

**2000 MANAGEMENT FRAMEWORK PLAN  
AND  
SALMON RUNS' STATUS  
FOR THE  
STRAIT OF JUAN DE FUCA REGION**

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(for the Port Gamble, Lower Elwha and Jamestown S'Klallam Tribes)  
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# 1. Introduction

## *1.1 General*

This report has been prepared by the Point No Point Treaty Council (for the Lower Elwha, Port Gamble, and Jamestown S'Klallams), was reviewed and agreed to, by the Washington Department of Fish and Wildlife and the Makah Tribe and is intended to fulfill the parties' reporting requirements under the provisions of Section 5.2 of the Puget Sound Salmon Management Plan, facilitate the management of the 2000 runs of Strait of Juan de Fuca-origin salmon in that region, as well as document the methodologies used. This report covers all species of salmon (except steelhead) for the Strait of Juan de Fuca Tributaries. The regional "Management Framework" (Section 4.0) documents the parties' preseason management framework understandings.

Forecasted returns of each species (available for net fisheries and escapement, and excluding non-landed mortalities, troll, recreational, ceremonial and subsistence harvests not taken in net fisheries) are outlined in this report by management unit. For coho and summer chum salmon, forecasts of abundance, anticipated harvests and escapements are based on the total anticipated recruits and all intercepting fisheries. Agreed-upon escapement goals, expected escapements (those that would result under the parties' management framework) for each management unit (natural and hatchery, primary and secondary), expected harvests, test and evaluation fishery requirements, and pre-season and inseason run assessment methods are included. Detailed information concerning the methods used to forecast the abundance of each run are presented in Appendix A.

The parties' pre-season management framework outlines the anticipated measures to be taken in Strait of Juan de Fuca near-terminal, terminal, and extreme terminal commercial and recreational fisheries for the harvest and protection of salmon runs returning to this region. The framework also includes contingency measures contemplated by the parties for use inseason, should the need arise.

## *1.2 Summary of the 2000 Runs and Fisheries*

All of the runs returning to the Strait of Juan de Fuca rivers and streams (except for coho salmon in the Elwha River and the Dungeness Bay and River, and chinook salmon returning to the Elwha River) will be managed on the basis of natural production. Of the various runs of salmon, only the coho returning to the Elwha River and the Dungeness River are expected to be of sufficient abundance to support directed fisheries in the terminal areas. However, all runs may be harvested incidentally in fisheries for other runs and/or species in preterminal and terminal areas. In 2000, management measures have been taken in fisheries to reduce impact upon ESA listed (50 CFR Parts 223 and 224) evolutionarily significant units (ESU's) of fish which include Hood Canal/Strait of Juan de Fuca summer chum salmon and Puget Sound chinook salmon. Chinook and summer chum salmon originating from streams east of, and including the Elwha River, are included within the Puget Sound chinook ESU and/or the Hood Canal-Strait Summer Chum ESU, as defined in the federal register notice of March 2000.

Preseason forecasts of abundance (Tables 3.1 - 3.4) are provided as a pre-season guide for fisheries and conservation planning. The actual run sizes may deviate from the forecasts because of statistical variability, unusual rates of survival (high or low), or unanticipated changes in exploitation rates in prior fisheries. Methods used to derive the preseason forecasts, for 2000, are detailed in Appendix A of this report. In most cases, the escapement goals indicate the currently accepted estimate of escapement abundance necessary to provide for future maximum sustainable harvest (MSH), under average progeny survival conditions. Expected escapements are those that would result from the stated forecasts after fisheries consistent with the parties' preseason planned management framework. Finally, expected

harvests generally refer to Puget Sound net fishery harvests exclusive of sport, troll, take-home, subsistence, ceremonial, and non-landed mortalities.

With the exception of Elwha River and Dungeness River-origin coho, no runs returning to the Strait of Juan de Fuca tributaries in 2000 are expected to have a significant harvestable surplus available for harvest in net fisheries. Therefore, the parties' management framework (See Section 4.0 of this report) has focused on the need to provide opportunity to limited fisheries while striving to maintain protective and rehabilitative measures for Strait of Juan de Fuca salmon returning to natural spawning areas.

## 2. 2000 Fishery Management Periods

AREA	CHINOOK	SUMMER CHUM	COHO	FALL CHUM	WINTER STEELHEAD
6D & DUNG. I	07/23-09/16	---	09/17-10/28	10/29-12/02	12/03-03/31
DUNGENESS II	08/06-09/23	---	09/24-10/21	10/22-12/09	12/10-04/14
ELWHA	07/17-09/09	---	09/10-11/04	11/05-12/09	12/10-04/14
DISC-SEQ TRIBUTARIES	---	09/17-10/15	10/29-12/30	---	12/03-04/30
HOKO-SEKIU	09/10-11/04	---	09/24-11/11	11/12-12/09	12/10-03/31
MISC. SJF TRIBUTARIES	09/10-11/10	---	09/25-11/11	11/12-12/15	11/28-04/14

Notes: Region I of the Dungeness River (Dung. I), extends from the Schoolhouse Bridge, downstream to the river mouth. It is located in the area of tidal influence, and therefore it is managed concurrent with the rest of Dungeness Bay (Area 6D). Shaded portions in the above table indicate no adjustment to eliminate overlaps/gaps was applied.

The management periods defined above describe, for each area, the time intervals during which regulatory actions will be directed to meet the conservation and allocation requirements for adult salmon of each species, taking into consideration the catches (actual and/or expected) of that species, outside its management period. Since many runs extend over lengthy periods of time, with small portions of the runs available at the extreme ends of the annual entry pattern, it is impractical to attempt to take management actions directed at these stocks throughout their entire entry while continuing to simultaneously manage fisheries on other species and stocks. In managing fisheries, the parties shall attempt to apportion the harvest throughout each management period in order to achieve catch and escapement from all segments of each run.

For 2000, the above management periods have been derived by the following steps: first the central 80% of the average entry pattern for each species, for each area where that species is found, was used as the "base" management period. The source of this information comes from a 1995 analysis of entry pattern information based on historical harvest and spawner entry, which was reviewed by the affected parties. Next, "overlaps" and "gaps" between the periods were eliminated, generally by halving. The resulting "start" and "end" dates for each period were adjusted to begin on the nearest Sunday and end on Saturday, in order to facilitate weekly fisheries management actions.

Finally, management periods should not be viewed as inflexible and may be adjusted in-season by agreement of the parties, on the basis of in-season information indicating a shift in run timing for a particular stock.

### 3. Summary of Pre-Season Forecasts, Expected Harvests and Escapements

#### 3.1 Summer/Fall Chinook Salmon

Production Unit	Puget Sound Run	Pre-Terminal Harvest	Terminal Run	Expected Escape.	Expected Spawners	Escapement Goal
Dungeness R.	124	10	114	113	113	925
Elwha R.	1,882	182	1,700	1,694		
Nat.					1,016	500
Hat.					571	2,400
Hoko R.	1,235	93	1,142	1,142	1,142	850
<b>Totals</b>	3,241	285	2,956	2,949	2,842	4,675

\*Note: Pre-Term Harvest includes Puget Sound net, troll, and sport catch.

The forecasts of runs returning to rivers other than the Dungeness, Elwha, and Hoko, are quite uncertain. Given recent years' estimated levels of escapement in these systems, we have forecasted a minimal, rounded number of returns to these terminal areas (100 fish). This is because spawning surveys in the Sekiu, Lyre, Pysht, Morse, and Clallam Rivers have indicated extremely low escapement levels.

Estimates of pre-terminal harvests terminal run size are based on FRAM model run #0800. The average proportion of the terminal (net catch plus escapement) run intercepted by net fisheries in the 1994-1999 period. The initial Dungeness River forecast is for chinook expected to return to the terminal area. The Elwha run has been forecast as a single unit because a portion of the progeny of natural spawners is taken for hatchery brood stock, and conversely, a portion of the hatchery return spawns in the river. The Hoko River run was forecast as the mean of the 1990-99 runs. Methods used to forecast the Dungeness and Elwha runs are further detailed in Appendix A-1 of this report.

In 1999, Puget Sound chinook salmon were listed as threatened as defined by NMFS (50 CFR part 424) and ESA Section 4(d). The Dungeness and Elwha Rivers are included in this ESU and are essential to recovery. Protective measures include no terminal area fisheries directed at chinook salmon in these systems.

Escapement goals for natural spawning areas are generally those developed in 1977 and outlined in WDF Tech. Report No. 29. For the Dungeness, that goal was revised in 1994, to reflect the availability of additional spawning area. Hatchery escapement goals are those necessary to meet agreed-upon levels of enhanced production. Methods used to estimate the expected escapement, and the escapement distribution, after anticipated pre-spawning mortalities and broodstock removals in the Elwha River, are detailed in Appendix A-1. The expected escapement in the Hoko River includes any brood take by the Makah Tribe for in-river run augmentation. In all cases, no harvestable surplus is indicated, therefore no commercial or recreational fisheries directed at chinook salmon in the terminal or extreme terminal areas are anticipated.

### 3.2 Summer Chum Salmon

<b>Production Unit</b>	<b>Total Recruits</b>	<b>CDN Harvest</b>	<b>WA Preterminal Harvest</b>	<b>Expected Escapement</b>	<b>Escapement Goal</b>
Discovery Bay	710	45	18	648	91.2 % of recruits
Sequim Bay	82	5	2	75	91.2 % of recruits
<b>Totals</b>	792	50	20	722	

The methods used to develop the 2000 forecasts of summer chum salmon returning to the streams of Discovery Bay and Sequim Bay are detailed in Appendix A-2 of this report. The escapement targets of the Base Conservation Regime (BCR), of the Summer Chum Salmon Conservation Initiative, are those which would result on the average given application of the exploitation rate based regime. The 2000 summer chum run was forecast as total recruits to fisheries and escapement. In addition to the Discovery Bay and Sequim Bay production units, Chimacum Creek is expected to receive returns from a reintroduction program. However, we have not been able to provide a quantitative forecast for this unit because of the newness of the run, and the lack of sufficient historical performance data.

In 1999, the Hood Canal-Strait of Juan de Fuca ESU summer-run chum salmon was listed as threatened by NMFS (50 CFR part 223) and the ESA Section 4(d). The Hood Canal-Strait of Juan De Fuca ESU includes tributaries of Sequim Bay, Discovery Bay, and the Dungeness River. Given the low number of forecasted returns and closure of terminal area fisheries during the estimated summer chum run in these areas very little incidental harvest is anticipated. The listed values for anticipated harvest, are those which would result from an expected 6.3% Canadian, and 2.5% U.S. preterminal incidental capture rate. No information is available regarding the Dungeness River.

### 3.3 Coho Salmon

The coho salmon runs returning to the Strait of Juan de Fuca tributaries consist of several small natural components in all river systems, as well as hatchery-supported returns to the Elwha and Dungeness Rivers. The Dungeness and Elwha origin runs are the only ones which have harvestable numbers of coho salmon, sufficient to support directed fisheries in the terminal and extreme terminal areas in 2000.

Methods used to develop the forecasts for the 2000 season are detailed in Appendix A-2 of this report. Expected harvest numbers refer to the total anticipated harvests from both incidental and targeted capture fisheries which were modeled pre-season in FRAM model run #0024. In 2000, given the low expected returns of wild coho to the Strait primary units, the tribal and state co-managers considered the significantly lower expected interceptions in Canadian fisheries and structured the pre-season management framework to achieve a total exploitation rate of less than 35% for Strait of Juan de Fuca "primary" production units, managed for wild coho salmon. The escapement goals for hatchery/secondary-wild aggregated management units are those necessary to meet the parties' agreed-upon enhanced production.

**Strait of Juan de Fuca Coho Salmon Management / Production Units**

Fishery	Miscellaneous Natural Runs		Elwha R.	Dungeness R.	Subtotals		Total
	Eastern Natural	Western Natural	Aggregate <sup>(1)</sup>	Aggregate <sup>(1)</sup>	Natural	Hatchery & Secondary Natural	
Recruits	2,652	8,147	4,674	11,887	10,799	16,561	27,360
Canada	14	40	17	42	54	59	113
Alaska	2	6	3	6	8	9	17
S.Falcon Tr/Rec	3	10	7	18	13	25	38
N.Falcon Tr/Rec	135	401	294	748	536	1,042	1,578
P.S. Troll	15	44	18	44	59	62	121
Strait Rec.	101	300	617	1,567	401	2,184	2,585
SJI Rec.	0	0	0	0	0	0	0
Admiralty	23	68	27	69	91	96	187
N. Sound Rec.	0	0	0	0	0	0	0
S. Sound Rec.	38	114	47	121	152	168	320
Hood Canal Rec.	2	4	2	4	6	6	12
Strait Net	96	284	109	277	380	386	766
San Juans Net	84	248	90	229	332	319	651
Admiralty Net	0	0	0	0	0	0	0
No. Sound Net	2	5	1	4	7	5	12
So. Sound Net	21	61	22	57	82	79	161
Hood Canal Net	12	35	13	33	47	46	93
SJF Rivers Rec.	0	0	365	508	0	873	873
6D Net	0	0	0	3,804	0	3,804	3,804
Elwha/Dungen. Net	0	0	1,543	0	0	1,543	1,543
Miscellaneous Net	0	78	0	0	78	0	78
Mgmt Unit Harvest	546	1,700	3,174	7,532	2,246	10,706	12,952
Mgmt Unit Escap.	2,106	6,447	1,500	4,355	8,553	5,855	14,408
Min. Escap. Goal	1,724	5,296	1,280	1,599	7,019	2,879	9,898

Notes: (1) The Elwha R. "Aggregate" is composed of 2.37% secondary wild, and 97.63% hatchery coho salmon. The Dungeness R. "Aggregate" is composed of 6.21% secondary wild and 93.79% hatchery coho salmon.

### 3.4 Fall Chum Salmon

<b>Production Unit</b>	<b>"4B" Run</b>	<b>Pre-Terminal Harvest</b>	<b>Terminal Run</b>	<b>Extr. Term Harvest</b>	<b>Expected Escapement</b>	<b>Escapement Goal</b>
Dungeness R.	395	21	375	0	375	500
Deep Crk.	395	21	375	0	375	500
Pysht R.	1,299	68	1,231	9	1,222	1,650
Miscellaneous	734	38	696	17	678	900
<b>Totals</b>	<b>2,823</b>	<b>147</b>	<b>2,676</b>	<b>27</b>	<b>2,649</b>	<b>3,550</b>

Methods used to estimate the forecasts of fall-timed chum salmon returning to the Strait of Juan de Fuca streams in 2000 are detailed in Appendix A-4 of this report. The expected harvests refer to the total incidental catch from these runs during preterminal and terminal area fisheries directed at other species and stocks. For 2000, no directed fishery is anticipated in the terminal or extreme terminal areas. The escapement goals are based on the overall escapement goal of 3,550 fall chum salmon for the region, as re-apportioned in 1987 on the basis of relative stock strength. These escapement goals are treated as interim, pending the development of more accurate escapement targets.

## 4. Pre-Season Management Framework

### *4.1 2000 Harvest Management Measures and Expected Fisheries*

In 2000, the condition of the salmon runs returning to the Strait of Juan de Fuca terminal areas requires that harvest management plans be conservative in all respects. The expected return of most runs in 2000 is very low and it appears that only hatchery coho salmon returning to the Elwha and Dungeness areas may be sufficiently abundant to warrant directed fisheries. In particular, the planned restrictions on Canadian fisheries (designed to protect British Columbia coho salmon) combined with somewhat improved escapements of wild coho to Strait streams, have afforded us the opportunity to implement exploitation rate based management for wild coho, by adopting conservative management practices.

#### *4.1.1 Commercial Fisheries*

Treaty Indian commercial fisheries generally occur in the near-shore marine areas of the Strait of Juan de Fuca from Angeles Point to Neah Bay (Areas 4B, 5, 6C), using set net gear. These fisheries harvest a mixture of passing stocks as well as concentrations of local stocks. The only terminal area in this region is Dungeness Bay (Area 6D) and fisheries in this area consist primarily of treaty set net and non treaty skiff gillnet fisheries which target coho salmon runs returning to the Dungeness River. In extreme terminal areas (rivers), treaty Indian set net, hook-and-line, and occasionally drift net fisheries take place.

During the 2000 season, treaty Indian set net fisheries in Areas 4B and 5 will operate from June 16 through August 12. Area 6C set net fisheries will operate from June 16 through August 18. A 6.5" minimum mesh size restriction shall be used in order to avoid the capture of Lake Washington sockeye. Pysht Bay, Hoko Bay and Freshwater Bay will be closed in addition to a closure of 1,000 ft. around all stream mouths. From October 15 through November 11 during the fall chum management period, the area within a 1,000 ft. radius from any stream mouth shall also be closed to fishing. A treaty Indian gillnet fishery directed at sockeye salmon is planned (start est. 7/23) to end no later than 9/2.

In Area 6D, no commercial fisheries will take place during the chinook and fall chum salmon management periods in order to maximize the protection necessary to these weak runs. Treaty Indian fisheries are planned for Area 6D from 9/21 through 10/28 with chinook and chum release through 10/10. A non treaty skiff gill net fishery is planned from 9/21 through 10/28 with non-retention of chinook salmon and release of chum through 10/15. These measures are intended to provide additional protection to ESA listed chinook and summer chum salmon. During fisheries for coho salmon, a closed area within 1,000 feet seaward from each mouth of the Dungeness River will be used to further limit the harvest of non target species as well as concentrated schools of coho salmon milling at the river mouth. If surveys indicate a high likelihood of coho fishing impact to chinook, additional measures may be employed including time-area restrictions, gear restrictions etc., as necessary. During this fishery, fishers will be required to attend to their gear at all times. Inseason, the extent and duration of the coho fishery will be determined by the fishing effort and the inseason estimate of the coho run entering the terminal area.

Of the various extreme terminal areas (rivers) along the Strait of Juan de Fuca, treaty Indian commercial fisheries are anticipated in the Elwha River and, if necessary, in the Dungeness River. The treaty net fishery for coho in Area 76B (Elwha River) will occur from 9/17 through 11/4. All other areas shall remain closed to commercial salmon fishing at all times prior to the 2000-2001 winter steelhead salmon season. The Elwha and Dungeness River fisheries (if any) will be targeted at hatchery runs of coho salmon. In the Dungeness River (downstream of the U.S. Hwy. 101), if a harvestable surplus of coho is available after coho-directed fisheries in Area 6D, fisheries may be authorized using selective gear only.

This restriction will be necessary because of low water conditions and the potential impact on non-target species in need of protection. The extent and duration of such fisheries will depend on the findings of in-season stream surveys.

In the Elwha River, net fisheries, directed at hatchery returns of coho salmon, are anticipated throughout the coho management period, from September 17 through November 4. Drift gillnets may be authorized only if river flow conditions require their use. The start of the in-river coho fishery may also be "shaped" to the extent necessary to avoid unnecessary impacts to chinook escapement and brood stocking operations. In order to ensure that coho escapement needs are met, the fishery will be restricted to areas upstream of the Elwha Hatchery during the last half of October (if the hatchery escapement goal has not already been achieved). Hatchery area closures will include the area from 150 ft upstream, to 150 ft. downstream of the Elwha Hatchery and the Elwha rearing channel outfalls.

#### *4.1.2 Test Fisheries*

No test fisheries, directed at salmon, are anticipated in any Strait of Juan de Fuca terminal areas, during the 2000 season.

#### *4.1.3 Recreational Fisheries*

Marine area recreational fisheries in mixed-stock areas of the Strait of Juan de Fuca are detailed elsewhere. Area 6D will be closed to angling from May 1 through September 30 and will then open with a two fish bag limit coho fishery (release all other species) through October 31. It shall then be closed to salmon fishing from November 1 through April 30.

In freshwater areas, all Strait of Juan de Fuca streams, except for the Elwha River and the Dungeness River, shall be closed to recreational fishing for salmon. In the Elwha River, from 8/1 through 9/30, from the river mouth to the DFW channel, only flyfishing gear may be used for gamefish. Angling for salmon will be permitted from October 1 through November 15, with a six fish bag limit (four adults, coho only). An area closure of 150 ft. above and below each hatchery outfall will be in effect. In the Dungeness River, angling for salmon will be permitted downstream of the Dungeness Hatchery outfall from October 16, through November 30, with a two fish bag limit (coho only). The Dungeness River will remain closed to angling for salmon (except steelhead), from December 1 through April 30, 2001.

#### **4.2 Other Recommended Measures**

In addition to routine fishery planning, monitoring, stock and harvest assessment and fishery regulation, the parties recommend that additional tasks should be undertaken in order to ensure the health of the resource, facilitate future resource management decisions and action, as well as attempt to address a number of serious resource-related problems in this region. Therefore, the following are recommended:

Intensive spawner surveys in summer chum drainages (Discovery Bay, Sequim Bay, Chimacum Creek, Dungeness River) should be conducted in 2000 to determine the number, age, sex ratio, and distribution of spawners. In the Dungeness system, information concerning summer chum salmon is lacking. Therefore surveys of similar intensity and scope should be conducted. Mixed stock fisheries directed at other species should also be monitored and sampled (tissues for GSI analysis) for the incidence and origin of summer chum interceptions. The in-stream supplementation program, utilizing native spawners, in Salmon Creek and JimmyComeLately Creek, should be conducted.

Federal, State, and Tribal fisheries agencies, and private organizations have developed and implemented a

captive brood stock program designed to rehabilitate chinook salmon runs to the Dungeness River. The primary goal of this recovery program is to increase the number of fish spawning naturally in the river while maintaining the genetic characteristics of the existing Dungeness stock. The long term success of this program will depend on the continuing efforts to monitor and assess stock status, determining and correcting the factors that currently limit production (including habitat degradation), and designing and implementing long term monitoring and evaluation plans designed to determine the effectiveness of the recovery effort, as well as assist in improving management of the resource. The 2000 run will be the first return of 4 year olds returning from the broodstock program. There is a need to measure these returns as accurately as possible to evaluate initial success of the program. These efforts should be continued in accordance with the Dungeness River Chinook Rebuilding Plan. Specifically, in 2000, releases of smolts from this program should be tagged, using CWT's. The downstream emigration should be monitored, using smolt traps. Finally, studies to determine critical freshwater habitat for this species should be implemented.

In the Dungeness River, stream surveys should be used to verify clearance of chinook and pink salmon from any anticipated fishing areas.

In the Elwha River, a tribal project designed cooperatively with the USNPS, the USFWS, and the WDFW, is aimed at the restoration of native fall chum salmon and will collect up to 75,000 fall chum salmon eggs (depending on availability). Eyed eggs from the captured brood will be distributed to instream incubators, in Bosco Slough and Boston Charlie creeks.

Although none have been proposed for 2000, limited test or evaluation fisheries, or in stream surveys, are recommended to assess the Pysht and Lyre rivers' fall chum runs, to document run timing and age composition, and to evaluate assumptions concerning the relation of the Pysht River as an escapement index area to other tributaries in the Strait of Juan de Fuca region.

### ***4.3 Inseason Run Size Updates***

During the 2000 season, no in-season updates of run abundance will be provided for chinook, summer chum, and fall chum salmon returning to the miscellaneous Strait of Juan de Fuca streams. Since no directed fisheries are planned or anticipated for any of these runs, and no inseason management action is contemplated, the pre-season forecasted returns to the terminal areas will be sufficient.

For coho salmon returning to the Elwha River, no method has been found to provide inseason updates of the estimate of abundance with sufficient accuracy. Therefore, inseason harvest management actions will be controlled by time and area closures designed to provide closed periods in the area between the Elwha Hatchery and the river mouth when the major escapement influx is most likely to occur, based on historical information.

For coho salmon returning to the Dungeness River system, an inseason update of terminal run abundance will be performed given that satisfactory cumulative catch per cumulative landing information from the gillnet fishery in area 6D is available. If CPUE data are not available, the fishery will be managed in-season on the basis of subjective estimates of abundance, escapement progress, and fishing effort.

# **APPENDIX**

## **A. Preseason Forecasting Methods**

## **B. Inseason Abundance Updating Method for Dungeness Coho**



## A. Pre-Season Forecasting Methods

### A-1. Chinook Salmon

#### A-1.1 Dungeness River Natural

The forecast of the Dungeness River natural-origin chinook salmon terminal area run for 2000, was estimated using the mean of the post season 1992-99 terminal (Area 6D) runs. The run sizes for the return years 1992-99 best represent current survival conditions. The races were aggregated because of the lack of adequate information to separately quantify the returns of any spring and summer chinook salmon. The 2000 terminal area forecast return is 106 natural chinook salmon (Table A-1-a).

In the Dungeness river, small releases of supplementation chinook from brood years 95-97 are expected to contribute a small, but currently unquantified number of terminal area returns. This forecast was used to estimate recruitment inputs for preseason simulation modeling.

**Table A-1-a. Dungeness River Chinook Salmon Forecast Data**

Return Year	Escapement	Area 6D Harvest	Terminal Run
1986	238	9	247
1987	100	4	104
1988	335	5	340
1989	88	1	89
1990	310	0	310
1991	163	19	182
1992	153	1	154
1993	43	1	44
1994	65	0	65
1995	163	0	163
1996	183	0	183
1997	50	0	50
1998	110	0	110
1999	75	0	75
<b>Average Return (1992-99)</b>			<b>106</b>

A-1.2 Elwha River

The 2000 "Area 4B" forecast of Elwha River chinook salmon was estimated as the 1993-99 average terminal area run expanded to an "Area 4B" run size using the mean of the estimated pre-terminal interception rates for return years 1993-99. The 2000 terminal area forecast of 1,937 was expanded by 1.0143 to an "Area 4B" forecast estimate of 1,965 chinook salmon (Table A-1-b). This forecast was used to estimate recruitment inputs for pre-season simulation modeling.

**Table A-1-b. Elwha River Chinook Salmon Forecast Data.**

<b>Return Year</b>	<b>Terminal Run</b>	<b>Preterminal Catch</b>	<b>Area 4B Run</b>	<b>Area 4B /Terminal</b>
1988	8,666	417	9,083	1.0481
1989	5,703	113	5,816	1.0198
1990	3,605	39	3,644	1.0108
1991	3,761	63	3,824	1.0168
1992	4,002	54	4,056	1.0135
1993	1,669	26	1,695	1.0156
1994	1,580	42	1,622	1.0266
1995	1,814	38	1,852	1.0209
1996	1,877	7	1,884	1.0037
1997	2,528	43	2,571	1.0170
1998	2,462	7	2,469	1.0028
1999	1,629	na	na	na
<b>1993-98</b>		27	2,016	1.0143
<b>Average 1993-99</b>	1,937			

**Table A-1-c. Elwha River Chinook Natural and WDFW Rearing Channel Prespawning Mortalities**

<b>Return Year</b>	<b>Hatchery Voluntary Escapement</b>	<b>In-River Gross Escapement</b>	<b>Gaff-Seine Removals</b>	<b>In-Hatchery Prespawning Mortality</b>	<b>In-River Prespawning Mortality</b>
1986	1,285	1,842	505	376	482
1987	1,283	4,610	1,138	432	1,830
1988	2,089	5,784	506	428	50
1989	1,135	4,352	905	148	412
1990	586	2,594	886	160	64
1991	970	2,499	857	108	N/A
1992	97	3,762	672	26	2,611
1993	165	1,404	771	7	0
1994	365	1,181	749	61	269
1995	145	1,667	518	37	625
1996	214	1,661	1,177	147	120
1997	318	2,209	624	3	7
1998	138	2,322	1,689	51	0
1999	117	1,512	699	27	0

Note: The 1999 Run size is a preliminary estimate, subject to revision

In order to estimate potential escapements, the forecasted return to the Elwha River was further apportioned, using the 1995-1999 mean proportions (Table A-1-c), as follows: Of the 1,937, **7.47%** (145) are expected to voluntarily return to the Elwha Rearing Channel, and **92.53%** (1,792) to the river. The voluntary hatchery return was reduced by **22.14%** (32), to account for on-station pre-spawning mortality, leaving 113 hatchery spawners. The in-river escapement was reduced by **5.07%** (91), to account for in-river pre-spawning mortality. The remaining 1,701 in-river escapement was further reduced by **31.74%** (540) to account for broodstock removals (gaff & seine), leaving an anticipated in-river spawning escapement of 1,161 chinook salmon.

The chinook broodstock removed from the river, were then added to the remaining hatchery spawners, resulting in a hatchery spawning escapement of 653 chinook salmon.

A-1.3 Hoko River

The forecast of Hoko River chinook salmon for 1999 was estimated as the 1990-99 average "Area 4B" run. The 2000 forecast estimate is 997 chinook salmon. (Table A-1-d). This forecast was used to estimate recruitment inputs for preseason simulation modeling.

**Table A-1-d. Hoko River Chinook Salmon Forecast Data.**

<b>Return Year</b>	<b>Hoko River Escapement</b>	<b>Catch</b>	<b>4B Run Size</b>
1986	801	38	839
1987	581	25	606
1988	784	37	821
1989	845	17	862
1990	493	5	498
1991	1,008	16	1,024
1992	741	9	750
1993	894	14	908
1994	429	11	440
1995	929	20	949
1996	1,253	5	1,258
1997	868	20	888
1998	1,702	0	1,702
1999	1,550	0	1,550
<b>Average 1990-99</b>			<b>997</b>

Note: The 1999 estimate is preliminary and subject to revision.

## A-2. Summer Chum Salmon

The 2000 return of summer-timed chum to the Strait of Juan de Fuca region (Discovery Bay and Sequim Bay tributaries) was forecasted as an 8 year mean of total recruits to fisheries and escapements, separately for each of these units in the 1992 through 1999 return years (Table A-3-a). A few additional recruits are expected from supplementation efforts at Chimacum Creek, however, their number is not quantifiable at present.

**Table A-2-a Summer Chum Salmon Recruits to Fisheries and Escapement**

Year	Discovery	Sequim	Eastern Strait Subtotal
1974	1,494	492	1,986
1975	1,374	373	1,747
1976	1,264	409	1,673
1977	1,364	446	1,810
1978	2,413	828	3,241
1979	699	201	900
1980	4,127	1,447	5,574
1981	879	261	1,140
1982	2,771	771	3,542
1983	946	272	1,218
1984	1,311	397	1,708
1985	304	108	412
1986	890	327	1,217
1987	1,673	508	2,181
1988	2,952	1,177	4,129
1989	441	355	796
1990	432	98	530
1991	253	172	425
1992	592	<b>802</b>	1,394
1993	520	124	644
1994	196	18	214
1995	647	234	881
1996	1,075	31	1,106
1997	923	62	985
1998	1,206	101	1,307
1999	517	7	524
<b>92-99 Average:</b>			
<b>2000 Forecast:</b>	710	82	792

Note: Values in bold indicate outliers eliminated from the 8 yr mean.

### A-3. Coho Salmon

#### A-3.1 Natural Runs

The methodology used to develop this forecast estimate of naturally produced coho in 2000 is derived from smolt data obtained from trapping operations in Strait streams. This method relies on smolt emigration counts, which are projected to subsequent recruitment. However, since no return from such counts has been estimated at this time, a comparison is provided. In section A-3.1a the previously used recruit-per-spawner method is described.

The proportion of potential smolt area surveyed in 1999 was 14.82% in the East and 14.15% in the West. Applying these proportions to the estimated production (Table A-3-a) resulted in 53,401 Eastern and 139,873 Western SJF smolts. The total primary smolt estimate is 193,274.

A marine survival of 8.54% (Table A-3-b) was agreed for use, being approximately intermediate to coastal and Puget Sound estimates. This resulted in an estimate of 16,506 primary DA2 coho (4,560 Eastern and 11,945 Western).

The proportion of escapement to secondary areas (.0670) from the 1997 parent brood was applied to the primary DA2 number to estimate 1,106 secondary DA2 coho (Table A-3-c).

This method results in a DA2 estimate of 17,612. The recruit per spawner method presented in section A-3.2 results in 19,973 DA2's and is comparable.

**Table A-3-a. SJF Coho Smolt Production in Small Streams**

<b>Smolt Trapping</b>	<b>Enumerated Smolts</b>	<b>Trap Eff. Factor*</b>	<b>Estimated Production</b>
Cassalery Ck.	189	1	189
Bell Ck	1,094	1	1,094
Siebert Ck	1,426	1	1,426
Ennis Ck	717	1	717
Tumwater Ck	35	1	35
McDonald Ck	4,453	1	4,453
Salt Ck	10,711	1	10,711
Deep Ck	4,768	1	4,768
Little Hoko Ck	4,313	1	4,313
<b>East Total</b>			7,914
<b>West Total</b>			19,792
<b>Total</b>			27,706

Note: Enumerated smolts shown in the above table have been adjusted for trapping efficiency.

**Table A-3-b. Primary Management Units Summary**

<b>Primary Management Units</b>	<b>Measured Smolts</b>	<b>Proportion of Total Potential Measured</b>	<b>Estimated Total Smolts</b>	<b>DA2's Using 0.0854 Marine Survival</b>
East Strait	7,914	0.1482	53,401	4,560
West Strait	19,792	0.1415	139,873	11,945
<b>Total Primary</b>	<b>27,706</b>		<b>193,274</b>	<b>16,506</b>

**Table A-3-c. Secondary Management Units Summary**

<b>Secondary Management Units</b>	<b>1997 Brood Escapement Proportion</b>	<b>Smolts Estimated</b>	<b>DA2's</b>
Elwha	0.0088	1,823	156
Dungeness	0.0582	12,056	1,030
<b>Total Secondary</b>	<b>0.0670</b>	<b>13,879</b>	<b>1,185</b>

The resulting number of 17,691 Dec age 2 recruits derived from the above method were averaged with 18,216 derived by a similar method proposed by WDFW (the actual number by that method was 17,983 but not include the Elwha River).

The total forecast of 17,953 was apportioned to secondary (1,203) and primary (16,750) on the basis of parent brood escapement proportions (0.067 and 0.933 respectively). The secondary units' forecast was apportioned to the Elwha River (158) and the Dungeness River (1,045) again on the basis of parent brood escapement distribution (0.131 and 0.869 respectively). Finally, the primary units' forecast of 16,750 was apportioned to Eastern Strait streams (4,087) and Western Strait streams (12,663) on the basis of relative spawner and smolt potential capacity. The range of estimates was not substantial and as a result the parties have agreed to use a compromise value of 12,566 (3,163 east and 9,403 west) Age 3 ocean recruits for model input purposes in 2000. The forecast was apportioned on the basis of parent brood escapement.

A-3.1a Natural runs recruit-per-spawner forecast - Comparison with method used in prior years.

This method relates spawners to subsequent recruits of recent years. It has been used by itself, or in combination with others, through 1999. Both spawners and recruits are the best available information for this region.

The 2000 forecast of naturally reared coho salmon returning to tributaries of the Strait of Juan de Fuca was estimated using the mean (RY 1993-1998) of the recruit-per-spawner ratios, multiplied by the 1997 (parent brood) estimated natural escapement to the Strait of Juan de Fuca streams (Table A-3-d). The resulting number of December Age-2 recruits, is 19,973 and represents the total number of naturally reared coho salmon which are expected to be recruited into their third year of life in 2000.

**Table A-3-d. Strait of Juan de Fuca R/S Forecast of Natural Coho**

	<b>RY 1989</b>	<b>RY 1990</b>	<b>RY 1991</b>	<b>RY 1992</b>	<b>RY 1993</b>	<b>RY 1994</b>	<b>RY 1995</b>	<b>RY 1996</b>	<b>RY 1997</b>	<b>RY 1998</b>
<b>Parent Brood</b>	11,400	6,200	5,000	7,800	4,200	4,500	6,450	3,540	2,850	6,709
<b>Dec-2 Recruits</b>	32,176	18,811	17,685	25,478	12,054	9,871	19,251	17,271	12,216	23,424
<b>Nat. Mortality</b>	5,793	3,387	3,184	6,105	2,850	2,384	4,328	3,883	2,746	5,088
<b>Harvest</b>	18,583	11,224	10,001	12,923	5,664	4,637	8,214	8,032	4,475	1,578
<b>Escapement</b>	7,800	4,200	4,500	6,450	3,540	2,850	6,709	5,035	5,788	16,517
<b>Rec./Spawner</b>	2.822	3.034	3.537	3.266	2.870	2.194	2.985	4.879	4.286	3.491
<b>Average R/S (1993-1998)</b>										3.451
<b>2000 Dec-2 Recruit Forecast</b>										19,973

**A-3.2 Hatchery Runs**

The 2000 Strait of Juan de Fuca returns of hatchery coho were predicted using the estimated 1993-98 (6 years - 2 brood cycles) average smolt survival to December-Age 2 recruits, applied to the 1999 smolt releases (Table A-3-e). More specifically, the following sources of information were selected:

Dungeness Hatchery: 1993-1998 average recruits per smolt (0.02576) (Table A-3-e). In order to provide for conservative management the co-managers have agreed to use a rate of 0.020 recruits per smolt for preseason planning purposes. Given a release of 788,600 smolts, the 2000 forecast is 15,772 Dec-2 recruits.

Elwha Hatchery: 1993-1998 average recruits per smolt (0.01146) (Table A-3-e). In order to provide for conservative management the co-managers have agreed to use a rate of 0.010 recruits per smolt for preseason planning purposes. Given a release of 645,643 smolts, the 2000 forecast is 6,456 Dec-2 recruits.

For preseason modeling purposes, a total value of 17,578 age 3 ocean recruits (22,228 Dec-2) was used.

**Table A-3-e. Strait of Juan de Fuca Hatchery Coho Contribution  
to Puget Sound Net Fisheries and Escapements**

Run Year	Dungeness Hatchery			Elwha Hatchery		
	Smolts Released	DA 2 Recruits	R/Sm	Smolts Released	DA 2 Recruits	R/Sm
1979	796,100			1,387,900		
1980	399,200			837,900		
1981	679,700			1,168,700		
1982	929,400			2,845,100		
1983	106,590			2,756,200		
1984				567,800		
1985	188,000			751,000		
1986	298,000			645,400		
1987	320,000			836,000		
1988	748,600	22,236	0.0297	728,500	5,260	0.00722
1989	301,700	25,401	0.0841	240,700	15,017	0.06239
1990	359,050	20,953	0.0583	413,500	12,320	0.02979
1991	342,700	11,918	0.0347	768,600	3,522	0.00458
1992	296,400	14,058	0.0474	688,600	9,848	0.01430
1993	433,700	9,738	0.0224	755,600	4,913	0.00650
1994	340,000	8,923	0.0262	580,000	2,504	0.00432
1995	680,000	26,830	0.0394	707,700	10,250	0.01448
1996	808,700	29,804	0.0368	801,000	13,705	0.01711
1997	871,600	16,596	0.0190	722,200	11,988	0.01659
1998	774,600	8,193	0.0105	643,037	6,272	0.00975
1999	877,300			867,379		
2000	788,600			645,643		
<b>Average(1993-98):</b>			0.0258	<b>Average (1993-98):</b>		0.0115

**A-4. Fall Chum Salmon**

The 2000 return of fall-timed chum salmon to the Strait of Juan de Fuca tributaries was forecasted in the aggregate, as the average of the natural runs observed in the years 1991 through 1998 (Table A-4-a). The resulting forecast was apportioned on the basis of historical escapement survey data which resulted in the following proportions: Pysht River (46%), Dungeness River (14%), Deep Creek (14%), and miscellaneous, including Elwha R. and Lyre R. (26%) (Table A-4-b).

**Table A-4-a. Strait of Juan de Fuca Historical Fall Chum Salmon "4B" Runs**

<b>Return Year</b>	<b>Fall Chum Run Size</b>
1980	5,880
1981	6,519
1982	6,749
1983	1,770
1984	8,292
1985	8,330
1986	1,922
1987	7,269
1988	<b>13,962</b>
1989	4,330
1990	1,220
1991	1,940
1992	5,653
1993	5,775
1994	2,564
1995	600
1996	2,161
1997	3,927
1998	1,566
<b>Average</b>	4,248
<b>Avg. 91-98</b>	3,023
<b>Std.Dev.<sup>(1)</sup></b>	1,906

**Table A-4-b. Apportionment of the Strait of Juan de Fuca  
Fall Chum Salmon Forecast**

<b>Area</b>	<b>Proportion</b>	<b>Forecast</b>
Pysht R	0.460	1,391
Dungeness R	0.140	423
Deep Creek	0.140	423
Miscellaneous	0.260	786
<b>Total</b>		<b>3,023</b>



## B. Inseason Run Assessment Methods

### *B-1. Dungeness Coho Salmon*

The Dungeness River coho is the only run among those returning to the Strait of Juan de Fuca tributaries for which an acceptable model for estimating abundance during the season has been found. For all other runs the preseason forecast will serve as the in-season estimate of abundance.

For the Dungeness River coho, run size updates will be estimated on October 12, using catch and landing data through October 10. Prior to October 12, the preseason terminal run size forecast will serve as the estimate of the run entering Dungeness Bay (Area 6D). If there has been sufficient fishing effort from September 15 through October 10, the run size will be updated on October 12. Fishing effort and harvest will be considered sufficient if the following relationship is satisfied: (the cumulative CPUE through October 10<sup>th</sup> must fall in a range greater than 20 and less than 40 (the observed range over the most recent 5 years harvest data available). The update will be based on a regression model relating terminal run size to cumulative catch and landings (treaty and nontreaty) in Area 6D based upon the most recent five years (1994-1998) catch data available. The update model for October 12 is as follows:

$$6D \text{ Run Size} = 16264.417 - 27.365 * (\text{Catch}) + 0.006 * (\text{Catch}^2) + 218.122 * (\text{Landings})$$

In the absence of an inseason updated estimate of run size due to a CPUE outside of the specified range, management will be accomplished subjectively based on estimates of abundance including escapement progress, catch, and effort.

Table B-1-a shows the regression statistics for the update model. Table B-1-b shows the data series used to develop this model. The data base used to develop this model includes catches and landings by gillnets (treaty and nontreaty) from years 1994 though 1998.

**Table B-1-a. Summary Statistics of the Area 6D In-Season Abundance Estimation Model**

<b>Using Data through Oct - 10</b>	
R <sup>2</sup>	0.995
R <sup>2</sup> Adjusted	0.981
Std Error	538.070
N	5
Constant	16264.417
X Coefficient a:	-27.365
X Coefficient b:	0.006
X Coefficient c:	218.122

**Table B-1-b. In-Season Coho Abundance Estimation Data for Area 6D.**

Year	Dungeness Bay Run Size			Catch	Landings	CC/CL
	Hatchery	Natural	Total			
1979	6,995	2,934	9,929			
1980	13,664	3,769	17,433			
1981	18,956	1,663	20,619			
1982	28,386	8,515	36,901			
1983	10,351	3,168	13,519			
1984	1,000	1,100	2,100			
1985	1,752	876	2,628	734	72	10.19
1986	3,149	4,013	7,162	2,530	123	20.57
1987	3,332	4,923	8,255	2,272	111	20.47
1988	4,944	1,268	6,212	2,645	185	14.30
1989	4,769	1,894	6,663	2,086	119	17.53
1990	4,330	1,134	5,464	1,115	109	10.23
1991	3,944	1,360	5,304	1,986	154	12.90
1992	2,952	519	3,471	698	64	10.91
1993	2,820	206	3,026	90	15	6.00
1994	1,434	300	1,734	802	31	25.87
1995	7,188	290	7,478	558	23	24.26
1996	5,151	120	5,271	736	35	21.03
1997	12,234	337	12,571	203	10	20.30
1998	7,966	434	8,400	2,816	101	27.88
1999						

