CHAPTER II - CHINOOK SALMON ASSESSMENT

CHINOOK STOCKS SOUTH OF CAPE FALCON

SACRAMENTO RIVER FALL CHINOOK SALMON

Predictor Description

The Council's Salmon FMP sets the escapement goal for SRFC as a range from 122,000 to 180,000 hatchery and natural adults. This stock comprises a large proportion of the escapement of all Chinook stocks that return to Central Valley streams and hatcheries. In 2008, the Sacramento Index (SI) was developed as a SRFC-specific abundance index to replace the Central Valley Index (CVI), which provided an annual index of abundance for the combined Central Valley Chinook stocks (see Appendix D). The SI is the sum of (1) SRFC ocean fishery harvest south of Cape Falcon between September 1 and August 31, (2) the recreational harvest of SRFC in the Sacramento River Basin, and (3) the SRFC adult spawner escapement (Table II-1, Figure II-1). The SI harvest index is the ocean harvest of SRFC landed south of Cape Falcon divided by the SI, and has varied significantly since 1983 (Table II-1). Since 1990, the SI harvest index has generally declined over time. In 2008, owing to the closure of nearly all winter, spring, and summer ocean fisheries south of Cape Falcon, the SI harvest index was 0.06, the lowest on record.

Beginning in 2008, the STT based its forecast of the SI on a zero-intercept linear model relating the previous year (t-1) SRFC jack escapement to the SI in year t, for years 1990 forward (Figure II-2). The zero-intercept linear model was used again in 2009 owing to three consecutive years of very low jack escapement, suggesting that age-four and older carryover would be minimal in 2009. In addition, the 2005 data point was excluded from the SI predictor in 2009 because it has excessive leverage on the predictor and provides little information to the prediction of the SI at the current, low level of jack escapement.

Predictor Performance

In 2008, the SI was defined as the sum of ocean harvest south of Cape Falcon and the total escapement of SRFC (it did not include the river harvest component, as it currently does). Under the 2008 definition, the SI preseason forecast of 54,570 was 0.78 of its postseason value.

2009 Stock Status

A total of 4,061 SRFC jacks were estimated to have escaped to Sacramento River basin hatcheries and natural spawning areas in 2008, the second lowest return on record (the 2007 jack escapement was the lowest). The resulting 2009 SI forecast is 122,196 adult Chinook (Figure II-2), which would correspond to the second lowest postseason estimate of the SI since 1983.

Evaluation of 2008 and 2007 Regulations on 2009 Stock Abundance

A repeat of 2008 regulations would be expected to result in a SRFC escapement of 122,100, which is slightly above the lower end of the SRFC adult escapement goal range. Under 2007 regulations, which featured much more ocean fishing opportunity than 2008 and a relatively unrestricted Sacramento Basin recreational fishery, 62,600 adult spawners would be forecast for Sacramento River Basin. This projection is well below the lower end of the SRFC escapement goal range.

KLAMATH RIVER FALL CHINOOK

Predictor Description

For Klamath River fall Chinook, linear regressions are used to relate September 1 ocean abundance estimates of age-3, age-4, and age-5 fish to that year's river run size estimates of age-2, age-3, and age-4 fish, respectively (Table II-2). Historical abundance estimates were derived from a cohort analysis of CWT information (brood years 1979-2004). The y-intercept of the regressions is constrained to zero, which gives the biologically reasonable expectation that a river run size of zero predicts an ocean abundance remainder of zero for the same cohort. The abundance of age-2 fish is not forecasted because no precursor to age-2 fish of that brood is available. Ocean fisheries harvest small numbers of age-2 KRFC.

Predictor Performance

Since 1985, the preseason ocean abundance forecasts for age-3 fish have ranged from 0.33 to 2.72 times the postseason estimates; for age-4 fish from 0.47 to 2.60 times the postseason estimates; and for the adult stock as a whole from 0.34 to 2.03 times the postseason estimates (Table II-3). The September 1, 2007 age-3 forecast (31,600) was 0.88 times its postseason estimate (36,058). The age-4 forecast (157,200) was 1.93 times its postseason estimate (81,595); and the age-5 forecast (1,900) was 0.70 times its postseason estimate (2,724) (Table II-3).

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

The Council's FMP conservation objective for KRFC (Amendment 9) permits an average natural spawner reduction rate via fisheries of no more than 0.67, with a minimum escapement of 35,000 natural spawning adults. The plan allows for any ocean and river harvest allocation that meets the spawner reduction rate constraint, provided it also meets the minimum escapement goal. The regulations adopted in 2008 were expected to result in 40,700 natural spawning adults and an age-4 ocean harvest rate of 2.4 percent. Postseason estimates of these quantities were 30,925 natural spawning adults and an age-4 ocean harvest rate of 9.8 percent (Table II-5).

2009 Stock Status

The forecast September 1, 2008 (preseason) ocean abundance of KRFC is 474,900 age-3 fish, the age-4 forecast is 25,200, and the age-5 forecast is 5,600 fish.

Late-season ocean fisheries in 2008 (September through November state-water terminal fisheries in Oregon) were estimated to have harvested zero age-3, age-4, and age-5 KRFC. Therefore no harvest will be deducted from the ocean fishery's allocation in determining the 2009 allowable ocean harvest.

Evaluation of 2008 and 2007 Regulations on 2009 Stock Abundance

A repeat of 2008 fishery regulations, which consisted of the closure of most ocean Chinook fisheries south of Cape Falcon, a river recreational harvest quota of 22,477, and a tribal allocation of 50 percent (of the overall adult harvest), would be expected to result in 51,800 natural area adult spawners. This projection exceeds the spawner floor and the Council objective of targeting no less than 40,700 natural area adult spawners while KRFC is under an Overfishing Concern. The forecast age-4 ocean harvest rate

of zero percent meets NMFS ESA consultation standard for California Coastal Chinook. If the ocean fisheries (recreational and commercial) were closed from January through August 2009 between Cape Falcon and Point Sur, and the Klamath River fisheries (tribal and recreational) were closed in 2009, the expected number of natural area adult spawners would be 81,600. Under 2007 fishery regulations, which consisted of substantially more ocean salmon fishing opportunity than 2008, a river recreational harvest of 26 percent (of the nontribal adult harvest), and a tribal allocation of 50 percent (of the overall adult harvest), 41,800 natural area adult spawners would be predicted. The 2007 fishery structure results in a forecast age-4 ocean harvest rate of 15 percent, which meets the NMFS ESA consultation standard for California Coastal Chinook.

Amendment 15 to the Salmon FMP (implemented March 26, 2008) provides for potential limited harvest of KRFC in ocean salmon fisheries during years that might otherwise be closed due to a projected shortfall in meeting the 35,000 natural spawner conservation objective, as long as this would not jeopardize the long term capacity of the stock to produce maximum sustainable yield on continuing basis. In 2009, there is no basis for invoking *de minimis* fishing under Amendment 15 because KRFC is not projected to fall short of the 35,000 floor. The Council recommended a target natural spawning escapement of 40,700 adult KRFC until the Overfishing Concern is ended, and when implementing *de minimis* fisheries during this period, provide for an age-4 ocean impact rate of no more than 10 percent when preseason stock abundance forecasts result in pre-fishing spawning escapement projections of less than about 54,000. Because the KRFC projected escapement absent fishing is greater than 54,000, Amendment 15 would not apply.

OTHER CALIFORNIA COASTAL CHINOOK STOCKS

Other California coastal streams that support fall Chinook stocks which contribute to ocean fisheries off Oregon and California, include the Smith, Little, Mad, Eel, and Mattole rivers, and Redwood Creek. Except for the Smith River, these stocks are included in the California coastal Chinook ESU, which is listed as threatened under the ESA. Current information is insufficient to forecast the ocean abundance of these stocks, however, the NMFS ESA consultation standard restricts the Klamath River fall Chinook age-4 ocean harvest rate to no more than 16.0 percent to limit impacts on these stocks. As indicated in the previous section, the postseason estimate of this rate for 2008 is 9.8 percent, with a preseason forecast of 2.4 percent. If the ocean fisheries were closed from January through August 2009 between Cape Falcon and Point Sur, the expected age-4 ocean harvest rate for 2009 would be zero percent (zero KRFC were harvested during the September through November 2008 period).

OREGON COASTAL CHINOOK STOCKS

Oregon coastal Chinook stocks are categorized into three major subgroups based on ocean migration patterns; the North Oregon Coastal Chinook aggregate, the Mid Oregon Coastal Chinook aggregate, and the Southern Oregon Coastal Chinook aggregate. Although their ocean harvest distributions overlap somewhat, they have been labeled as either far-north, north, or south/local migrating, respectively.

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

Far-north and north migrating Chinook stocks include 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 ocean fisheries off British Columbia, Canada and Southeast Alaska, and to a much lesser degree in Council area and terminal area (state waters) fisheries off Washington and Oregon. CWT analysis indicates populations from five major mid-Oregon Coast (MOC) systems, from the Coos through the Elk Rivers, are harvested primarily in ocean fisheries off British Columbia, Canada, Washington, and Oregon with minor contributions to California fisheries.

South/Local Migrating Chinook (SOC group)

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

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

Umpqua and Rogue spring Chinook contribute to ocean fisheries primarily as age-3 fish. Mature Chinook enter the rivers primarily during April and May and generally prior to annual ocean fisheries. Quantitative abundance predictions are not made for these stocks.

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

Predictor Description and 2009 Stock Status for NOC and MOC groups

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

Natural spawner escapement is assessed yearly from the Nehalem through Sixes rivers. Peak spawning counts of adults are obtained from standard index areas on these rivers and monitored to assess stock trends (*Review of 2008 Ocean Salmon Fisheries*, Chapter II, Table II-4 and Figure II-3). Natural fall Chinook stocks from both the NOC and MOC dominate production from this subgroup. Also present in lesser numbers are naturally-produced spring Chinook stocks from several rivers, and hatchery fall and/or spring Chinook released in the Trask, Nestucca, Salmon, Alsea, and Elk rivers.

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

North Oregon Coast

Since 1977, the Salmon River Hatchery production has been CWT'd for use primarily as a PSC indicator stock for the NOC stock component. Because these fish are harvested in fisheries north of the Council management area, the STT has not reviewed the procedure by which this indicator stock is used in estimating annual stock status. The annual spawner counts have been decreasing since 2002 despite excellent parental escapements indices in 2001 to 2004 (*Review of 2008 Ocean Salmon Fisheries*, Appendix B, Table B-11). If this trend continues, the 2009 NOC stock abundance is expected to be less than the 2008 abundance.

Based on the density index of total spawners, the generalized expectation for NOC stocks in 2009 is below recent years average abundance. Specifically, the 2008 spawner density in standard survey areas for the NOC averaged 25 spawners per mile; well below the lower bound of the FMP aggregate goal of 60 to 90 spawners per mile. Moreover, escapements in the NOC escapement indicator basins of the

Nehalem, Siletz, and Siuslaw have failed to achieve PSC agreed-to escapement goals in 2007 and 2008. The escapement of fall Chinook to the Nehalem basin has failed to reach its PSC agreed-to escapement goal (6,989) for the past 3 years

Mid-Oregon Coast

Since 1977, the Elk River Hatchery production has been CWT'd for potential use as a PSC indicator stock for the MOC stock aggregate. Age specific ocean abundance forecasts for 2009 are not currently available, but are being developed. The STT has not undertaken a review of the methods used by Oregon Department of Fish and Wildlife (ODFW) staff in developing these abundance forecasts.

The annual spawner counts had been decreasing since 2004 despite excellent parental escapements indices in 2001 to 2004 (*Review of 2008 Ocean Salmon Fisheries*, Appendix B, Table B-11). The MOC average spawner per mile from standard survey areas was 52 adult spawners per mile, below the goal of 60 to 90 spawners per mile, but improving over the record low escapements seen in the previous year (*Review of 2008 Ocean Salmon Fisheries*, Appendix B, Table B-11). Fall Chinook escapement goals are currently under development for the South Umpqua and Coquille basins of the MOC.

Predictor Description and 2009 Stock Status for South/Local Migrating Chinook

Quantitative abundance predictions are not made for all of these stocks, although an abundance index for Rogue River fall Chinook has been developed. General trends in stock abundance for SOC Chinook stocks are assessed through escapement indices (*Review of 2008 Ocean Salmon Fisheries*, Chapter II, Table II-4 and Figure II-3).

Carcass recoveries in Rogue River index surveys covering a large proportion of the total spawning area were available for 1977-2004. Using Klamath Ocean Harvest Model (KOHM) methodology, these carcass numbers, allocated into age-classes from scale data, were used to estimate the Rogue Ocean Population Index (ROPI) for age-3 to age-5 fish. A linear regression was developed using the escapement estimates (all ages) in year i based on seining at Huntley Park (1976-2003) to predict the ROPI in year i + 1 (1977-2004). The 2008 Huntley Park escapement estimate and the resulting 2009 ROPI forecast was then scaled to the historical carcass survey-based ROPI. The 2009 ROPI forecast (10,700) consisting of age-3 (6,100), age-4 (4,000) and age-5 (700) are based on the average annual age-class strengths of the carcass-based ROPIs from 1991-2004. This data-set was truncated at 1991 because significant harvest restrictions that could affect age structure began that year. The 2009 ROPI is slightly higher than the recent three-year average of 10,300, Table II-6.

Other Stocks

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

Evaluation of 2008 Regulations on 2009 Stock Abundance

The FMP conservation objective for Oregon coast Chinook is 150,000 to 200,000 natural adult spawners, and attainment of this goal is assessed using peak spawner counts of 60 to 90 fish per mile in nine standard index reaches. The aggregate stock had been meeting or exceeding this goal since 1984 and had been generally increasing until 2005. However, since reaching a peak in 2003, the escapement has been declining. In 2007 and 2008, the stock failed to meet its goal for the first time since 1983. No forecast is available for this stock, but given recent trends, it seems likely that it would fail to meet its goal again in 2009 under 2008 fishing seasons.

CHINOOK STOCKS NORTH OF CAPE FALCON

Columbia River Fall Chinook

Predictor Description and Past Performance

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

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

The 2009 return of each fall Chinook stock group is estimated using relationships between successive age groups within a cohort. The database for these relationships was constructed by combining age-specific estimates of escapement and inriver fishery catches for years since 1964 (except for MCB, which started in 1980). Typically, only the more recent broods are used in the current predictions. Fall Chinook stock identification in the Columbia River mixed stock fisheries is determined by sampling catch and escapement for CWTs and visual stock identification (VSI). Age composition estimates are based on CWT data and scale reading of fishery and escapement samples, where available. These stock and age data for Columbia River fall Chinook are the basis for the return data presented in the *Review of 2008 Ocean Salmon Fisheries* (Appendix B, Tables B-15 through B-20). The 2008 returns for the five fall Chinook stocks listed in this report may differ somewhat from those provided in the *Review of 2008 Ocean Salmon Fisheries*, since ocean escapement estimates may have been updated after that report was printed.

Performance of the preliminary inriver run size estimation methodology can be assessed, in part, by examining the differences between preseason and postseason estimates (Table II-7). The recent 10-year average March preliminary preseason estimates as a percentage of the postseason estimates for the URB, LRW, LRH, SCH, and MCB are 1.00, 1.00, 0.90, 1.05, and 0.92 respectively. The only March preliminary preseason estimate to show a bias was LRH, which was under predicted between 1994 and 2006; however since 2005, the prediction record has improved substantially. The other four stocks have been both over and under predicted.

Ocean escapement estimates developed for the March Council meeting do not take into account variations in marine harvest. The STT combines the initial inriver run size (ocean escapement; Table II-7) with expected Council area fishery harvest levels and stock distribution patterns to produce adjusted ocean

escapement estimates based on the proposed ocean fishing regulations. These revised estimates are available at the end of the Council preseason planning process in April and should provide a more accurate prediction of ocean escapement.

2009 Stock Status

The preliminary forecast for 2009 URB fall Chinook ocean escapement is 259,900 adults, about 132 percent of last year's return and about 109 percent of the recent 10-year average of 238,100.

No preseason forecast for 2009 ocean escapement of ESA-listed Snake River wild fall Chinook is currently available. However, the Columbia River TAC is expected to develop a run size estimate for this stock prior to the April Council meeting.

Ocean escapement of LRW fall Chinook in 2009 is forecast at 8,500 adults, about 120 percent of last year's forecast, and about 57 percent of the recent 10-year average return of 14,870. The forecast is more than double last year's return and the spawning escapement goal of 5,700 in the North Fork Lewis River may be achieved this year depending on fishing regulations.

The preliminary forecast for 2009 ocean escapement of LRH fall Chinook is for a return of 88,800 adults, about 147 percent of last year's return and 109 percent of the recent 10-year average of 81,120.

Ocean escapement of SCH fall Chinook in 2009 is forecast at 59,300 adults, about 65 percent of last year's return and 63 percent of the 10-year average of 93,990.

The preliminary forecast for the 2009 ocean escapement of MCB fall Chinook is 94,400 adults, about 125 percent of last year's return and about 112 percent of the recent 10-year average of 84,160.

Evaluation of 2008 Regulations on 2009 Stock Abundance

Applying 2008 regulations to the projected 2009 abundance of Columbia River fall Chinook would result in ocean escapements meeting spawning escapement goals for all major stocks. Compared to actual 2008 returns, the 2009 ocean escapement forecasts are higher for all stocks except SCH. Compared to 2008 forecast ocean escapement, the 2009 forecasts are higher for all major stocks except SCH.

Washington Coastal Chinook

Predictor Description and Past Performance

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

2009 Stock Status

The 2009 Willapa Bay hatchery fall Chinook ocean escapement abundance forecast is 34,817, which is higher than the 2008 prediction of 27,047. The 2009 natural fall Chinook ocean escapement forecast is 1,951, down from last year's prediction of 2,516.

For the Hoh River, the 2009 natural spring/summer Chinook ocean escapement abundance forecast is 1,061. The natural fall Chinook forecast is predicted to be 2,587 (currently under review).

The 2009 Quillayute hatchery spring Chinook forecast for ocean escapement abundance is 2,000 and the natural summer/fall Chinook abundance forecast is for a return of 6,766 (1,183 summer, 5,583 fall).

Puget Sound Chinook

Run-size expectations for various Puget Sound stock management units are listed in Table I-1. A comparison of preseason and postseason forecasts for recent years is detailed in Table II-8. The STT has not undertaken a review of the methods employed by state and tribal staffs in preparing these abundance forecasts. Methodologies for estimates are described in the annual Puget Sound management reports (starting in 1993, reports are available by Puget Sound management unit, not by individual species). Forecasts for Puget Sound stocks generally assume production is dominated by age-4 adults. Puget Sound Chinook were listed as threatened under the ESA in March 1999. Southern U.S. fisheries that impact Puget Sound Chinook are constrained by terms of a Resource Management Plan (RMP), and are exempted from ESA Section 9 take prohibitions under Limit 6 of the 4(d) rule.

2009 Stock Status

Spring Chinook

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

Summer/Fall Chinook

The 2009 preliminary forecast for Puget Sound summer/fall stocks is for a return of 222,371 Chinook, slightly lower than the 2008 preseason forecast of 244,910. The 2009 natural Chinook return forecast of 56,568 (includes supplemental category forecasts) is lower than the 2008 forecast of 59,406. Changes in the abundance of individual stocks from various production areas are detailed in Table I-1.

Natural stocks from Puget Sound had experienced improved survival in recent years. However, natural returns to several major populations were significantly lower in 2007 and 2008 than had been observed for recent years. Fishery management for Puget Sound Chinook has changed from an escapement goal basis to the use of stock specific exploitation rates and "critical abundance thresholds." This new approach is evaluated on an annual basis through the RMP.

Evaluation of 2008 Regulations on 2009 Stock Abundance

Council fisheries north of Cape Falcon have only a minor impact on most stocks that originate in Washington coastal and Puget Sound rivers. These stocks have northerly marine distribution patterns and are therefore impacted primarily by Canadian and Alaskan fisheries. An evaluation of 2008 Council area regulations on projected 2009 abundance would not provide a useful comparison of ocean escapement.

SELECTIVE FISHERY CONSIDERATIONS FOR CHINOOK

As the North of Falcon region has moved forward with mass marking of hatchery Chinook salmon stocks, selective fishing options for non-Indian fisheries are under consideration in the ocean area from Cape Falcon, Oregon to the Queets River, Washington. Based on preseason abundance forecasts, the expected mark rate for Chinook is predicted to be about 45% in the area from the Queets River to Leadbetter point and 60 percent in the area from Leadbetter Point to Cape Falcon. Mark rates for these areas observed in the ocean fisheries last year were in the 40 to 50 percent range, but not all hatchery Chinook releases were mass marked.

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

	SRFC Ocean Harvest South of Cape Falcon[a/]			River Harvest	Spawning Escapement			Sacramento	SI Harvest
Year	Troll	Sport	Total	Fall	Natural	Hatchery	Total	Index (SI)[b/]	Index (%)[c/]
1983	245.5	86.1	331.6	18.2	91.4	18.6	110.0	459.8	72
1984	266.1	87.0	353.0	26.2	119.5	38.7	158.2	537.4	66
1985	355.3	158.9	514.2	39.5	209.5	29.3	238.7	792.4	65
1986	618.9	137.5	756.5	39.4	216.3	21.8	238.2	1,034.0	73
1987	686.1	173.2	859.2	32.2	174.8	19.8	194.6	1,086.1	79
1988	1,162.6	188.3	1,350.9	37.2	198.0	26.8	224.7	1,612.8	84
1989	611.4	159.2	770.6	25.1	126.7	24.9	151.6	947.3	81
1990	514.2	150.5	664.7	17.4	83.2	21.7	104.9	787.0	84
1991	298.8	90.2	389.0	26.0 [d/]	91.0	26.0	117.0	532.0	73
1992	232.5	70.1	302.6	13.3 [d/]	58.3	21.7	79.9	395.9	76
1993	342.4	115.3	457.8	27.7 [d/]	110.6	24.6	135.2	620.6	74
1994	303.3	164.7	468.0	28.9 [d/]	133.0	30.6	163.6	660.5	71
1995	735.7	387.9	1,123.6	48.8	253.5	41.5	295.0	1,467.5	77
1996	426.7	157.0	583.7	49.6	267.1	32.5	299.6	932.9	63
1997	579.7	210.2	790.0	56.7	279.6	63.3	342.9	1,189.6	66
1998	292.8	113.9	406.7	69.8 [d/]	168.1	69.9	238.1	714.6	57
1999	308.1	76.6	384.7	68.9 [d/]	353.7	42.2	395.9	849.5	45
2000	431.4	153.2	584.5	59.5 [d/]	369.2	47.6	416.8	1,060.8	55
2001	284.4	93.5	377.9	98.4	537.4	57.4	594.8	1,071.1	35
2002	447.6	184.1	631.7	89.2 [d/]	682.7	85.7	768.4	1,489.3	42
2003	501.9	106.5	608.3	86.3	413.4	108.2	521.6	1,216.3	50
2004	621.9	212.6	834.5	46.9	203.5	80.1	283.5	1,165.0	72
2005	367.7	127.1	494.8	65.2	210.7	183.3	394.0	954.0	52
2006	149.9	107.6	257.5	44.3	189.3	78.7	268.0	569.9	45
2007	120.6	32.3	152.9	14.3 [d/]	66.6	21.3	87.9	255.1	60
2008[e/]	3.2	1.0	4.1	0.7 [d/]	48.5	17.7	66.3	71.1	6

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

b/ Total ocean harvest south of Cape Falcon plus Sacramento River Basin sport harvest plus total spawning escapement of SRFC.

c/ Total ocean harvest of SRFC as a percent of the SI.

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

e/ Preliminary.

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

	Ocean Abundance Sept. 1 (t-1)			Annual Ocean Harvest Rate Sept. 1 (t-1) - Aug. 31 (t)		Klamath Basin River Run (t)				
Year (t)	Age-3	Age-4	Total	Age-3	Age-4	Age-2	Age-3	Age-4	Age-5	Total Adults
1981	493.2	57.0	550.2	0.21	0.53	28.2	64.1	14.4	1.8	80.3
1982	566.2	133.4	699.6	0.30	0.52	39.4	30.1	33.9	2.6	66.6
1983	316.5	116.3	432.9	0.19	0.60	3.8	35.9	20.7	0.9	57.5
1984	158.5	83.4	241.9	0.08	0.38	8.3	21.7	24.4	1.1	47.2
1985	376.5	57.5	434.0	0.11	0.24	69.4	32.9	25.7	5.8	64.4
1986	1,305.8	141.8	1,447.6	0.18	0.46	44.6	162.9	29.8	2.3	195.0
1987	782.0	342.6	1,124.6	0.16	0.43	19.1	89.7	112.6	6.8	209.1
1988	756.9	235.5	992.4	0.20	0.39	24.1	101.2	86.5	3.9	191.6
1989	370.3	177.7	548.0	0.15	0.36	9.1	50.4	69.6	4.3	124.3
1990	176.1	104.1	280.3	0.30	0.55	4.4	11.6	22.9	1.3	35.9
1991	69.4	37.2	106.6	0.03	0.18	1.8	10.0	21.6	1.1	32.7
1992	39.5	28.2	67.7	0.02	0.07	13.7	6.9	18.8	1.0	26.7
1993	168.5	15.0	183.5	0.05	0.16	7.6	48.3	8.2	0.7	57.2
1994	119.9	41.7	161.6	0.03	0.09	14.4	37.0	26.0	1.0	64.0
1995	784.3	28.7	813.0	0.04	0.14	22.8	201.9	18.3	2.6	222.8
1996	192.3	225.5	417.8	0.05	0.16	9.5	38.8	136.7	0.3	175.8
1997	140.4	62.8	203.3	0.01	0.06	8.0	35.0	44.2	4.6	83.7
1998	154.8	44.9	199.7	0.00	0.09	4.6	59.2	29.7	1.7	90.6
1999	129.4	30.5	159.8	0.01	0.09	19.2	29.2	20.5	1.3	51.0
2000	617.6	44.3	661.9	0.06	0.10	10.2	187.1	30.5	0.5	218.1
2001	357.1	133.9	491.0	0.03	0.09	11.3	99.1	88.2	0.2	187.4
2002	514.5	99.5	614.0	0.02	0.15	9.2	94.6	62.5	3.7	160.8
2003	401.1	192.6	593.7	0.08	0.21	3.8	94.3	96.8	0.9	191.9
2004	160.2	105.3	265.6	0.12	0.34	9.7	33.2	40.7	5.3	79.2
2005	190.6	38.2	228.9	0.02	0.20	2.3	43.8	17.5	3.9	65.2
2006	90.2	63.5	153.7	0.01	0.10	26.9	18.5	41.6	1.3	61.4
2007	377.5[a/]	33.4	410.9	NA [a/]	0.21	1.7	113.7	16.8	1.6	132.1
2008	36.1[b/]	81.6[a/]	117.7	NA [c/]	0.10[a/]	25.3	18.6	50.2	1.7	70.6

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

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

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

TABLE II-3. Comparisons of preseason forecast and postseason estimates for ocean abundance of adult Klamath River fall Chinook. (Page 1 of 4)

Year (t)	Preseason Forecast[a/] Sept. 1 (t-1)	Postseason Estimate Sept. 1 (t-1)	Pre/Postseason
		Age-3	
1985	113,000	276,000	0.41
1986	426,000[b/]	1,305,782	0.33
1987	511,800	782,032	0.65
1988	370,800	756,908	0.49
1989	450,600	370,328	1.22
1990	479,000	176,133	2.72
1991	176,200	69,442	2.54
1992	50,000	39,502	1.27
1993	294,400	168,473	1.75
1994	138,000	119,913	1.15
1995	269,000	784,279	0.34
1996	479,800	192,290	2.50
1997	224,600	140,421	1.60
1998	176,000	154,819	1.14
1999	84,800	129,355	0.66
2000	349,600	617,573	0.57
2001	187,200	357,085	0.52
2002	209,000	514,524	0.41
2003	171,300	401,092	0.43
2004	72,100	160,243	0.45
2005	185,700	190,636	0.97
2006	44,100	90,170	0.49
2007	515,400	377,534	1.37
2008[c/]	31,600	36,058	0.88
2009	474,900	-	-

TABLE II-3. Comparisons of preseason forecast and postseason estimates for ocean abundance of adult Klamath River fall Chinook. (Page 2 of 4)

Year (t)	Preseason Forecast[a/] Sept. 1 (t-1)	Postseason Estimate Sept. 1 (t-1)	Pre/Postseason
		Age-4	
1985	56,875	57,500	0.99
1986	66,250	141,772	0.47
1987	206,125	342,555	0.60
1988	186,375	235,535	0.79
1989	215,500	177,655	1.21
1990	50,125	104,131	0.48
1991	44,625	37,172	1.20
1992	44,750	28,181	1.59
1993	39,125	15,037	2.60
1994	86,125	41,736	2.06
1995	47,000	28,725	1.64
1996	268,500	225,526	1.19
1997	53,875	62,830	0.86
1998	46,000	44,889	1.02
1999	78,750	30,468	2.58
2000	38,875	44,346	0.88
2001	247,000	133,869	1.85
2002	143,800	99,464	1.45
2003	132,400	192,598	0.69
2004	134,500	105,346	1.28
2005	48,900	38,239	1.28
2006	63,700	63,485	1.00
2007	26,100	33,365	0.78
2008[c/]	157,200	81,595	1.93
2009	25,200	-	-

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

Year (t)	Preseason Forecast[a/] Sept. 1 (t-1)	Postseason Estimate Sept. 1 (t-1)	Pre/Postseason
		Age-5	
1985	NA	11,187	NA
1986	NA	6,367	NA
1987	5,250	19,443	0.27
1988	13,250	14,669	0.90
1989	10,125	9,627	1.05
1990	7,625	7,776	0.98
1991	1,500	2,774	0.54
1992	1,250	1,444	0.87
1993	1,125	1,759	0.64
1994	500	1,468	0.34
1995	2,000	3,805	0.53
1996	1,125	787	1.43
1997	7,875	8,859	0.89
1998	3,250	2,389	1.36
1999	2,000	2,106	0.95
2000	1,375	1,051	1.31
2001	1,250	258	4.84
2002	9,700	6,970	1.39
2003	6,500	1,917	3.39
2004	9,700	17,196	0.56
2005	5,200	6,893	0.75
2006	2,200	5,242	0.42
2007	4,700	2,915	1.61
2008[c/]	1,900	2,724	0.70
2009	5,600	-	-

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

Year (t)	Preseason Forecast[a/] Sept. 1 (t-1)	Postseason Estimate Sept. 1 (t-1)	Pre/Postseason
		Total Adults	
1985	169,875[d/]	344,687	0.49
1986	492,250[d/]	1,453,921	0.34
1987	723,175	1,144,030	0.63
1988	570,425	1,007,112	0.57
1989	676,225	557,610	1.21
1990	536,750	288,040	1.86
1991	222,325	109,388	2.03
1992	96,000	69,127	1.39
1993	334,650	185,269	1.81
1994	224,625	163,117	1.38
1995	318,000	816,809	0.39
1996	749,425	418,603	1.79
1997	286,350	212,110	1.35
1998	225,250	202,097	1.11
1999	165,550	161,929	1.02
2000	389,850	662,970	0.59
2001	435,450	491,212	0.89
2002	362,500	620,958	0.58
2003	310,200	595,607	0.52
2004	216,300	282,785	0.76
2005	239,800	235,768	1.02
2006	110,000	158,897	0.69
2007	546,200	413,814	1.32
2008[c/]	190,700	120,377	1.58
2009	505,700	-	-

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

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

c/ Postseason estimates are preliminary.

d/ Does not include age-5 adults.

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

	Preseason Ocean Abundance Forecast[a/] Sept. 1 (t-1)		Postseason Ocean Abundance Estimate Sept. 1 (t-1)		Preseason Age-4 Harvest Rate Forecast[b/]		Postseason Age-4 Harvest Rate Estimate[c/]		Preseason Adult Harvest Forecast		Postseason Adult Harvest Estimate	
Year(t)	Age-3	Age-4	Age-3	Age-4	Ocean	River	Ocean	River	Ocean	River	Ocean	River
1986	426,000	66,250	1,305,782	141,772	0.28	0.50	0.46	0.67	72,000	37,700	302,478	46,154
1987	511,800	206,125	782,032	342,555	0.28	0.53	0.43	0.44	121,200	78,200	277,104	73,265
1988	370,800	186,375	756,908	235,535	0.31	0.53	0.39	0.52	114,100	65,400	254,444	73,854
1989	450,600	215,500	370,328	177,655	0.30	0.49	0.36	0.70	128,100	67,600	125,523	54,340
1990	479,000	50,125	176,133	104,131	0.30	0.49	0.55	0.36	85,100	31,200	114,911	11,459
1991	176,200	44,625	69,442	37,172	0.13	0.28	0.18	0.45	16,700	12,800	9,871	13,581
1992	50,000	44,750	39,502	28,181	0.06	0.15	0.07	0.27	4,200	4,200	3,140	6,787
1993	294,400	39,125	168,473	15,037	0.12	0.43	0.16	0.49	20,100	22,500	11,355	12,808
1994	138,000	86,125	119,913	41,736	0.07	0.20	0.09	0.29	10,400	14,300	7,961	13,524
1995	269,000	47,000	784,279	28,725	0.07	0.32	0.14	0.19	13,500	18,500	32,230	21,637
1996	479,800	268,500	192,290	225,526	0.17	0.66	0.16	0.39	88,400	129,100	45,147	69,241
1997	224,600	53,875	140,421	62,830	0.10	0.43	0.06	0.26	17,600	26,500	8,657	17,764
1998	176,000	46,000	154,819	44,889	0.07	0.29	0.09	0.30	10,200	14,800	5,012	17,897
1999	84,800	78,750	129,355	30,468	0.10	0.28	0.09	0.45	12,300	18,100	5,126	16,942
2000	349,600	38,875	617,573	44,346	0.11	0.53	0.10	0.25	24,000	32,400	42,336	35,066
2001	187,200	247,000	357,085	133,869	0.14	0.61	0.09	0.29	45,600	105,300	21,783	50,780
2002	209,000	143,800	514,524	99,464	0.13	0.57	0.15	0.26	30,000	70,900	29,436	35,069
2003	171,300	132,400	401,092	192,598	0.16	0.50	0.21	0.28	30,600	52,200	71,124	39,715
2004	72,100	134,500	160,243	105,346	0.15	0.38	0.34	0.48	26,500	35,800	64,264	29,807
2005	185,700	48,900	190,636	38,239	0.08	0.16	0.20	0.19	7,100	9,600	13,229	10,001
2006	44,100	63,700	90,170	63,485	0.11	0.23	0.10	0.18	10,000	10,000	10,476	10,345
2007	515,400	26,100	377,534	33,365	0.16	0.63	0.21	0.56	30,200	51,400	30,346	33,884
2008[d/]	31,600	157,200	36,058	81,595	0.02	0.43	0.10	0.38	4,500	49,500	8,480	24,124
2009	474,900	25,200	-	-	-	-	-	-	-	-	-	-

a/ Original preseason forecasts for years 1986-2001 were for May 1 (t); converted to Sept. 1 (t-1) forecasts by dividing the May 1 (t) number by the assumed Sept. 1 (t-1) through May 1 (t) survival rate assumed in those years: 0.5 age-3, 0.8 age-4, 0.8 age-5.

b/ Ocean harvest rate forecast is the fraction of the predicted ocean abundance expected to be harvested Sept. 1 (t-1) through August 31(t). River harvest rate forecast is the fraction of the predicted river run expected to be harvested in river fisheries. Original ocean harvest rate forecasts for year (t), 1986-2001, were based on a May 1 (t) ocean abundance denominator; converted to Sept. 1 (t-1) abundance denominator by multiplying former values by 0.8 (the assumed age-4 survival rate between Sept. 1 (t-1) and May 1 (t) in those years).

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

d/ Postseason estimates are preliminary.

TABLE II-5. Harvest levels and rates of age-3 and age-4 Klamath River fall Chinook. (Page 1 of 2)

	Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t))							River Fisheries (t)		
	KMZ			North of	South of		Ocean			
Year (t)	Troll	Sport	Subtotal	KMZ	KMZ	Subtotal	Total	Net	Sport	Total
					HARVEST (numbers of fish)					
Age-3										
1986	35,630	4,876	40,506	73,913	122,913	196,826	237,332	8,100	18,100	26,200
1987	17,231	5,083	22,314	42,875	56,362	99,237	121,551	11,400	11,400	22,800
1988	15,996	5,164	21,160	24,312	107,949	132,261	153,421	12,500	15,600	28,100
1989	6,462	11,793	18,255	15,368	23,750	39,118	57,373	2,700	900	3,600
1990	81	4,357	4,438	36,578	11,006	47,584	52,022	1,300	1,400	2,700
1991	0	1,022	1,022	343	810	1,153	2,175	2,123	1,277	3,400
1992	0	0	0	972	0	972	972	970	251	1,221
1993	0	822	822	833	6,424	7,257	8,079	5,426	2,917	8,343
1994	42	604	646	0	3,387	3,387	4,033	4,543	965	5,508
1995	0	999	999	12,211	14,808	27,019	28,018	11,840	5,536	17,376
1996	0	0	0	0	9,312	9,312	9,312	12,363	3,661	16,024
1997	0	232	232	620	1,215	1,835	2,067	2,166	2,736	4,902
1998	0	6	6	298	466	764	770	2,231	5,781	8,012
1999	63	180	243	1,262	433	1,695	1,938	4,981	1,748	6,729
2000	404	3,282	3,686	8,730	25,206	33,936	37,622	22,458	4,893	27,351
2001	113	105	218	2,765	6,088	8,853	9,071	17,885	7,294	25,179
2002	220	783	1,003	1,623	9,912	11,535	12,538	11,734	6,258	17,992
2003	173	679	852	2,026	27,312	29,338	30,190	6,996	5,061	12,057
2004	403	971	1,374	9,902	7,337	17,239	18,613	4,679	2,051	6,730
2005	0	568	568	889	2,381	3,270	3,838	4,394	1,641	6,035
2006	0	475	475	32	339	371	846	2,388	13	2,401
2007[a/]	766	8,057	8,823	4,408	9,316	13,724	22,547	17,543	5,734	23,277
2008[a/]	0	0	0	0	0	0	0	3,225	598	3,823
Age-4										
1986	7,797	1,120	8,917	23,560	32,131	55,691	64,608	17,000	2,900	19,900
1987	21,727	4,427	26,154	71,123	48,812	119,935	146,089	41,000	8,500	49,500
1988	11,867	3,598	15,465	26,950	50,278	77,228	92,693	38,600	6,200	44,800
1989	6,062	9,735	15,797	32,428	16,608	49,036	64,833	41,000	7,700	48,700
1990	4,000	2,916	6,916	39,760	10,608	50,368	57,284	6,000	2,200	8,200
1991	0	1,001	1,001	1,513	4,135	5,648	6,649	7,593	2,016	9,609
1992	171	55	226	1,781	12	1,793	2,019	4,360	723	5,083
1993	0	0	0	849	1,616	2,465	2,465	3,786	243	4,029
1994	0	1,124	1,124	1,168	1,499	2,667	3,791	6,666	818	7,484
1995	0	242	242	1,879	1,771	3,650	3,892	2,957	480	3,437
1996	773	3,464	4,237	10,336	20,738	31,074	35,311	43,959	9,080	53,039
1997	3	172	175	463	2,995	3,458	3,633	8,734	2,586	11,320
1998	0	105	105	4,062	0	4,062	4,167	7,164	1,822	8,986
1999	15	381	396	1,667	696	2,363	2,759	8,789	494	9,283
2000	117	895	1,012	2,484	1,076	3,560	4,572	6,733	756	7,489
2001	1,312	1,604	2,916	5,830	3,927	9,757	12,673	20,759	4,819	25,578
2002	1,938	827	2,765	3,226	9,416	12,642	15,407	11,929	4,063	15,992
2003	834	918	1,752	8,154	30,002	38,156	39,908	22,754	4,592	27,346
2004	1,422	1,215	2,637	11,667	21,960	33,627	36,264	17,623	1,751	19,374
2005	247	317	564	5,355	1,910	7,265	7,829	3,048	304	3,352
2006	196	725	921	4,269	985	5,254	6,175	7,569	42	7,611
2007	268	2,317	2,585	2,009	2,452	4,461	7,046	8,987	502	9,489
2008[a/]	6,242	1,083	7,325	535	110	645	7,970	17,891	1,214	19,105

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

	Ocean Fisheries (Sept. 1 (t-1) - Aug. 31 (t))							River Fisheries (t)		
	KMZ			North of	South of		Ocean			
Year (t)	Troll	Sport	Subtotal	KMZ	KMZ	Subtotal	Total	Net	Sport	Total
					HARVEST RATE[b/]					
Age-3										
1986	0.03	0.00	0.03	0.06	0.09	0.15	0.18	0.05	0.11	0.16
1987	0.02	0.01	0.03	0.05	0.07	0.13	0.16	0.13	0.13	0.25
1988	0.02	0.01	0.03	0.03	0.14	0.17	0.20	0.12	0.15	0.28
1989	0.02	0.03	0.05	0.04	0.06	0.11	0.15	0.05	0.02	0.07
1990	0.00	0.02	0.03	0.21	0.06	0.27	0.30	0.11	0.12	0.23
1991	0.00	0.01	0.01	0.00	0.01	0.02	0.03	0.21	0.13	0.34
1992	0.00	0.00	0.00	0.02	0.00	0.02	0.02	0.14	0.04	0.18
1993	0.00	0.00	0.00	0.00	0.04	0.04	0.05	0.11	0.06	0.17
1994	0.00	0.01	0.01	0.00	0.03	0.03	0.03	0.12	0.03	0.15
1995	0.00	0.00	0.00	0.02	0.02	0.03	0.04	0.06	0.03	0.09
1996	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.32	0.09	0.41
1997	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.06	0.08	0.14
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.10	0.14
1999	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.17	0.06	0.23
2000	0.00	0.01	0.01	0.01	0.04	0.05	0.06	0.12	0.03	0.15
2001	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.18	0.07	0.25
2002	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.12	0.07	0.19
2003	0.00	0.00	0.00	0.01	0.07	0.07	0.08	0.07	0.05	0.13
2004	0.00	0.01	0.01	0.06	0.05	0.11	0.12	0.14	0.06	0.20
2005	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.10	0.04	0.14
2006	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.13	0.00	0.13
2007[a/]	0.00	0.02	0.02	0.01	0.02	0.04	0.06	0.15	0.05	0.20
2008[a/]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.03	0.21
Age-4										
1986	0.05	0.01	0.06	0.17	0.23	0.39	0.46	0.57	0.10	0.67
1987	0.06	0.01	0.08	0.21	0.14	0.35	0.43	0.36	0.08	0.44
1988	0.05	0.02	0.07	0.11	0.21	0.33	0.39	0.45	0.07	0.52
1989	0.03	0.05	0.09	0.18	0.09	0.28	0.36	0.59	0.11	0.70
1990	0.04	0.03	0.07	0.38	0.10	0.48	0.55	0.26	0.10	0.36
1991	0.00	0.03	0.03	0.04	0.11	0.15	0.18	0.35	0.09	0.45
1992	0.01	0.00	0.01	0.06	0.00	0.06	0.07	0.23	0.04	0.27
1993	0.00	0.00	0.00	0.06	0.11	0.16	0.16	0.46	0.03	0.49
1994	0.00	0.03	0.03	0.03	0.04	0.06	0.09	0.26	0.03	0.29
1995	0.00	0.01	0.01	0.07	0.06	0.13	0.14	0.16	0.03	0.19
1996	0.00	0.02	0.02	0.05	0.09	0.14	0.16	0.32	0.07	0.39
1997	0.00	0.00	0.00	0.01	0.05	0.06	0.06	0.20	0.06	0.26
1998	0.00	0.00	0.00	0.09	0.00	0.09	0.09	0.24	0.06	0.30
1999	0.00	0.01	0.01	0.05	0.02	0.08	0.09	0.43	0.02	0.45
2000	0.00	0.02	0.02	0.06	0.02	0.08	0.10	0.22	0.02	0.25
2001	0.01	0.01	0.02	0.04	0.03	0.07	0.09	0.24	0.05	0.29
2002	0.02	0.01	0.03	0.03	0.09	0.13	0.15	0.19	0.06	0.26
2003	0.00	0.00	0.01	0.04	0.16	0.20	0.21	0.24	0.05	0.28
2004	0.01	0.01	0.03	0.11	0.21	0.32	0.34	0.43	0.04	0.48
2005	0.01	0.01	0.01	0.14	0.05	0.19	0.20	0.17	0.02	0.19
2006	0.00	0.01	0.01	0.07	0.02	0.08	0.10	0.18	0.00	0.18
2007	0.01	0.07	0.08	0.06	0.07	0.13	0.21	0.53	0.03	0.56
2008[a/]	0.08	0.01	0.09	0.01	0.00	0.01	0.10	0.36	0.02	0.38

a/ Preliminary (incomplete cohort).

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

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

Return Year	Inriver Run Index in Thousands of Fish[a/]					Ocean Impact Rate by Age[b/]		Ocean Population Index in Thousands of Fish[c/]			
	Age-2	Age-3	Age-4	Age-5	Total[d/]	Age-3	Age-4-5	Age-3	Age-4	Age-5	Total
1977	2.4	1.0	0.3	0.0	3.7	0.23	0.55	9.7	1.4	0.1	11.2
1978	1.0	6.1	2.3	0.1	9.5	0.23	0.55	38.7	5.2	0.2	44.1
1979	0.2	1.0	6.5	0.0	7.7	0.23	0.55	7.8	18.8	0.1	26.7
1980	0.4	0.2	0.9	0.6	2.1	0.23	0.55	5.2	4.0	1.4	10.6
1981	1.1	3.3	1.0	0.3	5.7	0.21	0.53	9.2	3.0	0.7	12.9
1982	0.7	1.3	1.3	0.1	3.4	0.30	0.52	9.8	2.9	0.3	13.0
1983	0.3	1.1	1.5	0.0	2.9	0.19	0.60	8.6	4.4	0.1	13.1
1984	0.4	1.2	1.8	0.1	3.5	0.08	0.38	9.9	4.7	0.2	14.8
1985	2.5	1.3	3.5	0.6	7.9	0.11	0.25	9.7	6.3	0.9	16.9
1986	3.1	12.5	2.3	0.5	18.4	0.18	0.46	71.3	5.9	1.0	78.2
1987	2.6	7.8	18.1	0.4	28.9	0.16	0.43	80.3	36.3	0.6	117.2
1988	1.4	4.8	25.2	1.5	32.9	0.20	0.39	17.3	47.9	2.5	67.7
1989	0.5	1.3	4.0	2.0	7.8	0.15	0.36	8.4	7.2	3.2	18.8
1990	0.0	0.3	1.4	0.2	1.9	0.30	0.55	6.0	4.7	0.5	11.2
1991	0.2	0.4	1.9	0.5	3.0	0.03	0.18	3.5	3.2	0.6	7.3
1992	0.5	0.3	1.5	0.5	2.8	0.02	0.07	4.4	2.4	0.6	7.4
1993	0.3	3.5	1.5	0.5	5.8	0.05	0.16	16.1	3.2	0.6	19.9
1994	0.5	0.8	5.8	0.9	8.0	0.03	0.09	3.0	9.5	0.9	13.4
1995	0.2	0.6	1.4	2.0	4.2	0.04	0.13	4.3	1.7	2.3	8.3
1996	0.1	0.4	1.8	0.1	2.4	0.05	0.16	2.4	2.8	0.1	5.3
1997	0.1	0.3	1.0	0.3	1.7	0.01	0.06	5.2	1.5	0.3	7.0
1998	0.0	0.5	2.8	0.3	3.6	0.00	0.09	3.8	3.9	0.3	8.0
1999	0.2	0.3	1.6	0.5	2.6	0.01	0.09	1.5	2.7	0.6	4.8
2000	0.2	2.0	0.8	0.6	3.6	0.06	0.10	9.9	0.9	0.6	11.4
2001	0.8	2.3	4.2	0.0	7.3	0.03	0.09	14.1	5.9	0.0	20.0
2002	0.9	4.0	7.1	0.8	12.7	0.02	0.15	32.2	9.1	0.9	42.2
2003	0.9	2.3	12.0	0.4	15.6	0.08	0.21	14.4	22.1	0.5	37.0
2004	0.4	0.6	4.9	2.9	8.8	0.12	0.34	3.9	9.7	4.4	18.0
2005[f/]	NA	NA	NA	NA	NA	0.02	0.20	7.6	5.0	0.8	13.4
2006[f/]	NA	NA	NA	NA	NA	0.01	0.11	4.9	3.2	0.5	8.6
2007[f/]	NA	NA	NA	NA	NA	0.04	0.21	5.8[e/]	3.8	0.6	10.2[e/]
2008[f/]	NA	NA	NA	NA	NA	0.00	0.01	6.9[e/]	4.6[e/]	0.7	12.2[e/]
2009[f/]	NA	NA	NA	NA	NA	-	-	6.1[g/]	4.0[g/]	0.7[g/]	10.7[g/]

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

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

c/ Based on cohort reconstruction methods. Index values for 2008 predicted from regression equations; postseason estimates are not available.

d/ Excludes age-6 fish.

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

f/ Spawning surveys were discontinued 2005.

g/ Preseason forecast.

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

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

TABLE II-7. Predicted and postseason returns of Columbia River adult fall Chinook in thousands of fish. (Page 2 of 3)

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

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

Year	March Preseason Forecast[a/]	April STT Modeled Forecast[b/]	Postseason Return	March Pre/Postseason	April Pre/Postseason
			MCB		
1990	69.50	69.30	58.90	1.18	1.18
1991	48.40	48.50	35.40	1.37	1.37
1992	42.50	40.70	31.10	1.37	1.31
1993	33.00	32.30	27.50	1.20	1.17
1994	23.90	26.70	33.70	0.71	0.79
1995	25.00	30.00	34.20	0.73	0.88
1996	40.80	43.20	59.70	0.68	0.72
1997	72.10	61.90	59.00	1.22	1.05
1998	47.80	44.90	36.80	1.30	1.22
1999	38.30	27.70	50.70	0.76	0.55
2000	50.60	61.60	36.80	1.38	1.67
2001	43.50	45.30	76.40	0.57	0.59
2002	96.20	91.80	108.40	0.89	0.85
2003	104.80	94.60	150.20	0.70	0.63
2004	90.40	88.80	117.60	0.77	0.76
2005	89.40	89.73	98.00	0.91	0.92
2006	88.30	86.60	80.40	1.10	1.08
2007	68.00	69.10	46.90	1.45	1.47
2008[c/]	54.00	55.10	75.50	0.72	0.73
2009	94.40	-	-	-	-

a/ March preseason forecasts are ocean escapements based on terminal run size and stock-specific cohort relationships affected by the historical "normal" ocean fisheries, generally between 1979 and the most recent adequately complete broods.
b/ STT modeled forecasts adjust March preseason forecasts for Council-adopted ocean regulations each year and should provide a more accurate estimate of expected ocean escapement.
c/ Postseason estimates are preliminary.

TABLE II-8. Comparison of preseason and postseason forecasts of Puget Sound run size for summer/fall Chinook.[a/] (Page 1 of 4)

Year	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason
	Nooksack-Samish Hatchery and Natural			**East Sound Bay Hatchery**			**Skagit Hatchery**			**Skagit Natural**		
1993	50.4	32.3	1.53	3.2	3.8	0.84	1.0	1.4	0.71	14.0	6.9	2.00
1994	46.6	28.1	1.66	3.2	0.7	4.00	1.3	5.5	0.30	8.4	5.9	1.27
1995	38.5	22.3	1.73	3.5	0.2	17.50	1.6	3.4	0.48	5.0	9.2	0.52
1996	27.0	29.2	0.92	1.7	0.5	2.43	1.0	1.2	0.83	7.1	10.9	0.58
1997	34.0	41.7	0.99	1.2	1.2	1.00	0.1	0.0	-	6.4	6.1	1.03
1998	28.0	31.5	0.95	0.5	0.3	1.67	0.0	0.0	-	6.6	15.0	0.44
1999	27.0	42.1	0.66	2.3	0.3	7.67	0.0	0.0	-	7.6	5.3	1.46
2000	19.0	32.6	0.57	5.0	0.1	50.00	0.0	0.0	-	7.3	17.3	0.42
2001	34.9	64.7	0.55	1.6	0.9	16.00	0.0	0.0	-	9.1	14.1	0.65
2002	52.8	54.3	0.99	1.6	0.9	2.29	0.0	0.1	-	13.8	20.0	0.69
2003	45.8	30.0	1.51	1.6	0.2	8.00	0.0	0.3	-	13.7	10.3	1.38
2004	34.2	17.9	1.83	0.8	0.0	200.0	0.5	0.0	-	20.3	24.3	0.83
2005	14.5	15.9	1.07	0.4	0.0	13.33	0.7	0.4	3.50	23.4	23.4	0.99
2006	16.9	30.7	0.55	0.4	0.0	25.0	0.6	0.4	1.51	24.1	22.5	1.07
2007[b/]	18.8	25.9	0.73	0.4	0.0	66.7	1.1	0.4	2.75	15.0	12.9	1.16
2008	35.3	NA	NA	0.8	NA	NA	0.7	NA	NA	23.8	NA	NA
2009	23.0	-	-	0.1	-	-	0.6	-	-	23.4	-	-

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

Year	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason
		Stillaguamish [c/] Natural			**Snohomish [c/] Hatchery**			**Snohomish [c/] Natural**			**Tulalip [c/] Hatchery**	
1993	NA	1.3	-	1.6	2.7	0.58	4.9	5.5	0.89	2.8	1.4	2.03
1994	NA	1.3	-	1.8	5.4	0.33	4.5	5.0	0.90	2.8	1.8	1.59
1995	1.8	0.9	1.92	2.2	4.0	0.54	4.3	4.0	1.08	2.3	8.5	0.27
1996	1.3	1.2	1.04	6.7	4.6	1.47	4.2	5.9	0.71	2.7	11.5	0.24
1997	1.6	1.2	1.36	7.7	12.0	0.64	5.2	4.4	1.19	4.0	8.7	0.46
1998	1.6	1.6	1.03	6.5	4.7	1.37	5.6	6.4	0.88	2.5	7.2	0.35
1999	1.5	1.1	1.36	7.8	4.7	1.65	5.6	4.8	1.16	4.5	15.2	0.30
2000	2.0	1.7	1.21	6.2	1.9	3.20	6.0	6.1	0.98	5.0	8.3	0.60
2001	1.7	1.4	1.22	4.1	0.9	4.57	5.8	8.4	0.69	5.5	5.1	1.08
2002	2.0	1.6	1.25	6.8	2.6	2.66	6.7	7.3	0.92	5.8	5.2	1.12
2003	2.0	1.0	1.98	9.4	5.8	1.63	5.5	5.6	0.99	6.0	8.7	0.69
2004	1.9	1.6	1.19	3.3	6.4	0.52	10.6	11.2	0.95	6.8	6.5	1.05
2005	1.7	1.2	1.42	4.4	4.0	1.10	14.1	5.0	2.82	6.4	7.4	0.86
2006	1.0	1.3	0.77	2.8	4.3	0.65	11.0	8.8	1.25	9.3	5.8	1.60
2007	1.0	0.6	1.67	3.5	6.6	0.53	12.7	4.2	3.02	8.4	6.1	1.38
2008[b/]	0.6	1.7	0.35	3.8	6.2	0.61	7.4	8.6	0.86	2.7	3.9	0.69
2009	1.7	-	-	4.9	-	-	8.4	-	-	4.0	-	-

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

Year	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason
	South Puget Sound Hatchery			**South Puget Sound Natural**			**Strait of Juan de Fuca Hatchery**			**Strait of Juan de Fuca Natural**		
1993	61.8	43.1	1.68	26.5	9.6	1.34	0.7	1.0	3.50	3.1	1.6	1.29
1994	52.7	49.9	1.08	18.0	10.5	0.60	3.9	1.2	2.44	1.0	1.0	2.00
1995	49.6	75.4	0.67	21.7	24.9	0.63	3.0	0.7	30.00	0.9	2.3	0.33
1996	51.9	53.2	0.89	19.0	16.5	0.53	2.8	1.4	14.00	0.9	2.0	0.29
1997	65.1	38.3	1.40	18.2	15.9	0.88	2.2	1.0	7.33	0.8	2.9	0.23
1998	67.8	49.6	1.24	21.8	14.6	0.79	1.7	1.7	1.00	0.9	2.1	0.47
1999	59.4	67.3	0.71	19.6	33.5	1.15	1.9	0.7	2.71	0.9	2.7	0.33
2000	77.5	47.4	1.39	17.5	39.5	1.26	2.0	1.2	1.67	1.1	1.7	0.65
2001	73.7	76.6	0.76	16.2	44.6	0.80	0.0	1.7	NA	3.5	2.0	1.75
2002	90.8	69.2	1.07	16.9	58.5	0.79	0.0	1.6	NA	3.6	2.2	0.97
2003	86.6	56.6	1.14	19.6	31.0	1.28	0.0	1.3	NA	3.4	2.8	0.72
2004	86.5	66.4	1.16	17.5	24.5	0.61	0.0	1.4	NA	3.5	4.1	0.85
2005	83.1	73.7	0.95	17.7	19.1	0.46	0.0	1.4	NA	4.2	2.0	2.00
2006	85.8	105.1	0.82	21.3	42.2	0.50	0.0	1.2	NA	4.2	3.0	1.39
2007[b/]	83.0	139.6	0.59	17.0	32.5	0.52	0.0	0.8	NA	4.4	1.3	3.38
2008	101.6	NA	NA	21.1	NA	NA	0.0	NA	NA	4.5	NA	NA
2009	93.0	-	-	17.2	-	-	0.0	-	-	3.4	-	-

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

Year	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason	Preseason Forecast	Postseason Return	Pre/Postseason
	Hood Canal											
	Hatchery and Natural											
1993	NA	NA	-									
1994	11.7	4.7	2.44									
1995	11.5	3.7	3.03									
1996	3.9	9.9	0.41									
1997	9.0	8.1	1.10									
1998	2.7	7.8	0.34									
1999	6.7	16.3	0.41									
2000	14.0	29.0	0.47									
2001	19.2	20.1	0.90									
2002	25.3	26.6	1.31									
2003	24.0	39.6	0.76									
2004	29.6	36.5	0.86									
2005	30.5	41.1	1.36									
2006	30.2	68.1	0.44									
2007	47.5	45.9	1.03									
2008[b/]	36.8	33.2	1.11									
2009	42.6	-	-									

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

b/ Postseason returns are preliminary.

c/ These numbers are in terms of terminal run of Chinook returning to area 8A. This includes all adult Chinook harvested in the net fisheries in Areas 8A, 8D, the Stillaguamish and Snohomish Rivers; harvest in sport fisheries in Area 8D and the Stillaguamish and Snohomish Rivers; and escapement.

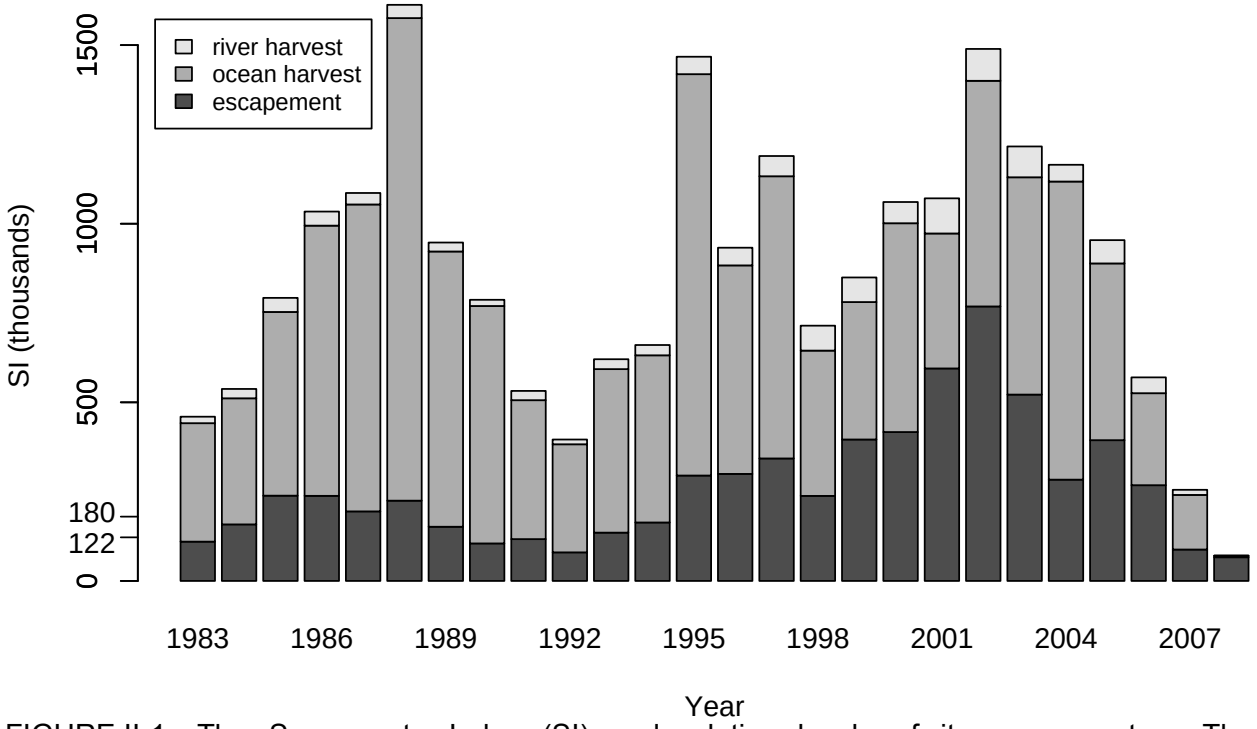

FIGURE II-1. The Sacramento Index (SI) and relative levels of its components. The Sacramento River fall Chinook escapement goal range of 122,000-180,000 adult spawners is noted on the vertical axis.

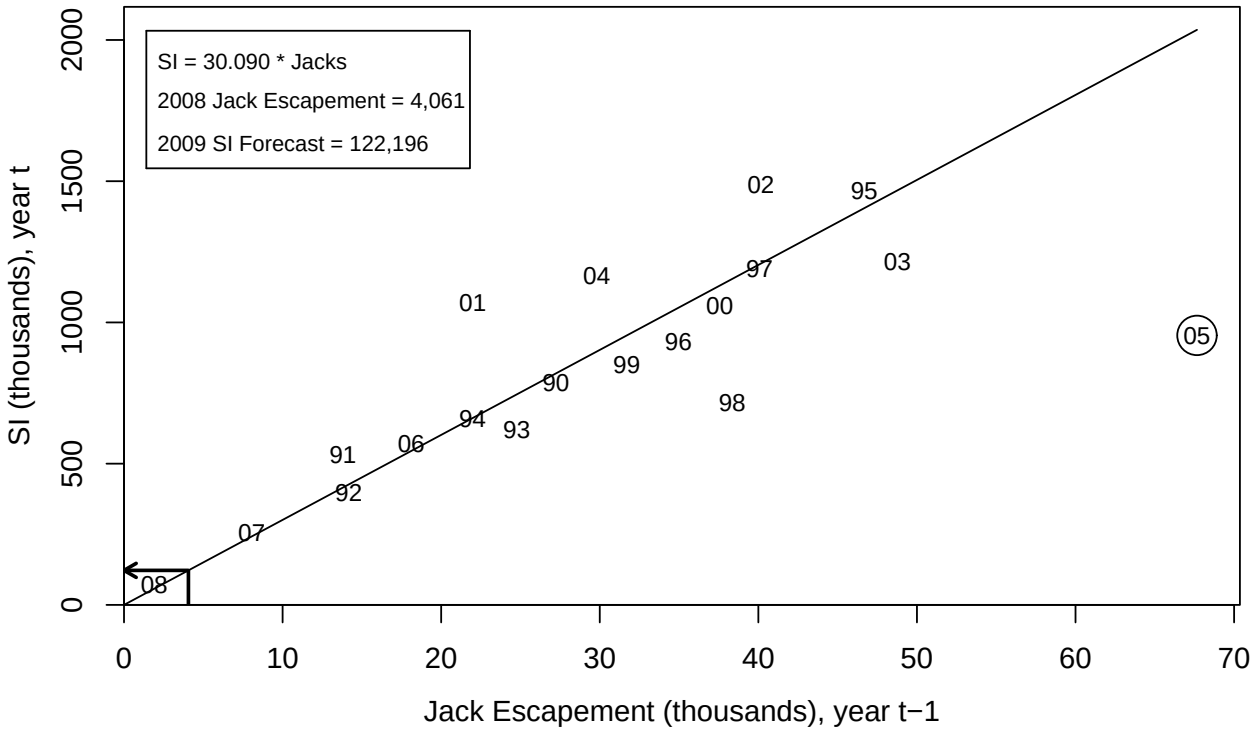

FIGURE II-2. Regression estimator for the SI based on previous year's escapement of Sacramento River fall Chinook jacks, 1990-2008, with 2005 data point omitted. Years shown are SI year. Arrows denote the use of this relationship for the 2009 SI forecast.

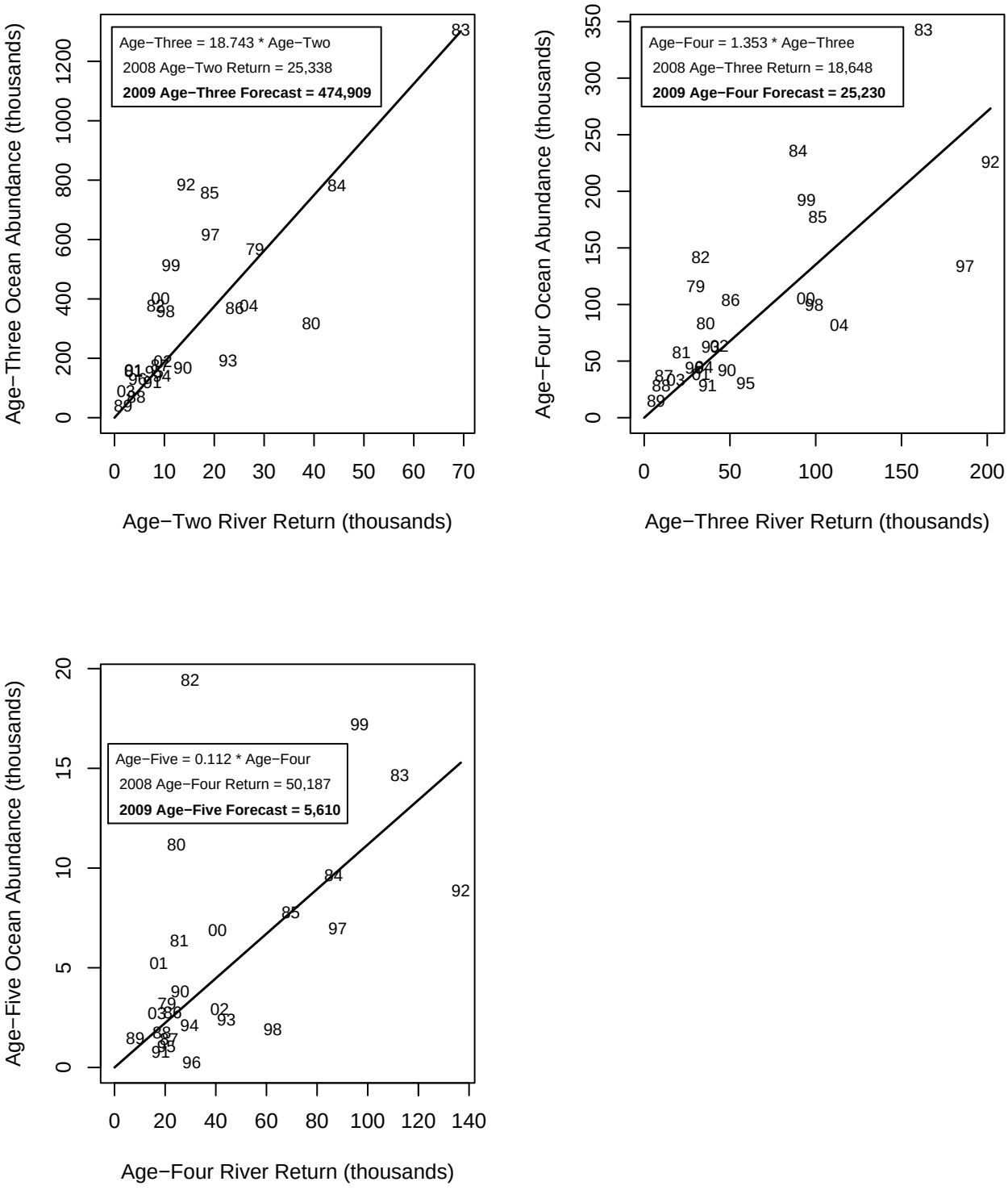

FIGURE II-3. Regression estimators for Klamath River fall Chinook ocean abundance (September 1) based on that year's river return of same cohort. Numbers in plots denote brood years.