

## **CHAPTER III - COHO SALMON ASSESMENT**

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

#### *(OREGON PRODUCTION INDEX AREA)*

The majority of coho harvested in the OPI area originate from stocks produced in rivers located within the OPI area (Leadbetter Point, Washington, to the U.S./Mexico border). These stocks include hatchery and natural production from the Columbia River, Oregon Coast, and northern California, and are divided into the following components: (1) public hatchery (OPIH), (2) Oregon coastal natural (OCN), including river and lake components, (3) hatchery smolt production from the Oregon coastal Salmon Trout Enhancement Program (STEP), Lower Columbia natural (LCN), and (5) natural and hatchery stocks south of Cape Blanco, Oregon, which include the Rogue, Klamath, and Northern California coastal stocks.

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

Beginning in 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 2008 abundance forecasts with recent year SRS abundance projections, both preseason and postseason, are reported in Table III-1. All fishery impacts and escapements from the coho FRAM are reported in SRS values.

Beginning in 2008, a new method was developed to estimate coho abundances for both the natural and hatchery components of the Columbia River and the Oregon coast. The traditional method of stock abundance estimation used only catch data from Leadbetter Point, Washington, to the U.S./Mexico border. This estimation technique was not consistent with the methods used in the FRAM. The Mixed Stock Model (MSM) used for constructing the FRAM base period data was used to estimate the contribution of various coho stocks, including the OPI area stocks, to ocean fisheries and was based on coded-wire tags (CWTs) and associated tag rates. The MSM includes all fisheries that impact a particular stock and therefore should provide a better overall accounting of total harvest and mortality of both Columbia River and Oregon coast coho stocks. The new run size estimates are based on the 1986 – 1992 base period and “backwards” FRAM runs for more recent years. The Oregon Production Index Technical Team (OPITT) has decided to use the MSM run reconstruction database for future accounting and predictions.

#### **Public Hatchery Coho**

OPI area public hatchery coho smolt production occurs primarily in Columbia River facilities and net pens. Several facilities located in Oregon coastal rivers and in the Klamath River Basin, California, collectively produce fewer coho. OPI area smolt releases since 1960 are reported by geographic area in Appendix B, Table B-1.

### *Predictor Description*

Since 1988, the OPIH stock predictor was a multiple linear regression with the following variables: 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]).

The 2008 stock prediction differs slightly from that used in previous years. Because of the shorter data set (1986-2007 vs. 1970-2007) and the near-total phase-out of coastal coho salmon hatcheries the factor for Oregon and California jacks (JackOC) was not significant in the regression. A simplified model with all OPI Jacks combined in one term (Jack OPI) was used, and all parameters were significant.

The OPIH stock predictor is partitioned into Columbia River early and late stocks based on the proportion of the 2007 jack returns to each area adjusted for stock specific maturation rates. The coastal hatchery stock is partitioned into northern and southern coastal stock components. The northern OPIH coastal stock is comprised of hatchery production from the central Oregon Coast. The southern OPIH coastal stock is comprised of hatchery production from the Rogue River basin in southern Oregon and the Klamath and Trinity basins in northern California. The 2008 partition was based on the “backwards” FRAM 2007 ocean abundance proportion.

For the 2008 abundance prediction, the data base includes 1986-2007 recruits. It also includes 1985-2006 jack returns. The model is:

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

Where:

$$a = -42.645724$$

$$b = 15.885113$$

$$c = 37.059908$$

$$\text{adjusted } r^2 = 0.87$$

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

### *Predictor Performance*

Recent year OPIH stock preseason abundance predictions, partitioned by production area and as a total, are compared with postseason estimates in Table III-1. The 2007 preseason abundance prediction of 593,600 OPIH coho was 125 percent of the preliminary postseason estimate of 476,500 coho.

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

### *2008 Stock Status*

Using the appropriate values from Appendix B, Table B-2, the OPIH abundance prediction for 2008 is 216,100 coho, 36 percent of the 2007 prediction and 45 percent of the preliminary 2007 postseason estimate.

### **Oregon Coastal Natural Coho**

The OCN stock is composed of natural production north of Cape Blanco, Oregon from OCNR and OCNL systems, which are predicted independently.

## *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 over-predict abundances, the database in the predictor was shortened from 1970-1991 to 1980-1991 starting with 1992 predictions.

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

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

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

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

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

In 2008, the OPITT adopted a new abundance time series based on MSM run reconstructions and “backwards” FRAM modeling. This time series starts in 1986, in contrast to the SRS time series that starts in 1970. There is much less contrast in the environmental variables in the shorter time period than there was in the longer period. In addition, there appears to be a weaker relationship between abundance and the environmental variables in recent years. A third consideration is that the MSM estimates of OCN abundance are considerably higher than the OPITT estimates and additional work is needed to determine the superior estimate.

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

### **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 (Tenmile, Siltcoos, and Tahkenitch). Production from these systems has declined substantially from the levels observed during 1950-1973, but has steadily increased in recent years. The 2007 abundance estimate was 10,400. Following the same reasoning used for the OCN Rivers predictor, the OPITT chose to use the 2007 postseason abundance for the 2008 preseason prediction instead of using a three year average.

### *Predictor Performance*

Recent-year OCN preseason SRS abundance predictions are compared to postseason estimates in Table III-1. Since 2000 the OCN predictor has under estimated abundance except for 2005 and 2007. The 2007 preseason abundance prediction of 255,400 OCN coho was 426 percent of the preliminary postseason estimate of 60,000 coho.

### *2008 Stock Status*

The 2008 preseason prediction for OCN (river and lake systems combined) is 60,000 coho, 23 percent of the 2007 preseason prediction and the same as the 2007 postseason estimate (Table III-1). The 2008 preseason SRS prediction for OCNR and OCNL components are 50,000 and 10,000 coho, respectively.

### **Private Hatchery Coho**

There have been no Oregon coastal PRIH coho smolt releases since 1990. Thus, there is no PRIH recruitment in 2007.

### **Salmon Trout Enhancement Hatchery Coho Smolt Program**

#### *Predictor Description*

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

The 2007 prediction used the observed 2002-2003 brood smolt-to-adult survival rate applied to the 2004 brood smolt production.

#### *Predictor Performance*

Recent-year STEP preseason abundance predictions are compared to postseason estimates in Table III-1. For 2007, there were no reported returns for the preseason abundance prediction of 2008 coho.

#### *2008 Stock Status*

Due to changes with the STEP program, releases for this forecast were discontinued after the 2004 brood and no forecast was made for 2008 (Table III-1).

### **Lower Columbia River Natural**

#### *Predictor Description*

The 2008 prediction for the Clackamas and Sandy Rivers is based on the recent 3-year cohort averages. The forecast for other Oregon lower Columbia River populations are recent cohort averages and average of recent year abundances. The total Oregon lower Columbia natural coho forecast to terminal areas of 3,200 was expanded by the recent 2-year OPI harvest rate to produce an ocean abundance estimate of 3,900.

The 2008 prediction for the Washington lower Columbia natural coho populations are derived by combining estimates of natural smolt production based on watershed area and a predicted 2005 brood year marine survival rate. The 2008 adult ocean abundance forecast is 9,500 coho.

### *Predictor Performance*

The LCN stock predictor methodology was developed in 2007. The preseason abundance compared to the postseason estimate is presented in Table III-1. The 2007 preseason abundance prediction of 21,500 LCN coho was 111 percent of the preliminary postseason estimate of 19,400 coho

### *2008 Stock Status*

The 2008 prediction for LCN coho is 13,400 coho (Table III-1). This ocean abundance estimate includes both Oregon and Washington LCN components.

### **Oregon Production Index Area Summary of 2008 Stock Status**

The 2008 combined OPI area stock abundance is predicted to be 276,100 coho, which is 33 percent of the 2007 preseason prediction of 849,200 coho and 51 percent of the 2007 preliminary postseason estimate of 536,500 coho. The 2008 OPI area predictions are compared to historical abundances in Table III-2.

## *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). These estimators are used to forecast preseason abundance of adult ocean recruits.

The performance of preseason abundance forecasts (adult ocean recruits) cannot be evaluated at this time because postseason run reconstructions for U.S. and Canadian coho production units have not been completed. A comparison of expected preseason and postseason ocean escapements for Washington coastal and Puget Sound stocks in recent years is presented in Tables III-3 and III-4. Postseason estimates of 2007 ocean escapements for some of these stocks are not available at this time. The comparison of preseason and postseason estimates of ocean escapement reflects annual errors in abundance estimates, deviations in ocean fisheries from preseason expectations, and variations in ocean distributions of stocks as described in the introduction. Fishery impact levels anticipated preseason may be substantially different than those that actually occur.

### **2008 Stock Status**

#### *Washington Coastal Coho*

##### **Willapa Bay**

The 2008 Willapa Bay hatchery coho abundance forecast is 25,511 ocean recruits compared to a 2007 preseason forecast of 37,228. The hatchery forecast is based on the regression of 1998-2007 hatchery terminal returns on the 1997-2006 jack returns. The natural coho forecast is 35,063 ocean recruits, based on the regression of wild terminal returns in 1997, 1999, 2003, 2005, and 2006 on the previous year's ( $n-1$ ) hatchery jack returns.

##### **Grays Harbor**

Preseason abundance forecasts are made for natural fish throughout the system and for hatchery fish returning to three freshwater rearing complexes and three saltwater net-pen sites. The forecasts include fish originating from numerous volunteer production projects. The abundance forecast for Grays Harbor natural stock coho for 2008 is 42,651 ocean age-3 recruits. The forecast for hatchery stock ocean abundance is 53,051 ocean age-3 recruits.

The natural coho forecast consists of an estimate of smolt production in the Humptulips and Chehalis basins multiplied by a smolt to adult survival rate. The smolt production estimate is calculated using 66 smolts per female multiplied by the number of female spawners, which is ½ of the observed 2005 total Grays Harbor natural escapement. The smolt production estimate is then divided by the total available square miles of habitat in the entire Grays Harbor Basin. This results in 587 smolts per square mile. The 587 smolts per square mile is then multiplied by the number of square miles in each component basin (Humptulips and Chehalis). That result is then multiplied by the survival estimate of 0.0285, which is based on a regression of postseason survival estimates on trawl survey catch off Oregon and Washington for 1999-2006.

The hatchery coho forecast consists of an estimate of smolt releases from on- and off-station sites, multiplied by a smolt to adult survival rate. For 2008, the on-station releases totaled 2,208,100 from Bingham Creek, Satsop Springs, Lake Aberdeen and Humptulips Hatcheries. Off station releases totaled 805,100 from Grays Harbor and Lower Chehalis net-pens, and other lower and upper Chehalis River rearing and release sites. The survival estimate of 0.0187 was the mean 2004-2007 survival rate for on-station releases. The survival rate was scaled by a factor of 0.5 (0.0093) for off-station releases.

### **Quinault River**

The 2008 forecast for Quinault natural coho is 17,441 ocean recruits, a 6 percent decrease from the 2007 forecast of 18,600. This forecast is based on the mean estimate of recent ocean recruits for 2001, 2003, 2004, 2005, 2006, and 2007 resulting from the recent Quinault Department of Fisheries work to re-develop the Quinault coho run reconstruction estimates.

The Quinault hatchery coho forecast is 24,540 ocean recruits, a 7 percent increase from the 2007 forecast of 22,735. This return is from a smolt release of 649,573, and is based on a survival rate of 3.8 percent, which lies between the recent five year mean rate for Queets River hatchery rates and somewhat higher rates indicated from recent Quinault Department of Fisheries work to re-develop the Quinault River coho run reconstruction estimates.

### **Queets River**

The 2008 Queets natural coho forecast is 10,182 ocean recruits, a decrease of 25 percent compared to the 2007 forecast level of 13,551. This forecast represents the estimated smolt production (301,250) multiplied by an expected survival rate of 3.38 percent. The estimate of survival rate is based on a regression of Queets wild coho ocean survival rates against September trawl survey data of juvenile coho collected off the coast of Oregon and Washington.

The 2008 Queets hatchery (Salmon River) coho forecast is 10,334 ocean recruits, a decrease of 46 percent compared to the 2007 forecast of 19,138. This forecast is based on a smolt release of 467,680 multiplied by the 2000-2003 brood year average observed marine survival rate (2.2 percent). Approximately 79 percent of the fish released from the Salmon River facility were marked with an adipose fin clip.

### **Hoh River**

The Hoh River natural coho forecast is 4,349 ocean recruits, a decrease of 20 percent compared to the 2007 forecast of 5,400. This forecast is based on estimated smolt production per square mile of watershed from the Clearwater tributary to the Queets River (430 smolts/square mile), multiplied by the size of the Hoh watershed (299 square miles), for a total of 128,678 smolts. The total wild smolt production prediction was then multiplied by an expected survival rate of 3.38 percent. The marine survival rate was based on the regression of eight years of marine survival data for Queets wild coho against trawl survey catch of yearling coho off the WA/OR coast in September of 2007. This estimate of

3.8 percent is consistent with an upward trend in marine survival observed for coho stocks originating from more northerly systems.

No hatchery production is projected for the Hoh system for 2008.

### **Quillayute River**

The Quillayute River summer natural and hatchery coho forecasts for 2008 are 1,115 and 4,228 ocean recruits, respectively. The natural component run size is based on the estimated total summer coho smolt production (27,877) and a projected ocean survival rate of 4.0 percent, which was derived from a regression of survival rates for Queets and Bingham Creek wild coho against catches of juvenile coho in September trawl surveys off the Washington and Oregon coast. The estimate of 4.0 percent is consistent with an upward trend in marine survival observed for coho stocks originating from more northerly streams. The hatchery component run forecast was based on a projected marine survival rate of 2.0 percent, which was derived from review of the relative performance of hatchery vs. wild coho in recent years, multiplied by a release of 211,400 smolts. Approximately 100 percent of the fish were marked with an adipose fin clip. The 2008 forecast abundance of natural summer coho is 1 percent higher than the 2007 forecast, while the hatchery forecast is 34 percent lower than the 2007 forecast level.

The Quillayute River fall natural and hatchery coho forecasts are 10,529 and 12,988 ocean recruits, respectively. The 2008 forecast abundance of natural Quillayute fall coho is 3 percent lower, and the hatchery forecast 28 percent lower, than their respective 2007 forecast levels. The forecast for the natural component is based on the estimated total fall coho smolt production (263,227) multiplied by an expected marine survival rate of 4.0 percent, which was derived from a regression of survival rates for Queets and Bingham Creek wild coho against catches of juvenile coho in September trawls off of the Washington and Oregon coast. The estimate of 4.0 percent is consistent with an upward trend in marine survival observed for coho stocks originating from more northerly streams. The fall hatchery production forecast was based on the same prediction of marine survival (2.0 percent) used for the summer hatchery coho forecast, multiplied by a release of 649,400 smolts. Approximately 88.7 percent of the hatchery fish were marked with an adipose fin clip.

The basin total coho smolt production estimate (summer and fall stocks) was derived by multiplying the 1987, 1988, and 1990 out-migration year average smolt production for the Quillayute system (306,000) by a multiplier (0.95) which represents the proportion of production from the Clearwater in those years. Smolt production was apportioned according to brood year natural spawning escapements of summer and fall coho, to yield the smolt estimates for each natural population.

### **North Washington Coast Independent Tributaries**

Production from several smaller rivers and streams along the North Washington Coast (Waatch River, Sooes River, Ozette River, Goodman Creek, Mosquito Creek, Cedar Creek, Kalaloch Creek, Raft River, Camp Creek, Duck Creek, Moclips River, Joe Creek, Copalis River, Conner Creek), which flow directly into the Pacific Ocean, is forecast as an aggregate. Generally, stock assessment programs on these systems are minimal. The 2008 forecast of natural coho production for these independent streams is 3,180, based on a prediction of 375 smolts per square mile of watershed drainage, 424 square miles of watershed, and an expected marine survival rate of 2.0 percent. The marine survival projection was derived from jack-to-adult return information collected at the WDFW Bingham Creek research station.

The hatchery forecast of 5,007 ocean recruits is developed from linear regression model estimates of marine survival, predicted by the jack return rate for coho from the Makah National Fish Hatchery. The predicted marine survival for the brood year 2005 was multiplied by the 2005 brood year smolt release

(224,579) from the Makah National Fish Hatchery. The entire 2005 brood year release was marked with an adipose fin clip.

### *Puget Sound*

The 2008 total hatchery and natural coho ocean recruit forecast for the Puget Sound region of 614,547 is 3 percent below the 2007 forecast of 633,153. The hatchery coho forecast of 333,543 is 3 percent below the 2007 forecast of 342,529, and the natural coho forecast of 281,004 is 3 percent below the 2007 forecast of 290,624.

Puget Sound hatchery forecasts for 2008 were generally the product of 2005 brood year (BY) smolt releases from each facility, and a predicted marine survival rate for each program. Marine survival rates were typically based on recent year average survival rates derived from CWT recovery information and/or run reconstructions. Forecasts for natural Puget Sound coho stocks were generally derived by measured or predicted smolt production from each major watershed or region, multiplied by stock-specific marine survival rate predictions based on jack return models, recruits/smolt or adult models, or other information.

### **Strait of Juan de Fuca**

The 2008 forecasts for Strait of Juan de Fuca natural and hatchery coho ocean recruits are 24,111 and 9,483, respectively. The natural coho forecast was derived by multiplying the estimated 2005 brood natural smolt production for the region by a predicted ocean age-3 marine survival rate of 6.2 percent. The hatchery forecasts were based on applying hatchery-specific ocean age-3 recruitment rate predictions (0.9 percent for Dungeness, 0.7 percent for Elwha) to the 2005 BY smolt releases for each hatchery. The recruitment rate predictions were based on recent year averages of cohort reconstruction-based recruits/smolt for the aggregate natural stock, and each hatchery production unit.

### **Nooksack-Samish**

The 2008 forecasts for Nooksack-Samish natural and hatchery coho ocean recruits are 14,800 and 47,118, respectively. The natural coho forecast is the product of projected natural smolt production from each stream basin in the region, multiplied by a marine survival rate expectation of 8 percent. The natural coho marine survival rate prediction is based on the average Baker River (Skagit basin) indicator stock CWT-based recruits/smolt rate, adjusted against the Big Beef Creek jack-based marine survival prediction. The hatchery forecasts are based on the 2001-2003 BY average recruits/smolt rate for Kendall Creek Hatchery (1.8 percent), applied to the 2005 BY smolt releases for each facility in the region.

### **Skagit**

The 2008 forecasts for Skagit River natural and hatchery coho ocean recruits are 61,444 and 18,340 (16,744 from in-river hatchery production, 1,596 from Oak Harbor net-pens), respectively. The natural coho forecast is the product of measured smolt production from the Skagit basin multiplied by a marine survival rate expectation of 8.2 percent. The natural coho marine survival rate is based on the average of the 1989-2003 BY (odd years only) Skagit wild recruits/smolt rate adjusted by marine environmental and NMFS ocean juvenile salmonid sampling information related to the parent brood. New environmental and juvenile salmonid indicator data were incorporated into the marine survival rate forecast this year to account for generally poor juvenile coho abundance and erratic ocean conditions observed by NMFS researchers during 2007 off the coasts of Washington and Oregon. The hatchery forecasts are based on an average marine survival rate of the 1989-2003 BY (odd years only) Cascade Hatchery CWT-based recruits/smolt rate adjusted by marine environmental and NMFS ocean juvenile salmonid sampling information related to the parent brood, as was done for the wild forecast.

## **Stillaguamish**

The 2008 forecast for Stillaguamish River natural coho ocean recruits is 31,000. The natural coho forecast is based upon an adult/recruit spawner production model, which contains a recruitment rate adjustment variable based on the deviation pattern in Wallace River Hatchery and South Fork Skykomish River natural coho recruits/smolt rates.

## **Snohomish**

The 2008 forecast for Snohomish River natural coho ocean recruits is 92,000. The Snohomish regional hatchery coho forecast is 53,457; 6,198 for Skykomish River/Wallace River Hatchery facility releases, 44,519 for the Tulalip Bay facility, and 2,740 for the Edmonds and Possession net-pen projects. The natural coho forecast used the measured smolt production for the river basin multiplied by a survival rate expectation of 4.1 percent (see below), averaged with the output from a recruits-per-spawner model. The hatchery forecasts are based on a marine survival rate of 4.1 percent applied to the 2005 BY smolt releases. This value was taken from the observed survival rate for 2003 BY Wallace Hatchery releases. This was a low return rate relative to most return years for this facility, and was expected to represent continued low survival expectations for the coming return year.

## **South Sound**

The 2008 forecasts for South Sound region natural and hatchery coho ocean recruits are 27,286 and 170,022, respectively. The natural coho forecast is the product of projected smolt production from each of the stream basins in the region multiplied by marine survival rate expectation of 5-7 percent for natural coho in the region, with the lowest survival rates expected for deep south sound populations, as per the trend observed for recent years. The marine survival prediction was based upon review of the Big Beef Creek and Deschutes River indicator stock survival data trends, and review of hatchery and natural fish survival rate information from around the region. The hatchery coho forecasts are typically based on the 2001-2003 or 2002-2003 BY average CWT based recruits/smolt rate for each facility, applied to the 2005 BY smolt releases. The expected survival rates range from 4.2-6.1 percent for central Puget Sound hatchery programs, to 0.6 percent -3.1 percent for the deep South Sound region.

## **Hood Canal**

The 2008 forecasts for Hood Canal region natural and hatchery coho ocean recruits are 30,363 and 35,042, respectively. The natural coho forecast is based on a regression of Big Beef Creek jacks versus Hood Canal natural coho run sizes. The hatchery coho forecasts are based on the 1995-2003 BY average cohort reconstruction-based recruits/smolt rates for each facility, applied to the 2005 BY smolt releases (5.2 percent for George Adams Hatchery, 1.7 percent for Port Gamble Net Pens, 5.2 percent for the Quilcene National Fish Hatchery, and 2.7 percent for the Quilcene Bay Net Pens). A moving average of the most recent 3-year marine survival rate is typically used for forecasting hatchery coho production in this region, but concerns regarding the most recent three years (2001-2003 BY) being higher than what likely occurred in 2007, and generally higher than expected to occur in 2008, resulted in a decision by the co-managers to use a longer term marine survival average for forecasting.

## ***SELECTIVE FISHERY CONSIDERATIONS***

As the region has moved forward with mass marking of hatchery coho salmon stocks, selective fishing options have become an important consideration for fishery managers. Table III-5 summarizes estimates of mass mark rates for coho stocks from Southern British Columbia, Canada to the Oregon Coast, based on preseason abundance forecasts. Agencies have released coho mass marked with adipose clips from the 2005 brood, making these fish available to 2008 fisheries (Table III-6).

## *EVALUATION OF 2007 REGULATIONS ON 2008 STOCK ABUNDANCE*

Escapements and fishery impacts were estimated using coho FRAM. Abundance forecasts for 2008 were updated for Washington and Oregon stocks, but forecasts for Canadian stocks are unchanged from those employed for 2007 planning. Updated forecasts for Canadian stocks are expected to become available in March 2008. To provide information on the effect of changes in abundance forecasts, the final 2007 pre-season regulatory package for ocean and inside fisheries was applied to 2008 projections of abundance.

### **Oregon Production Index Area**

Ocean fisheries were modeled with 2007 Council regulations and 2007 expectations for non-Council area fisheries. Under this scenario, expected exploitation rates are 42.7 percent on OCN coho and 18.2 percent on Rogue/Klamath hatchery coho. Expected spawner escapement is 35,044 for OCN coho (Tables III-7 and III-8). For Columbia River hatchery coho stocks, the predicted ocean exploitation rate (excluding Buoy 10) is 33.7 percent on the Columbia River early stock and 36.4 percent on the Columbia River late stock. Predicted ocean escapements (after Buoy 10) into the Columbia River in 2008 under this exercise show that under 2007 ocean regulations, Columbia River early would not meet hatchery egg take goals; Columbia River late coho are expected to meet hatchery egg take goals (without inside fishing).

Based on parent escapement levels and observed OPI smolt-to-jack survival for 2005 brood OPI smolts, the total allowable OCN coho exploitation rate for 2008 fisheries is no greater than 15 percent under FMP Amendment 13 and no greater than 8 percent under the matrix developed by the OCN work group. (Table III-9; Appendix A, Tables A-2 and A-3). The total allowable Rogue/Klamath hatchery coho marine exploitation rate is 13.0 percent (NMFS ESA consultation standard).

Lower Columbia River natural (LCN) coho were listed as Endangered under the Oregon state ESA in 1999 and have been managed under a state Recovery Plan harvest rate matrix since 2001. LCN coho were listed as threatened under the Federal ESA in 2005. From 2001 through 2005, Oregon coast hatchery stocks were used as a surrogate in FRAM; in 2006 and 2007, unmarked Columbia River hatchery stocks were used as a surrogate in FRAM. In 2007, NMFS allowed a 20.0 percent exploitation rate in marine area and mainstem Columbia River fisheries combined. The 20.0 percent exploitation rate was split by managers to allow one-third for inriver fisheries and two-thirds for all marine fisheries. Under 2007 fishery regulations and 2008 abundances the exploitation rate is predicted to be 34.7 percent for marine fisheries (excluding the Buoy 10 fishery) using combined unmarked Columbia River hatchery stocks as the proxy. Based on guidance from NMFS the allowable exploitation rate on LCN coho in 2008 is no more than 8 percent in marine and mainstem Columbia River fisheries.

### **North of the Oregon Production Index Area**

Ocean escapement expectations in relation to management goals for selected naturally-spawning coho stocks, given 2008 pre-season abundance forecasts and 2007 pre-season projections for fishing patterns, are presented in Table III-7. The 2008 forecasts for Canadian coho stocks are not available, but are assumed to be at 2007 levels for this analysis. More detailed fishery management goals for Council area coho stocks are listed in Appendix A, Table A-1.

Under 2007 regulations, 2008 ocean escapements for natural coho stocks north of the OPI index area are expected to be at levels that would permit attainment of FMP escapement goals for all U.S. stocks except Hood Canal and Snohomish coho. In addition, all annual management objectives for stocks subject to the PSC agreement would be met except Hood Canal coho. The Hood Canal coho exploitation rate is predicted to be 51 percent (the Council area portion of this is 7.2 percent) under this exercise and the allowable rate for 2008 is 45 percent. The exploitation rate by U.S. fisheries south of the Canadian border

on Interior Fraser coho is projected to be 12.3 percent, exceeding the anticipated 10.0 percent allowable exploitation rate under the 2002 PST Coho Agreement. The Council area fisheries portion is 7.3 percent.

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

TABLE III-1. Preliminary 1996-2008 preseason and postseason coho stock Stratified Random Sampling abundance estimates for Oregon production index area stocks in thousands of fish. (Page 1 of 2)

Stock	Year	Preseason	Postseason	Preseason/Postseason <sup>a/</sup>
<b>Oregon Production Index Area Hatchery Total</b>	1996	309.2	182.6	1.69
	1997	376.1	215.3	1.75
	1998	118.4	203.6	0.58
	1999	559.2	319.6	1.75
	2000	671.4	677.1	0.99
	2001	1,707.6	1,395.5	1.22
	2002	361.7	660.1	0.55
	2003	863.1	952.5	0.91
	2004	623.9	634.6	0.98
	2005	389.9	443.1	0.88
	2006	398.8	440.6	0.91
	2007	593.6	476.5	1.25
	2008	216.1	-	-
Columbia River Early	1996	142.2	98.0	1.45
	1997	206.9	129.8	1.59
	1998	63.8	126.4	0.50
	1999	325.5	174.9	1.86
	2000	326.3	378.0	0.86
	2001	1,036.5	815.9	1.27
	2002	161.6	324.7	0.50
	2003	440.0	645.7	0.68
	2004	313.6	389.0	0.81
	2005	284.6	282.7	1.01
	2006	245.8	251.4	0.98
	2007	424.9	291.0	1.46
	2008	110.3	-	-
Columbia River Late	1996	114.4	30.8	3.71
	1997	86.5	53.7	1.61
	1998	24.9	47.3	0.53
	1999	140.9	120.7	1.17
	2000	278.0	260.1	1.07
	2001	491.8	488.3	1.01
	2002	143.5	271.8	0.53
	2003	377.9	248.0	1.52
	2004	274.7	203.0	1.35
	2005	78.0	111.6	0.70
	2006	113.8	156.3	0.73
	2007	139.5	171.0	0.82
	2008	86.4	-	-
Oregon Coastal North of Cape Blanco	1996	38.5	28.0	1.38
	1997	60.4	19.0	3.18
	1998	21.6	19.7	1.10
	1999	59.4	14.4	4.13
	2000	48.5	23.4	2.07
	2001	127.3	46.9	2.71
	2002	36.6	41.6	0.88
	2003	29.3	34.5	0.85
	2004	16.6	21.7	0.77
	2005	11.5	10.7	1.07
	2006	8.6	7.9	1.09
	2007	7.0	1.3	5.38
	2008	1.7	-	-

TABLE III-1. Preliminary 1996-2008 preseason and postseason coho stock Stratified Random Sampling abundance estimates for Oregon production index area stocks in thousands of fish. (Page 2 of 2)

Stock	Year	Preseason	Postseason	Preseason/Postseason
<b>Oregon and California Coastal South of Cape Blanco</b>				
	1996	14.2	25.8	0.55
	1997	22.3	12.8	1.74
	1998	8.1	10.2	0.79
	1999	33.4	9.6	3.48
	2000	18.6	15.6	1.19
	2001	52.0	46.0	1.13
	2002	20.0	22.0	0.91
	2003	15.9	24.3	0.65
	2004	19.0	29.9	0.64
	2005	15.8	38.1	0.41
	2006	30.6	25.0	1.22
	2007	22.2	13.2	1.68
	2008	17.7	-	-
<b>Lower Columbia River Natural</b>				
	2007	21.5	19.4	1.11
	2008	13.4	-	-
<b>Oregon Coastal Natural</b>				
	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
	2001	50.1	163.2	0.31
	2002	71.8	304.5	0.24
	2003	117.9	278.8	0.42
	2004	150.9	197.0	0.77
	2005	152.0	150.1	1.01
	2006	60.8	116.4	0.52
	2007	255.4	60.0	4.26
	2008	60.0	-	-
<b>Salmon Trout Enhancement Program</b>				
	1996	0.4	1.2	0.33
	1997	1.3	0.3	4.33
	1998	0.2	0.3	0.67
	1999	0.7	0.4	1.75
	2000	0.6	0.5	1.20
	2001	1.0	1.4	0.71
	2002	0.6	3.0	0.20
	2003	3.6	3.6	1.00
	2004	3.1	1.0	3.10
	2005	1.0	0.4	2.50
	2006	0.6	0.1	6.00
	2007	0.2	0.0	-
	2008	0.2	-	-

a/ Postseason estimates are based on preliminary data, and not all stocks have been updated with final estimates.

TABLE III-2. Oregon production index (OPI) area coho harvest impacts, spawning, abundance, and exploitation rate estimates by SRS accounting in thousands of fish.<sup>a/</sup>  
(Page 1 of 1)

Year or Avg.	Oregon and California Coastal Returns							Ocean	OCN Exploitation
	Ocean Fisheries <sup>b/</sup>		Hatcheries and Freshwater		Private	Columbia River	Abundance	Exploitation Rate Based on OPI Abundance <sup>d/</sup>	Rate Based on Postseason FRAM
	Troll	Sport	Harvest <sup>c/</sup>	OCN Spaw ners	Hatcheries	Returns			
1970-1975	1,629.6	558.4	45.8	55.2	-	460.4	2,749.3	0.80	-
1976-1980	1,253.6	555.0	31.2	31.1	26.1	263.3	2,155.1	0.83	-
1981	830.9	339.9	34.1	32.6	117.8	170.3	1,555.0	0.81	-
1982	740.9	300.4	37.1	76.2	184.7	453.1	1,763.4	0.62	-
1983	429.6	275.0	18.2	22.7	133.9	109.7	1,070.0	0.79	-
1984	95.8	174.2	51.2	74.4	115.4	424.7	881.5	0.32	-
1985	166.4	280.4	45.4	73.9	332.0	366.2	1,373.4	0.43	-
1986	643.5	320.6	81.8	70.0	453.7	1,548.2	3,026.7	0.34	-
1987	469.1	296.2	45.3	30.1	119.3	316.3	1,377.9	0.60	-
1988	844.7	297.2	62.3	56.8	116.1	670.7	1,989.2	0.56	-
1989	646.9	425.5	62.3	46.4	46.9	711.8	1,871.2	0.55	-
1990	277.6	357.1	30.6	24.3	35.6	196.1	1,128.5	0.69	-
1991	450.6	469.9	84.0	38.6	35.1	934.3	1,823.2	0.45	-
1992	67.5	256.5	52.8	44.4	-	215.9	610.0	0.51	-
1993	13.2	140.8	40.6	55.7	-	113.9	342.1	0.42	-
1994	2.7	3.0	30.0	49.6	-	168.9	250.5	0.02	0.07
1995	5.4	43.5	38.6	57.7	-	74.1	215.9	0.23	0.12
1996	7.0	31.8	47.9	78.6	-	113.0	297.3	0.15	0.08
1997	5.5	22.4	27.2	31.7	-	148.3	204.6	0.12	0.12
1998	3.5	12.8	29.7	34.1	-	168.7	265.2	0.06	0.08
1999	3.6	36.5	20.9	50.4	-	274.1	414.0	0.12	0.09
2000	25.9	74.6	32.9	79.6	-	547.6	901.0	0.13	0.07
2001	38.1	216.8	82.5	182.9	-	1,108.3	1,438.6	0.16	0.07
2002	14.9	118.7	56.3	268.4	-	499.7	990.5	0.14	0.12
2003	28.8	252.4	47.8	235.0	-	677.2	1,183.6	0.23	0.14
2004	26.2	159.4	38.7	194.4	-	442.6	826.8	0.25	0.15
2005	10.5	58.2	42.8	164.1	-	341.8	592.1	0.12	0.11
2006	4.5	47.5	31.7	132.8	-	384.1	557.1	0.06	0.10
2007 <sup>e/</sup>	26.7	128.5	11.7	57.1	-	318.6	536.6	0.31	0.11

a/ The OPI area 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 1982-2005 and drop-off mortality for all years; sport fishery-hook-and-release mortality for 1994-2005 and drop-off mortality for all years.

c/ Includes returns from Salmon-Trout Enhancement Program (STEP) smolt releases.

d/ 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.

e/ Preliminary.

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

Year	Preseason			Postseason			Preseason			Postseason			Preseason			Postseason								
	Forecast	Return	Pre/Postseason	Forecast	Return	Pre/Postseason	Forecast	Return	Pre/Postseason	Forecast	Return	Pre/Postseason	Forecast	Return	Pre/Postseason	Forecast	Return	Pre/Postseason						
	<b>Quillayute River Fall</b>						<b>Hoh River</b>						<b>Queets River</b>						<b>Grays Harbor<sup>a/</sup></b>					
1984	7.0	11.0	0.64	2.7	7.7	0.35	5.2	9.7	0.54	28.7	103.8	0.28												
1985	19.2	15.8	1.22	6.6	5.2	1.27	11.3	6.0	1.88	56.4	25.1	2.25												
1986	6.1	17.1	0.36	3.9	6.4	0.61	5.2	5.8	0.90	51.6	33.3	1.55												
1987	11.7	23.8	0.49	5.5	7.2	0.76	9.0	8.9	1.01	103.3	55.7	1.85												
1988	10.4	9.1	1.14	2.0	2.6	0.77	4.7	4.5	1.04	26.4	58.0	0.46												
1989	14.5	11.1	1.31	5.7	5.4	1.06	6.2	5.4	1.15	43.0	60.9	0.71												
1990	15.2	9.5	1.60	5.1	4.5	1.13	5.9	7.1	0.83	48.3	57.3	0.84												
1991	8.8	10.6	0.83	3.4	5.4	0.63	7.9	8.6	0.92	138.0	108.7	1.27												
1992	12.5	13.6	0.92	4.9	5.0	0.98	5.6	7.0	0.80	48.4	40.9	1.18												
1993	7.6	4.7	1.62	4.8	1.9	2.53	6.5	5.4	1.20	84.7	37.3	2.27												
1994	7.0	6.4	1.09	3.0	1.4	2.14	3.6	1.2	3.00	31.3	11.8	2.65												
1995	8.5	14.3	0.59	4.4	5.4	0.81	7.2	7.3	0.99	64.4	58.9	1.09												
1996	9.2	14.6	0.63	3.0	5.8	0.52	5.4	10.7	0.50	82.7	82.4	1.00												
1997	5.1	5.0	1.02	1.6	1.4	1.14	2.4	2.0	1.20	14.8	18.9	0.78												
1998	7.4	17.0	0.44	3.2	5.2	0.62	4.5	4.6	0.98	27.1	41.2	0.66												
1999	12.8	19.5	0.66	2.8	6.3	0.44	3.7	5.0	0.74	50.3	38.9	1.29												
2000	8.2	17.7	0.46	3.3	8.8	0.38	2.5	8.3	0.30	44.2	40.8	1.08												
2001	20.6	36.7	0.56	7.6	14.8	0.51	10.6	27.8	0.38	46.6	73.5	0.63												
2002	18.5	34.7	0.53	6.9	11.2	0.62	10.2	16.1	0.63	50.3	117.2	0.43												
2003	21.2	25.2	0.84	10.4	8.1	1.28	19.6	11.2	1.75	52.3	107.9	0.48												
2004	17.7	25.1	0.71	6.6	6.3	1.05	14.7	11.1	1.32	101.1	93.1	1.09												
2005	16.1	22.1	0.73	6.4	8.2	0.78	14.1	9.8	1.44	78.5	49.8	1.58												
2006	13.0	11.5	1.13	5.6	3.1	1.81	7.1	5.4	1.31	60.3	19.8	3.05												
2007 <sup>b/</sup>	10.8	9.8	1.10	5.4	5.2	1.04	13.6	NA	NA	59.4	NA	NA												
2008 <sup>b/</sup>	10.5	-	-	4.3	-	-	10.2	-	-	41.6	-	-												

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

b/ Postseason returns are preliminary.

TABLE III-4. Preseason and postseason estimates of ocean escapements for selected Puget Sound adult natural coho stocks in thousands of fish. (Page 1 of 1)

Year	Preseason			Postseason			Preseason			Postseason		
	Forecast	Return	Pre/Postseason	Forecast	Return	Pre/Postseason	Forecast	Return	Pre/Postseason	Forecast	Return	Pre/Postseason
	<b>Skagit River<sup>a/</sup></b>			<b>Stilliguamish River<sup>a/</sup></b>			<b>Hood Canal<sup>b/</sup></b>					
1984	29.6	37.2	0.80	NA	26.9	NA	NA	57.5	NA	NA	NA	NA
1985	26.1	31.3	0.83	NA	34.4	NA	NA	38.5	NA	NA	NA	NA
1986	43.5	73.4	0.59	37.0	49.9	0.74	NA	82.2	NA	NA	NA	NA
1987	33.0	41.2	0.80	29.7	46.3	0.64	NA	71.7	NA	NA	NA	NA
1988	29.6	29.9	0.99	24.5	35.4	0.69	18.2	15.5	1.2	NA	NA	NA
1989	31.2	27.6	1.13	24.5	13.5	1.81	36.8	25.5	1.4	NA	NA	NA
1990	37.6	25.9	1.45	30.8	34.1	0.90	43.9	14.2	3.1	NA	NA	NA
1991	40.8	11.8	3.46	32.9	11.3	2.91	17.6	15.3	1.2	NA	NA	NA
1992	35.7	9.5	3.76	18.7	18.0	1.04	10.1	19.9	0.5	NA	NA	NA
1993	28.1	14.5	1.94	24.5	10.6	2.31	39.5	16.7	2.4	NA	NA	NA
1994	17.9	30.5	0.59	10.2	30.3	0.34	13.5	57.0	0.2	NA	NA	NA
1995	30.0	16.2	1.85	32.7	20.4	1.60	19.3	41.1	0.5	NA	NA	NA
1996	26.7	8.6	3.07	29.8	10.1	2.44	15.4	53.6	0.4	NA	NA	NA
1997	34.2	40.4	0.85	15.7	14.1	1.14	38.1	109.2	0.4	NA	NA	NA
1998	41.1	83.2	0.48	37.7	31.2	1.23	87.3	132.1	0.7	NA	NA	NA
1999	53.4	34.1	1.44	27.3	7.5	3.64	45.2	17.6	2.4	NA	NA	NA
2000	24.7	74.7	0.35	15.0	31.2	0.46	50.4	41.2	1.2	NA	NA	NA
2001	46.9	105.0	0.41	18.1	80.6	0.22	40.6	123.8	0.4	NA	NA	NA
2002	79.9	67.7	1.31	14.5	30.5	0.48	25.6	79.6	0.3	NA	NA	NA
2003	97.9	87.9	1.12	27.7	49.8	0.56	25.8	201.6	0.1	NA	NA	NA
2004	130.9	166.7	0.76	26.6	66.0	0.40	79.7	223.8	0.4	NA	NA	NA
2005	48.4	50.7	1.39	41.8	29.9	1.62	79.6	57.6	2.1	NA	NA	NA
2006	106.6	18.9	5.65	45.0	23.6	1.91	59.4	37.8	1.6	NA	NA	NA
2007 <sup>c/</sup>	26.8	NA	NA	69.2	38.7	1.79	42.4	NA	NA	NA	NA	NA
2008 <sup>c/</sup>	61.4	-	-	31.0	-	-	30.4	-	-	NA	NA	NA

a/ Post-season numbers for 1996-to-present represent terminal run sizes. Pre-season values for 2001 forward are for April age-3 ocean runsize before fishing.

b/ Post-season numbers for 1996-to-present represent Ocean age-3 runsizes. Pre-season values for 2001 forward are for April age-3 ocean runsize before fishing.

c/ Preliminary.

TABLE III-5. Mass marking of 2005 brood coho available to 2008 Council fisheries. The mark used is an adipose fin clip. (Page 1 of 1)

Region	Ocean Recruits		Percent Mass Marked
	Natural	Hatchery	
<b>PUGET SOUND STOCKS:</b>			
Nooksack-Samish and 7/7A Independent	14,800	47,118	69.7%
Skagit	61,444	18,340	20.0%
Stillaguamish	31,000	80	0.3%
Snohomish	92,000	53,457	26.3%
South Puget Sound Normal	27,286	161,978	82.4%
South Puget Sound Delayed	0	8,044	97.7%
Hood Canal	30,363	34,425	45.8%
Strait of Juan de Fuca and Area 9	24,111	9,484	19.3%
Puget Sound Total	281,004	332,926	48.4%
<b>WASHINGTON COASTAL STOCKS:</b>			
North Coast Independent Tributaries	3,180	5,007	61.2%
Quillayute Summer	1,115	4,228	79.1%
Quillayute Fall	10,529	12,988	49.0%
Hoh	4,349	0	0.0%
Queets	10,182	10,333	39.8%
Quinault	17,441	24,540	49.6%
Grays Harbor	42,651	53,051	54.0%
Willapa Bay	35,063	25,511	39.9%
Washington Coastal Total	124,510	135,658	48.3%
<b>COLUMBIA RIVER STOCKS:</b>			
Columbia River Early	7,243	103,057	69.3% <sup>a/</sup>
Columbia River Late	6,189	80,211	75.8% <sup>a/</sup>
Columbia River Total	13,432	183,268	72.2% <sup>a/</sup>
<b>OREGON COASTAL</b>	60,000	19,400	24.4%
<b>SOUTHERN BRITISH COLUMBIA STOCKS<sup>b/</sup>:</b>			
Georgia Strait Mainland	81,408	20,044	17.5%
Georgia Strait Vancouver Island	122,304	1,701	0.7%
Johnstone Strait	57,098	7,269	5.6%
Southwest Vancouver Island	32,650	30,377	26.0%
Northwest Vancouver Island	176,545	8,024	0.1%
Lower Fraser River	5,601	89,665	65.9%
Interior Fraser River	14,177	854	0.7%
Southern British Columbia Total	489,782	157,934	15.2%

a/ Columbia River estimate of percent mass marked do not include natural production.

b/ For this assessment, the percent mass marked was assumed to be the same as in 2007.

TABLE III-6. Projected coho mark rates for 2008 fisheries under base period fishing patterns (% marked). (Page 1 of 1)

Area	Fishery	June	July	August	Sept
Canada					
Johnstone Strait	Recreational	-	12%	9%	-
West Coast Vancouver Island	Recreational	27%	14%	10%	8%
North Georgia Strait	Recreational	24%	23%	23%	18%
South Georgia Strait	Recreational	28%	27%	20%	21%
Juan de Fuca Strait	Recreational	37%	40%	42%	39%
Johnstone Strait	Troll	32%	21%	14%	18%
NW Vancouver Island	Troll	19%	19%	21%	25%
SW Vancouver Island	Troll	38%	36%	41%	45%
Georgia Strait	Troll	34%	34%	35%	28%
Puget Sound					
Strait of Juan de Fuca (Area 5)	Recreational	48%	49%	47%	49%
Strait of Juan de Fuca (Area 6)	Recreational	49%	46%	47%	46%
San Juan Island (Area 7)	Recreational	44%	35%	38%	34%
North Puget Sound (Areas 6 & 7A)	Net	-	31%	31%	37%
Council Area					
Neah Bay (Area 4/4B)	Recreational	39%	48%	49%	54%
LaPush (Area 3)	Recreational	50%	50%	56%	43%
Westport (Area 2)	Recreational	56%	57%	56%	56%
Columbia River (Area 1)	Recreational	67%	65%	62%	65%
Tillamook	Recreational	56%	53%	49%	43%
New port	Recreational	53%	49%	48%	32%
Coos Bay	Recreational	43%	40%	31%	16%
Brookings	Recreational	34%	25%	22%	13%
Neah Bay (Area 4/4B)	Troll	50%	48%	50%	54%
LaPush (Area 3)	Troll	48%	54%	51%	60%
Westport (Area 2)	Troll	47%	50%	55%	59%
Columbia River (Area 1)	Troll	59%	57%	56%	61%
Tillamook	Troll	55%	51%	55%	50%
New port	Troll	51%	51%	51%	47%
Coos Bay	Troll	45%	41%	38%	23%
Brookings	Troll	29%	26%	28%	46%
Columbia River					
Buoy 10	Recreational	-	-	-	68%

TABLE III-7. Estimated ocean escapements for critical natural and Columbia River hatchery coho stocks (thousands of fish) based on preliminary 2008 preseason abundance forecasts and 2007 Council regulations.<sup>a/</sup> (Page 1 of 1)

Stock	Ocean Escapement Estimates Under 2007 Regulations <sup>b/</sup>		2008 Spawning Escapement Goal <sup>c/</sup>
	2008 Preseason Abundance	2007 Preseason Abundance	
<b>Natural Coho Stocks</b>			
Skagit	49.1	18.8	30.0 <sup>d/</sup>
Stillaguamish	24.0	50.2	17.0 <sup>d/</sup>
Snohomish	69.2	66.4	70.0 <sup>d/</sup>
Hood Canal	18.6	29.8	21.5 <sup>d/</sup>
Strait of Juan de Fuca	21.3	26.9	12.8 <sup>d/</sup>
Quillayute Fall	9.5	9.7	6.3 - 15.8
Hoh	3.4	4.7	2.0 - 5.0
Queets	7.4	11.5	5.8 - 14.5
Grays Harbor	36.8	53.4	35.4
LCN	13.4 (34.7%)	20.0 (7.0%)	Exploitation Rate ≤8.0%
OCN	35.0 (42.7%)	240.0 (6.2%)	Exploitation Rate ≤8.0%
R/K	NA (18.2%)	NA (2.9%)	Exploitation Rate ≤13.0%
<b>Hatchery Coho Stocks</b>			
Columbia Early	23.7	343.6	18.6
Columbia Late	18.2	93.4	11.9

a/ Quota levels include harvest and hooking mortality estimates used in planning the Council's 2007 ocean fisheries and a coho catch for the Canadian troll fishery off the West Coast of Vancouver Island (WCVI).

b/ 2007 preseason regulations include the following coho quota fisheries: Treaty Indian troll - 38,000 non-selective; non-Indian troll - 22,400 selective; recreational north of Cape Falcon - 117,600 selective; recreational Cape Falcon to OR/CA border - 50,000 selective; troll Cape Falcon to OR/CA border - 10,000 non-selective. 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 and LCN stocks, ocean escapement represents the number of coho before the Buoy 10 fishery; the LCN exploitation rate shown is the total ocean fisheries exploitation rate, which had an ER forecast of 13.3% and an ESA limit of 20% including in mainstem Columbia River fisheries.

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

d/ Annual management goals may be determined by the state and tribal co-managers during the preseason planning process, and expressed in terms of total mortality exploitation rate constraints.

TABLE III-8. Comparison of Lower Columbia natural (LCN), Oregon coastal natural (OCN), and Rogue/Klamath (RK) coho projected harvest mortality and exploitation rates by fishery under Council-adopted 2007 regulations and preliminary 2008 preseason abundance estimates. (Page 1 of 1)

Fishery	Projected Harvest Mortality and Exploitation Rate					
	LCN		OCN		RK	
	Number	Percentage	Number	Percentage	Number	Percentage
<b>SOUTHEAST ALASKA</b>	0	0.0%	0	0.0%	0	0.0%
<b>BRITISH COLUMBIA</b>	0	0.0%	112	0.2%	21	0.2%
<b>PUGET SOUND/STRAITS</b>	27	0.2%	93	0.2%	0	0.0%
<b>NORTH OF CAPE FALCON</b>						
Recreational	2,144	16.0%	3,846	6.3%	15	0.1%
Treaty Indian Troll	295	2.2%	902	1.5%	0	0.0%
Non-Indian Troll	469	3.5%	1,214	2.0%	2	0.0%
<b>SOUTH OF CAPE FALCON</b>						
Recreational:	978	7.3%				
Cape Falcon to Humbug Mt.			8,176	13.4%	131	0.9%
Humbug Mt. to Horse Mt. (KMZ)			1,828	3.0%	1,216	8.7%
Fort Bragg			851	1.4%	341	2.4%
South of Pt. Arena			798	1.3%	218	1.6%
Troll:	697	5.2%				
Cape Falcon to Humbug Mt.			6,448	10.5%	311	2.2%
Humbug Mt. to Horse Mt. (KMZ)			120	0.2%	62	0.4%
Fort Bragg			184	0.3%	66	0.5%
South of Pt. Arena			794	1.3%	125	0.9%
<b>BUOY 10</b>	764	5.7%	349	0.6%	0	0.0%
<b>ESTUARY/FRESHWATER</b>	NA	NA	453	0.7%	31	0.2%
<b>TOTAL</b>	5,373	42.0%	26,168	42.7%	2,539	18.2%

TABLE III-9. Maximum allowable fishery impact rate for OCN coho under Amendment 13 matrix (Appendix A, Table A-2) and the OCN work group matrix (Appendix A, Table A-3) based on parent escapement levels by stock component and marine survival category.<sup>a/</sup> (Page 1 of 1)

Fishery Year (t)	Estimated OCN Coho Spaw ners by Stock Component					Hatchery Jack Survival Rate (t-1)	Amendment 13 Matrix			OCN Work Group Matrix <sup>b/</sup>		
	Parent Spaw ner Year (t-3)	Northern	North-Central	South-Central	Southern		Marine Survival Category	Parental Spaw ner Category	Maximum Allow able Impacts	Marine Survival Category	Parental Spaw ner Category	Maximum Allow able Impacts
1998	1995	3,900	13,600	36,500	3,800	0.04%	Low	Very Low	≤10-13%	Extremely Low	Very Low	≤8%
1999	1996	3,300	18,100	52,600	4,600	0.10%	Med	Very Low	≤15%	Low	Critical	0-8%
2000	1997	2,100	2,800	18,400	8,300	0.12%	Med	Very Low	≤15%	Low	Critical	0-8%
2001	1998	2,600	3,300	25,900	2,300	0.27%	Med	Very Low	≤15%	Medium	Critical	0-8%
2002	1999	8,900	11,800	28,300	1,400	0.09%	Med	Low	≤15%	Low	Low	≤15%
2003	2000	17,900	14,300	36,500	11,000	0.20%	Med	Low	≤15%	Med	Low	≤15%
2004	2001	33,500	25,200	112,000	12,200	0.14%	Med	Low	≤15%	Med	Low	≤15%
2005	2002	52,500	104,000	104,100	7,800	0.11%	Med	High	≤20%	Low	High	≤15%
2006	2003	59,600	68,900	99,800	6,800	0.12%	Med	High	≤20%	Low	High	≤15%
2007	2004	33,100	40,400	96,400	24,500	0.17%	Med	Med	≤20%	Med	Med	≤20%
2008	2005	16,500	51,400	86,300	10,000	0.07%	Low	High	≤15%	Extremely Low	High	≤8%
2009	2006	24,100	21,200	83,500	3,900	-	-	Med	-	-	Low	-
2010	2007	15,100	10,000	26,800	5,200	-	-	Low	-	-	Very Low	-

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

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

