45.7	152.7	
	Hatchery	144.6	133.9	105.8	61.1	211.5	228.9	
Puget Sound[a/]								b/
Strait Natural		21.4	13.5	14.7	16.8	6.5	10.7	
	Hatchery	14.4	13.6	37.7	28.3	29.7	38.2	
Nooksack-Samish	Natural	12.4	14.9	13.8	30.8	28.0	55.8	
	Hatchery	44.4	65.5	95.0	119.1	223.3	328.9	
Skagit	Natural	87.2	30.2	75.7	55.0	70.9	44.8	
	Hatchery	10.1	10.3	10.9	12.9	22.1	45.2	
Stillaguamish	Natural	24.4	17.7	35.7	47.8	36.0	51.6	
Snohomish	Natural	129.6	53.0	141.6	165.3	186.6	338.1	
	Hatchery	60.9	62.1	87.8	47.1	184.6	212.9	
South Sound	Natural	29.5	11.7	19.4	57.2	135.0	142.5	
	Hatchery	172.6	121.8	372.1	408.7	674.1	659.9	
Hood Canal	Natural	62.0	61.0	65.1	108.0	78.4	25.1	
	Hatchery	33.5	38.5	96.8	95.2	66.3	59.6	
Puget Sound Total	Natural	366.5	202.0	366.0	480.9	541.4	668.6	
	Hatchery	335.9	311.8	700.3	711.3	1,200.1	1,344.7	

a/ Run sizes scaled to FRAM base period (1979-1981) catch and escapement.

b/ A variety of methods were used for 2001, 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.

TABLE I-3. Achievement of **conservation objectives** for natural stocks listed in Table 3-1 of Amendment 14. 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 Conservation Objective (thousands of spawners; spawners per mile; impact or replacement rate)	**Observed or Projected Conservation Achievement** (postseason estimates of thousands of spawners or spawners per mile; pre- or postseason impact or replacement rate)							**Overfishing Criteria**		
	1995	1996	1997	1998	1999	2000[a/]	2001[b/]	Alert[c/]	Concern[d/]	Exception[e/]
CHINOOK										
Sacramento River Fall 122.0 - 180.0 hatchery and natural spawners	267.8	244.4	323.9	237.5	273.3	428.3	>180.0	No	No	
Klamath River Fall - no less than 35.0 adult spawners	161.7	81.0	46.1	42.5	**18.5**	80.0	>35.0	No	No	
Southern, Central and Northern Oregon Coast No less than 60 adult spawners/mile[f/]	93.3	135.0	92.6	101.6	107.0	76.0	>60.0	No	No	
Upper Columbia River Bright 43.5 adults over McNary Dam Base period impacts <4%.	68.2	73.9	67.1	63.8	78.4	66.4	>43.5	No	No	✓
Upper Columbia River Summer 80.0 to 90.0 adults over Bonneville Dam. Base period ocean impacts <2%. Long history of dam passage and habitat losses.	**14.6**	**15.5**	**27.6**	**21.1**	**25.7**	**30.3**	**<80.0**	Limited[e/]	Limited[e/]	✓
Grays Harbor Fall - 14.6 adult spawners (MSP)	**12.7**	20.2	18.2	**12.5**	**10.4**	NA	NA[g/]	NA[g/]	No	✓
Grays Harbor Spring - 1.4 adult spawners	2.1	4.5	4.4	2.3	**1.3**	NA	NA[g/]	NA[g/]	No	✓
Queets Fall - no less than 2.5 adult spawners (MSY)	2.9	3.4	2.5	4.0	**1.9**	3.6	NA[g/]	NA[g/]	No	✓
Queets Spring/Summer - no less than 0.7 adult spawners	**0.63**	0.78	**0.54**	**0.49**	**0.37**	NA	NA[g/]	NA[g/]	Limited[e/]	✓
Hoh Fall - no less than 1.2 adult spawners (MSY)	2.2	3.0	1.8	4.3	1.9	1.8	NA[g/]	NA[g/]	No	✓
Hoh Spring/Summer - no less than 0.9 adult spawners	1.1	1.4	1.8	1.3	1.0	**0.5**	NA[g/]	NA[g/]	No	✓
Quillayute Fall - no less than 3.0 adult spawners (MSY)	5.5	7.3	5.4	6.7	3.3	4.0	NA[g/]	NA[g/]	No	✓
Quillayute Spring/Summer - 1.2 adult spawners (MSY)	1.3	1.2	**0.9**	1.6	**0.7**	**0.9**	NA[g/]	NA[g/]	No	✓

TABLE I-3. Achievement of **conservation objectives** for natural stocks listed in Table 3-1 of Amendment 14. 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 Conservation Objective (thousands of spawners; spawners per mile; impact or replacement rate)	**Observed or Projected Conservation Achievement** (postseason estimates of thousands of spawners or spawners per mile; pre- or postseason impact or replacement rate)							**Overfishing Criteria**		
	1995	1996	1997	1998	1999	2000[a/]	2001[b/]	Alert[c/]	Concern[d/]	Exception[e/]
COHO										
Grays Harbor - 35.4 adult spawners (MSP)	47.4	63.6	**22.5**	35.6	**33.3**	NA	>35.4	No	No	
Queets - 5.8 to 14.5 adult spawners (MSY range) Includes supplemental adults.	6.8	12.6	**1.9**	**5.5**	**5.3**	8.1	>5.8	No	Under Review	
Hoh - 2.0 to 5.0 adult spawners (MSY range)	4.7	4.9	**1.4**	4.9	4.9	4.0	>2.0	No	No	
Quillayute Fall - 6.3 to 15.8 adult spawners (MSY range)	10.0	11.0	**4.6**	13.9	9.4	11.6	>6.3	No	No	
Western Strait of Juan de Fuca - 11.9 adult spawners		**3.7**	**4.1**	15.1	15.1	NA	>11.9	No	No	
Eastern Strait of Juan de Fuca - 0.95 adult spawners		2.03	1.69	1.39	**0.8**	NA	>0.95	No	No	
Hood Canal - 21.5 adult spawners (MSP)	40.3	37.1	96.4	101.0	**16.5**	NA	>21.5	No	No	
Skagit - 30.0 adult spawners (MSP)	**13.4**	**8.3**	32.6	76.8	NA	NA	>30.0	No	No	
Stillaguamish - 17.0 adult spawners (MSP)	21.9	**10.2**	**11.0**	27.2	**7.0**	28.3	>17.0	No	No	
Snohomish - 70.0 adult spawners (MSP)	110.3	**53.1**	**58.2**	150.0	**61.0**	94.2	>70.0	No	No	

a/ Preliminary estimates.

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 Klamath River fall chinook spawners]).
Actions for Stocks that are not Exceptions (beginning in 2001) - 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, which may vary from the MSY or MSP conservation objectives. For all natural stocks which 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 that state and tribal fishery managers identify the probable causes, if known. If the stock in question has not met its conservation objective in the previous two years, the Council will request the pertinent state and tribal managers to do a formal assessment of the primary factors leading to the shortfalls and report their conclusions and recommendations 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 HSG to provide recommendations for habitat restoration and enhancement measures within a suitable time frame.

e/ **Exception** - strict 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 limited to 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) - Utilize expertise of STT and HSG 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.

TABLE I-3. Achievement of conservation objectives for natural stocks listed in Table 3-1 of Amendment 14. Bolded numbers indicate a failure to meet the conservation objective. Stocks listed under the Endangered Species Act are not included. (Page 3 of 3)

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 9.2 miles for northern stocks).

g/ Preseason forecasts are not made for Washington coastal chinook stocks.

CHAPTER II
CHINOOK SALMON ASSESSMENT

SACRAMENTO RIVER FALL CHINOOK SALMON

Predictor Description

The Council's framework amendment sets the escapement goal for Sacramento River fall chinook as a range from 122,000 to 180,000 adults. This fall stock comprises over 90% of the escapement of all chinook stocks that return to Central Valley streams and hatcheries. The Central Valley index (CVI), which provides an annual index of abundance for the combined Central Valley chinook stocks, is the sum of ocean fishery chinook harvests in the area south of Point Arena plus the Central Valley adult chinook spawning escapement (Table II-1). The CVI harvest index is the ocean harvest landed south of Point Arena, divided by the CVI.

Prior to 1989, the Salmon Technical Team (STT) based its projection of the CVI on recent CVI levels (with general consideration given for brood year natural escapements), hatchery releases, and the previous year jack returns. Between 1989 and 1991, several predictors of the CVI were evaluated, including weight and number of juveniles in hatchery releases and previous year jack returns. Since 1991, the STT has used a linear regression of the CVI on the previous year's Central Valley jack return to forecast the CVI (Figure II-1).

Predictor Performance

For the 1985-2000 period, the CVI preseason forecast has ranged from 50% to 167% of the postseason CVI estimate (Table II-2).

The 2000 CVI projection of 790,400 fish was based on the jack to CVI relationship from 1990 to 1999. The postseason estimate for the 2000 CVI was 1,044,500 fish, approximately 32% higher than the preseason projection (Table II-2). The postseason estimate of 54% for the CVI harvest index was 6% higher than the preseason projection of 51% (Table II-1).

2001 Stock Status

The CVI projection for 2001, based on the jack to CVI relationship of the most recent ten years of data (1991-2000), is 649,400 adult chinook (Figure II-1), 82% of the 2000 projection and 62% of the actual 2000 estimated return.

Evaluation of 2000 Regulations on 2001 Stock Abundance

The CVI harvest index has varied significantly since it was first calculated in 1970. After reaching its lowest level of 51% in 1985, the index rose to 78% in 1988 and ranged between 71% and 78% over the 1989-1995 period (Table II-1). The CVI harvest index fell to approximately 65% in 1996 and 1997, and to approximately 54% in 1998, 1999, and 2000. This decline in the CVI harvest index accompanied the observed reduction in fishing effort south of Point Arena between 1996 and 2000.

A repeat of 2000 regulations would be expected to result in a CVI harvest index similar to that observed in 2000 (54%). Applying the complement of this fraction (1 - 0.54) to the 2001 CVI projection of 649,400 fish and multiplying that quantity by the typical percentage of Central Valley chinook spawners that are fall run fish (approximately 90%), yields a projected 2001 adult escapement of 268,900 Sacramento River fall chinook, which is above the upper end of the escapement goal range (Figure II-2).

TABLE II-1. Indices of annual **abundance and ocean** fishery **impacts** on **California Central Valley chinook** in thousands of fish. (Page 1 of 1)

	Ocean Chinook Landings South of Pt. Arena			Hatchery and Natural Escapements of Central Valley Adults				
Year	Troll	Sport	Total	Fall	Other[a/]	Total	CVI Abundance (Ocean Landings + Escapement)	CVI Harvest Index (%)[b/]
1970	226.8	111.1	337.9	190.5	55.6[c/]	246.1	584.0	58
1971	150.7	166.3	317.0	190.6	62.0	252.6	569.6	56
1972	229.8	187.6	417.4	99.6	46.1	145.7	563.1	74
1973	422.5	180.9	603.4	227.1	27.1	254.2	857.6	70
1974	282.7	141.6	424.3	205.6	35.7	241.3	665.6	64
1975	234.4	92.7	327.1	159.2	47.6	206.8	533.9	61
1976	237.9	68.6	306.4	168.8	43.8	212.6	519.0	59
1977	263.8	76.6	340.4	148.7	42.8	191.5	531.9	64
1978	291.0	65.9	356.9	136.9	17.1	154.0	510.9	70
1979	234.1	108.5	342.6	167.9	11.3	179.2	521.8	66
1980	294.3	77.1	371.4	155.9	31.6	187.5	558.9	66
1981	289.9	73.8	363.7	189.3	18.8	208.1	571.8	64
1982	418.4	122.5	540.9	177.2	38.3	215.5	756.4	72
1983	178.2	53.0	231.2	121.0	12.8	133.8	365.0	63
1984	221.7	78.7	300.3	197.5	17.0	214.5	514.8	58
1985	212.3	121.8	334.1	308.9	18.1	327.0	661.1	51
1986	502.5	114.8	617.3	259.0	33.2	292.2	909.5	68
1987	446.8	152.8	599.7	188.0	25.5	213.5	813.2	74
1988	830.5	130.4	960.9	244.9	28.0	272.9	1,233.8	78
1989	363.8	130.9	494.7	149.6	17.9	167.5	662.2	75
1990	336.2	112.7	448.9	108.3	13.6	121.9	570.8	79
1991	254.6	62.1	316.7	112.3	15.3	127.6	444.3	71
1992	163.5	66.7	230.2	85.3	8.2	93.5	323.7	71
1993	259.7	99.3	359.0	131.5	10.4	141.9	500.9	72
1994	290.4	159.9	450.3	148.8	6.8	155.6	605.9	74
1995	670.6	354.6	1,025.2	272.0	16.2	288.2	1,313.4	78
1996	348.9	129.3	478.2	255.3	8.7	264.0	742.2	64
1997	482.5	208.4	690.9	350.8	17.4	368.2	1,059.1	65
1998	221.9	114.4	336.3	253.0	39.1	292.1	628.4	54
1999	285.6	76.4	362.0	289.8	20.5	310.3	672.3	54
2000[d/]	418.4	141.1	559.5	469.2	15.8[e/]	485.0	1,044.5	54

a/ Spring run of the current calendar year and late fall and winter runs of the following calendar year.
b/ Ocean harvest landed south of Pt. Arena as a percent of the CVI.
c/ Percent of adults in 1970 spring run assumed the same as 1971 (72%, 5,500 total).
d/ Preliminary.
e/ Late-fall and winter contributions unknown - respective averages of 1996-2000 escapement used.

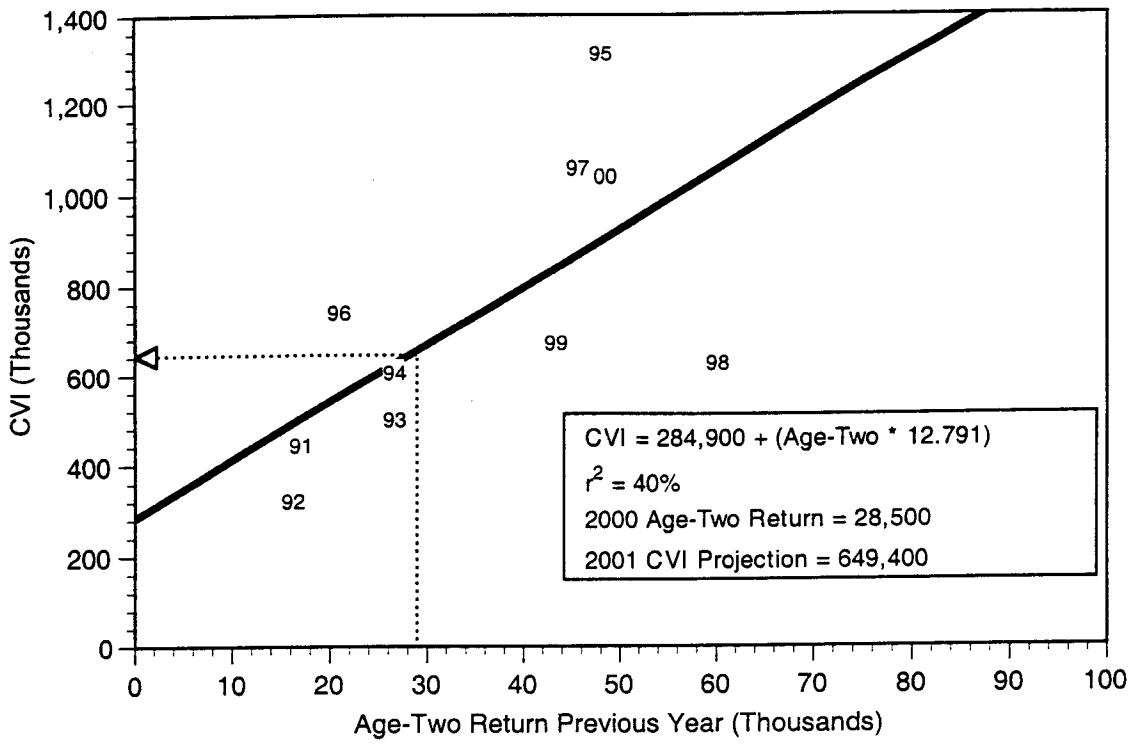

FIGURE II-1. Linear regression of CVI on inriver age-two Central Valley chinook of the previous year, 1991-2000. Years shown are CVI year.

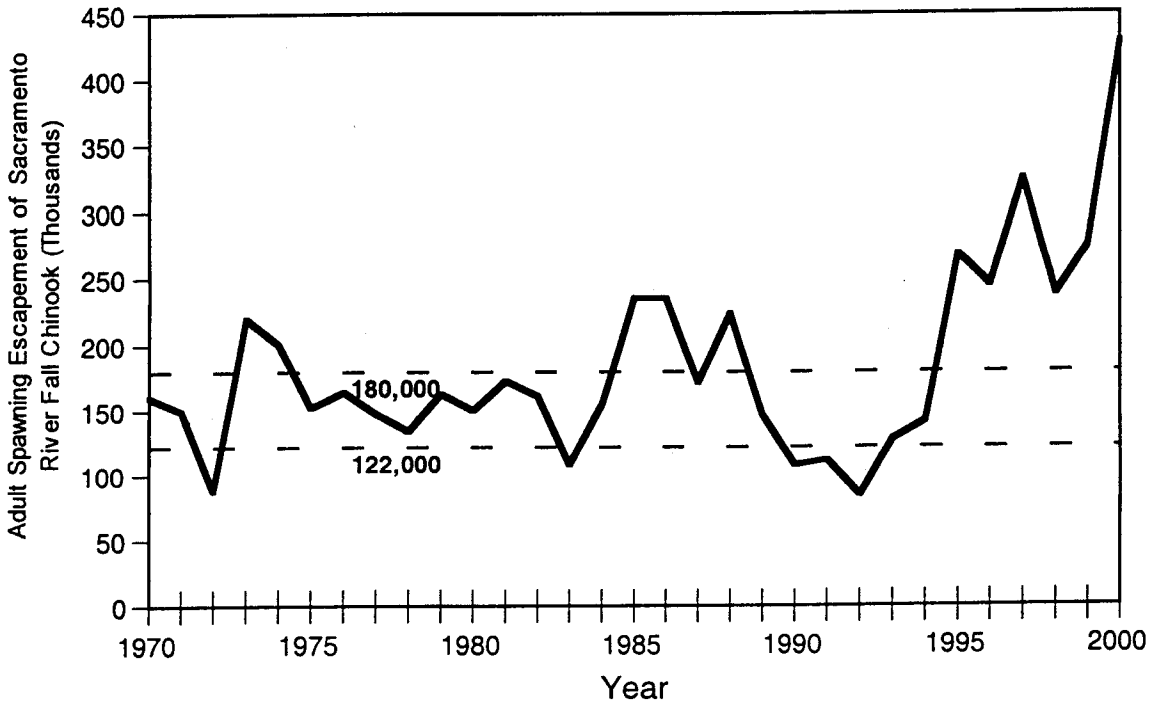

FIGURE II-2. Spawning escapements of adult Sacramento River fall chinook, 1970-2000, and the goal range for the stock of 122,000 to 180,000 adult fish (2000 estimate is preliminary).

TABLE II-2. Comparisons of **preseason and postseason** estimates for the **CVI** in thousands of fish. (Page 1 of 1)

Year	Preseason	Postseason	Preseason/Postseason
1985	524.8	661.1	0.79
1986	546.5	909.5	0.60
1987	592.9	813.2	0.73
1988	707.1	1,233.8	0.57
1989	625-885	662.2	0.94-1.34
1990	500-900	570.7	0.88-1.58
1991	466.0	444.3	1.05
1992	452.0	323.7	1.40
1993	501.0	500.9	1.00
1994	503.0	605.9	0.83
1995	654.0	1,313.4	0.50
1996	533.0	742.2	0.72
1997	849.0	1,059.1	0.80
1998	1,051.0	628.4	1.67
1999	847.7	672.3	1.26
2000	790.4	1044.5	0.76

KLAMATH RIVER FALL CHINOOK

Predictor Description

For Klamath River fall chinook, linear regressions relate the preseason ocean abundance estimates of age-three, age-four, and age-five fish to the previous year's inriver run size estimates of age-two, age-three, and age-four fish, respectively (Table II-3). Historical abundance estimates were derived from a cohort analysis of coded-wire tag (CWT) information (brood years 1979-1996). The y-intercept of the regressions was constrained to zero, which gives the biologically reasonable expectation that a river run size of zero predicts an ocean abundance of zero for the same cohort the following spring. The abundance of age-two fish was not projected, because no precursor to age-two fish of that brood is available. Ocean fisheries harvest small numbers of age-two and age-five Klamath River fall chinook.

Predictor Performance

Since 1985, the preseason ocean abundance projections for age-three fish have ranged from 29% to 213% of the postseason abundance estimates (Table II-4). The age-four preseason projections for these same years ranged from 58% to 310% of the postseason estimates. For years of low stock abundance, particularly 1991-1994, the regression models generally have overpredicted ocean stock size. The 2000 age-three preseason prediction was 37% of the postseason estimate, while the age-four prediction was 84% of the postseason estimate (Table II-4).

Management of Klamath River fall chinook harvest since 1986 has attempted to achieve specific harvest rates on fully-vulnerable age-four and age-five fish in ocean and inriver fisheries (Table II-5). The Council has used a combination of quotas and time/area restrictions in ocean fisheries in an attempt to meet the harvest rate goal set each year. Since 1992, fisheries have been managed to achieve 50/50 allocation between tribal and non-tribal fisheries. Inriver fisheries have been managed on the basis of adult chinook quotas (tribal net fishing) and partial quotas that trigger area closures (recreational fishing).

The Council's framework plan goal for Klamath River fall chinook (Amendment 9) permits a natural spawner reduction rate via fisheries of no more than 67%, with a minimum escapement of 35,000 natural spawning adults. The amendment allows for any ocean and inriver allocation that meets the spawner reduction rate goal if it also meets the minimum escapement floor. Based on the preseason estimate, the regulations adopted in 2000 by the Secretary of Commerce were expected to provide an inriver escapement of 50,000 adults, with 35,000 spawning in natural areas, and an age-four ocean harvest rate of 14%. Based on postseason estimates, the 2000 age-4 ocean harvest rate was 12% (Table II-6). The postseason estimate of the 2000 ocean abundance is 478,000 age-three fish and 37,000 age-4 fish, whereas their preseason forecasts were 174,800 age-three fish and 31,100 age-4 fish. The 2000 spawning escapement was 180,200 adults, of which 82,600 spawned in natural areas.

2001 Stock Status

The projected 2001 ocean abundance of Klamath River fall chinook salmon is 93,500 age-three fish (Figure II-3), 197,600 age-four fish (Figure II-4), and 1,000 age-five fish.

In the absence of ocean and inriver fisheries in 2001, the projected stock abundance, based on the average maturity rates observed for the 1979-1995 broods (39.9%, 93.9%, and 100% for age-three, age-four, and age-five fish, respectively), is a 2001 spawning population of 219,300 adults. Assuming the five-year average natural spawner proportion (63%), 138,200 of these fish would be expected to spawn in natural areas. In 2000, 46% of the adults returning to the river spawned in natural areas.

Late-season ocean fisheries in 2000 (September-November) were estimated to have harvested zero age-three, 3,000 age-four, and 90 age-five Klamath River fall chinook (in summer equivalent units). This harvest will be deducted from the ocean fishery's allocation in determining the 2001 allowable ocean harvest.

TABLE II-3. Estimated number of **fall chinook** salmon **by age** entering the **Klamath River** in thousands of fish, including estimates of ocean harvest rates and ocean abundance.[a/] (Page 1 of 1)

	River Run					Ocean Harvest Rate		Ocean Abundance		
Calendar Year	Age-2	Age-3	Age-4	Age-5	Total Adults	Age-3	Age-4	Age-3	Age-4	Total
1981	28.1	64.0	14.3	1.8	80.1	0.42	0.66	246.6	45.6	292.2
1982	39.4	30.0	33.9	2.6	66.5	0.57	0.65	344.5	106.7	451.2
1983	3.8	35.8	20.7	0.9	57.5	0.28	0.70	103.8	84.9	188.7
1984	8.3	29.6	15.2	2.3	47.1	0.14	0.43	103.0	29.1	132.1
1985	69.4	30.7	32.7	0.9	64.4	0.25	0.29	138.0	46.0	184.0
1986	44.5	167.9	26.9	0.1	194.8	0.30	0.52	604.1	56.1	660.2
1987	19.0	120.7	88.0	b/	208.7	0.36	0.53	415.4	192.9	608.4
1988	24.0	136.5	53.5	1.2	191.3	0.37	0.45	612.2	108.7	720.9
1989	9.1	15.2	105.6	3.2	124.0	0.21	0.44	129.7	190.0	319.7
1990	4.4	9.1	26.6	0.2	35.8	0.61	0.61	113.3	68.7	182.0
1991	1.8	14.4	18.1	0.1	32.6	0.10	0.21	43.8	24.8	68.7
1992	13.7	7.3	18.3	1.0	26.7	0.02	0.04	20.5	20.0	40.5
1993	7.6	48.7	7.8	0.6	57.1	0.11	0.11	98.0	10.1	108.2
1994	14.4	35.6	25.0	1.0	61.6	0.05	0.07	68.8	30.4	99.2
1995	22.8	194.0	17.3	2.4	213.7	0.10	0.21	457.2	23.4	480.6
1996	9.5	38.9	136.2	0.3	175.4	0.08	0.17	112.6	171.2	283.8
1997	8.0	34.9	44.2	4.6	83.7	0.08	0.10	86.2	51.4	137.6
1998	4.6	58.7	30.1	1.7	90.6	0.02	0.10	90.0	35.5	125.4
1999	19.1	29.4	20.2	1.3	50.9	0.03[c/]	0.12	78.3[c/]	23.8	102.1
2000	10.2	186.6	30.3	0.5	217.4	d/	0.12[c/]	478.0[e/]	37.0[c/]	514.9

a/ Ocean harvest rate and ocean abundance of age-3 fish in 1981 and age-4 fish in 1981 and 1982 from CDFG; all others from KRTAT.
b/ Fewer than 50 fish.
c/ Preliminary: incomplete cohort data (age-5 data unavailable).
d/ Not estimated: incomplete cohort data (age-4 and age-5 data unavailable).
e/ Preliminary: incomplete cohort data (age-4 and age-5 data unavailable).

TABLE II-4. Comparisons of **preseason and postseason** ocean abundance estimates for age-three and age-four **Klamath River fall chinook**. (Page 1 of 1)

Season	Preseason Estimate	Postseason Estimate	Pre/Postseason
		Age-Three	
1985	56,500	138,000	0.41
1986	213,000[a/]	604,100	0.35
1987	255,900	415,400	0.62
1988	185,400	612,200	0.30
1989	225,300	129,700	1.74
1990	239,500	113,300	2.11
1991	88,100	43,800	2.01
1992	25,000	20,500	1.22
1993	147,200	98,000	1.50
1994	69,000	68,800	1.00
1995	134,500	457,200	0.29
1996	239,900	112,600	2.13
1997	112,300	86,200	1.30
1998	88,000	90,000	0.98
1999	42,400	88,300[b/]	0.54
2000	174,800	478,000[b/]	0.37
		Age-Four	
1985	45,500	46,000	0.99
1986	53,000	56,100	0.94
1987	164,900	192,900	0.85
1988	149,100	108,700	1.37
1989	172,400	190,000	0.91
1990	40,100	68,700	0.58
1991	35,700	24,800	1.44
1992	35,800	20,000	1.79
1993	31,300	10,100	3.10
1994	68,900	30,400	2.27
1995	37,600	23,400	1.61
1996	214,800	171,200	1.25
1997	43,100	51,400	0.84
1998	36,800	35,500	1.04
1999	63,000	23,800	2.65
2000	31,100	37,000[b/]	0.84

a/ A scalar of 0.75 was applied to the jack count because, (1) most jacks returned to the Trinity River, and (2) the jack count was outside the database range.

b/ Preliminary (incomplete cohort data).

TABLE II-5. Summary of **management objectives** and performance for **Klamath River fall chinook**. (Page 1 of 1)

	Preseason Stock Abundance Projection		Postseason Stock Abundance Estimate		Preseason Harvest Rate Target on Age-four Fish[a/]		Postseason Harvest Rate on Age-four Fish[b/]		Preseason Adult Harvest Projection		Postseason Adult Harvest Estimate	
Year	Age-3	Age-4	Age-3	Age-4	Ocean	River	Ocean	River	Ocean	River	Ocean	River
1986	213,000	53,000	604,100	56,100	0.35	0.50	0.52	0.74	72,000	37, 700	224,200	46,200
1987	255,900	164,900	415,400	192,900	0.35	0.53	0.53	0.56	121,200	78,200	260,900	73,300
1988	185,400	149,100	612,200	108,700	0.39	0.53	0.45	0.84	114,100	65,400	288,300	73,900
1989	225,300	172,400	129,700	190,000	0.38	0.49	0.44	0.46	128,100	67,600	114,000	54,300
1990	239,500	40,100	113,300	68,700	0.38	0.49	0.61	0.31	85,100	31,200	115,700	11,400
1991	88,100	35,700	43,800	24,800	0.16	0.28	0.21	0.43	16,700	12,800	9,700	13,600
1992	25,000	35,800	20,500	20,000	0.08	0.15	0.04	0.26	4,200	4,200	1,600	6,800
1993	147,200	31,300	98,000	10,100	0.15	0.43	0.11	0.47	20,100	22,500	12,500	12,800
1994	69,000	68,900	68,800	30,400	0.09	0.20	0.07	0.30	10,400	14,300	6,000	13,500
1995	134,500	37,600	457,200	23,400	0.09	0.32	0.21	0.20	13,500	18,500	54,200	21,600
1996	239,900	214,800	112,600	171,200	0.21	0.66	0.17	0.39	88,400	129,100	38,600	69,200
1997	112,300	43,100	86,200	51,400	0.12	0.43	0.10	0.26	17,600	26,500	12,600	17,800
1998	88,000	36,800	90,000	35,500	0.09	0.29	0.10	0.30	10,200	14,800	5,200	17,900
1999	42,400	63,000	78,300	23,800	0.12	0.28	0.12	0.45	12,300	18,100	5,600	16,700
2000[c/]	174,800	31,100	478,000	37,000	0.14	0.53	0.12	0.24	24,000	32,400	42,600	34,800

a/ Ocean harvest rate target expressed as fraction of ocean stock projection. River harvest rate target expressed as fraction of fish projected to enter the river.
b/ Ocean harvest rate expressed as fraction of ocean stock abundance. River harvest rate expressed as fraction of fish entering the river.
c/ Preliminary.

TABLE II-6. **Harvest** levels and rates of age-three and age-four **Klamath River fall chinook** (biological years are defined as September 1 through August 31 for ocean fisheries). (Page 1 of 2)

	Ocean Fisheries							River Fisheries[a/]		
	KMZ			North of	South of		Ocean			
Year	Troll	Sport	Subtotal	KMZ	KMZ	Subtotal	Total	Net	Sport	Total
					HARVEST LEVELS (numbers of fish)					
Age-Three										
1986	30,040	3,759	33,799	58,086	103,129	161,214	195,013	8,100	18,100	26,200
1987	24,826	6,032	30,858	43,453	84,487	127,940	158,798	11,400	11,400	22,800
1988	29,739	7,625	37,364	44,685	156,167	200,852	238,216	12,500	15,600	28,100
1989	735	5,307	6,042	12,206	10,342	22,547	28,589	2,700	900	3,600
1990	1,324	8,741	10,065	42,998	20,131	63,129	73,194	1,300	1,400	2,700
1991	0	1,456	1,456	839	2,172	3,011	4,467	2,124	1,999	4,123
1992	0	0	0	514	0	514	514	970	638	1,608
1993	0	1,080	1,080	1,037	9,248	10,285	11,365	5,707	3,016	8,723
1994	57	283	340	0	3,592	3,592	3,931	4,543	972	5,515
1995	0	1,708	1,708	21,384	26,096	47,480	49,188	11,840	5,531	17,371
1996	73	256	329	110	8,952	9,061	9,390	12,363	3,801	16,164
1997	0	1,161	1,161	2,031	3,772	5,803	6,964	2,166	2,736	4,902
1998	0	149	149	398	921	1,319	1,468	2,231	5,782	8,013
1999	95	332	427	1,754	1,474	2,227	2,654	4,887	1,735	6,622
2000[b/]	335	3,263	3,598	12,960	21,499	34,460	38,058	22,458	4,714	27,172
Age-Four										
1986	3,588	532	4,119	12,145	12,876	25,022	29,141	17,000	2,900	19,900
1987	13,784	2,992	16,777	48,526	36,751	85,276	102,053	41,000	8,500	49,500
1988	5,958	2,919	8,876	12,371	27,704	40,076	48,952	38,600	6,200	44,800
1989	12,359	1,310	25,461	33,928	24,217	58,145	83,606	41,000	7,700	48,700
1990	1,118	2,842	3,960	29,414	8,655	38,069	42,029	6,000	2,200	8,200
1991	73	655	727.842	746	3,714	4,461	5,189	7,598	1,356	8,954
1992	47	47	94	687	78	765	859	4,360	334	4,694
1993	0	0	0	226	867	1,093	1,093	3,549	145	3,694
1994	0	592	592	473	1,033	1,506	2,098	6,666	812	7,478
1995	0	176	176	1,850	2,789	4,639	4,815	2,957	485	3,442
1996	755	1,144	1,899	6,883	19,656	26.539	28,438	43,959	8,942	52,901
1997	303	683	986.333	1,631	2,390	4,021	5,007	8,734	2,585	11,319
1998	0	117	117	3,546	0	3,546	3,663	7,163	1,821	8,984
1999	26	464	490	1,612	851	2,463	2,953	8,679	488	9,167
2000[b/]	108	621	729	2,699	1,107	3,805	4,534	6,733	621	7,354
					HARVEST RATE					
Age-Three										
1986	0.05	0.01	0.06	0.10	0.17	0.27	0.32	0.05	0.11	0.16
1987	0.06	0.01	0.07	0.10	0.20	0.31	0.38	0.09	0.09	0.19
1988	0.05	0.01	0.06	0.07	0.26	0.33	0.39	0.09	0.11	0.21
1989	0.01	0.04	0.05	0.09	0.08	0.17	0.22	0.18	0.06	0.24
1990	0.01	0.08	0.09	0.38	0.18	0.56	0.65	0.14	0.15	0.30
1991	0.00	0.03	0.03	0.02	0.05	0.07	0.10	0.20	0.18	0.38
1992	0.00	0.00	0.00	0.03	0.00	0.03	0.03	0.13	0.09	0.22
1993	0.00	0.01	0.01	0.01	0.09	0.10	0.12	0.12	0.06	0.18
1994	0.00	0.00	0.00	0.00	0.05	0.05	0.06	0.13	0.03	0.15
1995	0.00	0.00	0.00	0.05	0.06	0.10	0.11	0.06	0.03	0.09
1996	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.32	0.10	0.42
1997	0.00	0.01	0.01	0.02	0.04	0.07	0.08	0.06	0.08	0.14
1998	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.04	0.10	0.14
1999	0.00	0.00	0.01	0.02	0.01	0.03	0.03	0.17	0.06	0.23
2000[b/]	0.00	0.01	0.01	0.03	0.04	0.07	0.08	0.12	0.03	0.15

TABLE II-6. **Harvest** levels and rates of age-three and age-four **Klamath River fall chinook** (biological years are defined as September 1 through August 31 for ocean fisheries). (Page 1 of 2)

	Ocean Fisheries							River Fisheries[a/]		
	KMZ			North of	South of		Ocean			
Year	Troll	Sport	Subtotal	KMZ	KMZ	Subtotal	Total	Net	Sport	Total
					HARVEST RATE (continued)					
Age-Four										
1986	0.06	0.01	0.07	0.22	0.23	0.45	0.52	0.63	0.11	0.74
1987	0.07	0.02	0.09	0.25	0.19	0.44	0.53	0.47	0.10	0.56
1988	0.05	0.03	0.08	0.11	0.25	0.37	0.45	0.72	0.12	0.84
1989	0.07	0.07	0.13	0.18	0.13	0.31	0.44	0.39	0.07	0.46
1990	0.02	0.04	0.06	0.43	0.13	0.55	0.61	0.23	0.08	0.31
1991	0.00	0.03	0.03	0.03	0.15	0.18	0.21	0.37	0.07	0.43
1992	0.00	0.00	0.00	0.03	0.00	0.04	0.04	0.24	0.02	0.26
1993	0.00	0.00	0.00	0.02	0.09	0.11	0.11	0.45	0.02	0.47
1994	0.00	0.02	0.02	0.02	0.03	0.05	0.07	0.27	0.03	0.30
1995	0.00	0.01	0.01	0.08	0.12	0.20	0.21	0.17	0.03	0.20
1996	0.00	0.01	0.01	0.04	0.11	0.16	0.17	0.32	0.07	0.39
1997	0.01	0.01	0.02	0.03	0.05	0.08	0.10	0.20	0.06	0.26
1998	0.00	0.00	0.00	0.10	0.00	0.10	0.10	0.24	0.06	0.30
1999	0.00	0.02	0.02	0.07	0.04	0.10	0.12	0.43	0.02	0.45
2000[b/]	0.00	0.02	0.02	0.07	0.03	0.10	0.12	0.22	0.02	0.24

a/ Net fishery estimates provided by Yurok and Hoopa Tribes. Sport fishery estimates provided by CDFG.
b/ Preliminary data (incomplete cohort)

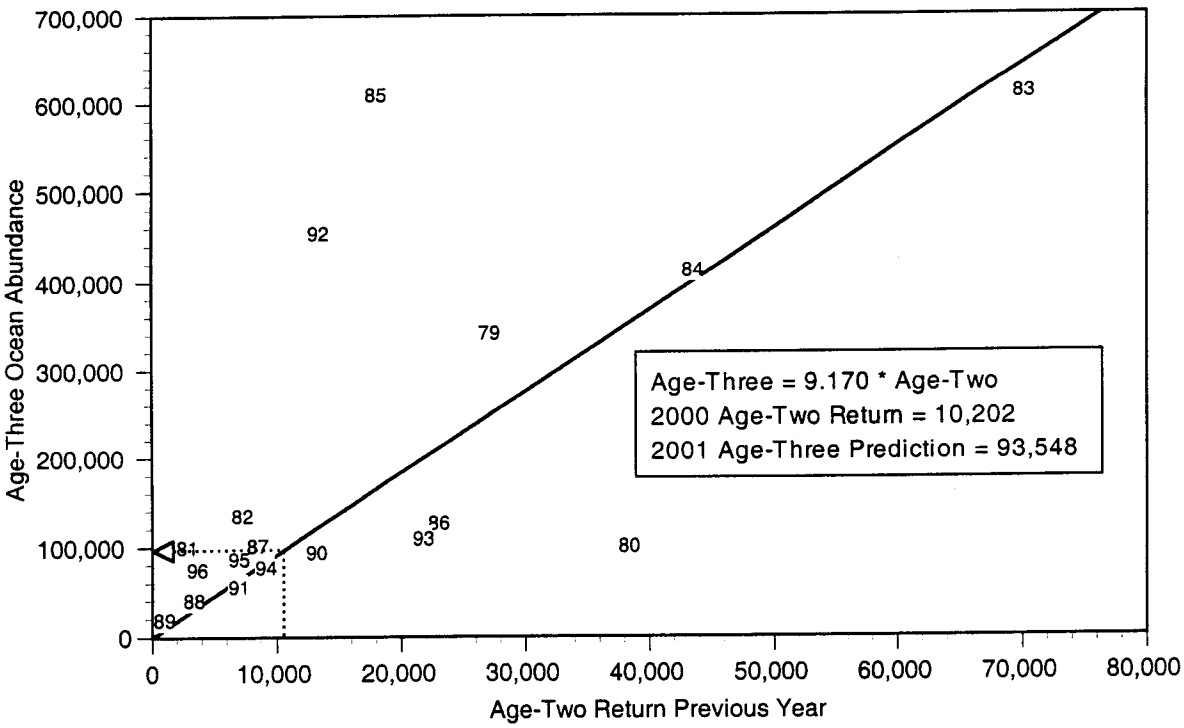

FIGURE II-3. Linear regression of age-three ocean abundance on inriver age-two Klamath River fall chinook of the same cohort, 1979-1996 broods (years shown are brood years).

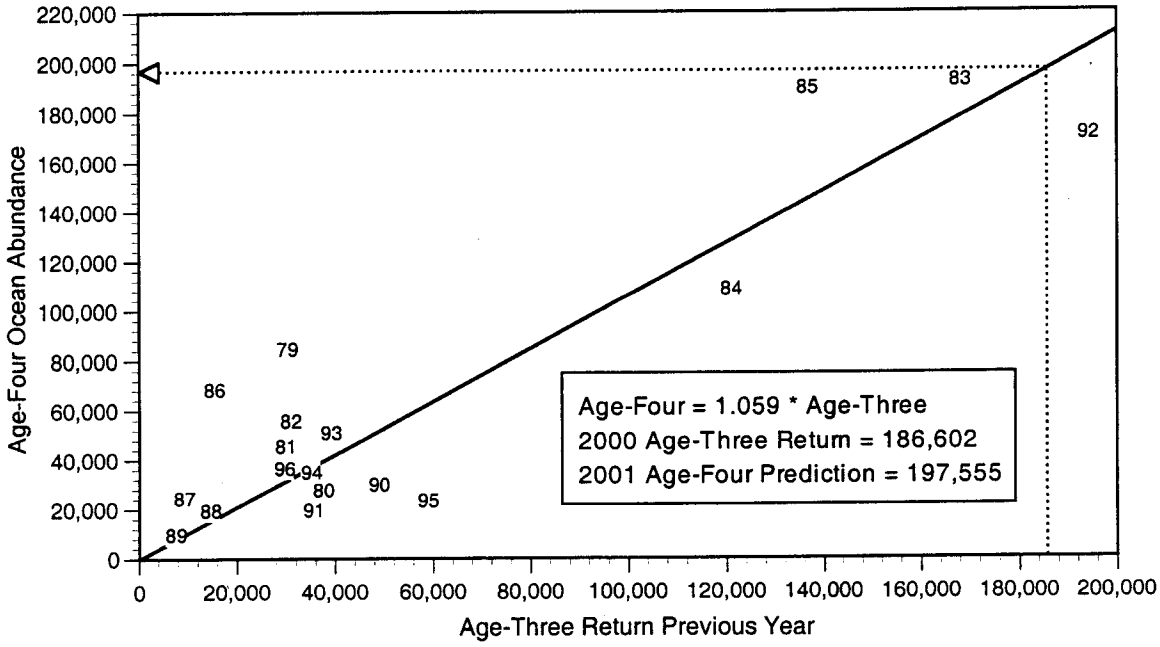

FIGURE II-4. Linear regression of age-four ocean abundance on inriver age-three Klamath River fall chinook of the same cohort, 1979-1996 broods (years shown are brood years).

Evaluation of 2000 Regulations on 2001 Stock Abundance

The Klamath Ocean Harvest Model (KOHM) has not yet been updated to evaluate 2001 ocean fishery options. The KOHM was developed for use in evaluating 1988 fishery options and has been updated each year thereafter. When the model is calibrated for 2001, it will be calibrated to the average 1986-1990 fishery observations and expected 2001 stock strengths for Klamath, Central Valley, and Rogue River fall chinook. A precise evaluation of the 2000 regulations coupled with the 2001 stock predictions is not possible at this time. However, the Harvest Rate Model (HRM) developed by the Klamath River Technical Advisory Team (KRTAT) provides an approximate evaluation based on the following assumptions:

1. a maximum spawner reduction rate of 67%;
2. a natural spawner floor of 35,000 adults;
3. a 50% harvest share for the tribes; and
4. 15% of the nontribal harvest allocated to the inriver recreational fishery.

Under these assumptions, the HRM projects a spawning population of approximately 71,200 adults, of which 44,900 would be expected to spawn in natural areas. The total harvest projected by the HRM under this scenario would be 158,000 adults (tribes 79,000; in-river sport 11,900; ocean troll/sport 67,200), with age-four ocean and inriver harvest rates of 25.8% and 57.9%, respectively. HRM projections are provided for relative comparisons only; the Council does not use the HRM to model Klamath River fall chinook fisheries.

OTHER CALIFORNIA COASTAL CHINOOK STOCKS

Other California streams that contribute to ocean fisheries include the Smith, Little, Mad, Eel, and Mattole rivers, and Redwood Creek. All of these streams support fall stocks and are believed to contribute to ocean fisheries off the California and Oregon coasts. Current information is insufficient to forecast ocean abundance of these stocks.

OREGON COASTAL CHINOOK STOCKS

Oregon coastal chinook stocks are categorized into two major subgroups based on ocean migration patterns. Although their ocean harvest distributions overlap somewhat, they have been labeled as either north or south/local migrating.

North Migrating Chinook

North migrating chinook stocks include 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 north Oregon coast (NOC) river systems from the Nehalem through the Siuslaw Rivers are harvested primarily in Pacific Salmon Commission (PSC) ocean fisheries off British Columbia and southeast Alaska and to a much lesser degree in Council area fisheries off Washington, Oregon, and in terminal area (state waters) fisheries. CWT analysis indicates that populations from five major mid-Oregon coast (MOC) systems from the Coos to the Elk Rivers are harvested primarily in ocean fisheries off British Columbia, Washington, and Oregon, with minor contributions to California fisheries.

Predictor Description and 2001 Stock Status

Specific techniques have not been developed to make quantitative abundance predictions for these stocks for use in annual development of Council area fishery regulations. Qualitative expectations are based on parental year spawner escapement and recently developed hatchery indicator stocks for use in the PSC management process.

Natural spawner escapement is assessed yearly from streams between the Nehalem and Coquille rivers (inclusive). Peak spawning counts of adults are obtained from standard index areas on these rivers and monitored to assess stock trends (*Review of 2000 Ocean Salmon Fisheries*, Chapter II, Table II-4 and Figure II-3). Natural fall chinook stocks from the Nehalem River on the NOC south to the Elk River near Humbug

Mountain 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.

North Oregon Coast (NOC)

Since 1986, the Salmon River Hatchery production has been coded-wire-tagged and used as an indicator stock for the NOC stock component. Because these fish are mostly 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. Based on this indicator stock and compared with index abundances since 1986, expectations in 2001 are that the NOC stock will return at levels similar to recent year averages.

Mid-Oregon Coast (MOC)

Since 1992, the Elk River Hatchery production has been coded-wire-tagged for use as an indicator stock for the MOC stock component. Forecasts of abundance assume that river returns of younger age classes of a brood reflect abundance of the remaining, as yet immature, ocean residents of the brood. Age-specific ocean escapements for 2000 are not currently available. The STT has not undertaken a review of the methods used by ODFW staff in preparing these abundance forecasts.

Based on the density index of total spawners, the generalized expectation for Oregon coastal north migrating (NOC & MOC) stocks in 2001 is for average abundance. The density of adults observed since 1985 has met or exceeded the goal of 60-90 spawners per mile, a primary indicator that these stocks are generally healthy (Review of 2000 Ocean Salmon Fisheries, Appendix B, Table B-11).

South/Local Migrating Chinook

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

Predictor Description and 2001 Stock Status

Quantitative abundance predictions are not made for these stocks, although an abundance index for Rogue River fall chinook has been developed. General trends in stock abundance for southern Oregon coastal chinook stocks are assessed through escapement indices (*Review of 2000 Ocean Salmon Fisheries*, Chapter II, Table II-4 and Figures II-3 and II-4).

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. Also present in lesser numbers are hatchery fall chinook with the majority of releases occurring in the Chetco River. Substantial releases of hatchery spring chinook occur in both the Rogue and Umpqua Rivers.

Umpqua River and Rogue River Spring Chinook

Umpqua and Rogue rivers spring chinook contribute to ocean fisheries primarily as age-three fish. Mature (age-four and age-five) chinook enter the rivers primarily during April and May, generally prior to annual ocean fisheries. Quantitative abundance predictions are not made for these stocks.

Rogue River Fall Chinook

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

Annual predictions of Rogue River fall chinook are used for the purposes of ocean impact modeling and specifically for use in assessing allowable Klamath Management Zone (KMZ) area harvest. A Rogue River fall chinook ocean abundance index was developed based on carcass counts, ocean exploitation rates and cohort reconstruction methods. Linear regression analysis is used to relate the Rogue River fall chinook ocean abundance index for age-three, age-four, and age-five fish to inriver carcass counts of age-two, age-three and age-four fish, respectively, of the previous year. The inriver age composition estimates are based on scale sampling of carcasses. Ocean exploitation rates are based on Klamath River fall chinook CWT analysis since 1979 because Rogue River fall chinook ocean exploitation rate information is not available. The ocean harvest distribution and age composition of Rogue and Klamath fall chinook are assumed to be similar. The Rogue River fall chinook ocean abundance index for 2001 was unavailable when this report went to press, but is expected to be similar to the 2000 index of 6,000 chinook, and still below the long-term average (Table II-7).

Other Stocks

Information is insufficient to forecast the abundance of fall chinook from other smaller rivers south of the Elk River. These stocks are minor contributors to general season mixed stock ocean fisheries.

Evaluation of 2000 Regulations on 2001 Stock Abundance

Under 2000 regulations and the projected 2001 Oregon coastal chinook stock abundance, it is expected that the aggregate Oregon coastal chinook goal of 150,000 to 200,000 naturally spawning adults would be met.

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 of primarily hatchery or primarily natural production and originating above or below Bonneville Dam. The upriver brights (URB) and lower river wild (LRW) are primarily naturally produced stocks. The lower river hatchery (LRH) tule, Spring Creek Hatchery (SCH) tule, and mid-Columbia brights (MCB) are primarily hatchery produced stocks. The tule stocks generally mature at an earlier age than the natural fall stocks and do not migrate as far north. Minor stocks include lower river bright (LRB), a naturally produced stock and Select Area brights (SAB), a hatchery stock originally from Rogue River stock; both occur downstream from Bonneville Dam.

Preseason estimates of Columbia River fall chinook stock-specific abundance, used by the STT to assess the Council's adopted fishery regulations, are based on age-specific forecasts of annual ocean escapement (return to the Columbia River). These forecasts are developed by the technical staffs of the Columbia River management agencies. Columbia River return forecast methodologies used for Council management are generally identical to those used for planning Columbia River fall season inriver fisheries, although minor updates to Council estimates of inriver run size may occur prior to finalization of the inriver fishery plans.

The 2001 return of each fall chinook stock group is estimated using relationships between successive age groups within a brood year. The database for these relationships was constructed by combining age-specific estimates of escapement and inriver fishery catches for years since 1964, although only the more recent broods (1975-1998) are used in most current predictions. Fall chinook stock identification in the Columbia River mixed stock fisheries is determined by sampling catch and escapement for such factors as CWT recovery 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 2000 Ocean Salmon Fisheries*

TABLE II-7. **Rogue River fall chinook** inriver run and ocean **population indices**. (Page 1 of 1)

Return Year	Inriver Run Index in Thousands of Fish[a/]					Ocean Impact Rate[b/] (percentage) by Age		Ocean Population Index[c/] in Thousands of Fish			
	Age-2	Age-3	Age-4	Age-5	Total[d/]	Age-3	Age-4-5	Age-3	Age-4	Age-5	Total
1977	1.9	0.8	0.3	0.0	3.0	40	60	14.0	1.6	0.1	15.7
1978	1.0	6.1	2.3	0.1	9.5	40	60	72.7	6.0	0.3	79.0
1979	0.2	1.0	6.5	0.0	7.7	36	68	17.3	30.0	0.1	47.4
1980	0.4	0.2	0.9	0.6	2.2	43	75	9.8	8.1	2.5	20.4
1981	1.0	3.1	0.9	0.3	5.2	42	66	14.5	4.3	0.9	19.6
1982	0.7	1.3	1.3	0.1	3.4	57	65	20.4	4.0	0.4	24.8
1983	0.2	0.6	0.9	0.0	1.7	28	70	10.5	6.0	0.1	16.6
1984	0.2	0.8	1.1	0.1	2.2	14	43	11.3	5.2	0.2	16.7
1985	2.5	1.3	3.5	0.6	7.9	25	29	13.1	6.8	0.9	20.8
1986	3.2	12.8	2.4	0.5	18.9	30	52	99.7	6.8	1.1	107.6
1987	2.8	8.5	19.8	0.4	31.5	36	53	117.8	45.9	0.8	164.5
1988	0.9	3.2	16.5	1.0	21.6	37	45	24.2	54.1	2.8	81.1
1989	0.5	1.3	4.0	2.1	7.8	21	44	10.3	8.3	3.6	22.3
1990	0.0	0.3	1.4	0.2	1.9	61	61	11.1	5.5	0.6	17.2
1991	0.2	0.4	1.9	0.5	2.9	10	21	3.6	3.3	0.6	7.5
1992	0.5	0.3	1.5	0.5	2.8	2	4	4.1	2.3	0.5	7.0
1993	0.3	3.5	1.5	0.5	5.7	11	11	17.3	2.9	0.6	20.8
1994	0.5	0.8	5.8	0.9	7.9	5	7	3.3	9.5	0.9	13.7
1995	0.2	0.6	1.4	2.0	4.1	10	21	4.5	1.9	2.5	8.8
1996	0.1	0.4	1.8	0.1	2.3	8	17	2.6	2.7	0.1	5.4
1997	0.1	0.3	1.0	0.3	1.7	9	10	5.8	1.6	0.3	7.8
1998	0.1	0.5	2.6	0.3	3.4	2	11	3.7	4.0	0.3	8.0
1999	0.2	0.3	1.6	0.5	2.6	-	11	2.3[e/]	2.5	0.6	5.4
2000	-	-	-	-	-	-	-	4.3[e/]	1.4[e/]	0.3	6.0
2001	-	-	-	-	-	-	-	NA	NA	NA	NA

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 1979 are based on Klamath River fall chinook cohort analysis.

c/ Based on cohort reconstruction methods. Index values for 2000 predicted from regression equations; postseason estimates are not available.

d/ Excludes age-six fish.

e/ Preliminary; complete cohort not available. Used mean maturity rate to derive estimate.

(Appendix B, Tables B-15 through B-19). The 2000 returns for the five fall chinook stocks listed in this report will differ somewhat from those provided in the *Review of 2000 Ocean Salmon Fisheries* since ocean escapement estimates were updated after that report was printed.

Performance of the preliminary inriver return estimation methodology can be assessed, in part, by examining the differences between preseason and postseason estimates (Table II-8). The 1991-2000 average March preliminary preseason estimates as a percentage of the postseason estimates for the URB, LRW, LRH, SCH, and MCB stock estimates are 0.91, 0.75, 0.93, 0.97, and 1.08 respectively. The return of SCH adults was overpredicted in 1999 and 2000, but has been under-predicted the previous four years. The LRH return has been under-predicted the past seven years. LRW returns tend to be under-predicted (five of the last six years) whereas URB and MCB returns have been both over- and under-predicted.

Inaccuracies of ocean escapement estimates developed for the March Council meeting are partly a result of the lack of assessment of variable ocean fishery impacts on these stocks. March estimates of the inriver run size abundance for Columbia River fall chinook stocks are based on age-specific and stock-specific cohort relationships for a database impacted by the historic marine fisheries during the last 20 years. The STT combines the initial inriver run size (ocean escapements) with expected Council area fishery harvest levels and stock distribution patterns to produce adjusted ocean escapement estimates based on the proposed ocean fishing regulations. These revised estimates are available at the end of the Council preseason planning process in April (Table II-8) and should provide a more accurate prediction of ocean escapement.

2001 Stock Status

The preliminary forecast for 2001 URB fall chinook ocean escapement is 127,200 adults, less than the recent 5-year range of 142,300 to 164,900 adults. A Preseason estimate of Snake River wild fall chinook ocean escapement for 2001 is currently unavailable. However, the Columbia River technical staffs are expected to develop a run size estimate for this critical ESA listed stock during the March or April Council meeting process.

Ocean escapement of LRW fall chinook in 2001 is forecast at 16,700 adults, an improvement over the recent 5-year range of 2,600 to 8,800. The forecast run is expected to exceed the spawning escapement goal of 5,700 into the North Lewis River, Washington.

The preliminary forecast for 2001 ocean escapement of LRH fall chinook is for a return of 32,200 adults, over last years low return of 27,000. Recent reductions in LRH production, especially in Oregon as a result of Mitchell Act funding cuts, have decreased the ocean escapement needed to meet hatchery brood stock requirements. The forecast return exceeds expected broodstock requirements.

Ocean escapement of SCH fall chinook in 2001 is projected to be 56,600 adults, more than double the 2000 actual return of 20,100 adults and above the recent 5-year average.

The preliminary forecast for the 2001 ocean escapement of MCB fall chinook is 43,500 adults, greater than the 2000 observed return of 36,700 adults. The MCB chinook are primarily returns from hatchery releases of bright fall chinook stock in the area downstream from McNary Dam, although some natural spawning in tributaries between Bonneville and McNary dams also occurs.

Washington Coastal Chinook

Predictor Description and Past Performance

Preseason abundance estimates for most Washington coastal chinook stocks are not available for consideration in Council preseason fishery management planning. Since Council fisheries have only a minor impact on the ocean escapement of Washington coastal stocks, they have not been included in the preseason fishery impact assessment reports prepared by the STT.

TABLE II-8. **Predicted and postseason** returns of **Columbia River** adult **fall chinook** in thousands of fish. (Page 1 of 2)

Stock	Year	March Preseason Forecast[a/]	April STT Modeled Forecast[b/]	Postseason Return	March Pre/Postseason	April Pre/Postseason
URB	1984	90.1	93.0	131.4	0.69	0.71
	1985	159.1	159.1	196.4	0.81	0.81
	1986	285.9	286.1	281.5	1.02	1.02
	1987	436.4	436.4	420.7	1.04	1.04
	1988	450.7	446.5	339.9	1.33	1.31
	1989	234.0	231.8	261.3	0.90	0.89
	1990	127.2	126.9	153.6	0.83	0.83
	1991	88.8	88.9	103.3	0.86	0.86
	1992	68.4	66.3	81.0	0.84	0.82
	1993	84.5	82.7	102.9	0.82	0.80
	1994	85.4	94.7	132.8	0.64	0.71
	1995	110.3	125.0	106.5	1.04	1.17
	1996	88.9	94.1	143.2	0.62	0.66
	1997	166.4	158.0	164.9	1.01	0.96
	1998	150.8	141.8	142.3	1.06	1.00
	1999	147.5	102.1	166.7	0.88	0.61
	2000	171.1	208.2	155.9	1.10	1.34
LRW	1984	16.7	NA	13.3	1.26	NA
	1985	12.9	NA	13.3	0.97	NA
	1986	15.7	NA	24.5	0.64	NA
	1987	29.2	NA	37.9	0.77	NA
	1988	43.3	42.1	41.7	1.04	1.01
	1989	27.3	26.9	38.6	0.71	0.70
	1990	23.7	23.4	20.3	1.17	1.15
	1991	12.7	12.7	19.8	0.64	0.64
	1992	17.4	16.7	12.5	1.39	1.34
	1993	12.5	11.9	13.3	0.94	0.89
	1994	14.7	13.2	12.2	1.20	1.08
	1995	12.4	11.5	16.0	0.78	0.72
	1996	8.8	8.1	14.6	0.60	0.55
	1997	7.5	7.2	12.3	0.61	0.59
	1998	8.1	7.0	7.3	1.11	0.96
	1999	2.6	2.5	3.3	0.79	0.76
	2000	3.5	2.7	10.2	0.34	0.26
LRH	1984	70.4	89.0	102.4	0.69	0.87
	1985	81.5	86.7	111.0	0.73	0.78
	1986	171.6	173.9	154.8	1.11	1.12
	1987	294.9	298.7	344.1	0.86	0.87
	1988	267.7	246.5	309.9	0.86	0.80
	1989	104.9	97.5	130.9	0.80	0.74
	1990	68.5	65.5	60.0	1.14	1.09
	1991	71.4	73.1	62.7	1.14	1.17
	1992	113.2	121.5	62.6	1.81	1.94
	1993	79.3	77.7	52.3	1.52	1.49
	1994	36.1	46.5	53.6	0.67	0.87
	1995	35.8	42.4	46.4	0.77	0.91
	1996	37.7	48.3	75.5	0.50	0.64
	1997	54.2	68.7	57.4	0.94	1.20
	1998	19.2	22.5	45.3	0.42	0.50
	1999	34.8	38.2	37.4	0.93	1.02
	2000	23.7	26.4	27.0	0.88	0.98

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

Stock	Year	March Preseason Forecast[a/]	April STT Modeled Forecast[b/]	Postseason Return	March Pre/Postseason	April Pre/Postseason
SCH	1984	21.3	27.0	47.5	0.45	0.57
	1985	34.9	37.1	33.2	1.05	1.12
	1986	16.0	16.2	16.6	0.96	0.98
	1987	9.1	9.2	9.1	1.00	1.01
	1988	6.5	5.9	12.0	0.54	0.49
	1989	29.5	23.0	26.8	1.10	0.86
	1990	27.3	23.7	18.9	1.44	1.25
	1991	56.3	61.4	52.4	1.07	1.17
	1992	40.9	41.3	29.5	1.39	1.40
	1993	19.9	18.2	16.8	1.18	1.08
	1994	20.2	28.9	18.5	1.09	1.56
	1995	17.5	22.5	33.8	0.52	0.67
	1996	27.6	35.2	33.1	0.83	1.06
	1997	21.9	25.7	27.4	0.80	0.94
	1998	14.2	14.2	20.2	0.70	0.70
	1999	65.8	61.0	49.3	1.33	1.24
	2000	21.9	26.9	20.1	1.09	1.34
MCB	1990	69.5	69.3	59.1	1.18	1.17
	1991	48.4	48.5	35.9	1.35	1.35
	1992	42.5	40.7	31.1	1.37	1.31
	1993	33.0	32.3	27.4	1.20	1.18
	1994	23.9	26.7	33.7	0.71	0.79
	1995	26.5	30.1	34.2	0.77	0.88
	1996	40.8	43.2	59.7	0.68	0.72
	1997	72.1	61.9	59.7	1.21	1.04
	1998	47.8	44.9	36.8	1.30	1.22
	1999	38.3	27.7	49.9	0.77	0.56
	2000	48.0	58.4	36.7	1.31	1.59

a/ March preseason forecasts are ocean escapements based on terminal run size and stock-specific cohort relationships affected by the historical "normal" ocean fisheries during the brood year data base time period (generally 1978-1994).

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.

2001 Stock Status

The Willapa Bay hatchery fall chinook ocean escapement abundance forecast is 17,815 adults, down approximately 6% from the 2000 preseason forecast. The natural fall chinook ocean escapement abundance forecast is 4,271 adults, essentially the same as the 2000 preseaon forecast. Preseason forecasts for other Washington coastal chinook stocks are not available at this time.

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-9. 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 joint WDFW-tribal 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-four adults. All naturally produced, and some hatchery stocks of Puget Sound chinook were listed as threatened under the ESA in March 1999.

2001 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 continuing concern.

Summer/Fall Chinook

Preliminary information for Puget Sound summer/fall stocks indicates that the total 2001 return is expected to be similar to the 2000 preseason forecast. Changes in the abundance of individual stocks from various production areas are detailed in Table I-1 and II-9.

The total return from Puget Sound hatchery production is forecast to be about 27% above the 2000 forecast level.

The total return of natural Puget Sound summer/fall stocks is expected to be about the same as in 2000. Returns to the Skagit River are forecast to be 9,100 which is 25% greater than the 2000 return, but the escapement goal is not expected to be attained. Returns to the Stillaguamish and Snohomish rivers are expected to similar to the 2000 preseason forecasts. Returns to the Strait of Juan de Fuca and to south Puget Sound are also forecast to be similar to the 2000 level. Natural stocks from Puget Sound have experienced poor survival in recent years, resulting in depressed production and escapements. Only four natural Puget Sound summer/fall chinook stocks have met escapement goals at least once in the last five years (Hoko, Snohomish, Green, and Nisqually). However, two of these stocks (Green and Niqually) have significant numbers of hatchery chinook that stray into natural spawning areas which are counted as natural fish.

Evaluation of 2000 Regulations on 2001 Stock Abundance North of Cape Falcon

A detailed assessment of 2001 projected ocean fishery impacts with 2000 regulations for north of Cape Falcon chinook stocks has not been completed. The chinook model used for impact assessment in 2000 is currently being modified to include recent data on ocean fishery impacts and abundance forecasts. The updating procedure for the chinook model used for impact assessment incorporates adjustments due to variable impacts by ocean fisheries. It will not be ready for use in 2001 until the March Council meeting.

Council fisheries north of Cape Falcon have a very minor impact on most stocks that originate in Washington coastal and Puget Sound Rivers since these stocks have northerly marine distribution patterns. The stocks that are major contributors to Council fisheries north of Cape Falcon include Columbia River fall hatchery tules, which normally account for more than half the total catch, lower Columbia River spring, and California and Oregon coastal chinook stocks.

TABLE II-9. Comparison of **preseason and postseason** forecasts **of Puget Sound** run size for **summer/fall chinook**. Postseason estimates for 1999 are preliminary.[a/] (Page 1 of 1)

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	32.9	1.53	3.2	3.8	0.84	1.0	1.4	0.71	14.0	7.0	2.00
1994	46.6	28.1	1.66	3.2	0.8	4.00	1.3	4.3	0.30	8.4	6.6	1.27
1995	38.5	22.2	1.73	3.5	0.2	17.50	1.6	3.3	0.48	5.0	9.6	0.52
1996	27.0	29.4	0.92	1.7	0.7	2.43	1.0	1.2	0.83	7.1	12.2	0.58
1997	34.0	34.2	0.99	1.2	1.2	1.00	0.1	0.0	-	6.4	6.2	1.03
1998	28.5	29.5	0.97	0.5	0.3	1.67	0.0	0.1	-	6.4	14.9	0.43
1999	29.3	40.9	0.72	2.3	0.3	7.67	0.0	0.0	-	7.6	5.2	1.46
	Stillaguamish - Natural			**Snohomish - Hatchery**			**Snohomish - Natural**			**Tulalip - Hatchery**		
1993	NA	1.3	NA	1.6	2.7	0.59	4.9	5.7	0.86	2.8	1.4	2.00
1994	NA	1.3	NA	1.8	5.4	0.33	4.5	5.0	0.90	2.8	1.9	1.47
1995	1.8	1.4	1.29	2.2	6.0	0.37	4.3	5.9	0.73	2.3	4.1	0.56
1996	1.3	2.3	0.57	6.7	9.2	0.73	4.2	8.0	0.53	2.7	4.0	0.68
1997	1.6	1.2	1.33	7.7	2.7	2.85	5.2	4.4	1.18	4.0	8.6	0.47
1998	1.6	1.5	1.07	6.5	1.1	5.91	5.6	6.4	0.88	2.5	7.2	0.35
1999	1.5	1.1	1.36	7.8	1.6	4.88	5.6	4.8	1.17	4.5	15.2	0.30
	South Puget Sound - Hatchery			**South Puget Sound - Natural**			**Hood Canal - Hatchery and Natural**					
1993	61.8	36.8	1.68	26.5	19.8	1.34	11.7	4.8	2.44			
1994	52.7	46.2	1.14	18.0	29.9	0.60	11.5	3.8	3.03			
1995	49.6	74.5	0.67	21.7	34.5	0.63	3.9	9.4	0.41			
1996	51.9	57.6	0.90	19.0	35.8	0.53	9.0	8.2	1.10			
1997	65.1	46.5	1.40	18.2	20.6	0.88	2.7	7.9	0.34			
1998	67.8	54.2	1.25	21.8	27.3	0.80	6.7	16.3	0.41			
1999	59.4	74.7	0.80	19.6	27.1	0.72	14.0	29.6	0.47			
	Strait of Juan de Fuca - Hatchery			**Strait of Juan de Fuca - Natural**								
1993	0.7	0.2	3.50	3.1	2.4	1.29						
1994	3.9	1.6	2.44	1.0	0.5	2.00						
1995	3.0	0.1	30.00	0.9	2.7	0.33						
1996	2.8	0.2	14.00	0.9	3.1	0.29						
1997	2.2	0.3	7.33	0.8	3.5	0.23						
1998	1.7	1.7	1.00	0.9	1.9	0.47						
1999	1.9	0.7	2.71	0.9	2.7	0.33						

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.

CHAPTER III
COHO SALMON ASSESSMENTS

COLUMBIA RIVER AND OREGON COASTAL COHO (OREGON PRODUCTION INDEX AREA)

The majority of the coho harvested in the Oregon production index (OPI) area originate from stocks produced in rivers located within the OPI area (Leadbetter Point, Washington, to the U.S.-Mexico border). These stocks include hatchery and natural production from the Columbia River, Oregon coast, and northern California.

The Council adopted revised abundance estimation predictors in 1987, for use starting in 1988, which were expected to more accurately predict the abundance of individual stock components originating in the OPI area. These stock components are: (1) public hatchery (OPIH), (2) Oregon coastal natural river (OCNR), (3) Oregon coastal natural lake (OCNL), (4) private hatchery (PRIH), and (5) hatchery smolt production from the Oregon coastal Salmon Trout Enhancement Program (STEP).

A stratified random sampling (SRS) study, implemented in 1990, indicated an overestimation of annual OCN spawner escapement. Because OPI area ocean impacts are proportioned to the ocean escapements of various OPI components, a reduction in OCN spawner escapement indicates that traditional OCN abundances were overestimated, while traditional abundance estimates for other OPI area stocks were 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 various OPI area stocks. To achieve targeted exploitation rates and spawner escapement goals, the various OPI area stock abundance index predictions were scaled in the Fishery Regulation Assessment Model (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 1999, with the availability of a long term data set in SRS values, all five OPI area stock abundances were projected in SRS accounting. Direct comparisons of 2000 abundance forecasts with recent year SRS abundance projections, both preseason and postseason, are reported in Table III-1. For comparison, OPI area stock abundance projections using traditional values for 1985-1998 are reported in Appendix B, Table B-1. To facilitate fishery modeling with the coho FRAM, abundance estimates are converted from SRS values into index values using the relationship between the two historic data sets. All fishery impacts and escapements from the coho FRAM are converted to and reported in SRS values.

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, California, collectively produce lesser amounts of coho as well. OPI area smolt releases since 1960 are reported by geographic area in Appendix B, Table B-2.

Predictor Description

Since 1988, the adult abundance of the OPIH index stock has been predicted using a linear multiple regression that relates OPI hatchery adults to the Columbia River, coastal Oregon, and Klamath River jack returns from the same cohort (previous year jack counts), and the proportion of Columbia River smolts from the same cohort with delayed release rearing strategy. All jack counts are adjusted for misidentified small adults (mostly Columbia River returns).

Specifically, the OPIH stock predictor uses Columbia River jacks (Jack CR), Oregon coastal and Klamath River Basin jacks (Jack OC), and a correction term for delayed smolts released from Columbia River hatcheries (Jack CR * [SmD/SmCR]) to predict public hatchery stock abundance.

TABLE III-1. Preliminary 1992-2000 **preseason and postseason coho** stock **SRS abundance** estimates for OPI area stocks in thousands of fish. (Page 1 of 1)

Stock	Year	Preseason	Postseason	Preseason/Postseason
OPIH	1992	479.2	540.3	0.89
	1993	589.4	261.7	2.25
	1994	147.5	203.9	0.72
	1995	301.5	145.6	2.07
	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
OCN	1992	77.1	90.1	0.86
	1993	82.2	98.9	0.83
	1994	49.3	45.2	1.09
	1995	60	68.5	0.88
	1996	63.2	86.1	0.73
	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
STEP	1992	2.1	1.2	1.75
	1993	5.5	3.5	1.57
	1994	0.8	1.8	0.44
	1995	8.3	0.5	16.60
	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

For the 2001 abundance prediction, the data base includes 1970-2000 recruits, excluding the *El Niño* adult impact year of 1983. It also includes 1969-1999 jack returns, excluding 1982, also due to *El Niño* influence. The model is:

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

Where:

a	=	143.714292
b	=	19.458976
c	=	20.375257
d	=	31.413253
adjusted r^2	=	0.97

The OPIH stock data set, and a definition of the above terms, are presented in Appendix B, Table B-3.

Predictor Performance

Recent year OPIH stock preseason abundance predictions, adjusted to SRS accounting, are compared with postseason estimates in Table III-1. The 2000 preseason abundance prediction of 671,400 OPIH coho was 99% of the preliminary postseason estimate of 677,100 coho.

Since 1983, the OPIH predictor has often performed poorly, due principally to high interannual variability in the jack to adult ratios.

2001 Stock Status

Using the appropriate values from Appendix B, Table B-3, the OPIH abundance prediction for 2001 is 1,707,600. The 2001 forecast is 250% of the 2000 abundance and the largest forecast since 1985.

Oregon Coastal Natural Coho

The OCN stock is composed of natural production from OCNR and OCNL systems, which are predicted independently. Historical returns by river system are presented in Appendix B, Table B-4

Predictor Description

Oregon Coastal Natural Rivers

From 1988-1993, the abundance of OCNR index coho was predicted 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 overpredict abundances, the data base in the predictor was shortened from 1970-1991 to 1980-1991 starting with 1992 predictions.

Because of concern that the adopted OCNR model does 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. Specifically, the OCNR environment-based predictor uses 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), to predict OCNR abundance.

For 1999-2001, the environmental based model with the year component, was used for predicting OCNR stock abundances. The 2000 OCNR abundance prediction data base includes 1970-2000 recruits, 1969-2000 upwelling, and 1969-2001 sea surface temperatures. The model is:

$$\ln(\text{Recruits}(t)) = a+b*\text{UpAnom}(t-1)+c*\text{JanAnom}(t)+d*\text{Year}(t)$$

Where:

a	=	126.071383
b	=	0.002598
c	=	-0.71903
d	=	-0.061177
adjusted r^2	=	0.78

The OCNR stock data set, and a definition of the above terms, are presented in Appendix B, Table B-5.

Oregon Coastal Natural Lakes

Since 1988, 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 (Ten Mile, Siltcoos, and Tahkenitch lake systems). Production from these systems has declined substantially from the levels observed during 1950-1980 but has been relatively stable.

Predictor Performance

Recent-year OCN stock preseason SRS abundance predictions are compared to postseason estimates in Table III-1. The 2000 preseason abundance prediction of 55,900 OCN coho was 81% of the preliminary postseason estimate of 69,000 coho.

2001 Stock Status

The 2001 preseason prediction for OCN (river and lake systems combined) is 50,100 coho, 90% of the 2000 preseason prediction of 55,900 coho and 73% of the 2000 postseason estimate (Table III-1). The 2001 preseason SRS prediction for OCNR and OCNL components are 38,100 and 12,000 coho, respectively.

Private Hatchery Coho

There have not been any Oregon coastal PRIH coho smolt releases since 1990. Thus, there was no recruitment for 1992-2001 of the PRIH coho stock.

Salmon Trout Enhancement Hatchery Coho Smolt Program

Predictor Description

Since 1988, preseason abundance predictions for Oregon coastal STEP index coho smolt production facilities have been based on the Council-approved procedure. This procedure involves calculating the smolt to adult survival rate for the 2000 return and multiplying it by the ratio of 2000 OPI jack survival to 1999 OPI jack survival. The 2001 prediction is the product of this adjusted smolt to adult survival rate and the number of 1998 brood smolts released in 2000.

Predictor Performance

Recent-year STEP preseason abundance predictions are compared to postseason estimates in Table III-1. The 2000 preseason abundance prediction of 600 coho was 120% of the preliminary postseason estimate of 500 coho.

TABLE III-2. Oregon production index **(OPI) coho harvest , spawning** and **abundance** estimates by SRS accounting in thousands of fish.[a/] (Page 1 of 1)

	Ocean Fisheries[b/]		Oregon and California Coastal Returns						
Year	Troll	Sport	Hatcheries and Freshwater Harvest[c/]	OCN Spawners[d/]	Private Hatcheries	Columbia River Returns	Abundance	Ocean Exploitation Rate (%) Based on OPI Abundance[e/]	OCN Exploitation Rate (%) Based on Postseason FRAM
1970	1,463.7	499.0	80.3	71.7	-	895.3	3,010.0	65	-
1971	2,543.5	715.8	53.8	94.8	-	544.5	3,952.4	83	-
1972	1,275.6	560.3	29.9	34.1	-	277.8	2,177.7	84	-
1973	1,320.3	443.2	42.2	55.4	-	291.3	2,152.4	82	-
1974	2,095.1	668.6	49.5	34.5	-	460.8	3,308.5	84	-
1975	1,079.2	463.7	19.2	40.4	-	292.5	1,895.0	81	-
1976	2,936.1	977.7	62.6	40.7	-	337.0	4,354.1	90	-
1977	664.4	412.1	21.4	19.5	4.2	93.8	1,211.3	89	-
1978	1,104.2	524.6	12.6	19.8	12.3	307.5	1,968.7	83	-
1979	1,056.6	334.4	27.4	45.0	49.2	276.5	1,739.9	79	-
1980	506.9	526.4	32.1	30.3	38.7	301.6	1,397.3	73	-
1981	830.9	339.9	34.1	32.6	117.8	170.2	1,407.7	81	-
1982	740.9	300.4	37.1	76.2	184.7	453.1	1,607.7	62	-
1983	429.6	275.0	18.2	22.8	133.9	111.2	856.8	79	-
1984	95.8	174.2	51.2	74.5	115.4	425.9	933.3	32	-
1985	166.4	280.4	45.4	73.9	332.0	367.2	2,665.0	43	-
1986	643.5	320.6	81.8	70.0	453.7	1,549.1	1,157.3	34	-
1987	469.1	296.2	45.3	30.1	119.3	316.6	1,931.9	60	-
1988	844.7	297.2	62.4	56.8	116.1	670.8	1,893.9	56	-
1989	646.9	425.5	62.3	46.4	46.9	712.8	1,931.9	55	-
1990	277.6	357.1	30.6	20.9	35.6	196.7	882.9	69	-
1991	450.6	469.9	84.0	36.4	35.1	954.3	1,995.1	45	-
1992	67.5	256.5	53.8	40.6	-	217.7	630.1	51	-
1993	13.2	140.8	41.5	54.5	-	114.2	364.1	42	-
1994	2.7	3.0	30.8	43.3	-	169.1	248.9	2	7
1995	5.4	43.5	40	52.5	-	75.2	216.6	23	12
1996	7.0	31.8	48.9	73.0	-	104.6	265.3	15	8
1997	5.5	22.4	28.1	22.7	-	145.3	224.0	12	12
1998	3.5	11.5	28.4	30.9	-	164.5	238.8	6	8
1999	3.6	41.8	24.2	47.3	-	272.6	289.5	12	9
2000[f/]	25.9	77.2	34.8	62.7	-	550.7	751.3	14	8

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

b/ Includes estimated nonretention mortality: troll fishery--hook-and-release mortality for 1982-2000 and drop-off mortality for all years; sport fishery--hook and release mortality for 1994-2000 and drop-off mortality for all years.

c/ Includes returns from STEP smolt releases.

d/ Spawners returning to rivers were historically estimated by a nonrandom standard index. Beginning in 1990, returns have also been estimated with a stratified random sampling (SRS) method. The SRS method indicates that actual total natural spawners were less than those projected by the standard index.

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.

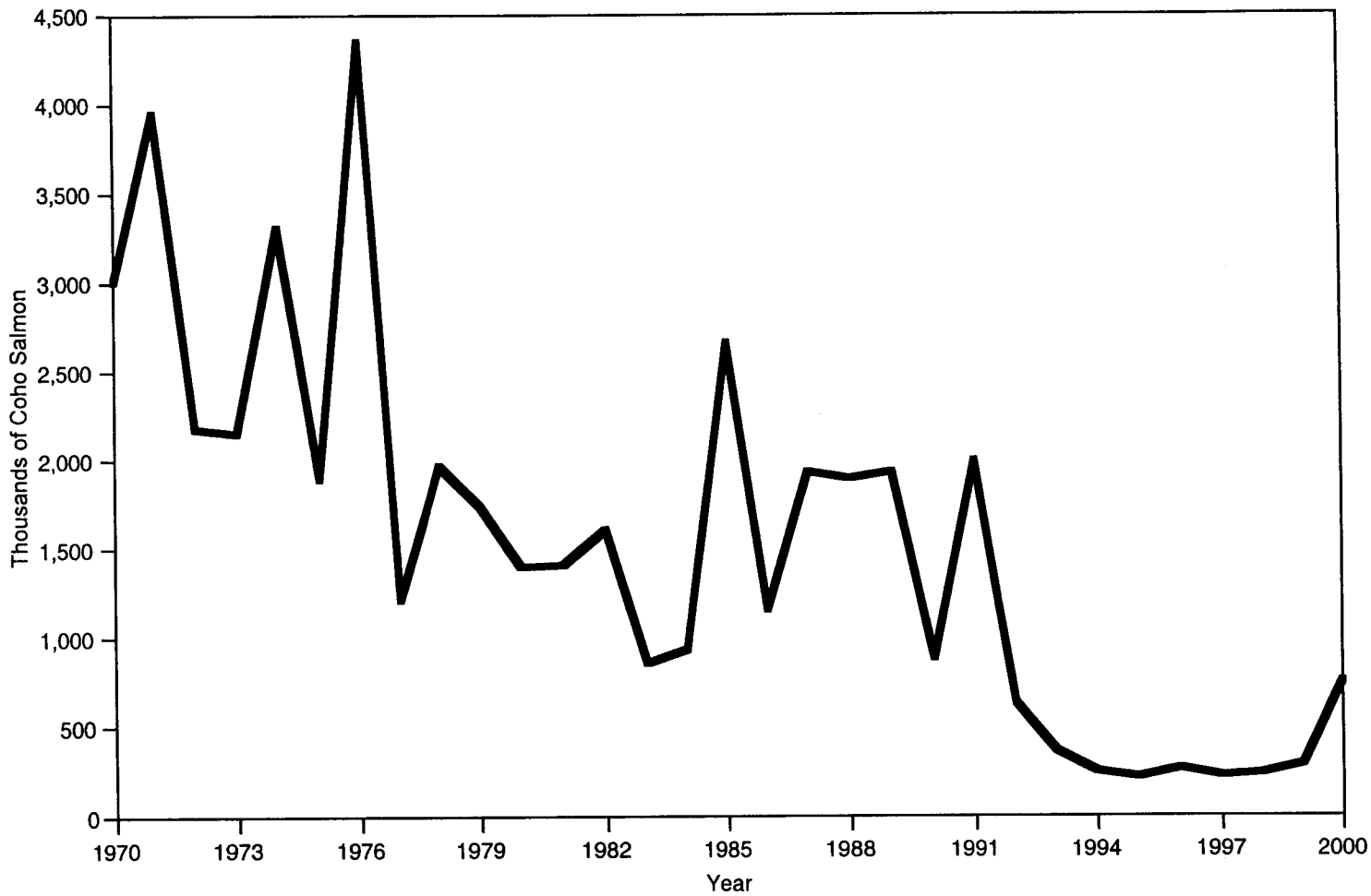

FIGURE III-1. Oregon production area coho salmon abundance estimates by SRS accounting methods, 1970-2000.

TABLE III-3. **Preseason and postseason** ocean **escapements** for selected **Washington coastal** adult **natural coho** stocks in thousands of fish. The 2000 postseason estimates are preliminary. (Page 1 of 1)

	Quillayute River Fall			Hoh River Fall			Queets River Fall			Grays Harbor[a/]		
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
1984	7.0	11.0	0.64	2.7	7.7	0.35	5.2	9.7	0.54	28.7	103.8	NA
1985	19.2	15.8	1.22	6.6	5.2	1.27	11.3	6.0	1.88	56.4	25.1	NA
1986	6.1	17.0	0.36	3.9	6.4	0.61	5.2	5.8	0.90	51.6	33.3	NA
1987	11.7	23.8	0.49	5.5	7.2	0.76	9.0	8.9	1.01	103.3	55.7	NA
1988	10.4	9.1	1.14	2.0	2.6	0.77	4.7	4.5	1.04	26.4	56.7	0.47
1989	14.5	11.2	1.29	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	67.5	0.72
1991	8.8	10.6	0.83	3.4	5.4	0.63	7.9	8.6	0.92	138.0	118.4	1.17
1992	12.5	13.6	0.92	4.9	5.0	0.98	5.6	7.0	0.80	48.4	44.7	1.08
1993	7.6	4.7	1.62	4.8	1.9	2.53	6.5	5.4	1.20	84.7	40.2	2.11
1994	7.0	6.4	1.09	3.0	1.4	2.14	3.6	1.2	3.00	31.3	15.5	2.02
1995	8.5	14.3	0.59	4.4	5.4	0.81	7.2	7.3	0.99	64.4	69.5	0.93
1996	9.2	14.6	0.63	3.0	5.8	0.52	5.4	10.7	0.50	82.7	101.0	0.82
1997	5.1	5.0	1.02	1.6	1.4	1.14	2.4	2.0	1.20	14.8	25.4	0.58
1998	7.4	17.0	0.44	3.2	5.7	0.56	4.5	4.6	0.98	27.1	33.6	0.81
1999	12.8	19.5	0.66	2.8	6.6	0.42	3.7	5.0	0.74	50.3	NA	NA
2000	8.2	NA	NA	3.3	6.0	0.55	2.5	NA	NA	44.2	NA	NA

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

TABLE III-4. **Preseason and postseason** ocean **escapements** for selected **Puget Sound** adult **natural coho** stocks in thousands of fish. The 2000 postseason estimates are not yet available. (Page 1 of 1)

Year	Skagit River			Stillaguamish River			Hood Canal		
	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason
1984	29.6	37.2	0.80	NA	26.9	NA	NA	57.5	NA
1985	26.1	31.3	0.83	NA	34.4	NA	NA	38.5	NA
1986	43.5	73.4	0.59	37.0	49.9	0.74	NA	82.2	NA
1987	33.0	41.2	0.80	29.7	46.3	0.64	NA	71.7	NA
1988	29.6	29.9	0.99	24.5	35.4	0.69	18.2	15.5	1.17
1989	31.2	27.6	1.13	24.5	13.5	1.81	36.8	25.5	1.44
1990	37.6	26.3	1.43	30.8	34.1	0.90	43.9	14.2	3.09
1991	40.8	11.8	3.46	32.9	11.3	2.91	17.6	15.3	1.15
1992	35.7	9.5	3.76	18.7	18.0	1.04	10.1	19.9	0.51
1993	28.1	14.5	1.94	24.5	10.6	2.31	39.5	16.7	2.37
1994	17.9	30.5	0.59	10.2	30.3	0.34	13.5	57.1	0.24
1995	30.0	16.2	1.85	32.7	20.4	1.60	19.3	41.1	0.47
1996	26.7	8.7	3.07	29.8	10.1	2.95	15.4	37.3	0.41
1997	34.2	40.1	0.85	15.7	12.9	1.22	38.1	100.4	0.38
1998	41.1	83.2	0.49	37.7	NA	NA	87.3	117.9	0.74
1999	53.4	NA	NA	27.3	NA	NA	45.2	28.0	0.74
2000	24.7	NA	NA	15.0	NA	NA	50.4	NA	NA

2001 Stock Status

The 2001 preseason STEP index abundance prediction is 1,000 coho. The 2001 prediction is higher than the 2000 preseason prediction of 600 coho due to improved OPI smolt to jack survival (Table III-1).

Oregon Production Index Area Summary of 2000 Stock Status

The 2001 combined OPI area stock abundance is predicted to be 1,758,700 coho, which is 242% of the 2000 preseason prediction of 727,900 coho and 236% of the 2000 postseason estimate of 746,600 coho. The 2001 OPI area predictions can be compared to historical abundances in Table III-2 and Figure III-1.

WASHINGTON COASTAL 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).

Prior to 1999, initial estimates of abundance for some Puget Sound and Washington coastal stocks, prepared by state and tribal staffs for use by the STT in Council preseason planning, represented terminal run sizes assuming an average ocean or preterminal area fishery impact rate. Forecasts of ocean escapement for each stock were estimated by adjusting terminal run sizes according to the approximate level of harvest expected in Council and other fisheries (e.g., West Coast Vancouver Island [WCVI] troll) and average stock distribution patterns by time and area. These adjustments were made with the FRAM, a stock-fishery impact assessment model, which has been employed by the STT and other management entities in planning since 1980. Currently, run predictions are provided in terms of ocean recruits, eliminating the need to convert terminal run forecasts to estimates of ocean abundance. (Table I-1)

A comparison of expected preseason and postseason ocean escapement abundance estimates for these stocks in recent years is presented in Tables III-3 and III-4. The comparison of preseason and postseason estimates of returns to terminal areas 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 quite different than those that actually occur. Postseason reconstructions of total fishery impacts and abundance estimates have not been completed for the 2000 season.

2001 Stock Status

Willapa Bay

This is the second year that hatchery and wild coho forecasts were estimated independently. The 2001 Willapa Bay hatchery coho abundance forecast is 36,121 ocean recruits, an 84% increase over the 2000 preseason forecast of 19,600. The prediction is based on a recent six year mean return per release without adjustment for jack abundance. The natural coho ocean abundance forecast is 21,600 ocean recruits. This prediction is the average terminal run size estimate for the recent three years (1998-2000). Terminal forecasts for both hatchery and natural stocks were expanded to ocean recruits using an ocean survival rate derived from Bingham Creek wild coded-wire tag recovery data.

Grays Harbor

Preseason forecasts of abundance 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 returns expected from numerous volunteer production projects. The forecast of Grays Harbor natural stock abundance for 2001 is 51,300 ocean recruits. The forecast of hatchery stock is 67,100 ocean recruits.

The hatchery forecast was generated by multiplying smolt releases by an average ocean recruit per release survival rate. The natural forecast was generated by estimating a terminal run size using a recent six year average return per spawner rate, which was then expanded to ocean recruits using Bingham Creek coded-wire tag recovery data.

Quinault River

The 2001 forecast for Quinault natural coho is 8,700 ocean recruits, an increase of 98% compared to the 2000 projected level. This estimate represents the 1998 brood year escapement (3,770) multiplied by the 1992-1996 brood year average ocean recruits per spawner (3.31), multiplied by a bias adjustment based on the predictor performance over the last five years (0.701).

The Quinault hatchery coho forecast is 10,800 ocean recruits, an increase of 46% compared to the 2000 forecast level. The forecast is derived from the mean 1992-1996 brood year observed marine survival rates (0.0178) and 1998 brood year smolt releases (610,000).

Queets River

The Queets natural coho forecast is 12,000 ocean recruits, an increase of 344% compared to the 2000 forecast level. This forecast represents the estimated smolt production from natural spawning (322,400) multiplied by the 1992-1996 brood year average observed ocean survival rate (0.0321 for tagged fish, 0.0382 for untagged fish).

No supplemental production is anticipated for 2001. The Salmon River fish culture facility (where juveniles used for the supplementation program are reared prior to release), experienced severe flooding in December 1999. The Queets supplementation program is designed to outplant progeny in the vicinity where brood stock are collected. When the flood completely inundated the ponds, all production was mixed. Consequently, it was no longer possible to maintain the identity of each group of progeny. All fish originally intended for the supplementation program were released along with hatchery fish from the Salmon River facility.

The Queets hatchery coho forecast is 10,000 ocean recruits, a decrease of 10% compared to the 2000 forecast level. This forecast is based on the smolt release of 637,200 multiplied by the 1992-1995 brood year average observed marine survival rate (0.0157).

Hoh River

The Hoh River natural coho forecast is 8,500 ocean recruits, an increase of 142% compared to the 2000 forecast. This forecast is based on estimated smolt production per square mile of watershed (based on Clearwater tributary to the Queets) multiplied by the size of the Hoh watershed for a total of 212,000 smolts. The total smolt production is then multiplied by the average recent year ocean survival rate (0.04) from the Bingham Creek jack return model and from a sea surface temperature anomaly model for Queets coho.

No hatchery production is projected for the Hoh system for 2000.

Quillayute River

The Quillayute River summer natural and hatchery coho forecasts for 2001 are 600 and 5,300 ocean recruits, respectively. The natural component run size is based on estimated smolt production (12,000) and a survival rate of 0.049. The hatchery component run forecast is based on average ocean recruits per release (0.025) multiplied by the number of smolts released (210,100). The 2001 forecast abundance of natural summer coho is 62% below the 2000 forecast while the hatchery forecast is 2% below the 2000 forecast level.

The Quillayute River fall natural and hatchery coho forecasts are 23,000 and 15,300 ocean recruits, respectively. The forecast of the natural component run size is based on the estimated smolt production (479,000), multiplied by the average survival rate (0.049) from the sea surface anomaly model and the Bingham Creek jack return model. The hatchery production forecast is based on average ocean recruits per

release (0.0247) multiplied by the number of smolts released (618,000). The 2001 forecast abundance of natural and hatchery components of Quillayute fall coho are 164% and 10% above their respective 2000 forecast levels.

Puget Sound

The total hatchery and wild coho ocean recruit forecast for Puget Sound is 702,400, 37% greater than the 2000 forecast. The hatchery forecast of 335,900 is 8% greater than the 2000 forecast prediction. The wild forecast of 366,500 is 67% greater than the 2000 forecast.

Puget Sound hatchery forecasts are generally based on multiplication of 1998 brood year smolt releases from each facility by the predicted ocean survival rate. The 2001 survival rate predictions are generally based (with exceptions noted below) on the mean of the draft 1986 to 1991 December Age 2 (DA2) return rates, adjusted by the preliminary mean 1995 to 1997 brood year DA2 survival rates return rates for selected Puget Sound hatcheries. The 1995 to 1997 brood year return rates were derived from simple run reconstructions of terminal runsizes for hatchery programs that had sufficient catch and escapement information available, with the terminal runsizes expanded to total DA2 runsizes by the FRAM model prediction of pre-terminal harvest rates for hatchery stocks. The derived average DA2 survival rates used in the hatchery forecasts vary from 1.8% to 7.2%, with the highest values in north-central Puget Sound (Snohomish, Skagit), and the lowest rates for extreme northern (Nooksack region), and southern Puget Sound and net pen programs. The preliminary 2000 return rate estimates showed significant improvement in survival rates for most Puget Sound hatcheries over 1999 levels, but southern Puget Sound facilities continued to experience exceptionally poor return rates in relationship to historical averages. Exceptions to the approach described above for development of forecasting return rates were in the Hood Canal and Strait of Juan de Fuca regions which are described in detail below.

Natural forecasts for Puget Sound coho were generally derived by measured or estimated smolt production from each major watershed or region within Puget Sound, multiplied by an ocean recruits per spawner prediction, with the exception of Hood Canal, where two different approaches were examined to develop the final forecast. Smolt production for the 1998 brood years were measured directly for the Skagit River, Deschutes, Green, Puyallup/White and several smaller tributaries to Puget Sound. Smolt production estimates for watersheds not directly measured were estimated by applying observations of smolt productivity from study watersheds to the un-censused watersheds based on habitat availability and habitat quality data, relative parent escapement levels, and other factors. The derivation of the ocean recruitment rate predictions were based on a variety of methods.

Strait of Juan de Fuca

The 2001 forecasts for Strait of Juan de Fuca natural and hatchery coho ocean recruits are 21,400 and 14,400, respectively. The ocean survival rate for Strait of Juan de Fuca natural coho forecast (5.6%) was derived from the average of the overall predicted 2001 Puget Sound natural coho survival rate and the North Coastal overall average predicted 2001 survival rate. Where Strait coho survival rates were assumed to be intermediate between coastal and Puget Sound coho stocks.

Nooksack-Samish

The 2001 forecasts for Nooksack-Samish natural and hatchery coho ocean recruits are 12,400 and 44,400, respectively.

Skagit

The 2001 forecasts for Skagit natural and hatchery coho ocean recruits are 87,200 and 10,100, respectively. The ocean survival rate estimate of 6% was based on the mean 1992-1996 even brood year ocean survival rate observed for the Baker wild coho indicator stock. Even brood years were used to develop the mean ocean survival rate prediction for Skagit, because Skagit wild coho exhibit different smolt production and marine survival rates during even and odd brood years. The Skagit forecast is then adjusted to account for

underestimates of actual escapement during the 1979-1981 base years. The 6% survival rate was also applied to the Nooksack, Samish, and Strait of Georgia tributaries smolt production estimates.

Stillaguamish

The 2001 forecast for Stillaguamish natural coho ocean recruits is 24,400. No hatchery production is anticipated. The Stillaguamish wild coho ocean survival rate (7.9%) was developed from the geometric mean of the 1994 to 1997 brood year Baker River wild coho indicator stock (no stratification into even and odd brood years).

Snohomish

The 2001 forecasts for Snohomish natural and hatchery coho ocean recruits are 129,600 and 60,900, respectively. The Snohomish wild coho ocean survival rate (7.9%) was developed from the geometric mean of the 1994 to 1997 brood year Baker River wild coho indicator stock (no stratification into even and odd brood years).

South Sound

The 2001 forecasts for south Puget Sound natural and hatchery coho ocean recruits are 29,500 and 172,600, respectively. The south Sound ocean survival rate prediction of 4% was based on a linear regression relationship between smolt to jack and smolt to ocean age-three runsize survival rates at the WDFW Deschutes River research station. An age-three ocean survival rate of 8% was used for the central Puget Sound region natural coho forecast, based on observations that survival rates were higher for hatchery and wild coho in central Puget Sound region than in the south Sound region.

Hood Canal

The 2001 forecasts for Hood Canal natural and hatchery coho ocean recruits are 62,000 and 33,500, respectively. The 2001 Hood Canal natural coho forecast is based on two different approaches. The Point-No-Point methodology utilizes a ratio of the mean 1994 to 1996 brood year Hood Canal natural DA2 runsize to mean 1994 to 1996 brood year Big Beef Creek smolt production, multiplied by the 1998 brood year smolt production, then divided by 1.333 to arrive at ocean age-three runsize. The WDFW methodology uses a jack predictor from Big Beef Creek to estimate an ocean survival rate, which is multiplied by an estimate of total 1998 brood year Hood Canal smolt production. The ocean survival rate prediction used for the WDFW Hood Canal forecast (6.2%) was derived by a linear regression between smolt to jack and smolt to ocean age-three survival rates at the WDFW Big Beef Creek research station. The smolt production estimate is based on 1998 brood year smolt production estimates measured from outmigrant trapping operations on four Hood Canal tributary streams, expanded to an estimate of total smolt production capability for the Hood Canal region from freshwater habitat availability estimates. The relative mean error of each forecasting technique was calculated from a hindcasting comparison of the results of each method to post season estimates of runsize. These error estimates were used to adjust the 2001 forecast values generated from each approach. The average of the two adjusted values (62,000) is the final 2001 Hood Canal natural coho ocean runsize forecast.

SELECTIVE FISHERY CONSIDERATIONS

As the region has moved forward with mass marking of hatchery coho salmon stocks, selective fishing options are an important consideration for fishery managers. Table III-5 summarizes estimates of mass mark rates for coho stocks from Southern British Columbia to the Oregon coast, based on preseason abundance forecasts. Agencies have released coho mass marked with adipose clips from the 1998 brood, making these fish available to 2001 fisheries.

TABLE III-5. **Mass marking** of 1998 brood **coho** available to 2001 Council fisheries. All stocks were marked with an adipose fin clip. (Page 1 of 1)

Region	Ocean Recruits Wild	Ocean Recruits Hatchery	Percent Mass Marked
PUGET SOUND STOCKS:			
Nooksack-Samish & 7/7A Independent	12.4	44.4	56.8%
Skagit	87.2	10.1	8.7%
Stillaguamish	24.4	0.0	0.0%
Snohomish	129.6	60.9	9.3%
South Puget Sound Normal	29.5	101.3	69.7%
South Puget Sound Delayed		71.6	100.0%
Hood Canal: WDFW	62.3	33.5	30.4%
Strait of Juan de Fuca & Area 9	21.4	14.4	26.8%
Puget Sound Total: WDFW	366.8	336.2	37.0%
WASHINGTON COASTAL STOCKS:			
North Coast Independent Tributaries	7.9	8.1	41.8%
Quillayute Summer	0.6	5.3	86.5%
Quillayute Fall	23.0	15.3	35.1%
Hoh	8.5	0.0	0.0%
Queets	12.0	10.0	14.4%
Quinault	8.7	10.8	45.7%
Grays Harbor	51.3	67.2	55.3%
Willapa Bay	21.6	36.1	59.4%
Washington Coastal Total	133.6	152.8	46.9%
COLUMBIA RIVER STOCKS:			
Columbia River Early		1,036.5	84.7%
Columbia River Late		491.8	98.8%
Columbia River Total	0	1528.3	89.2%
OREGON COASTAL	55.9	67.7	48.8%
SOUTHERN BRITISH COLUMBIA STOCKS:[a/]			
West Coast Vancouver Island	183.8	17.4	7.2%
Southeast Vancouver Island	13.5	23.8	12.0%
Quinsam	158.0	28.0	8.8%
Puntledge	23.6	9.7	22.3%
Big.Qualicum	29.9	29.2	47.1%
Capilano	2.7	15.8	85.4%
Fraser	67.7	117.8	54.4%
Southern British Columbia Total	479.2	241.7	26.0%

a/ For this assessment, 2000 abundance was adjusted for expected 2000 mark rates.

TABLE III-6. Estimated year **2001 ocean escapements** for critical natural and Columbia River hatchery **coho** stocks based on preliminary 2001 preseason abundance forecasts and 2000 Council regulations compared to predicted 2000 preseason escapements.[a/] (Page 1 of 1)

Stock	Ocean Escapement Estimates Under 2000 Regulations[b/]		2000 Spawning Escapement Goal[d/e/]
	2001 Preseason Abundance	2000 Preseason Abundance[c/]	
		COHO (thousands)	
Natural Coho Stocks			
Skagit	58.2	24.7	Exploitation Rate (30.0)
Stillaguamish	21.9	15.0	Exploitation Rate (17.0)
Snohomish	116.6	44.9	Exploitation Rate (70.0)
Hood Canal	48.5	50.4	Exploitation Rate (21.5)
Strait of Juan de Fuca	19.8	11.2	Exploitation Rate (12.8)
Quillayute Fall	22.2	8.2	6.3-15.8
Hoh	8.2	3.3	2.0 - 5.0
Queets[f/]	11.5	3.2	5.8 - 14.5
Grays Harbor	49.3	44.2	35.4
OCN	45.6 (4.1%)[g/]	48.9 (8.2%)[g/]	Exploitation Rate ≤15%
Hatchery Stocks			
Columbia Early	873.5	219.1	22.5
Columbia Late	384.4	172.9	16.3

a/ Quota levels include harvest and hooking mortality estimates used in planning the Council's 2000 ocean fisheries and a coho catch for the Canadian troll fishery off the West Coast of Vancouver Island (WCVI).

b/ 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 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 stocks, ocean escapement represents the number of coho after the Buoy 10 fishery.

c/ Based on a Canadian catch of 1,200 coho off of WCVI.

d/ Spawning escapement goals are not directly comparable to ocean escapement, because inside fishery harvest is not considered.

e/ Number in parentheses are presented for convenient reference to numerical escapement goals identified in Amendment 14 of the Salmon Framework Management Plan.

f/ Ocean escapement of 3,200 is 2,500 wild and 700 supplemental.

g/ Numbers in parentheses represent estimated total exploitation rates.

TABLE III-7. Comparison of Oregon coastal natural **(OCN)** and Rogue/Klamath **(RK) coho harvest** mortality and exploitation rates by fishery under Council-adopted 2000 regulations and preliminary 2001 preseason abundance (based on WDFW estimates for Hood Canal coho). (Page 1 of 1)

	Harvest Mortality and Exploitation Rate			
	OCN		RK	
Fishery	Number	Percent	Number	Percent
SOUTHEAST ALASKA	15	0.03	0	0.00
BRITISH COLUMBIA	2	0.00	0	0.00
PUGET SOUND/STRAITS	65	0.14	0	0.00
NORTH OF CAPE FALCON				
Treaty Indian Troll	61	0.13	0	0.00
Recreational	116	0.25	8	0.02
Non-Indian Troll	88	0.19	0	0.00
SOUTH OF CAPE FALCON				
Recreational:				
Cape Falcon to Humbug Mt.	167	0.35	15	0.03
Humbug Mt. to Horse Mt. (KMZ)	170	0.36	578	1.16
Fort Bragg	107	0.23	306	0.62
South of Pt. Arena	147	0.31	84	0.17
Troll:				
Cape Falcon to Humbug Mt.	331	0.70	18	0.04
Humbug Mt. to Horse Mt. (KMZ)	26	0.05	99	0.20
Fort Bragg	3	0.01	18	0.04
South of Pt. Arena	153	0.33	81	0.16
BUOY 10	34	0.07	23	0.05
ESTUARY/FRESHWATER	461	0.98		
TOTAL	1,946	4.13	1,230	2.47

TABLE III-8. Maximum **allowable** fishery **impact** rate for **OCN coho** under Amendment 13 matrix and the OCN work group matrix based on parent escapement levels by stock component and marine survival category. (Page 1 of 1)

	Estimated OCN Coho Spawners by Stock Component						Amendment 13 Matrix			OCN Work Group Matrix[a/]		
Fishery Year (t)	Parent Spawner Year (t-3)	Northern	North-Central	South-Central	Southern	Hatchery Jack Survival Rate (t-1)	Marine Survival Category	Parental Survival Category	Maximum Allowable Impacts	Marine Survival Category	Parental Survival Category	Maximum Allowable Impacts
1998	1995	4,000	13,600	34,800	4,200	0.04%	Low	Very Low	≤10-13%	Extremely Low	Very Low	≤8%
1999	1996	3,300	18,100	51,500	5,400	0.10%	Med	Very Low	≤15%	Low	Critical	0-8%
2000	1997	2,100	2,800	17,700	8,300	0.12%	Med	Very Low	≤15%	Low	Critical	0-8%
2001	1998	2,600	3,300	25,200	2,200	0.27%	Med	Very Low	≤15%	Medium	Critical	0-8%
2002	1999	8,300	11,500	27,000	2,400	-	-	Low	-	-	Low	
2003	2000	17,600	11,600	33,500	11,900	-	-	Low		-	Low	

a/ Developed by the OCN workgroup as a result of the 2000 Review of Amendment 13.

EVALUATION OF 2000 REGULATIONS ON 2001 STOCK ABUNDANCE

Oregon Production Index Area

Ocean fisheries were modeled with 2000 regulations, an expected WCVI fishery mortality of 1,200 coho, and 2001 preseason abundance predictions. Under this scenario, the estimated exploitation rate on OCN coho would be 4.1%, and the estimated OCN spawner escapement would be 45,600 adults. For Rogue-Klamath coho, the estimated exploitation rate would be 2.5%. Escapements and fishery impacts for OCN and Rogue/Klamath coho were estimated using the FRAM (Tables III-6 and III-7).

Based on parent escapement levels and observed OPI smolt-to-jack survival for 1998 brood OPI smolts, the total allowable OCN coho exploitation rate for 2001 fisheries is no greater than 15% under Amendment 13, (because of low parental escapement rates, the allowable exploitation rate is in the 0-8% range based on the matrix developed by the OCN work group). (Table III-8; Appendix A, Tables A-2 and A-3).

Ocean escapements into the Columbia River in 2001 would be sufficient to provide for treaty Indian obligations, inside non-Indian fisheries, and hatchery and wild spawning objectives under 2000 ocean fishing regulations.

North of the Oregon Production Index Area

Ocean escapement expectations for selected naturally-spawning coho stocks, given 2001 preseason abundance forecasts and preseason projections for 2000 fishing patterns, are presented in Table III-6. The expected escapements assume projections for 2000 catch levels, season structure, and regulations for all Council area ocean fisheries, U.S. inside water fisheries (e.g., Puget Sound), and Canadian fisheries (e.g., WCVI troll). Escapements and fishery impacts were estimated using FRAM, the fishery impact model used by the STT for the 2000 preseason assessment, updated with 2001 abundance forecasts. More detailed fishery management goals for Council area coho stocks are listed in Appendix A, Table A-1.

Under 2000 regulations, ocean escapements for natural coho stocks north of the OPI index area is expected to be at levels that would permit attainment of spawning escapement goals. Impacts of inside fisheries would ultimately determine levels of anticipated spawning escapements. For 2001, fisheries directed at pink salmon would be expected to impact Puget Sound coho stocks to a greater degree than fishing patterns for 2000.

Ocean escapement expectations for 2001 vary substantially by stock compared to 2000. The most dramatic change reflects improved expectations of abundance for Queets coho.

CHAPTER IV
FRASER RIVER AND PUGET SOUND PINK SALMON ASSESSMENTS

Two major stocks comprise the pink salmon population available to Council ocean fisheries during odd-numbered years. Table IV-1 provides a summary of recent run sizes.

The more abundant of the two runs originates from the Fraser River in British Columbia. The 2001 preliminary forecast for Fraser pinks is 5.47 million. Average run size for the period 1977-1999 (odd numbered years only) is approximately 13.6 million, ranging from 3.6 million in 1999 to 22.3 million in 1991. Fraser River pink salmon forecasts have been based on the relationship of fry index values and sea surface salinity at the time of juvenile emigration.

The preliminary forecast for Puget Sound pinks in 2001 is 2.92 million. The abundance of Puget Sound pink salmon stocks has averaged 1.2 million during the period 1977-1999 (odd numbered years only), ranging from 0.5 million in 1981 to 2.1 million in 1995. Forecasts of abundance are based on cyclic relationships of adult production and parent spawner abundance.

Fraser River and Puget Sound pink runs occur in significant numbers only in odd-numbered years.

TABLE IV-1. Actual **run sizes** (odd numbered years 1977-1999) for Fraser River and Puget Sound **pink salmon** in millions of salmon.

Year	Puget Sound[a/]	Fraser River[b/]
1977	0.88	8.21
1979	1.32	14.40
1981	0.50	18.69
1983	1.01	15.35
1985	1.76	19.10
1987	1.57	7.17
1989	1.93	16.63
1991	1.09	22.33
1993	1.06	17.01
1995[c/]	2.11	12.88
1997[c/]	0.44	8.20
1999[c/]	0.95	3.59

a/ Total Puget Sound run size.
b/ Total run size.
c/ Preliminary estimate. Likely to be adjusted when GSI bias correction methodologies are finalized.

APPENDIX A
SUMMARY OF COUNCIL STOCK MANAGEMENT GOALS

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TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a/] (Page 1 of 15)

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.	High abundance, large hatchery component. Single largest contributor to ocean fisheries off California, a significant contributor off southern and central Oregon, and present north into British Columbia. Primary impact south of Pt. Arena; considerable overlap with coastal and Klamath River fall chinook between Pt. Arena and Horse Mt.
Sacramento River Spring Threatened	NMFS jeopardy standard/recovery plan (not established at time of printing). No defined objective for ocean management prior to listing.	Indirectly. MSY criteria undefined. Assessment of ocean distribution and fishery impacts needed for ESA determination and to aid management. Present level of ocean fishery impacts limited by measures constraining harvest on Sacramento River winter and Klamath River fall chinook.	Severely depressed. Minor contributor to ocean fisheries off California, 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. MSY undefined but substantially reduced from historic levels by man-caused loss and deterioration of freshwater habitat.
Sacramento River Winter Endangered (1994)	NMFS jeopardy standard/recovery plan. Since 1996, an annual preseason objective of a 31% increase in the adult spawner replacement rate (equivalent to a 1.77 replacement rate) relative to the observed 1989-1993 mean rate of 1.35. Objective undefined prior to listing.	No. Listed stock, MSY criteria undefined. ESA jeopardy standard provides interim rebuilding program.	Depressed and listed, recent increase. Minor contributor to ocean fisheries south of Pt. Arena. Ocean fishery impacts incidental to harvest of Sacramento River fall chinook. Primary impact south of Pt. Arena.

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a/] (Page 2 of 15)

Stock	Conservation Objective (to be met annually unless noted otherwise)	Subject to Council Actions to Prevent Overfishing	Other Management Information
	- - - 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. 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)	Undefined. Indices of spawning abundance limited to one tributary of the Mad River and two tributaries of the Eel River. NMFS jeopardy standard/recovery plan for Eel, Mattole, and Mad River stocks not established at time of printing.	Indirectly. Data insufficient to define MSY criteria. CDFG developing an assessment and monitoring program. Conservation achieved by objective for Klamath River fall chinook which includes an inside allocation to tribal and sport fisheries which lowers ocean fishery impacts.	Depressed. Limited management data. 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.
Klamath River Fall (Klamath and Trinity Rivers)	33-34% of potential adult natural spawners, but no fewer than 35,000 naturally spawning adults in any one year. Brood escapement rate must average 33-34% 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).	Yes. A conservation alert or overfishing concern will be based on a failure to meet the 35,000 floor.	Abundance variable from high to depressed. Major contributor to ocean fisheries from Humbug Mt., OR to Horse Mt., CA (the KMZ) and to Klamath River tribal and recreational fisheries. Significant contributor to ocean fisheries from central Oregon to central California. 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 Pigeon Pt., California to Florence, Oregon.
Klamath River Spring (Klamath and Trinity Rivers)	Undefined.	Indirectly. MSY criteria undefined. Productive potential protected by the objective for Klamath River fall chinook which includes an inside allocation to tribal and sport fisheries which lowers ocean fishery impacts.	Depressed. Believed to occur in ocean fisheries off northern California and southern Oregon (based on Trinity River Hatchery fish). Impacts incidental to ocean fisheries for Sacramento and Klamath Rivers fall chinook.

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a/] (Page 3 of 15)

Stock	Conservation Objective (to be met annually unless noted otherwise)	Subject to Council Actions to Prevent Overfishing	Other Management Information
	--- CHINOOK ---		
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 60-90 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.			
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 also ensured 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.	Medium to low 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.	Variable between high and medium abundance. Stocks migrate northward and contribute to ocean fisheries off British Columbia and SE Alaska and to a lesser degree off Washington and Oregon.

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a] (Page 4 of 15)

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 the Columbia River Fish Management Plan. 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.			
North Lewis River Fall Threatened (1999)	NMFS jeopardy 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. ESA jeopardy standard provides interim rebuilding program. Base period Council-area ocean fishery impacts around 7%.	Medium to low abundance. Present in ocean fisheries north of Cape Falcon to SE Alaska.
Lower River Hatchery Fall	15,400 adults to meet egg-take goal or as determined by management entities.	No (hatchery exception).	Medium to low abundance. 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).	Medium to low abundance. Present in ocean fisheries north of Cape Falcon to SE Alaska.
Upper Willamette (Spring) Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). 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. ESA jeopardy standard provides interim rebuilding program. Base period Council-area ocean fishery exploitation rate of <1% prevents effective Council fishery management and rebuilding.	Low abundance. Present in fisheries north of Cape Falcon to SE Alaska.
Mid-River Bright Hatchery (Fall)	None for ocean fishery management.	No (hatchery exception).	Medium to high abundance. Contributor to ocean fisheries off Washington, British Columbia, and southeast Alaska. Primarily produced at Bonneville Hatchery.
Spring Creek Hatchery (Fall)	7,000 adults to meet hatchery egg-take goal.	No (hatchery exception).	Low abundance. Significant 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 as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a/] (Page 5 of 15)

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, Warm Springs, 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.	Long-term depressed abundance. No significance to ocean fisheries, infrequent occurrence in fisheries north of Cape Falcon to Alaska.
Snake River Fall Threatened (1992)	NMFS jeopardy/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% 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. ESA jeopardy standard provides interim rebuilding program. Recovering historic abundance unlikely as dams block former primary spawning area.	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., CA.
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 trend downward. Rare occurrence in ocean fisheries from Washington to SE Alaska.
Upper River Bright (Fall)	40,000 natural bright adults above McNary Dam (MSY proxy adopted in 1984 based on CRFMP. The management goal has been increased to 45,000 by Columbia River managers in recent years.	Limited. Base period Council-area ocean fishery exploitation rate <4% prevents effective Council fishery management and rebuilding.	High to medium abundance. Significant contributor to ocean fisheries off Canada and to a lesser extent Washington and Oregon. Primary impact area north of Cape Falcon.
Upper River Summer	Hold ocean fishery impacts at or below base period (<2%); recognize CRFMP objective - MSY proxy of 80,000 to 90,000 adults above Bonneville Dam, including both Columbia and Snake River stocks (state and tribal management entities considering separate objectives for these stocks).	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.	Long-term depressed abundance. Present in ocean fisheries north of Cape Falcon to southeast Alaska.

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a] (Page 6 of 15)

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)			
Upper 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.	Long-term depressed abundance. Captive broodstock programs started in 1997. No significance to ocean fisheries. Rare occurrence in ocean fisheries north of Cape Falcon to Canada.

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 SE Alaska, are not significantly impacted by Council-area ocean fisheries. Preseason abundance estimates are generally not available for Council management. 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.

Willapa Bay Fall (natural)	Undetermined.	Limited (exploitation rate exception).	
Willapa Bay Fall (hatchery)	8,200 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).	
Grays Harbor Spring	1,400 natural adult spawners.	"	
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).	
Queets Spring/Summer	Manage terminal fisheries for 30% harvest rate, but no less than 700 natural adult spawners.	"	

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a/] (Page 7 of 15)

Stock	Conservation Objective (to be met annually unless noted otherwise)	Subject to Council Actions to Prevent Overfishing	Other Management Information
		- - - CHINOOK - - -	
WASHINGTON COAST (continued)			
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).	"	
Hoh Spring/Summer	Manage terminal fisheries for 31% harvest rate, but no less than 900 natural adult spawners.	"	
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).	"	
Quillayute Spring/Summer	1,200 natural adult spawners for summer component (MSY).	"	
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.	"	

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 SE 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 stocks within this complex and their respective conservation objectives, established in U.S. District Court by WDFW and the Treaty tribes, are recognized below. The conservation objectives for stocks managed primarily for natural production were developed by a State/Tribal Management Plan Development Team following the Boldt Decision and were based on "the adult spawning population that will, on the average, maximize biomass of juvenile outmigrants subsequent to incubation and freshwater rearing under average environmental conditions." The objectives were estimated for the average spawning escapements during periods that were thought to represent spawner abundances that provided maximum production (Ames and Phinney 1977). The objectives for stocks managed for artificial production are based on hatchery escapement needs. Annual management targets (expected hatchery plus natural escapement) for specific rivers or regions of origin may vary from the conservation objectives by following fixed procedures established in U.S. District Court as outlined in "Memorandum Adopting Salmon Management Plan" (U.S. v. Washington, 626 F. Supp. 1405 [1985]).

Eastern Strait of Juan de Fuca Summer/Fall Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 3,825 natural and hatchery adult spawners--2,900 for the Elwha River (Ames and Phinney 1977) and 925 for the Dungeness River (Smith and Sele 1994).	Limited (exploitation rate exception).	

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a/] (Page 8 of 15)

Stock	Conservation Objective (to be met annually unless noted otherwise)	Subject to Council Actions to Prevent Overfishing	Other Management Information
		- - - CHINOOK - - -	
PUGET SOUND (continued)			
Skokomish Summer/Fall (Hood Canal) Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 1,650 natural adult spawners (Ames and Phinney 1977).	"	
Nooksack Spring (early) Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 2,000 natural adult spawners.	"	
Skagit Summer/Fall Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 14,850 natural adult spawners (Ames and Phinney 1977).	"	
Skagit Spring Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 3,000 natural adult spawners based on mean escapement 1959-1968.	"	
Stillaguamish Summer/Fall Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 2,000 natural adult spawners (Ames and Phinney 1977).	"	
Snohomish Summer/Fall Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 5,250 natural adult spawners (Ames and Phinney 1977).	"	
Cedar River Summer/Fall (Lake Washington) Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 1,200 natural adult spawners (Hage *et al.* 1994).	"	
White River Spring Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 1,000 natural adult spawners.	"	
Green River Summer/Fall Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 5,750 natural adult spawners (Ames and Phinney 1977).	"	
Nisqually River Summer/Fall (South Puget Sound) Threatened (1999)	NMFS jeopardy standard/recovery plan (not established at time of printing). MSP objective of 900 natural adult spawners.	"	

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a/] (Page 9 of 15)

Stock	Conservation Objective (to be met annually unless noted otherwise)	Subject to Council Actions to Prevent Overfishing	Other Management Information
- - - CHINOOK - - -			
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 SE 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 SE Alaska.
- - - 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 Threatened (1996)	NMFS jeopardy 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. ESA jeopardy 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.

TABLE A-1. **Conservation objectives** and management information for salmon stocks of significance to ocean salmon fisheries as provided in Amendment 14. Abundance information is generally based on the period 1994-1998.[a/] (Page 10 of 15)

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)			
Northern California Threatened (1997)	NMFS jeopardy standard/recovery plan. Since 1998, total marine fishery impacts limited to no more than 13% 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. ESA jeopardy 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. Threatened (1997 and 1998)	NMFS jeopardy standard/recovery plan consistent with Council's objective under Amendment 13 and the Oregon Plan: For each of the 4 component stocks, a rebuilding and data collection program with an allowable marine and freshwater exploitation rate of no more than 13% to 35%, depending on parent escapement and ocean survival trends (adopted 1997). For a detailed description of the objective, see Section 3.3.2. Prior PFMC objectives contained in PFMC (1984 and 1993).	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.	Depressed and listed. Major natural component of OPI area which, when abundant, contributes to ocean fisheries off California, Oregon, and Washington south of Leadbetter Pt., and freshwater fisheries in Oregon coastal streams. Current impacts primarily incidental in ocean fisheries under a total nonretention regulation south of Cape Falcon since 1994.
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., WA 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.