

**2002 MANAGEMENT FRAMEWORK PLAN
AND
SALMON RUNS' STATUS
FOR THE
STRAIT OF JUAN DE FUCA REGION**

Prepared by:
Point No Point Treaty Council
(for the Port Gamble, Lower Elwha and Jamestown S'Klallam Tribes)
Washington Department of Fish and Wildlife
Makah Tribe

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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. This report is intended to facilitate the management of the 2002 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 (2002-03 State/Tribal Agreed to Fisheries Document, NWIFC, May, 2002) understandings.

This report outlines the forecasted total abundance, by management unit, for each species, except fall chum salmon. For fall chum salmon forecasts include fish taken in net fisheries and escapement, and exclude non-landed mortalities, troll, recreational, ceremonial and subsistence harvests not taken in net 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 2002 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 2002, management measures were taken in fisheries to reduce impacts to Puget Sound chinook salmon and Hood Canal/Strait of Juan de Fuca summer chum salmon, currently listed as threatened.

Preseason forecasts of abundance are provided as a guide for fisheries and conservation planning (Tables 3.1 - 3.4). The actual run sizes entering Puget Sound 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 2002, 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.

With the exception of Elwha River and Dungeness River-origin coho, no runs returning to the Strait of Juan de Fuca tributaries in 2002 are expected to have a significant harvestable surplus available for harvest in directed fisheries. Therefore, the parties' management framework 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 (See Section 4.0 of this report).

2. 2002 Fishery Management Periods

Area	Chinook	Summer Chum	Coho	E. Fall Chum	L. Fall Chum	Winter Steelhead
6D & Dung. I	07/28-09/21	---	09/22-10/26	10/27-11/30	---	12/1-3/31
Dungeness II	08/11-09/21	---	09/22-10/26	10/27-12/14	---	12/15-04/15
Elwha	07/21-09/14	---	09/15-11/02	11/03-12/07	---	12/08-04/15
Discovery-Sequim Tributaries	---	09/15-10/19	11/06-12/29	---	---	12/01-04/30
Hoko-Sekiu	09/08-11/10	---	09/28-11/09	11/10-12/07	---	12/08-03/31
Misc. SJF Tributaries	09/08-11/09	---	09/29-11/09	11/10-12/15	11/30-12/31	12/01-04/15

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 2002, 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

Strait of Juan de Fuca Chinook Salmon Management / Production Units

Fishery	Elwha R.	Dungeness R.	Hoko R.	Total
	Aggregate	Supplemente	Natural	
Recruits	2,874	298	1,721	4,893
Canada	352	35	204	591
Alaska	54	5	31	90
S.Falcon Tr/Rec	0	0	0	0
N.Falcon Tr/Rec	19	2	11	32
P.S. Troll	7	1	4	12
No. Snd + Strait Recreational	41	4	24	69
Cntl. + So. Sound Recreational	55	6	32	93
Puget Sound Net	32	3	19	54
6D Net	0	0	0	0
FW Recreational	0	0	0	0
FW Net	1	0	0	1
Mgmt Unit Harvest	561	56	325	942
Extreme Terminal Natural Mortality	45	0	0	45
Mgmt Unit Escap.	2,313	242	1,396	3,951
Min. Escap. Goal	2,221	232	850	3,303

The abundance of runs returning to rivers other than the Dungeness, Elwha, and Hoko, is quite uncertain. Estimates of pre-terminal harvests terminal run size are based on FRAM run #0802. The initial Dungeness River forecast was for chinook salmon 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. Methods used to forecast the Dungeness, Elwha and Hoko River 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 are those outlined in the Puget Sound Comprehensive Chinook Management Plan-Harvest Management Component (3/23/2001). 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, little or no harvestable surplus is indicated under the current exploitation rate based management approach, therefore no commercial or recreational fisheries directed at chinook salmon are anticipated in the extreme terminal areas.

3.2 Summer Chum Salmon

Production Unit	Total Recruits	CDN Harvest	WA Preterminal Harvest	Expected Escapement	Escapement Goal
Discovery Bay	1,356	85	34	1,237	91.2 % of recruits
Sequim Bay	112	7	3	102	91.2 % of recruits
Totals	1,468	92	37	1,339	

The methods used to develop the 2002 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 2002 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 the closure of terminal area fisheries during the summer chum entry in these areas, very little incidental harvest is anticipated.

3.3 Coho Salmon

The coho salmon runs returning to the Strait of Juan de Fuca tributaries consist of several small component natural runs 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 were predicted to have harvestable numbers of coho salmon, sufficient to support directed fisheries in the terminal and extreme terminal areas in 2002.

Methods used to develop the forecasts for the 2002 season are summarized in Appendix A-3 of this report. Expected harvest numbers refer to the total anticipated harvests from both incidental and targeted fisheries which were modeled pre-season in FRAM run #0228. In 2002, given the low expected returns of 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 40% for Strait of Juan de Fuca “primary” production units, which are managed for wild coho salmon. The escapement goals for 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		Elwha R.	Dungeness R.	Subtotals		Total
	Eastern Natural	Western Natural	Aggregate ⁽¹⁾	Aggregate ⁽¹⁾	Natural	Hatchery & Secondary Natural	
Recruits	2,766	18,322	4,863	9,100	21,088	13,963	35,051
Canada	10	70	15	32	80	47	127
Alaska	1	3	0	2	4	2	6
S.Falcon Tr/Rec	5	42	10	43	47	53	100
N.Falcon Tr/Rec	135	906	236	652	1,041	888	1,929
P.S. Troll	2	13	1	7	15	8	23
Strait Rec.	118	784	301	1,795	902	2,096	2,998
SJI Rec.	0	0	0	0	0	0	0
Admiralty	4	23	7	14	27	21	48
N. Sound Rec.	0	0	0	0	0	0	0
S. Sound Rec.	7	49	13	14	56	27	83
Hood Canal Rec.	0	0	0	0	0	0	0
Strait Net	166	1,104	262	476	1,270	738	2,008
San Juans Net	6	36	10	22	42	32	74
Admiralty Net	0	0	0	0	0	0	0
No. Sound Net	0	1	0	0	1	0	1
So. Sound Net	6	39	8	24	45	32	77
Hood Canal Net	8	52	12	24	60	36	96
SJF Rivers Rec.	0	0	427	1,041	0	1,468	1,468
6D Net	0	0	0	2,505	0	2,505	2,505
Elwha/Dungen. Net	0	0	1,442	0	0	1,442	1,442
Miscellaneous Net	0	42	0	0	42	0	42
Mgmt Unit Harvest	468	3,164	2,744	6,651	3,632	9,395	13,027
Mgmt Unit Exp. Escapement	2,298	15,158	2,119	2,449	17,456	4,568	22,024
Min. Escap. Goal	1,660	10,993	1,875	1,225	12,653	3,099	15,752

Notes: (1) The Elwha R. "Aggregate" is composed of 7.80% secondary wild, and 92.20% hatchery coho salmon.
The Dungeness R. "Aggregate" is composed of 19.08% secondary wild and 80.92% hatchery coho salmon.

3.4 Fall Chum Salmon

Production Unit	"4B" Run	Pre-Terminal Harvest	Terminal Run	Extr. Term Harvest	Expected Escapement	Escapement Goal
Dungeness R.	246	13	234	0	234	500
Deep Crk.	246	13	234	0	234	500
Pysht R.	810	42	768	6	762	1,650
Miscellaneous	458	24	434	11	423	900
Totals	1,761	92	1,669	17	1,652	3,550

Methods used to develop the forecasts of fall-timed chum salmon returning to the Strait of Juan de Fuca streams in 2002 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 2002, 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 2002 Harvest Management Measures and Expected Fisheries

In 2002, 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 2002 is very low and it appears that only hatchery coho salmon returning to the Elwha and Dungeness areas will 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

In the Strait of Juan de Fuca, treaty Indian troll fisheries are anticipated, from 6/16 through 9/15, in Area 5, 6 (west of Green Pt.), and 6C. During that period the following areas shall be closed: 1000 ft. radius around stream mouths, Freshwater Bay (through 8/31) and Hoko Bay from Kydaka Pt. to Shipwreck Pt. From 9/16 through 4/15/2003 treaty Indian troll fisheries are anticipated in Areas 5, 6, 6C and Area 4B, with the following restrictions: 1000 ft. radius closure around stream mouths, release of coho, in Area 6, through 12/31, and release of chum salmon through 9/30.

Treaty Indian commercial net fisheries generally occur in the nearshore 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 2002 season, treaty Indian set net fisheries for chinook salmon in Areas 4B will operate from June 16 through August 10, and Area 5 from June 16 through August 17. A 6.5" minimum mesh size restriction shall be used in order to avoid the capture of Lake Washington sockeye. Pysht Bay and Freshwater Bay will be closed and Hoko Bay will be closed from Kydaka Pt. to Shipwreck Pt., in addition to a closure of 1,000 ft. around all stream mouths. A treaty Indian drift gillnet fishery directed at Fraser River sockeye salmon, in Areas 4B, 5, 6C is planned (start est. 7/21) to end no later than 9/7. In Area 6, Treaty Indian gillnet fisheries for Fraser River sockeye salmon are anticipated in the month of August. Drift gillnet fisheries for coho salmon will operate from the end of the Fraser Panel control, through October 12, with the chum salmon fishery following at 5 days per week, from October 13 through November 9. The coho fishery shall be managed to ensure that the preseason estimated incidental and directed coho catch is not greatly exceeded. In order to accomplish this, openings may vary from 1 to 4 days per week.

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 for coho salmon are planned for Area 6D from 9/22 through 10/26, with daytime only gillnet fishing and a requirement of chinook and chum salmon release through 10/10. A non treaty skiff gill net fishery is planned from 9/23 through 10/25 with non-retention of chinook and chum salmon. These measures are intended to provide additional protection to ESA listed chinook and summer chum salmon. During fisheries for coho salmon, a area closure of within 1,500 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 fishing impact to chinook and or summer chum salmon, 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 abundance 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) has been planned to occur from 9/15 through 11/2. All other rivers shall remain closed to commercial salmon fishing at all times prior to the 2001-2002 winter steelhead salmon season.

In the Dungeness River, downstream of the U.S. Hwy. 101, if a harvestable surplus of coho is available, fisheries of up to 3 days per week may be authorized using selective gear (any gear that is capable of releasing salmon alive) only, starting no earlier than the week of October 14. 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 15 through November 2. Drift gillnets may be authorized only if river flow conditions require their use. The start of the inriver 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 2002 season.

4.1.3 Recreational Fisheries

Marine area recreational fisheries in mixed-stock areas of the Strait of Juan de Fuca are detailed in 2002/2003 Sport Fishing Rules Pamphlet (WDFW 2002). Area 6D will be closed to angling from May 1 through September 30 and will then open with a two fish bag limit on coho only through October 31. It shall then be closed to salmon fishing from November 1 through April 30, 2003.

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. The Elwha River, from 7/16 through 9/30, from the river mouth to the DFW channel outfall marker, will be closed to all recreational fishing. This closure will provide additional protection to the ESA listed Elwha chinook salmon stock. Angling, for coho salmon only, will be permitted from October 1 through November 15, with a six fish bag limit (four adults, 12" min. size). An area closure of 150 ft. above and below each hatchery outfall will be in effect. In the Dungeness River, angling for salmon (marked coho only) will be permitted downstream of the Dungeness Hatchery outfall from October 16 through December 31, with a four fish bag limit (12" min. size). The Dungeness River will remain closed to angling for salmon (except steelhead), from January 1 through April 30, 2003. The Hoko River shall be closed to the taking of salmon and gamefish gear shall be restricted to flyfishing during the months of September and October.

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 2002 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 continued.

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 2002 run will be the second return of 5 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 2002, releases of smolts from this program should be tagged, using CWT's. Their 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 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 2002, 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 2002 season, no inseason 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. Methods that will be used to derive the inseason estimate, for 2002, is detailed in Appendix B. If sufficient fishing effort data is 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 Run Assessment Methods**

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 2002, was estimated using the mean of the post season 1998-01 terminal (Area 6D) runs. The run sizes for the return years 1998-01 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 2002 terminal area forecast return is 214 natural chinook salmon (Table A-1-a).

In the Dungeness River, releases of supplementation chinook from brood years 97-99 are expected to contribute a currently unquantified number of terminal area returns. However, returns from past supplementation releases are included indirectly, by using recent years' returns. This forecast was used to estimate recruitment inputs for pre-season 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
2000	218	0	218
2001	453	0	453
2002 Forecast (Average Return 1998-01)			214

A-1.2 Elwha River

The 2002 forecast return of Elwha River chinook salmon, to the terminal area, was estimated as the 1998-01 average terminal area run. The resulting 2002 terminal area forecast is 2,048 (Table A-1-b). This forecast was used to estimate recruitment inputs for preseason simulation modeling.

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

Return Year	Terminal Run	Preterminal Catch	Area 4B Run	Area 4B /Terminal
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	2,527	44	2,571	1.0174
1998	2,409	7	2,469	1.0249
1999	1,625	5	1,630	1.0031
2000	1,913	na	na	
2001	2,246	na	na	
1998-01	2,048			1.0140
2002 Forecast	2,048			

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

Return Year	Hatchery Voluntary Escapement	In-River Gross Escapement	Gaff-Seine Removals	In-Hatchery Prespawning Mortality	In-River Prespawning Mortality
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	2,271	1,551	51	0
1999	113	1,512	609	23	0
2000	177	1,736	1,021	62	0
2001	195	2,051	1,396	38	0

In order to estimate potential escapements, the forecasted return to the Elwha River was further apportioned, using the 1998-2001 mean proportions (Table A-1-c), as follows: Of the 2,048 , **7.7%** (158) are expected to voluntarily return to the Elwha Rearing Channel, and **92.2%** (1,890) to the river. The voluntary hatchery return was reduced by **27.9%** (44), to account for on-station pre-spawning mortality, leaving 114 hatchery spawners. The in-river escapement was not reduced for in-river pre-spawning mortality, based on recent years' performance. The 2,051 in-river escapement was reduced by **58.8%** (1,205) to account for broodstock removals (gaff & seine), leaving an anticipated in-river spawning escapement of 846 chinook salmon and an anticipated hatchery broodstock of 1,319.

A-1.3 Hoko River

The forecast of Hoko River chinook salmon for 2002 was estimated as the 1998-01 average return to the terminal area. The 2002 forecast estimate is 1,233 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.

Return Year	Hoko River Escapement	Catch	4B Run Size
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		
1999	1,690		
2000	700		
2001*	840		
Average 1998-01	1,233		

Note: The 2001 estimate is preliminary and subject to revision.

A-2. Summer Chum Salmon

The 2002 return of summer-timed chum to the two Strait of Juan de Fuca Management Units (Discovery and Sequim tributaries) was forecasted as an 4 year mean of total recruits to fisheries and escapements, separately for each of these units in the 1998 through 2001 return years (Table A-2-a). The forecasts are 1,356 fish to Discovery MU and 112 fish to Sequim MU. A few additional recruits are expected from supplementation efforts at Chimacum Creek, however, their number is not quantifiable at present. Recruits to the Dungeness / Graywolf system are also unquantifiable at this time.

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

Year	Discovery	Sequim	Chimacum	Eastern Strait Total
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	802		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	532	7	38	577
2000	879	55	52	986
2001	2,807	284	908	3,999
2002 Forecast (98-01 Avg.):	1,356	112	333	1,468*

*Does not include Chimacum

A-3. Coho Salmon

A-3.1 Natural Runs

A-3.1.1 Western Strait smolts

The methodology used to develop the forecast estimate of naturally produced coho salmon in 2002 was derived from smolt data obtained from trapping operations in Western Strait of Juan de Fuca (SJF) streams. This method relies on smolt emigration counts, which are projected to subsequent recruitment. In 2001, smolt trapping was conducted only in Western SJF. The proportion of potential smolt production area, surveyed during the 2001 emigration, was 21.64% in Western SJF. Applying this proportion to the estimated production (Table A-3-a) resulted in 285,432 Western SJF smolts.

A-3.1.2 Eastern Strait smolts

In order to estimate smolt production for Eastern SJF, the mean ratio of recent years' (BY 1997 and 1998) of Eastern to Western estimated spawner/estimated smolts relationship was applied to the current years' Western est. spawner/recruit relationship. This was then used to estimate Eastern smolts by applying this rate the 1999 Eastern spawning escapement (Table A-3-b). The method used to estimate production for Eastern SJF resulted in 43,139 smolts. This approach was used because no direct counts of emigrants were made in Eastern SJF during 2001.

The total Western and Eastern smolt estimate for primary units is 328,571 (Table A-3-a).

A-3.1.3 Marine Survival

The forecasted survival value of 8.61% was obtained as follows: The estimated survival value of 7.81% (for Washington North coast systems) was averaged with the estimated value of 9.42% for Puget Sound. The Puget Sound (Big Beef Creek) value was provided by WDFW. The coastal survival value was obtained by averaging the Queets, Hoh, Quillayute predicted survival of 6.83% (WDFW) and a predicted mean survival value of 8.78% for Queets obtained by PDO and SST correlations (Makah Tribe). Applying the resulting marine survival value to the estimates of emigrating smolts we derived an estimate of 28,300 primary DA2 coho recruits (3,716 Eastern and 24,584 Western) (Table A-3-c).

A-3.1.4 Secondary Units

The smolt production from secondary units was estimated using the proportion of naturally reared parent brood escapements in 1999. The total number of secondary smolts was further apportioned between the Elwha River and the Dungeness River, again on the basis of relative parent escapement proportions. The estimated number of smolts was multiplied by the same marine survival value of 8.61% and resulted in an estimated 3,082 total secondary DA2 coho recruits (Table A-3-d). The secondary units' recruits for each river are 675 for the Elwha River and 2,407 for the Dungeness River.

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

Smolt Trapping	Enumerated Smolts	Enumerated Proportion of Total Potential	Estimated Total Smolts
East Total	see text		43,139
Salt Ck	19,923		
E. Twin	7,792		
W. Twin	5,489		
Deep Ck	17,360		
Little Hoko	5,259		
Johnson Ck	5,953		
West Total	61,776	0.21643	285,432
E+W Total	61,776		328,571

Table A-3-b. Eastern SJF Smolt estimation data.

	BY 1997	BY 1998	BY 1999
Western SJF Escapement	1,104	15,128	7,968
smolts	19,792	371,558	285,432
smolts/spawner	17.92754	24.56095	35.82229
Eastern SJF Escapement	230	1,389	1,360
smolts	5,879	11,776	<i>43,139</i>
smolts/spawner	25.56087	8.47804	<i>31.72014</i>
East to West smolt/spawner	1.42579	0.34518	0.88549

Figures in italics are calculated for the 2002 forecast.

Table A-3-c. Primary Management Units Summary

Primary Management Units	Measured Smolts	Proportion of Total Potential Measured	Estimated Total Smolts	DA2's Using 0.08613 Marine Survival
East Strait			43,139	3,716
West Strait	61,776	0.21643	285,432	24,584
SJF Summary	61,776		328,571	28,300

Table A-3-d. Secondary Management Units Summary

Secondary Management Units	1999 Brood Escapement Proportion	Estimated Smolts	Estimated DA2's (0.08613 Marine Survival)
Elwha	0.0215	7,834	675
Dungeness	0.0767	27,946	2,407
Total Secondary	0.0982	35,779	3,082

A-3.2 Hatchery Runs

The 2002 Strait of Juan de Fuca returns of hatchery coho were predicted using the estimated 1998-00 (3 years - 1 brood cycle) average smolt survival to December-Age 2 (DA2) recruits, applied to the 2001 smolt releases (Table A-3-d). More specifically, the following sources of information were selected:

Dungeness Hatchery: 1998-2000 average recruits per smolt (0.02093) (Table A-3-d). Given a release of 548,700 smolts, the 2002 forecast is 11,484 DA2 recruits.

Elwha Hatchery: 1998-2000 average recruits per smolt (0.00835) (Table A-3-d). Given a release of 494,610 smolts, the 2002 forecast is 4,128 DA2 recruits.

The total hatchery-origin preseason forecast value of 11,709 age 3 ocean recruits (15,612 DA2) 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	20,948	0.02798	728,500	5,260	0.00722
1989	301,700	25,401	0.08419	240,700	15,017	0.06239
1990	359,050	20,811	0.05796	413,500	12,320	0.02979
1991	342,700	12,102	0.03531	768,600	3,522	0.00458
1992	296,400	14,058	0.04743	688,600	9,848	0.01430
1993	433,700	9,789	0.02257	755,600	4,913	0.00650
1994	340,000	8,923	0.02624	580,000	2,504	0.00432
1995	680,000	26,830	0.03946	707,700	10,250	0.01448
1996	808,700	29,804	0.03685	801,000	13,705	0.01711
1997	871,600	16,596	0.01904	722,200	11,988	0.01660
1998	774,600	8,287	0.01070	643,037	6,272	0.00975
1999	877,300	5,182	0.00591	867,379	7,759	0.00895
2000	788,600	36,419	0.04618	645,856	4,093	0.00634
2001	865,700			687,799		
2002	548,700			494,610		
Average(1998-00):			0.02093	Average (1998-00):		0.00835
2002 Forecast DA2's			11,484			4,128

A-4. Fall Chum Salmon

The 2002 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 1997 through 2000 (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

Return Year	Fall Chum Run Size	Return Year	Fall Chum Run Size
1980	5,880	1991	1,941
1981	6,519	1992	5,653
1982	6,749	1993	5,775
1983	1,770	1994	2,564
1984	8,292	1995	610
1985	8,330	1996	2,161
1986	1,922	1997	3,927
1987	7,269	1998	1,535
1988	13,962	1999	1,313
1989	4,331	2000	267
1990	1,220	2001	
Average (All Yrs.):			3,901
Average 1997-00:			1,761
Std. Dev. (97-00):			1,339

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

Area	Proportion	Forecast
Pysht R	0.460	810
Dungeness R	0.140	246
Deep Creek	0.140	246
Miscellaneous	0.260	458
Total		1,761

B. Inseason Run Assessment Methods

The Dungeness River coho salmon 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.

B-1. Dungeness Coho Salmon

Prior to October 10, the preseason terminal run size forecast will serve as the estimate of the run entering Dungeness Bay (Area 6D). For the Dungeness River coho salmon, run size updates will be estimated on October 10, if there has been sufficient fishing effort from September 15 through October 8, using catch and landing data through October 8. Fishing effort and harvest will be considered sufficient if the following relationship is satisfied: the catch and landings through October 8 must fall within the observed historical range of harvest data. The update will be based on a linear regression model relating terminal run size to cumulative catch and landings (treaty and nontreaty) in Area 6D based upon the years 1986-1991 and 1995-2001 (excluding 1992 and 1997 as outliers and 1993-1994 when non-treaty fisher effort was zero). The update model for October 10 is as follows:

$$6D \text{ Run Size} = -1081.765 + (405.340 * CC/CL \text{ through } 10/8)$$

The updated run abundance entering the terminal area will represent the total abundance. The hatchery/natural ratio that is being used shall be assumed to be as forecast preseason.

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 database used to develop this model includes catches and landings by gillnets (treaty and nontreaty) from the observed years.

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

Using Data through Oct - 8	
R ²	0.913
R ² Adjusted	0.905
Std Error	2739.740
N	12
β ₀	-1081.765
β ₁	405.340
P(β ₀ = 0)	0.456

Table B-1-b. Inseason 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	907	93	9.75
1986	3,149	4,013	7,162	2,637	128	20.60
1987	3,332	4,923	8,255	2,476	117	21.16
1988	4,944	1,268	6,212	2,631	184	14.30
1989	4,769	1,894	6,663	2,487	133	18.70
1990	4,330	1,134	5,464	1,304	118	11.05
1991	3,944	1,360	5,304	2,068	164	12.61
1992	2,952	519	3,471	770	68	11.32
1993	2,820	206	3,026	90	15	6.00
1994	2,554	534	3,088	923	35	26.37
1995	8,101	327	8,428	630	28	22.50
1996	7,780	181	7,961	695	32	21.72
1997	12,234	337	12,571	203	10	20.30
1998	7,966	434	8,400	2,677	83	32.25
1999	4,797	730	5,527	665	24	27.71
2000	25,487	4,786	30,273	7,054	87	81.08
2001	27,989	760	28,749	4,776	79	60.46