

**2007 MANAGEMENT FRAMEWORK PLAN
AND
SALMON RUNS' STATUS
FOR THE
HOOD CANAL REGION**

Joint Report

Prepared by:

Point No Point Treaty Council

(for the Port Gamble, and Jamestown S'Klallam Tribes)

Washington Department of Fish and Wildlife

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1. Introduction

1.1 General

This report has been prepared by the Point No Point Treaty Council (for the Port Gamble, and Jamestown S'Klallams) and was reviewed and agreed to, by the Lower Elwha Klallam Tribe, the Skokomish Tribe and the Washington Department of Fish and Wildlife (WDFW). Any differences between the parties are noted. This report 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 2007 runs of Hood Canal-origin salmon in that region, as well as document the methodologies used. This report covers all species of salmon (except steelhead) for the Hood Canal Region. The regional "Management Framework" section of this report (Section 4.0) documents the parties' pre-season framework management understandings for this region.

Forecasted returns of each species, except fall chum salmon, are based on the total anticipated recruits and all intercepting fisheries. For fall chum salmon, forecasts include only salmon available for net fisheries and escapement, and exclude non-landed mortalities, troll, recreational, ceremonial and subsistence harvests not taken in net fisheries. All forecasts are outlined in this report by management unit. 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 as well as in-season run assessment methods are included. Detailed information, concerning the methods used to forecast the abundance of each run, is presented in Appendix A. Information concerning methods used to obtain inseason estimates of abundance is presented in Appendix B.

The parties' pre-season management framework outlines the anticipated measures to be taken in Puget Sound commercial and recreational fisheries for the harvest and protection of salmon runs returning to Hood Canal. The framework also includes any contingency measures contemplated by the parties for use in-season, should the need arise.

1.2 Summary of the 2007 Runs and Fisheries

Of the runs returning to Hood Canal, the early fall chum runs and south Hood Canal chinook will be managed on the basis of hatchery production. Additionally, coho salmon of the Port Gamble and Quilcene-Dabob management units will also be managed on the basis of hatchery production. The remaining management units of all species will be managed on the basis of natural production. These include (in accordance with the Hood Canal Salmon Management Plan) all of the remaining coho management units; Mid Hood Canal chinook salmon, all summer chum salmon (managed as secondary to chinook and coho salmon), and all late fall chum salmon. Additionally, since 2000, management strategies have been adopted to reduce impact upon listed (50 CFR Parts 223 and 224) evolutionarily significant units (ESU's) of fish which include Hood Canal/Strait of Juan de Fuca (HC-SJF) summer chum salmon and Puget Sound chinook salmon.

Summer/Fall chinook returning to hatcheries and natural spawning areas in area 12C and the Skokomish River are predicted to return at harvestable levels to be managed for directed harvest inseason. Chinook salmon returning to Area 12B tributaries are expected to be of extremely low abundance and require long term protective measures. A limited Treaty Indian fishery, as well as recreational fisheries, for chinook salmon are anticipated in Areas 12C and in Area 12H where Hoodsport hatchery returns are expected to provide for additional directed harvest.

Summer chum salmon are in recovery mode throughout this region and two of the three management units are predicted to be of sufficient abundance to exceed their recovery thresholds. However, the forecasted return of the Mainstem management unit, although predicted to be well above its critical threshold, will require continued application of restrictive measures in the Hood Canal “mainstem”, in order to assist recovery. In the Quilcene-Dabob area, appropriate fishing restrictions will be in place, as described in the *Summer Chum Salmon Conservation Initiative* (SCSCI) to ensure that the escapement rates to this management unit are met.

Of the various other runs of salmon, coho returning to the Quilcene Bay Pens and the Quilcene National Fish Hatchery (QNFH), coho returning to Port Gamble pens, and fall chum returning to all Hood Canal hatchery facilities, are expected to be of sufficient abundance to support significant directed commercial and recreational fisheries. Naturally reared coho salmon, from all other management units, are expected to also be of sufficient abundance to provide for significant levels of directed harvest (as well as incidental harvests) in the Hood Canal “mainstem” fishery and in the Skokomish River.

Pre-season forecasts of abundance (Tables 3.1 - 3.5) are provided as a pre-season estimate of harvest and a guide for 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 2007 pre-season forecasts, 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. However, in the case of summer chum salmon, the goals are based on the target escapement rates established in SCSCI. In the case of chinook salmon, the targets are those established in the *Puget Sound Comprehensive Chinook Management Plan* (PSCCMP). In the case of coho salmon returning to natural spawning areas, the escapement goal is that which would result from the rate of escapement allowance established for the 2007 recruits. The escapement rate was established at a level equal to, or higher than, the minimum escapement rate allowable for the 2007 forecasted recruitment (35%), under the stepped exploitation rate management approach, which has been implemented for Hood Canal natural (primary) coho. Expected escapements are those that would result from the stated forecasts after fisheries consistent with the parties' pre-season planned management framework.

2. 2007 Fishery Management Periods

Area	Spring Chinook	Summer Chinook	Pink	Summer Chum	Coho	Early Fall Chum	Late Fall Chum	Winter Steelhead
9A	---	---	---	---	8/26-11/3	11/4-12/1	---	12/2-3/31
12A	---	---	---	8/26-09/27	8/27-10/13	10/14---	---12/26	---
12	4/16-7/14	7/15-9/05	7/29-9/29	9/01-9/22	9/10-10/20	10/21-11/20	---	---
12B	4/16-7/14	7/15-9/12	7/29-9/29	9/05-10/1	9/14-10/20	10/21-11/20	---	---
12C	4/16-7/14	7/15-9/18	7/29-9/8	8/26-10/1	9/18-10/27	10/28-11/27	---	---
12D	4/16-7/14	7/15-9/18	---	8/29-9/22	9/18-10/27	10/28-11/27	---	---
Quilcene R	---	---	---	9/3-10/2	8/26-10/20	11/11---	---12/29	12/9-4/15
Dosewallips Duckabush	---	8/12-9/22	9/9-10/13	9/7-10/12	9/23-11/10	11/11---	---1/4	12/9-4/15
Skokomish R	5/01-7/30	7/31-9/22	---	---	9/23-11/10	11/11-12/1	12/2-1/4	12/9-4/15
Union R.	---	---	---	9/2-10/6	9/23-11/10	11/11-12/1		12/9-4/15
Misc. HC Tribs.	---	8/12-9/22	9/9-10/13	---	9/23-11/10	11/11---	---12/29	12/9-4/15

Note: Shaded areas represent cases where the management periods have not been adjusted to eliminate overlaps/gaps.

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 of that species (actual and/or expected), 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 runs throughout their entire entry while continuing to simultaneously manage fisheries on other species and runs. 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.

The Hood Canal "Early-fall" chum management periods cover the central 80% of the Hoodspout Hatchery run timing for all marine areas except Areas 9A and 12A, which are based on the actual Area 9A and 12A hatchery stock timing. "Late-fall" chum management periods begin after the central 80% of the Hoodspout hatchery run has returned. Late-fall ending dates (generic) are based on adult tagging (or, in the case of QNFH, rack counts), but in practice are often adjusted to eliminate overlaps and gaps with winter steelhead management periods.

For 2007, the above management periods have been derived (unless otherwise noted) by the following steps: first the central 80% (average) of the 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 all affected parties. Next, "overlaps" and "gaps" between the periods were generally eliminated, generally by halving. Finally, 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. These last

procedures, were not followed in the case of summer chum salmon, because to do so, might result in inadequate protection for these diminished runs. 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 population.

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

3.1 Summer/Fall Chinook Salmon

Harvest and Escapement by Management / Production Unit (FRAM 3907)						
Fishery	Skokomish		Mid-Canal	Miscell.	Hoodsport	Total
	Natural	Hatchery	Natural	Natural	Hatchery	
Catch & Escapement Total	4,317	30,586	162	910	33,722	69,697
Canada	830	5,871	32	175	6,440	13,347
Alaska	0	0	0	0	0	0
S.Falcon Tr/Rec	3	19	0	1	28	50
N.Falcon Tr/Rec	131	945	5	28	1,085	2,193
P.S. Troll	27	200	1	6	279	512
SJF Rec.	16	136	1	4	294	450
Puget Sound Rec.	104	861	4	22	1,769	2,760
Puget Sound Net	65	470	2	14	594	1,145
Hood Canal Rec.	17	151	0	4	691	863
Hood Canal Net	125	903	3	27	1,043	2,101
Freshwater Rec.	645	4,528	0	0	7	5,180
Extreme Terminal Net	792	5,564	0	0	16,997	23,353
Mgmt Unit Harvest	2,754	19,648	48	278	29,226	51,954
Mgmt Unit Escapement	1,563	10,938	114	632	4,496	17,743
Minimum Escapement Target	1,200	2,000	108	n/a	1,800	5,108

In March 1999, Puget Sound chinook were listed as threatened by the NMFS (50 CFR part 223 and 224). Chinook runs in Hood Canal, included in the Puget Sound ESU, have been at fairly low levels over the last decade. Given the relatively low expected returns, of naturally reared Hood Canal chinook salmon in 2006, fisheries directed at chinook salmon will be significantly curtailed in Hood Canal areas.

The above table was prepared using the results of the final PFMC simulation model run *FRAM #3907* which incorporates the forecast information and takes into account all anticipated preterminal and terminal area harvest impacts. The harvest figures shown above include all Puget Sound harvests (commercial net, troll, marine and freshwater recreational). For further details on the methods used to estimate the above forecasts, see Appendix A-1. Escapement targets for natural spawning areas are based on the Order Re: *Hood Canal Salmon Management Plan (Proc. 83-8)* as well as pre-season interagency agreements and are listed here primarily for reference purposes, since the pre-season planning was primarily based on total exploitation rate limitations, as outlined in the Puget Sound Comprehensive Chinook Management Plan.

The escapement goals listed for the Hoodsport and George Adams/McKernan (Skokomish R.) hatcheries are those necessary to provide the required enhanced production in accordance with the parties' 2004 enhancement planning modifications to the Hood Canal Production Program.

3.2 *Pink Salmon*

Production Unit	Total Recruits	Canada Pre-Terminal Harvest	Washington Pre-Terminal Harvest	Terminal Area Harvest	Expected Escapement	Escapement Goal
Dosewallips	63,721	5,648	1,412	0	56,661	N/A
Duckabush	2,462	218	55	0	2,189	N/A
Hamma Hamma	6,128	543	136	0	5,449	N/A
Misc.	970	86	22	0	863	N/A
Hoodsport H.	4,614	409	102	3,002	1,100	1,100
Totals	77,895	6,905	1,726	3,002	66,262	

The pink salmon runs to Hood Canal consist primarily of naturally reared recruits of the Dosewallips River, the Duckabush River, the Hamma Hamma River, and miscellaneous small tributaries to Area 12C. The natural stock forecast was apportioned to individual rivers using the brood year 2005 escapement distribution. Anticipated prior harvests were estimated using the mean interception in the 1997-2005 period (current PST period). Methods used to forecast the 2007 runs, originating from these areas, are detailed in Appendix A-2.

The optimum level of spawning escapement for the primary natural units is currently unresolved (See: HCSMP). The Hoodsport Hatchery escapement goal has been established at the level required to maintain the current brood stock. However, because of the unit's secondary status, and the need to protect commingled chinook salmon in prior fisheries, excess escapement is highly probable and will be used in accordance with jointly established procedures and priorities. Anticipated surplus above the escapement goal of pink salmon returning to Hoodsport Hatchery may be sufficient to support fisheries in Area 12H, in the vicinity of the station.

3.3 *Summer Chum Salmon*

Management Unit	Total Recruits	Canadian Harvest	Washington Preterminal Harvest	Terminal Harvest	Extreme Terminal Harvest	Expected Escapement	Minimum Escapement Threshold
Quilcene/Dabob	10,129	640	252	213	506	8,519	1,110
Mainstem HC	8,969	566	223	188	0	7,991	2,660
SE Hood Canal	4,632	292	115	176	0	4,048	300
Totals	23,729	1,498	590	577	506	20,558	4,070

Note: The forecast include the combined return of naturally reared supplementation program summer chum to each Management Unit.

Hood Canal summer chum salmon originate from natural production in streams tributary to the mainstem Hood Canal, Quilcene/Dabob, and SE Hood Canal. The methods used to develop the 2007 forecasts of summer chum salmon are described in Appendix A-3 of this report.

In March 1999, the Hood Canal-Strait of Juan de Fuca ESU (Evolutionary Significant Unit) summer-run chum salmon was listed as threatened by NMFS (50 CFR part 224). Hood Canal summer chum salmon are managed as secondary management units, in accordance with the Puget Sound and Hood Canal Salmon Management plans. In 2007, anticipated interceptions may occur during marine area fisheries for chinook and coho salmon in Hood Canal. There may also be some potential for incidental catch in Washington pre-terminal area fisheries, directed at sockeye salmon. Although these units are managed as secondary, additional measures are taken to ensure that their recovery is not impeded by harvest impacts.

In 2007, the mean expected exploitation rate based interception, derived from *the Base Conservation Regime* (BCR) management, was used to assess interception of total recruits entering terminal areas. Because of additional measures taken in various fisheries, it is expected that lower rates than those predicted will result. Minimum escapement thresholds are based on the BCR.

3.4 Coho Salmon

The normal-timed coho salmon runs returning to Hood Canal consist of several small natural components in all river systems, in addition to hatchery components returning to the George Adams Hatchery in the Skokomish river system and the Quilcene National Fish Hatchery in the Big Quilcene river system. Other normal-timed units include delayed-release coho from the sea pen facilities at Quilcene Bay and Port Gamble Bay. The Quilcene Hatchery run is timed somewhat earlier than the other normal-timed runs. The Port Gamble Bay run, using Quilcene stock, is also somewhat earlier and recent test fisheries have been used to gather information to obtain more precise estimates of its entry pattern.

3.4 Coho Salmon

Harvest and Escapement by Management / Production Unit (FRAM 0714)								
Fishery	12/12B/12C/12D Skokomish		9A ⁽¹⁾	12A ⁽¹⁾	Hood Canal Stocks' Subtotals		Non Local	Total
	Natural	Hatchery	Aggregate	Aggregate	Hatchery & SecNat'l	Primary Natural		
Harv & Esc. Total	42,618	14,803	8,925	31,742	55,470	42,618		98,088
Canada	447	312	209	548	1,069	447		1,516
S.Falcon Tr/Rec	74	51	20	102	173	74		247
N.Falcon Tr/Rec	1,561	1,152	1,067	2,595	4,814	1,561		6,375
P.S. Troll	46	16	10	33	59	46		105
Strait Rec.	1,638	858	830	2,050	3,738	1,638		5,376
SJI Rec.	0	8	56	74	138	0		138
Area 9 Rec.	1,743	726	315	1,486	2,527	1,743		4,270
P. Sound Rec.	847	366	144	797	1,307	847		2,154
Strait Net	255	100	58	193	351	255		606
SJI Net	13	15	4	35	54	13		67
No. Sound Net	103	63	18	118	199	103		302
So. Sound Net	1,427	519	272	1,056	1,847	1,427		3,274
Hood Canal Rec.	1,272	388	159	860	1,407	1,272	50	2,729
HC Rivers Rec.	2,213	1,502	0	8,163	9,665	2,213		11,878
HC Mainstem Net	4,138	1,222	37	540	1,799	4,138	222	6,159
Area 9A Net	1,935	379	5,125	692	6,196	1,935	712	8,843
Area 12A Net	174	39	0	5,877	5,916	174		6,090
Skokomish R Net	1,567	1,073	0	0	1,073	1,567		2,640
Mgt Unit Harvest	19,453	8,789	8,324	25,219	42,332	19,453	984	62,769
Mgt Unit Escap.	23,165	6,014	601	6,523	13,138	23,165		36,303
Min. Escap. Goal	14,916	550	573	1,820				

Notes: (1) These management units also contain naturally reared coho, which were estimated separately and then "aggregated" for modeling and management purposes, because of their secondary classification.

The aggregate (natural and hatchery) Hood Canal run of December Age-2 (DA-2) recruits was forecast to be 129,505, consisting of 56,964 natural (56,466 primary and 498 secondary) and 72,541 hatchery coho. These were used to provide model input values for the 2006 PFMC/North of Falcon management planning process. The methods used to develop the 2007 Hood Canal coho forecasts are further detailed in Appendix A-4 of this report.

The above table is based on the results of the pre-season *FRAM* simulation run #0714, and does not include estimated natural mortality in 2007. The expected harvest numbers refer to the total anticipated landed and nonlanded harvests from both incidental and targeted fisheries, based on estimates provided by pre-season *FRAM* simulation run #0714. Further details concerning pre-season fishing scenario are shown in Section 4 of this report.

The escapement targets for Hood Canal primary natural coho are based on a maximum allowable exploitation rate of 65% in all fisheries, based on this year's predicted abundance. The expected escapements are those which would result after the application of the pre-season established fishing regimes, to the 2007 forecasted abundance.

The escapement targets for hatchery (and secondary natural) management units are those necessary to meet the parties' agreed-upon enhanced production, as adjusted for 2007.

3.5 Fall Chum Salmon

The Hood Canal run of fall chum salmon is generally forecast as a single fall run, composed of hatchery and natural management units. However, in accordance with the Hood Canal Salmon Management Plan, and the SaSI resource inventory, it is also separated into two timing components, which are used for management purposes. "Early fall" chum refer to the Hoodsport Hatchery and other hatchery management units, using the same brood, as well as similarly timed natural units; "Late fall" chum refer to natural units returning after the Hoodsport run, as well as similarly timed hatchery units (Enetai and QNFH). In practice, during the early fall chum management period (through Nov. 20 in northern and central Hood Canal), only the Hoodsport/George Adams/McKernan units are considered primary. During the late-fall management period, natural units (Skokomish R., Area 12B, and Area 12A tributaries) become the primary units.

Methods used to estimate the 2007 forecasts of all fall chum salmon returning to Hood Canal are described in Appendix A-5 of this report. The pre-season summary, presented in Table 3.5, is the result of averaging the forecasting results obtained by PNPTC and WDFW, using alternate methods, for each production unit. This was made possible because of the similar overall abundances predicted by the various methods.

Pre-terminal catches are expected to occur primarily during Treaty Indian and non-treaty chum fisheries directed at mixtures of various Puget Sound and British Columbia runs. The portion of these catches that is expected to come from Hood Canal management units, has been estimated to be approximately 6,500 at the Strait of Juan de Fuca (SJF) and the San Juan Islands (SJI), combined. The methods used to obtain the SJF and SJI estimates utilized the 1986-1996 average of the Hood Canal contribution to management weeks' 40-46 catch in those fisheries, as shown by GSI sampling. The total anticipated volume of harvest in the above fisheries was estimated using the mean catch (+1 s.d.) during the 1999-2006 period (for SJF), and provisions of Annex IV, Ch. 6 of the PST and State-Tribal agreements (for SJI), as well as pre-season forecasts of abundance of chum salmon returning to Puget Sound and the "inside" areas of British Columbia.

The proportion of the escapement to be taken at the Hoodsport Hatchery versus the George Adams/McKernan Hatchery complex, is based on the management objectives of meeting the combined Hoodsport/Skokomish River hatchery escapement, as revised in 2004, by Co-Managers' agreement, plus providing a minimal in-river harvest in the Skokomish River. For the Quilcene National Fish Hatchery, escapement goals are based on the Co-Managers' decision to terminate production of fall chum from this facility.

3.5 Fall Chum Salmon

Management and Production Units	"4B" Run	Pre-Term Harvest	Terminal Run	Terminal Harvest	Extr. Term Harvest	Expected Escapement	Escapement Goal
<i>AREA 9A</i>							
Natural	0	0	0	0	0	0	0
Hatchery	4,975	57	4,917	4,573	310	34	0
<i>AREA 12</i>							
Natural	12,846	148	12,697	11,809	0	888	3,900
<i>AREA 12A</i>							
Natural	9,716	112	9,604	2,948	0	6,656	1,250
Hatchery	242	3	239	122	0	117	0
<i>AREA 12B</i>							
Natural	126,832	1,463	125,369	38,483	0	86,886	18,750
<i>AREA 12C</i>							
Natural	66,631	768	65,862	61,252	0	4,610	7,000
Hoodsport Hatchery	138,220	1,594	136,626	127,062	664	8,900	8,900
Enetai Hatchery	18,621	215	18,406	10,956	0	7,450	1,900
<i>AREAS 82G/J (Skokomish R.)</i>							
Natural	21,843	252	21,591	12,049	269	9,273	9,800
G.Adams-McKernan Hatchery	125,363	1,446	123,917	115,243	2,574	6,100	6,100
<i>AREA 12D</i>							
Natural-Augmented	62,238	718	61,521	57,215	0	4,306	13,550
Totals	587,526	6,775	580,751	441,712	3,817	135,222	71,150

The expected escapement to the Little Boston Hatchery assumes a 90% extreme terminal harvest rate in Port Gamble Bay. Other expected escapements on fall timed runs are based on the application of harvest appropriate to fully harvest the Hoodsport-George Adams-McKernan surplus. For late-fall chum, the expected escapements are those that would result after Hoodsport-timed chum have been taken from the portion of each late-fall management unit that overlaps the Hoodsport entry timing.

Escapement goals for natural fall chum salmon were developed by WDFW. They are generally the average of the three largest even-year escapements in the years 1968-1977. For secondary management units, these goals form a management guideline for secondary management unit protection.

4. Pre-Season Management Framework

4.1 2007 Harvest Management Measures and Expected Fisheries

In 2007, the condition of the salmon runs returning to the Hood Canal terminal areas requires that harvest management plans be conservative for some species, while providing opportunities for harvest of more abundant stocks and species.

Summer/Fall chinook salmon returning to Hood Canal should be managed in order to achieve the necessary escapements to the WDFW hatcheries which contribute the majority of the harvestable return to Hood Canal. The combined escapement target of 3,800 chinook salmon, to the various WDFW hatchery facilities, initially defines the aggregate allowable harvest rate in the terminal marine areas and the Skokomish River. However, in addition to that limitation, starting in 2000, additional management measures must be taken in response to the listing of Puget Sound chinook salmon as threatened, under the ESA. The Hood Canal chinook salmon return shall be managed to meet the needs of three major units: Mid-Canal (Dosewallips, Duckabush and Hamma Hamma), Skokomish (aggregate of naturally reared and hatchery mitigation), and the Hoodport Hatchery. In order to provide necessary protection to the Mid-Canal unit, as well as provide both fishing opportunity and protection to Skokomish chinook salmon, fisheries directed at chinook salmon will be limited to Area 12C and in the Hoodport Hatchery zone (Area 12H), as well as the Skokomish River (Area 82G). Fisheries in Area 12C and the Skokomish River delta will be further restricted in order to provide protection for commingled summer chum salmon.

Fisheries directed at Hood Canal hatchery and naturally reared coho salmon will be scheduled in Hood Canal mainstem terminal areas. Provisions for conservative management of Hood Canal coho salmon stocks were pursued during the 2007 PFMC/North of Cape Falcon process, primarily to ensure that commingled summer-run chum and chinook salmon will be protected. The parties have agreed to implement the previously adopted summer chum salmon base conservation regime (BCR) management measures in 2007. The BCR is based on a series of management measures, which are expected to effectively reduce incidental impact to the summer chum salmon ESU. These measures include a combination of specific management actions and fishery specific exploitation rate “ceilings”. Given the limited data available for summer chum, this has been determined the best strategy for protection and recovery of the Hood Canal mainstem management unit.

In 2007, early-fall chum salmon runs managed at rates appropriate for the George Adams/McKernan, Hoodport, and Little Boston hatcheries are expected to comprise most of the total fall chum salmon return. Therefore, significant harvests are expected during the early-fall chum salmon management period.

The following section provides a summary of the co-managers’ preseason understandings, regarding the fishery regimes to be used in 2007. The commercial and recreational fishery regimes were used during the preseason planning process discussions and simulation modeling, in an effort to achieve the co-managers’ intent for harvest and escapements. During the season, as more information becomes available on the runs, climatic and habitat conditions, fishery impacts and requirements, the fishery schedules, closures, and other measures may be modified to provide for the necessary protection to escapements, as well as opportunity to harvest available surpluses.

4.1.1 Preseason Framework Plan for Commercial Fisheries

Hood Canal Mainstem (Areas 12, 12B, 12C, 12D)

Treaty: 1,000 feet closure around streams which are closed to net fishing. Beach seines and hook and line gear release chum through 9/30 (through 10/10 if within 500' of western shore of Areas 12B and 12C).

Nontreaty: See WAC 220-47-307 for Nontreaty exclusion zones.

Chinook	Treaty	Areas 12, 12B and 12D: Closed Area 12C: Open wb 7/15; through 8/24, no more than 5 days/wk. Gillnets restricted to 7" min mesh starting 8/1. Area 12H: Open wb 8/5 through wb 9/23; hook and line gear continuous; beach seines daylight hours Tues and Thur each week; possible in-season modifications; chum release.
	Nontreaty	Closed
Pink	All:	Same as Chinook opening
Coho	Treaty:	Area 12: Open 9/25 through 10/20; for gillnets. Beach seines for coho only (release all chinook and chum through 9/30) may start no earlier than 9/16. Area 12B: Open 10/1 through 10/20; for gillnets; 500 foot closure along western shore through 10/10; beach seines for coho only (release all chinook and chum through 9/30) may start no earlier than 9/16. Area 12C: Open 10/01 through 10/27; for gillnets; 500 foot beach closure from Ayock Pt. to approx. 2,000 feet south of Lilliwaup (at the large house, north of Octopus Hole) through 10/10; beach seines for coho (release all chum through 9/30) may start no earlier than 9/21. Area 12D (west of Madrona Pt. - local name): Open for beach seines and gillnets no earlier than 10/1. Weekly schedules identical to Area 12C.
	Nontreaty	Closed
Chum	All	WDFW and the Tribes will review recent catches and the in-season management method for the Hood Canal Chum fishery. Review to be completed by August 30, 2007. Changes may be made by agreement to the fishing schedule based on those reviews.
	Treaty	Areas 12 – 12B: Open 10/21 through 11/20. Area 12C: Open 10/28 through 11/27. Area 12D: Closed. Area 12H: Hook and line gear open from 10/21 through 12/1; beach seines open Tuesday and Thursday of each week, then Monday and Wednesday for the week of 11/18; possible inseason adjustments. Starting 11/4, hatchery escapement control measures will go into effect.
	Nontreaty	Areas 12 – 12B: Open Wks 43 (wb 10/21) through wk 47 (wb 11/18), PS release chinook; PS fishing pattern: 1,2,1,1,1; GN fishing pattern: 2,3,2,2,1, daylight hours Area 12C Open Wks 46 (wb 11/11) through Wk 48 (wb 11/25) PS release chinook; PS fishing pattern: 1,1,1; GN fishing pattern: 2,2,2. Area 12D Closed

NOTE: Chum fishing schedules may change inseason due to updates of abundance.

Port Gamble (Area 9A)

Chinook	All	Closed
Coho	Treaty	Open wb 8/19 through wb 10/28, gillnet only.
	Nontreaty	Open Wks 35 (wb 8/26) through wk 44 (wb 10/28); GN and skiff GN, both gears limited to 100 fathoms length and 60 meshes in depth; 2 days wk 35, then 7 days/wk; chinook NR; chum NR through 9/30; release fish not to be retained by cutting ensnaring meshes. The beach area of the Port Gamble Indian Reservation, between Pt. Julia and the boundary marker at the south end of the reservation shall be closed to all fishing.
Chum	Treaty	Open wb 10/28 through wb 11/25.
	Nontreaty	Closed
Steelhead	Treaty	Open wb 12/2 through 1/31/2008.

Quilcene / Dabob (Area 12A)

Coho	Treaty	Open north of Pt. Whitney, wb 8/19 through wb 10/7; chum and chinook release from hook and line and beach seine gear through 9/30; beach seines 5 days/wk, daylight hours; hook and line open continuous; gillnets closed before 9/1 and limited to 1 day/wk from 9/1 through 9/30. Gillnets will close if 12A summer chum escapement projected <1,500. Additional gillnet time may be added after 9/15, if 12A summer chum escapement projected >2,500 and coho harvest needs require it. Beach seine advance notification required prior to fishing.
	Nontreaty	Open Wks 36 (wb 9/2) through wk 40 (wb 9/30); Skiff gillnet fishing pattern 1,1,1,1,1, daylight hours; net must be attended at all times. Chinook NR and chum NR through 10/7, Release fish not to be retained by cutting ensnaring meshes. Gillnets will close if 12A summer chum escapement projected <1,500. Additional gillnet time may be added after 9/15, if 12A summer chum escapement projected >2,500, per Summer Chum Salmon Conservation Initiative.
Chum	Treaty	Open to set and drift gillnets wb 10/21 through 11/20, south of an E-W line through Pt. Whitney.
	Nontreaty	Closed

Skokomish River (Area 82G) Treaty (Nontreaty net closed)

NOTE: The Skokomish Tribe may implement a commercial fishery in Purdy Creek. Further discussion and agreement on fishery schedules, including sampling and monitoring programs, is required.

NOTE: Hook and line gear and beach seines release chum through 10/15.

Chinook	Open 7/29 through 9/22; no more than 4 days/wk; closed to gillnets below SR 106.
Coho	Open 9/23 through 11/10; no more than 5 days/wk, (possible in-season modifications); closed to gillnets below SR 106 through 9/30.
Chum	Open 11/11 through 12/5.

Big Quilcene River (Area 82F) Treaty (Nontreaty net closed)

Coho	Openings to be determined in-season, for coho only, as necessary, from wb 9/2 through wb 9/23; from U.S. Hwy 101 to the Quilcene Hatchery rack, hand held gear only
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(dipnets, hand lines, etc.)
Chum Closed

Misc. Hood Canal Rivers (Dosewallips, Duckabush, Hamma Hamma, Tahuya, Dewatto, Union)

All Closed

4.1.2 Preseason Framework for Recreational Fisheries

Hood Canal Marine Area (Area 12) Recreational

5/1-6/30 Closed
7/1-8/31 North of Ayock Pt. – Closed to salmon angling except see Quilcene/Dabob Bay Recreational below.
9/1-10/15 North of Ayock Pt. (including Quilcene / Dabob Bay) – 4 fish limit, coho only.
7/1-10/15 South of Ayock Pt. - 4 fish limit, 2 chinook (chinook 22" min size); release chum.
10/16-12/31 4 fish limit, 1 chinook (chinook 22" min size).
1/1-2/15 Closed
2/16-4/10 1 fish limit (chinook 22" min size).
4/11-4/30 Closed

Quilcene/Dabob Bay Recreational

5/1-8/15 Same as Area 12
8/16-8/31 4 fish limit, coho only.
9/1-4/30 Same as Area 12

Hoodsport Hatchery Zone Recreational

Same as Area 12 except:

7/1-12/31 4 fish limit, only 2 chinook greater than 24"; chum release 7/1-10/15; night closure.

Dewatto River Recreational (mouth to Dewatto-Holly Rd. Bridge)

9/16 – 10/31 2 fish limit, 12" min size, coho only. Selective Gear Rules.

Dosewallips River Recreational (mouth to Hwy. 101 Bridge)

11/1 – 12/15 2 fish limit, 12" min size, chum only

Duckabush River Recreational (mouth to Mason Co. PUD #1 electrical distribution line)

11/1 – 12/15 2 fish limit, 12" min size, chum only

Quilcene River Recreational (from Rodgers St. to Hwy 101 Bridge)

8/16 – 10/31 4 fish, 12" min size, coho only. Only 1 single point barbless hook may be used. Only fish hooked inside the mouth may be retained.

Skokomish River Recreational (mouth to Hwy. 101 Bridge)

- 8/1 – 9/30 1 fish limit, 12” min size, release chum. All Species-night closure, non-buoyant lure restriction, and single point barbless hooks required through 11/30. Terminal gear (hooks, weights, lures or baits) and line must not be within 25’ or Tribal gillnets.
- 10/1 – 10/15 6 fish/4 adult, 12” min. size. Release chinook and chum. All Species-night closure, non-buoyant lure restriction, and single point barbless hooks required through 11/30. Terminal gear (hooks, weights, lures or baits) and line must not be within 25’ or Tribal gillnets.
- 10/16 – 12/15 6 fish/4 adult, 12” min. size. Release chinook. All Species-night closure, non-buoyant lure restriction, and single point barbless hooks required through 11/30. Terminal gear (hooks, weights, lures or baits) and line must not be within 25’ or Tribal gillnets.

Tahuya River Recreational (mouth to marker 1 mile above N. Shore Rd. Bridge)

- 9/16 – 10/31 2 fish limit, 12” min size, coho only. Selective Gear rules.

All other HOOD CANAL REGION freshwater recreational closed to salmon angling.

4.1.3 Test and Evaluation Fisheries

No test fisheries, directed at salmon, are anticipated in any Strait of Juan de Fuca terminal areas, during the 2007 season.

4.2 Other Recommended Measures

It is recommended that the parties initiate communication during the season, to the extent necessary to address unforeseen circumstances which would likely require the modification on one or more elements of the pre-season management framework. Examples of these may include lower than expected run sizes that may require conservation action, higher than expected interceptions of summer chum salmon, significant changes in the estimated coho run size, low water conditions that serve to delay the emigration of coho salmon from marine areas, and significantly higher, or lower, than expected fall chum run sizes and/or escapements that would require fishery plan modifications.

Also, in addition to routine fishery planning, catch monitoring, assessment and regulation, the following specific activities are recommended:

Emphasis should be placed on the recovery of a minimum of 20% coded-wire tags (CWT) from chinook and coho salmon in Hood Canal fisheries. This rate of sampling is crucial to annual escapement assessment, survival rate estimation and run reconstruction. In addition to CWT sampling, the individual aspects in need of attention include fishing effort, catch composition, accounting of catch and biological characteristics of individual stocks. In order to meet these objectives, a coordinated effort between the WDFW the PNPTC Tribes, and the Skokomish Tribe, to develop and implement a sampling and monitoring plan, should allow for an improved assessment of commercial and recreational fisheries in Hood Canal and the Skokomish River.

Commercial fisheries in Hood Canal and the Skokomish River should be intensively sampled and monitored to assure for accurate estimates of total (including incidental) catch of chinook, coho and chum in treaty and non-treaty fisheries. This can be accomplished by estimating daily fishing effort, as catch per unit effort (CPUE) and encounter rates throughout each fishery. Additional tribal and WDFW technicians stationed in all Hood Canal areas and the Skokomish River should provide for improved mainstem coverage of sampling and monitoring.

During the time when summer chum salmon may be present in the fishing areas, and at the spawning grounds, it is recommended that age samples be obtained from summer chum salmon, in order to enable the reconstruction of contributing cohorts. It is also recommended that summer chum spawner survey frequency be maintained to once per week in all areas, to maintain the accuracy of estimates.

4.3 Inseason Run Size Updates

For summer/fall chinook salmon, in Area 12H, the frequency of fisheries for chinook salmon will be regulated on the basis of observed hatchery escapements.

In 2002, an effort was undertaken to evaluate available sources of information that would permit inseason assessment of chinook salmon abundance entering the Skokomish River. These included, hatchery escapement patterns, recreational fishery monthly catch and Treaty Indian daily catch and landings information, for the 1980-2000 period. Unfortunately no relationship was found to consequently improve on pre-season estimates. Therefore the pre-season estimated abundance will be used during the season.

In the Quilcene area, in-river escapement estimates for coho and summer chum salmon shall be used inseason to assist in decision making regarding the potential adjustment of fishery restrictions. In the case of summer chum salmon, while no inseason estimate of total abundance will be made, an inseason estimate of anticipated spawning escapement will be made and compared with threshold values of the SCSCI. Adjustments to gillnet fishing in Area 12A may be made on the basis of the results obtained, in accordance with procedures of the SCSCI.

For fall chum salmon returning to Hood Canal, fisheries may be adjusted on the basis of inseason updates of run abundance. Methods used to provide inseason assessment of abundance are detailed in Appendix B-1 of this report. This inseason assessment uses a model that was also used in 2005 and 2006, now updated for the 2007 fishery schedules. It performed well in nearly all cases, except for the 1997 and the 2004 fisheries. In those years, very high harvest rates, by the gear type used for the inseason update (purse seines), possibly caused by high effort and efficiency, did not match the condition of the run. Therefore if catches appear unusually high, through the third week of the fishery in 2006, the inseason update may be inaccurate. In that case, inseason management should proceed conservatively.

APPENDIX

- A. Pre-season Forecasting Methods**
- B. Inseason Run Assessment Methods**

A. Pre-season Forecasting Methods

A-1. Summer/Fall Chinook Salmon

Table A-1-a. Hood Canal Summer/Fall Chinook Releases at WDFW Hatcheries and Run Sizes.

Return Year (RY)	0+ Lbs. Released in RY-3	Return/Lb	Terminal Run
1984	39,232	0.42295	16,593
1985	40,098	0.50574	20,279
1986	55,499	0.39329	21,827
1987	50,811	0.51412	26,123
1988	55,967	0.50753	28,405
1989	65,510	0.38222	25,039
1990	54,674	0.23280	12,728
1991	100,366	0.18881	18,950
1992	101,102	0.02929	2,961
1993	89,517	0.05293	4,738
1994	78,335	0.04785	3,748
1995	82,895	0.11068	9,175
1996	73,472	0.11065	8,130
1997	32,571	0.23963	7,805
1998	58,652	0.27682	16,236
1999	89,149	0.25677	22,891
2000	87,306	0.22775	19,884
2001	101,591	0.24112	24,496
2002	89,837	0.44063	39,585
2003*	106,363	0.34442	36,634
2004*	95,282	0.41388	39,435
2005*	92,989	0.73212	68,079
2006*	76,768	0.62095	47,669
2007	89,952		
2008	95,366		
2009	88,632		
Average 2003-2006		0.52784	
2007 Forecast			47,480

(*) : 2003-06 return data are preliminary and subject to revision, following reconciliation of records.

The 2007 forecasted terminal run size of summer-run Hood Canal chinook salmon is the product of brood 2003 fingerling lbs released from WDFW facilities in 2004, multiplied by the average of post-season estimated terminal area return rates (total terminal run / hatchery fingerling lbs released 3 yrs previous) for the last four return years (2003-2006), which are believed to represent current survival rates (Table A-1-a). The resulting terminal area run forecast is 47,487 chinook salmon. The Hood Canal forecast was apportioned to 43,647 hatchery fish (49.3% George Adams and 50.7% Hoodspport Hatchery) and 3,840 (8.1% of the total) natural fish based on the Hood Canal terminal run reconstruction-based relative contribution of the individual Hood Canal management units in the 2003-2006 return years (Table A-1-d). These estimates were used as inputs to generate ocean recruit forecasts during pre-season simulation modeling.

Table A-1-b. Hood Canal Summer/Fall Chinook Terminal Runs

Year	12A	12B	12C	12D	Skokomish	G.A. Hatchery	Hoodspport Hatchery	Total
1984	0	758	0	440	5,302	5,537	4,183	16,220
1985	0	1,908	0	1,040	8,297	5,739	3,044	20,028
1986	0	21	0	169	8,690	10,628	2,221	21,729
1987	0	112	0	64	8,064	12,743	4,311	25,294
1988	0	150	0	79	7,078	13,086	6,888	27,281
1989	0	129	0	158	6,133	13,023	5,175	24,618
1990	0	47	0	49	2,484	8,454	1,577	12,611
1991	0	88	0	73	5,461	9,746	3,514	18,882
1992	0	96	0	20	1,373	490	965	2,944
1993	29	143	0	46	1,385	883	2,242	4,728
1994	4	384	1	30	809	609	1,889	3,726
1995	7	103	2	491	1,398	5,196	1,978	9,175
1996	8	24	1	1	995	3,100	4,001	8,130
1997	27	6	15	7	452	1,887	5,411	7,805
1998	44	287	148	187	1,263	5,949	8,358	16,236
1999	0	323	590	198	1,909	9,946	9,925	22,891
2000	0	438	263	195	1,062	4,624	13,302	19,884
2001	0	322	594	200	2,480	11,428	9,472	24,496
2002	0	95	39	116	1,947	11,620	25,768	39,585
2003	0	194	94	108	1,500	13,377	21,361	36,634
2004	0	129	1,106	96	4,271	17,862	15,971	39,435
2005	0	45	666	117	3,641	28,703	34,907	68,079
2006*	0	30	301	35	2,649	27,074	17,580	47,669

Note: The 2001-2006 run reconstruction is preliminary and subject to revision.

Table A-1-c. Proportional Distribution of Hood Canal Summer/Fall Chinook Returns

Year	12A	12B	12C	12D	Skokomish	G.Adams	Hoodsport
2003	0.00000	0.00530	0.00257	0.00295	0.04095	0.36515	0.58309
2004	0.00000	0.00327	0.02805	0.00243	0.10830	0.45295	0.40500
2005	0.00000	0.00066	0.00978	0.00172	0.05348	0.42161	0.51274
2006	0.00000	0.00063	0.00631	0.00073	0.05557	0.56796	0.36879
'03 - 2006 Mean	0.00000	0.00246	0.01168	0.00196	0.06458	0.45192	0.46741

Table A-1-d. Apportionment of the Hood Canal Summer/Fall Chinook Forecast

Hood Canal Production Unit	Terminal Run Forecast	Proportion
12B	117	0.00246
12C	554	0.01168
12D	93	0.00196
Skokomish	3,066	0.06458
Natural Subtotal	3,831	0.08068
George Adams	21,457	0.45192
Hoodsport	22,193	0.46741
Hatchery Subtotal	43,650	0.91932
Total	47,480	1.00000

Note: The forecasted proportions are derived from the 2003-2006 mean return.

A-2. Pink Salmon.

A-2.1 Natural Runs

The 2007 return of naturally reared Hood Canal pink salmon was forecast as recruitment to all fisheries (Canadian and domestic) and escapement, using the product of the 2005 brood year estimated escapement (17,676) (Table A-2-a) multiplied by the average estimated "Cycle 3" return rate of (4.192) for a forecast of 74,099 natural pink salmon total recruits (Table A-2-b).

Table A-2-a. Corrected Pink Salmon Natural Run Reconstruction for Hood Canal

Return Year	Hood Canal Natural Escapement	Hood Canal Natural Terminal Run	Hood Canal Total Natural Recruits	Hoodsport Hatchery Recruits	Hood Canal Total Recruits
1959	30,600	30,600	49,421	2,471	51,892
1961	36,900	36,900	47,951	3,833	51,784
1963	503,200	503,200	1,200,196	15,837	1,216,033
1965	160,500	160,500	226,069	606	226,675
1967	269,400	271,100	493,000	4,092	497,092
1969	42,100	42,100	59,714	3,206	62,920
1971	104,100	104,100	143,875	3,303	147,178
1973	47,100	47,200	76,748	2,455	79,203
1975	12,600	12,600	20,047	3,739	23,786
1977	44,300	44,300	76,762	10,067	86,829
1979	37,300	37,400	84,235	9,797	94,032
1981	6,550	7,150	13,639	3,395	17,034
1983	25,200	25,400	29,247	622	29,869
1985	64,100	66,200	90,812	2,167	92,979
1987	62,200	64,000	77,417	11,092	88,509
1989	60,970	80,100	130,646	4,583	145,961
1991	118,450	118,487	180,734	5,037	186,862
1993	35,406	35,406	40,093	13,025	53,118
1995	31,306	31,306	39,531	32,102	71,633
1997	8,363	8,363	14,684	37,738	52,422
1999	12,667	12,667	12,818	7,741	20,559
2001	96,664	96,664	100,861	74,854	175,715
2003	37,531	38,250	39,793	29,857	69,650
2005	17,481	17,856	18,436	14,723	33,159

Table A-2-b. Hood Canal Natural Pink Salmon Returns per Spawner

Cycle 1 BY	Cycle 1 R/S	Cycle 2 BY	Cycle 2 R/S	Cycle 3 BY	Cycle 3 R/S
1959	1.567	1961	32.526	1963	0.449
1965	3.072	1967	0.222	1969	3.417
1971	0.737	1973	0.426	1975	6.092
1977	1.901	1979	0.366	1981	4.465
1983	3.604	1985	1.208	1987	2.100
1989	2.964	1991	0.338	1993	1.116
1995	0.469	1997	1.148	1999	7.963
2001	0.412	2003	0.491	2005	
Average:	1.841		0.600		4.192
Std. Dev.	1.260		0.404		2.543
2007 Forecast Recruits					73,282

The WDFW provided a separate forecast of 59,752 recruits, using the same general methodology approach. This difference (approx. 18.5%) was most likely the result of differences in historical run reconstruction methods, as well as assumptions concerning contributions to Canadian fisheries, which was used as a basis for the forecasts. These differences should be addressed in the near future.

A-2.2 Hatchery Runs.

The 2007 return of hatchery reared Hood Canal pink salmon was forecast as recruitment to all fisheries and escapement, using the product of the 2005 brood year fingerling pounds released from the Hoodspout Hatchery (1,670), multiplied by the long term average recruits per pound rate estimated for the Hoodspout Hatchery (2.763). The resulting recruit forecast is 4,614 pink salmon recruits (Table A-2-c).

For hatchery returns, the WDFW forecast is 4,395. Again, the relatively small difference (les than 220 recruits) was probably due to differences in historical run reconstruction.

Table A-2-c. Hoodspport Hatchery Pink Salmon Return Rates.

Brood Year	Lbs. Released	Total Recruits	Recruits/Lb
1959	2,515	3,833	1.5241
1961	492	15,837	32.1890
1963	1,209	606	0.5012
1965	1,283	4,092	3.1894
1967	1,416	3,206	2.2641
1969	2,399	3,303	1.3768
1971	3,071	2,455	0.7994
1973	2,104	3,739	1.7771
1975	3,477	10,067	2.8953
1977	3,496	9,797	2.8023
1979	2,253	3,395	1.5069
1981	1,748	622	0.3558
1983	655	2,167	3.3084
1985	2,152	11,092	5.1543
1987	5,625	4,583	0.8148
1989	1,913	5,037	2.6330
1991	4,453	13,025	2.9250
1993	6,532	32,102	4.9146
1995	7,623	37,738	4.9505
1997	7,851	7,741	0.9860
1999	3,117	74,854	24.0148
2001	3,244	29,857	9.2038
2003	3,563	14,723	4.1322
2005	1,670		
BY 1959-03 Average			2.7626
PNPTC 2007 Forecast		4,614	
WDFW 2007 Forecast		4,395	

Note: Values in boldface were excluded from the analysis.

A-3. Summer Chum Salmon

The 2007 forecast of the Hood Canal summer-timed chum salmon returns was forecast as total recruitment to all fisheries and escapements returning to the Mainstem Hood Canal, Quilcene, and SE Hood Canal management units.

Because of the exceptionally high return in 2004, all Hood Canal units were forecast as the mean of the 2002 - 03 and 2005 - 06 (four years) recruitment, as estimated by the current run reconstruction (Table A-3-a). Insufficient age-specific information is currently available for summer chum salmon, to attempt forecasts that are based on age specific, or cohort returns.. The forecasted recruitment, to all fisheries (domestic and Canadian) and escapement, for summer chum, is 8,965 for the Mainstem, 10,129 for the Quilcene, and 4,632 for the SE Hood Canal management units, for a total of 23,726. The forecasts include summer chum salmon which are expected to return to a number of streams from supplementation and reintroduction projects. However, those numbers are not separately quantifiable at present.

Table A-3-a. Hood Canal Summer Chum Salmon Recruits.

Year	Mainstem Hood Canal	Quilcene / Dabob	SE Hood Canal	Hood Canal Total
1974	11,810	944	1,067	13,821
1975	19,370	3,235	3,757	26,362
1976	35,613	11,206	21,869	68,688
1977	11,159	1,918	2,587	15,664
1978	18,791	5,555	716	25,062
1979	7,844	734	817	9,395
1980	8,867	1,932	2,133	12,932
1981	4,331	761	477	5,569
1982	5,522	1,494	956	7,972
1983	543	2,351	597	3,491
1984	1,279	1,486	502	3,267
1985	1,765	1,025	1,417	4,207
1986	1,284	1,483	5,001	7,768
1987	150	2,722	1,030	3,902
1988	2,191	2,540	915	5,646
1989	614	1,599	2,184	4,397
1990	259	623	577	1,459
1991	700	1,174	321	2,195
1992	1,953	1,237	183	3,373
1993	402	183	283	868
1994	1,170	896	891	2,957
1995	4,394	4,830	760	9,984
1996	10,734	9,801	511	21,046
1997	681	8,199	493	9,373
1998	758	3,201	255	4,214
1999	778	3,554	174	4,506
2000	2,035	6,704	757	9,496
2001	4,248	7,595	1,516	13,359
2002	6,220	6,050	890	13,160
2003	11,140	13,073	12,017	36,230
2004	25,898	56,723	5,999	88,620
2005	7,125	6,960	2,001	16,086
2006*	11,389	14,434	3,618	29,441
2007 Forecast **	8,969	10,129	4,632	23,729

* 2006 Data is preliminary and subject to revision. ** 2004 data were not used

A-4. Coho Salmon

A-4.1 Natural Runs

The forecasted recruitment of 2007 Hood Canal natural runs was based on a linear regression model that related the return of tagged jack coho at BBC to Hood Canal December Age 2 recruits in the subsequent run year. This model used recruit data from brood years 1983-1998 and 2002 (Table A-4-a). Recruit data from brood years 1999-2001 were excluded because of their unusually high recruit per tagged jack ratio, which is not expected to occur this year. The final form of the regression is shown below:

$$\text{Hood Canal Recruitment} = 23869.651 + (403.584 * (\text{BBC Tagged Jacks}))$$

Relevant statistics of the model used to derive the 2007 forecast are shown below.

Using Brood Years 1983-1998 , 2002	
Multiple R	0.75854
R ²	0.57539
Adj. R ²	0.54708
Std Error of Estimate	41034.55
N	17
Intercept	23869.651
Slope	403.584
2006 Jacks (X)	82
2007 Forecast (Y)	56,964

The forecasted recruits were subsequently apportioned to primary and secondary units on the basis of the distribution of their parent brood escapement. The total forecast of 56,964 natural DA2 recruits was thus apportioned into 56,466 from primary and 498 from secondary units, on the basis of parent brood spawner distribution (Table A-4-b).

Table A-4-a. 2007 Hood Canal Natural Coho Forecast Data

Brood Year	Big Beef Creek Total Smolts	Big Beef Total Natural Jacks	Big Beef Tagged Natural Jacks	Hood Canal Total Dec Age-2 Recruits
1975	35,025			
1976	17,619		36	
1977	45,634		452	
1978	20,715		265	
1979	41,054		398	
1980	25,225			
1981	25,333		210	
1982	36,636		554	
1983	25,720	427	346	211,127
1984	24,479	445	350	232,860
1985	11,510	201	121	40,236
1986	26,534	314	208	117,460
1987	17,594	336	234	118,316
1988	19,565	173	122	70,422
1989	23,646	167	144	61,949
1990	18,677	273	202	64,929
1991	13,071	206	149	138,845
1992	18,431	188	157	94,029
1993	16,574	224	185	71,422
1994	25,820	410	298	145,541
1995	40,828	610	510	176,029
1996	22,222	60	45	23,436
1997	20,967	96	85	54,905
1998	47,089	189	179	164,989
1999	21,855	114	90	106,147
2000	24,352	80	70	268,753
2001	36,060	350	257	297,155
2002	25,062	318	262	70,982
2003	32,222	72	43	
2004	38,579	125	82	

Table A-4-b. Apportionment of the 2007 Hood Canal Natural Coho Forecast

Area	Escapement Capacity	Escapement BY 2004	Management Unit Type	Proportion of Brood Escapement	December Age-2 Recruits
12 / 12B	28.88%	39,439	Primary	26.80%	15,266
12C / 12D	31.66%	43,445	Primary	29.52%	16,816
Skokomish	29.01%	62,995	Primary	42.81%	24,384
9A	1.25%	256	Secondary	0.17%	99
12A	9.20%	1,030	Secondary	0.70%	399
Primary Subtotal	89.55%	145,879		99.13%	56,466
Secondary Subtotal	10.45%	1,286		0.87%	498
Grand Total	100.00%	147,165		100.00%	56,964

Table A-4-c. Escapement of Coho Salmon to Primary Natural Spawning Areas of Hood Canal

Year	North (12-12B)	South (12C-12D)	Skokomish	Total
1986	17,485	18,943	3,432	39,860
1987	6,922	7,498	3,510	17,930
1988	4,623	5,009	1,948	11,580
1989	6,924	7,502	934	15,360
1990	2,664	2,885	1,281	6,830
1991	5,433	5,886	1,541	12,860
1992	8,199	8,882	2,179	19,260
1993	10,052	10,890	1,327	22,269
1994	21,289	23,063	12,128	56,480
1995	17,049	18,470	5,560	41,079
1996	16,254	17,609	4,008	37,871
1997	37,338	40,450	17,568	95,356
1998	40,323	44,420	14,957	99,700
1999	6,854	7,550	1,847	16,251
2000	8,687	9,569	8,288	26,544
2001	35,134	38,703	20,601	94,438
2002	26,172	28,831	13,647	68,650
2003	60,546	66,697	44,757	172,000
2004	39,439	43,445	62,995	145,879
2005	14,855	16,362	6,286	37,503

Table A-4-d. Hood Canal Hatchery and Net Pen Smolt to Dec-2 Recruit Survival

Brood Year	George Adams Hatchery			Port Gamble Net Pens			Quilcene NFH			Quilcene Bay Net Pens		
	Smolts	Recruits	R/Sm	Smolts	Recruits	R/Sm	Smolts	Recruits	R/Sm	Smolts	Recruits	R/Sm
1976	30,171						397,562					
1977	1,816,704						490,611					
1978	1,042,520						377,098					
1979	1,406,424			682,900			502,189					
1980	322,580			454,000			498,166					
1981	351,474			400,000			352,298					
1982	364,000			394,000			271,035					
1983	310,100	106,593	0.34374	586,400	89,105	0.15195	223,128					
1984	312,800	52,163	0.16676	394,400	73,890	0.18735	542,480			247,221	40,095	0.16218
1985	355,400	20,960	0.05898	351,900	9,450	0.02685	617,231			85,575	<i>4,363</i>	<i>0.05098</i>
1986	337,700	32,908	0.09745	429,141	29,183	0.06800	574,171	<i>98,188</i>	<i>0.17101</i>	193,522	<i>16,075</i>	<i>0.08307</i>
1987	298,000	28,068	0.09419	407,600	157,116	0.38547	753,390	75,121	0.09971	146,000	30,269	0.20732
1988	310,700	14,698	0.04731	383,629	74,033	0.19298	491,303	64,066	0.13040	311,327	21,484	0.06901
1989	300,300	7,106	0.02366	298,944	53,439	0.17876	352,556	9,874	0.02801	266,193	7,834	0.02943
1990	307,300	7,894	0.02569	403,600	32,220	0.07983	501,254	27,662	0.05519	353,263	18,203	0.05153
1991	304,197	20,054	0.06592	383,419	63,120	0.16462	397,701	49,061	0.12336	337,800	24,903	<i>0.07372</i>
1992	301,019	15,688	0.05212	361,553	13,281	0.03673	400,700	34,709	0.08662	287,187	<i>8,379</i>	<i>0.02918</i>
1993	303,054	31,320	0.10335	414,844	4,672	0.01126	425,334	29,577	0.06954	216,737	1,864	0.00860
1994	396,084	17,542	0.04429	378,686	8,741	0.02308	625,700	40,118	0.06412	0		
1995	434,140	6,963	0.01604	342,828	8,450	0.02465	425,971	17,650	0.04143	220,000	5,756	0.02616
1996	527,317	11,878	0.02253	441,656	17,564	0.03977	452,203	9,322	0.02061	225,269	3,421	0.01234
1997	534,554	22,621	0.04232	420,482	3,830	0.00911	437,222	22,091	0.05053	189,951	10,872	0.05724
1998	502,266	38,971	0.07759	391,765	7,196	0.01837	368,399	23,966	0.06505	208,000	9,780	0.04702
1999	493,992	46,008	0.09314	432,847	4,931	0.01139	428,995	33,187	0.07736	0		
2000	587,937	36,351	0.06183	432,161	6,521	0.01509	411,674	27,053	0.06571	210,627	12,982	0.06164
2001	336,886	44,572	0.13231	409,221	4,803	0.01174	388,212	42,242	0.10881	90,000	2,272	0.02524
2002	501,031	57,995	0.11575	423,746	16,496	0.03893	404,582	48,456	0.11977	200,835	14,916	0.07427
2003	309,179			437,316			361,891			179,711		
2004	290,570			540,000			488,080			215,731		
Average (2000-02)			0.06731			0.02135			0.06816			0.03796
2007 Forecast:	19,558			11,527			33,265			8,190		

Note: DEC Age-2 Recruits have been recalculated for BY95 - BY2001 and are therefore NOT comparable to those from earlier years. Earlier broods are in the process of being recalculated as well.

Note: Values in italics indicate untagged production units. Values in boldface were excluded from the analysis.

A-4.2 Hatchery Runs

For 2007, given the lower than average marine survival experienced by the BY 2002 and (suspected) BY2003 natural and, in the case of BY2003, hatchery smolts, we have decided to use a longer term mean of the estimated survival rates for each hatchery facility. The 2007 forecast utilized survival rates the latest available 9 broods (Table A-4-d). Historical marine survival rates were estimated from CWT-based cohort reconstruction of December Age-2 recruits, as were those of natural coho. Because there are several enhancement facilities in Hood Canal, and tag data were not available for all facilities for all years, marine survival rates were estimated from reconstructed cohorts, using the assumption that untagged releases contributed to preterminal fisheries in a way that maintained the same ratio to tagged releases, as estimated by RRTERM to have entered the Hood Canal terminal area (Table A-4-d).

The 2007 forecast of 72,540 hatchery reared December Age-2 coho recruits (Table A-4-d) was predicted from the brood year 2004 smolt releases multiplied by the average estimated marine survival rate for each facility's smolts from the nine latest available brood years. (Table A-4-d).

A-5. Fall Chum Salmon

The 2007 forecast of the Hood Canal fall chum salmon run was estimated separately for natural production units, off-station augmented production in natural rearing areas, and individual hatchery production units. The following descriptions of methods and source data are intended to provide documentation of the methods and approaches used. Because of delays in catch reconciliation records from 2002, 2003, 2004 and 2005 fisheries, combined with the lack of age specific data from 2005, the forecasts are extremely preliminary and possibly biased. For instance, substantial catches in Area 12H (Hoodsport hatchery zone) were reconstructed as being in Area 12C. This resulted in a possibly significant positive bias to the historical estimates for natural and Skokomish R. Hatchery returns, with a corresponding negative bias to Hoodsport hatchery returns. This, also may have affected the recruits at age estimates, for numerous Hood Canal units. It is our intent to correct this information in the near future. Until then, forecasts should be treated with caution and management actions should be conservative.

A-5.1 Natural Runs

A-5.1.1 Natural Run Forecasts (PNPTC)

The 2007 return of Hood Canal natural fall-timed chum salmon of each returning age group (3, 4, and 5 year olds) was forecast using the available mean return-per-spawner-at-age rates for broods 1996-2000, excluding estimates from the 2004 return. The mean recruit-per-spawner return rates were 1.64225, 3.30830, and 0.14078, for 3, 4, and 5 year-olds respectively (Table A-5-a). These age specific rates were used because they may better reflect the recent trends of survival. However, given the reconstruction and recruit assessment problems identified above for recent years, the very high return rate of 4 year olds in 2004 and the lack of age information from 2005 and 2006, even these average return rates were considered to be unrealistically high, and given the high levels of parent brood escapement and the less than expected returns of 2005, along with the higher than expected return of 2006, all rates were adjusted to 50% of the estimated mean. These adjusted rates of return were multiplied with the 2004, 2003, and 2002 brood escapements (169,991, 150,252, and 173,037; respectively) to estimate the total 2007 forecast of **400,303** Hood Canal natural fall chum returning to Puget Sound, before the addition of anticipated returns from instream supplementation projects. The Hood Canal natural run forecast was further apportioned to individual production units (Tables A-5-d and A-5-e), on the basis of relative proportion

attributable to each production unit's spawners (brood year escapements), for each returning age group.

The grand total return to each natural production unit was estimated by adding the estimated return from in stream enhancement and supplementation efforts. The forecast of this latter component is described under "Hatchery runs" (Section A-5.2).

A-5.1.2 Natural Run Forecasts (WDFW)

The 2007 return of natural fall-timed chum salmon to Hood Canal was preliminarily derived as a portion of the forecasted return of all Puget Sound natural fall-timed chum. The Puget Sound forecast was initially estimated using parent brood escapements, long-term odd/even-year specific average R/S values, and long-term odd/even-year specific mean proportions returning at age for 3, 4, and 5-year old returns. For example, the three-year old forecast was derived by multiplying the 2004 natural escapement by the mean even-year brood R/S value to get a total return of 2004 brood offspring. That number was then multiplied by the mean proportion of the return at age 3 for even-year broods, yielding the 2007 age 3 return forecast. This was repeated for 4 and 5-year old components, and all three were summed to obtain a total Puget Sound forecast of 1,923,751 (Table A-5-b). However, given the lower than expected returns in 2005 and the lack of age information from 2005 and 2006, this estimated was reduced by 50%, to 961,875.

The estimated return of each age group to Puget Sound was further apportioned to individual regions (including Hood Canal) and regional production units, using proportions of the parent escapement of each brood into each production unit. The resulting forecast for Hood Canal natural fall chum salmon is **199,167** (Table A-5-c). The forecasts for individual production units are shown in Table A-5-f.

A-5.1.3 Joint 2007 Hood Canal Natural Fall Chum Salmon Forecast

While the resulting estimates prepared by PNPTC and WDFW are substantially different, it should be noted that differences between methods have been further confounded by the potential data bias, discussed above, which would affect each approach to a different degree. For preliminary preseason planning, we agreed to use a forecast of **299,735** natural fall chum, the average of the PNPTC and WDFW results, apportioned to individual production units (Table A-5-g).

Table A-5-a. Hood Canal Natural Fall Chum Returns-at-Age per Spawner

Brood Year	Brood Escapement	3's	4's	5's	Total
1968	47,802	0.58849	1.63839	0.09531	2.32219
1969	30,070	0.55346	1.14771	0.09264	1.79381
1970	41,698	0.55975	1.58101	0.01314	2.15390
1971	41,139	0.58683	0.41252	0.33535	1.33470
1972	41,602	0.26600	1.27781	0.00000	1.54381
1973	27,870	1.77432	2.60438	0.07441	4.45311
1974	52,224	0.81057	4.42759	0.07083	5.30899
1975	16,266	7.39080	0.05030	0.00000	7.44110
1976	48,078	0.53107	0.20951	0.03284	0.77342
1977	26,074	2.63782	2.75187	0.13638	5.52607
1978	79,156	0.00000	0.60521	0.05628	0.66149
1979	14,323	1.90574	2.12510	0.00000	4.03084
1980	21,672	0.51985	2.14281	0.23020	2.89286
1981	14,311	3.49591	12.57517	0.62961	16.70069
1982	12,134	2.88354	7.08386	0.94399	10.91139
1983	7,121	9.05912	24.36310	1.13297	34.55519
1984	22,751	1.29322	5.88289	0.37653	7.55264
1985	50,910	0.47585	2.67119	0.33941	3.48645
1986	29,549	0.00000	3.15515	0.44356	3.59871
1987	24,481	0.00000	3.54568	1.04655	4.59223
1988	30,704	1.51411	8.58958	1.42974	11.53343
1989	24,873	0.11184	6.46342	5.71902	12.29428
1990	20,811	1.48264	8.26697	0.69326	10.44287
1991	44,745	0.59753	1.58643	0.12973	2.31369
1992	96,382	2.21238	4.21549	0.20013	6.62800
1993	67,770	1.07479	1.38931	0.10130	2.56540
1994	151,821	0.30984	0.88726	0.03062	1.22772
1995	119,344	0.58343	0.37619	0.01256	0.97218
1996	251,803	0.01674	0.19286	0.00000	0.20960
1997	53,492	0.59665	2.02701	0.40313	3.02679
1998	101,631	1.52336	2.19554	0.01921	3.73811
1999*	33,924	2.88933	8.81777	1.39799	13.10509
2000*	37,131	3.18516	12.33085		
2001*	101,713	1.98902			
2002*	173,037				
2003*	150,252				
2004*	169,991				
2005					
Mean: Brood Years 1968-01 (exclusive of outliers, in bold)					
All Odd Years	41,084	1.66646	3.23627	0.38880	5.57576
All Even Years	63,938	1.04098	3.80487	0.28973	4.46870
All Years	52,511	1.34424	3.53834	0.33767	5.00437
Mean: Brood Years 1996-00					
All Years	99,554	1.64225	3.30830	0.14078	2.32483
2007 Forecast (@ 0.5)		139,584	248,539	12,180	400,303

Table A-5-b. 2007 Puget Sound Natural Fall Chum R/S Based WDFW Forecast

Parent Brood	Age	Parent Escapement	Mean R/S ¹	Estimated R/S (all ages)	Mean Age Composition ¹	Natural Forecast
2002	5	1,082,188	2.58891	2,801,687	0.04870	136,442
2003	4	697,463	3.46847	2,419,129	0.56747	1,372,783
2004	3	872,280	2.58891	2,258,254	0.18356	414,525
					Total	1,923,751
Adjusted to 50% Prior to Use						961,875

Note: Uses odd or even brood year average, depending on brood year

Table A-5-c. 2007 WDFW Hood Canal Natural Chum R/S Forecasts

	R/S	HC Parent Escapement Proportion	HC Forecast by Age
Age 3 (2004 Brood) Forecast	207,263	0.19488	40,392
Age 4 (2003 Brood) Forecast	686,392	0.21543	147,867
Age 5 (2002 Brood) Forecast	68,221	0.15989	10,908
Total Forecast	961,875		199,167

Table A-5-d. 2007 Hood Canal Natural Fall Chum Parent Brood Escapement Distribution

Area	2004	2003	2002
9A	0.00%	0.00%	0.00%
12	5.43%	3.88%	2.33%
12A	1.60%	3.79%	6.59%
12B	42.15%	41.97%	49.58%
12C	18.26%	24.33%	17.06%
82G	8.80%	6.56%	7.90%
12D	23.75%	19.47%	16.55%

Table A-5-e. Apportionment of the PNPTC 2007 Hood Canal Natural Fall Chum Run

Area	3's	4's	5's	Total
9A	0	0	0	0
12	7,586	9,639	283	17,508
12A	2,237	9,422	802	12,461
12B	58,829	104,307	6,038	169,175
12C	25,493	60,474	2,078	88,045
82G	12,290	16,312	962	29,563
12D	33,150	48,385	2,016	83,551
Total	139,584	248,539	12,180	400,303

Table A-5-f. Apportionment of the WDFW 2007 Hood Canal Natural Fall Chum Run

Area	3's	4's	5's	Total
9A	0	0	0	0
12	2,195	5,735	254	8,183
12A	647	5,606	719	6,971
12B	17,024	62,057	5,408	84,488
12C	7,377	35,979	1,861	45,217
82G	3,556	9,704	862	14,122
12D	9,593	28,787	1,805	40,184
Total	40,392	147,867	10,908	199,167

Table A-5-g. Apportionment of the Joint 2007 Hood Canal Natural Fall Chum Salmon Forecasts

Area	PNPTC Forecast	WDFW Forecast	Joint Forecast
9A	0	0	0
12	17,508	8,183	12,846
12A	12,461	6,971	9,716
12B	169,175	84,488	126,832
12C	88,045	45,217	66,631
82G (Skokomish)	29,563	14,122	21,843
12D	83,551	40,184	61,868
Total	400,303	199,167	299,735

A-5.2 Hatchery Runs.

The 2007 hatchery-origin returns (including in-stream augmentation) of fall-timed chum salmon were generally forecasted using average returns-at-age-per-pound of fingerlings released, to Puget Sound net fisheries and escapements, using historical run sizes from the fall chum database, historical releases from each facility, and applying them to releases from brood years 2002, 2003, and 2004. In estimating the returns, the following information was used for each facility. Off-station production, resulting from instream augmentation programs was estimated separately and was then added to the forecasted return to natural spawning areas. The lack of reconciled recent years' data, as well as problems with recent years' terminal area run reconstruction, may have introduced significant positive bias to the estimates of Skokomish River hatchery runs, while introducing a negative bias to Hoodsport hatchery runs. These problems should be corrected in the near future. The following forecasts should be treated conservatively.

A-5.2.1 Forecasts of Instream Augmentation

Egg box and fry-augmented runs to streams of areas 12, 12B, 12C, 12D, 82G: PNPTC applied one half of the mean return rates of age 3, age 4, and age 5 fish per pound planted at Hoodsport Hatchery (1965-1971 broods). (Tables A-5-h and A-5-i). The resulting forecast for 2007 is 331 fish. WDFW applied return rates that were based on rates for corresponding hatcheries, reduced by a factor of 2 to 4, to compensate for the smaller size at release, resulting in a forecast of 128 fish (Table A-4-n). This forecast was apportioned to each area, according to the volume released from each brood year and the resulting estimates were added to the corresponding natural run components.

Table A-5-h. Hood Canal Fall Chum, Off-Station Lbs. Planted

Area	BY 2004		BY 2003		BY 2002	
	Lbs	%	Lbs	%	Lbs	%
9A	0	0.0%	0	0.0%	0	0.0%
12	0	0.0%	0	0.0%	0	0.0%
12B	0	0.0%	1	0.5%	0	0.0%
12A	0	0.0%	0	0.0%	0	0.0%
12C	0	0.0%	0	0.0%	0	0.0%
Skokomish	0	0.0%	0	0.0%	0	0.0%
12D	22	100.0%	191	99.5%	222	100.0%
Total	22	100.0%	192	100.0%	222	100.0%

Table A-5-i. Apportionment of the 2007 Hood Canal Fall Chum Off-Station Forecast

Area	3's	4's	5's	Total
9A	0	0	0	0
12	0	0	0	0
12B	0	0	0	0
12A	0	0	0	0
12C	0	0	0	0
82G	0	0	0	0
12D	15	342	14	371
Total	15	342	14	371

A-5.2.2 Hatchery On-Station Forecasts (PNPTC)

Hoodsport Hatchery: Mean return rate of age 3, 4, and 5 fish per pound planted at Finch Creek (1995-2001 broods) (Table A-5-j). The resulting forecast for 2007 is **123,038**. Run reconstruction problems may have biased this run low.

George Adams/McKernan Hatcheries: Mean return rate of age 3, age 4, and age 5 fish per pound released (1978-2001 broods) (Table A-5-k). The resulting forecast for 2007 is **137,270**. All available years were used in order to attempt to counteract a probable high bias, caused by run reconstruction and age at return data problems.

Quilcene Hatchery: Mean return rate of age 5 fish per pound planted at Walcott Slough (1965-1974 and 1979-1984 broods). The age specific return rates for age 5 (brood 1968) was determined to be an outlier and was excluded from the estimation of the age specific mean return rates (Table A-5-l). The resulting forecast for 2007 is based on the fingerling releases of 2,740 lbs. (BY 2002), which were used to estimate the return of 5-year olds (the QNFH ceased production of fall chum, following the BY 2002 release), for a total return of **258**.

Little Boston Hatchery and Port Gamble Pens: Mean return rate of age 3, age 4 and age 5 fish per pound planted at Hoodsport Hatchery (1965-1971 broods) (Table A-5-j). The resulting forecast for 2007 is based on the fingerling releases of 1,797 lbs (BY 2004), 1,699 lbs (BY 2003), and 1,888 lbs (BY 2001), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of **5,530**. (Table A-5-o).

Enetai Hatchery: Mean return rates of age 3, age 4 and age 5 fish per pound planted (1976-1999 broods). (Table A-5-m). The resulting forecast for 2007 is based on the fingerling releases of 6,613 BY 2004), 3,264 lbs (BY 2003), and 7,081 lbs. (BY 2002), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of **19,504**. In this instance, all available brood data were used, for the same reasons as those for George Adams / McKernan.

The PNPTC hatchery forecasts are summarized in Table A-5-o and indicate a total forecast of on-station hatchery-origin fall chum, for 2007, of **285,601**.

A-5.2.3 Hatchery Forecasts (WDFW)

The 2007 return of hatchery-origin fall chum was forecast by multiplying pounds released from each facility by long-term, even/odd brood year specific average return rates for that facility. For example, 3-year old returns were forecast by multiplying pounds released of 2004 brood year chum by the long-term, even-year brood age 3 return rate for that hatchery. Age 4 and age 5 returns were forecast by the same method. For off-station releases (volunteer/cooperative projects), return rates were based on rates for a corresponding hatchery, reduced by a factor of 2 or 4 to compensate for smaller size at release. Individual station forecasts are shown in the tables below. A summary of the WDFW forecasts by age are shown for Hood Canal hatcheries in Table A-5-n. The WDFW total Hood Canal hatchery on-station forecast is **289,240**.

A-5.2.4 Joint 2007 Hood Canal Hatchery Fall Chum Salmon Forecast

For preliminary preseason planning, we agreed to use a forecast of **287,420** hatchery fall chum, the average of the PNPTC and WDFW forecasting methods' results, apportioned to individual hatchery facilities (Table A-5-p).

**Table A-5-j. Fall Chum Returns-per-Pound,
by Age at Return from Hoodspout Hatchery Releases**

Brood Year	Release Lbs.	3's	4's	5's	Total
1965	888	0.80208	2.35750	0.01558	3.17516
1966	1,771	0.92010	2.66721	0.02299	3.61030
1967	2,301	0.93776	1.15006	0.11132	2.19914
1968	4,373	0.54928	1.56195	0.19686	2.30809
1969	2,424	0.59879	2.69040	0.26275	3.55194
1970	3,036	1.45276	4.96486	0.00000	6.41762
1971	3,794	1.45488	1.48756	0.02969	2.97213
1972	4,126	0.55870	7.49948	0.82970	8.88788
1973	9,202	0.70599	3.60727	0.16357	4.47683
1974	27,368	0.89570	5.68814	0.03343	6.61727
1975	22,776	2.54895	2.78624	0.05244	5.38763
1976	24,490	0.76752	1.80998	0.04155	2.61905
1977	21,883	3.98451	2.02120	0.02757	6.03328
1978	33,256	1.00278	2.34466	0.24428	3.59172
1979	24,238	2.98678	2.89652	0.21504	6.09834
1980	44,336	0.48636	2.23768	0.04039	2.76443
1981	23,589	3.18480	4.51989	0.36118	8.06587
1982	32,058	1.69592	4.43338	0.15862	6.28792
1983	34,748	1.23151	4.91046	0.44689	6.58886
1984	60,763	1.76204	2.85909	0.09411	4.71524

Continued ...

**Table A-5-j (cont'd). Fall Chum Returns-per-Pound,
by Age at Return from Hoodport Hatchery Releases**

1985	39,279	2.92389	5.00571	0.20595	8.13555
1986	33,036	0.53259	2.21872	0.20579	2.95710
1987	40,323	0.42814	3.70929	0.14736	4.28479
1988	36,877	3.13411	7.17034	0.29712	10.60157
1989	35,149	0.71847	1.79583	0.50845	3.02275
1990	38,422	4.27142	7.01940	0.37401	11.66483
1991	39,379	3.01183	1.98098	0.07460	5.06741
1992	33,678	2.33155	3.93700	0.12497	6.39352
1993	33,920	1.77835	4.03487	0.17676	5.98998
1994	37,075	0.73558	1.96470	0.03943	2.73971
1995	37,583	1.29662	0.93342	0.01997	2.25001
1996	25,374	0.35824	1.78350	0.05543	2.19717
1997	30,276	0.24440	2.52591	0.08956	2.85987
1998*	37,534	2.61358	3.17189	0.04088	5.82635
1999*	33,196	3.75717	3.05376	0.30281	7.11374
2000*	34,067	0.19623	1.19368		
2001*	35,033	1.16076			
2002*	35,574				
2003*	33,231				
2004	31,410				
2005					
All Odd Years	25,161	1.77661	2.85927	0.17842	4.71527
All Even Years	28,931	1.34803	3.58476	0.12312	5.30587
All Years	27,046	1.56811	3.22201	0.15239	5.07066
All Years 65-71	2,655	0.95938	2.41136	0.09131	3.46205
All Years 72-01	32,101	1.66830	3.36097	0.16678	5.47281
All Years 95-01	33,295	1.37529	2.29370	0.10173	4.04943
2007 PNPTC Forecast		43,198	76,222	3,619	123,038
2007 WDFW Forecast		44,690	103,923	4,789	153,402

Note: Because of incomplete reconstruction, 2003 and 2004 return rates were not available.

**Table A-5-k. Fall Chum Returns-per-Pound, by Age at Return
from G.Adams/McKernan Hatchery Releases**

Brood Year	Release Lbs.	3's	4's	5's	Total
1978	18,717	0.11901	0.85327	0.15188	1.12416
1979	40,273	0.36752	0.61002	0.06715	1.04469
1980	24,418	0.30902	2.10810	0.05751	2.47463
1981	12,028	3.24075	4.43634	0.36758	8.04467
1982	26,780	1.03328	3.20556	0.20036	4.43920
1983	25,917	1.25574	8.01500	0.44456	9.71530
1984	28,601	1.49188	1.18815	0.05936	2.73939
1985	24,500	0.78202	1.85405	0.20669	2.84276
1986	36,329	0.12036	1.56008	0.24038	1.92082
1987	30,566	0.10195	1.44458	0.20499	1.75152
1988	31,083	1.45527	4.69637	0.54805	6.69969
1989	32,315	0.52929	2.25103	0.20309	2.98341
1990	17,032	0.47710	5.81499	0.43246	6.72455
1991	30,024	1.45064	1.33176	0.05341	2.83581
1992	25,235	1.59492	2.86789	0.09179	4.55460
1993	27,016	1.21873	2.78823	0.32053	4.32749
1994	27,723	0.54142	3.79484	0.03621	4.37247
1995	22,624	3.11094	1.06483	0.00880	4.18457
1996	23,138	0.26978	0.51881	0.11447	0.90306
1997	27,884	0.07039	5.16473	0.21978	5.45490
1998	33,440	5.52435	4.11516	0.30166	9.94117
1999	27,365	4.92693	24.35584	2.42864	31.71141
2000	8,486	5.17945	17.68449		
2001	31,946	4.40683			
2002	30,996				
2003	32,631				
2004	23,127				
2005					
Average Return Brood Years (1978-01) excluding outliers in bold.					
Odd Years	28,084	1.78848	2.89606	0.20853	4.19225
Even Years	25,365	1.50965	2.79302	0.20310	4.17216
All Years	26,674	1.64907	2.84209	0.20622	4.24185
All Years 95-01	24,983	3.35552	2.71588	0.16118	5.12093
2007 PNPTC Forecast		38,138	92,740	6,392	137,270
2007 WDFW Forecast		32,738	75,941	4,776	113,455

Note: Because of incomplete reconstruction, 2003 & 2003 return rates were not available

Table A-5-l. Fall Chum Returns-per-Pound, by Age at Return for Walcott Slough Releases

Brood Year	Release Lbs.	3's	4's	5's	Total
1965	2,971	0.50151	1.05452	0.00849	1.56452
1966	2,903	0.84004	2.96892	0.02785	3.83681
1967	3,059	1.28706	1.71775	0.12019	3.12500
1968	1,615	2.95329	6.07059	0.82275	9.84663
1969	3,185	0.65411	3.16035	0.21257	4.02703
1970	7,612	0.89432	2.10500	0.02127	3.02059
1971	6,198	0.94671	1.07801	0.02229	2.04701
1972	5,998	0.65865	3.40362	0.04857	4.11084
1973	15,437	0.90626	1.41069	0.00213	2.31908
1974	10,192	1.41133	2.31994	0.04420	3.77547
1975	21,245	0.42200	0.34770	0.00374	0.77344
1976	32,295	0.04795	0.04098	0.00089	0.08982
1977	21,573	0.27020	0.25917	0.02519	0.55456
1978	13,970	0.01073	0.14823	0.01255	0.17151
1979	7,552	0.89457	1.59961	0.08287	2.57705
1980	2,844	1.85564	2.69076	0.03265	4.57905
1981	4,658	1.27643	1.71673	0.15167	3.14483
1982	1,804	1.94934	5.91494	0.33628	8.20056
1983	1,994	1.67552	5.31753	0.24362	7.23667
1984	1,301	1.52052	1.92800	0.06040	3.50892
Average Brood Years (1965-84; w/o 1975-78) excluding outliers in bold.					
Odd Years	5,632	1.01777	2.13190	0.10548	3.25515
Even Years	4,284	1.30426	3.42522	0.08160	4.43318
All Years	4,958	1.15147	2.77856	0.09434	3.80490

QNFH	Lbs Release	2007 Forecast
BY 2002	2,740	258

Table A-5-m. Fall Chum Returns-per-Pound, by Age at Return for Enetai Hatchery Releases

Brood Year	Release Lbs.	3's	4's	5's	Total
1976	3,696	0.18155	0.75214	0.00000	0.93369
1977	5,785	1.53198	3.31116		
1978	6,514	1.40297		0.01172	
1979	2,666		0.62223	0.09213	
1980	3,053	0.43328	1.81825	0.10249	2.35402
1981	4,985	2.12202	2.89871	0.10103	5.12176
1982	6,130	2.23198	2.83908	0.05719	5.12825
1983	2,727	3.66295	4.00346	0.12399	7.79040
1984	5,855	2.34790	1.46902	0.02738	3.84430
1985	5,485	2.22696	2.49188	0.03179	4.75063
1986	5,495	1.13061	1.07304	0.09600	2.29965
1987	4,455	1.07889	1.44217		
1988	4,493	1.46308		0.08704	
1989	4,191		1.67962	0.06531	
1990	3,294	3.14615	6.08997		
1991	2,936	6.39302		0.06815	
1992	2,095		3.07692	0.10468	
1993	4,297	1.77956	2.41267	0.08406	4.27629
1994	6,809	1.37618	3.03970	0.00283	4.41871
1995	3,456	4.32699	0.34679	0.00000	4.67378
1996	2,302	0.40142	0.65064	0.11105	1.16311
1997	4,068	0.20989	1.78593	0.13968	2.13550
1998	3,270	1.81444	3.78351		5.59795
1999	1,542	3.49463			
2000	194				
2001	5,321				
2002	7,081				
2003	3,264				
2004	6,613				
2005					
Average (Brood Years 1976-00). Outliers (in bold) excluded.					
Odd Years	3,883	2.68269	2.09946	0.07846	4.79139
Even Years	4,417	1.44814	2.45923	0.06004	3.21746
All Years	4,150	1.95814	2.08018	0.06963	3.89200
All Years 95-99	2,928	2.04947	1.64172	0.08358	3.39259
2007 PNPTC Forecast		13,553	5,359	592	19,504
2007 WDFW Forecast		10,414	6,852	472	17,738

Note: Because of incomplete reconstruction, and lack of rack sampling, return rates after 2002 were not available

Table A-5-n. Summary of WDFW 2007 Hood Canal Hatchery Fall Chum Forecasts

Facility	Age 3	Age 4	Age 5	Total
Little Boston Hatchery	1,385	2,895	139	4,419
Quilcene National Hatchery	0	0	226	226
Hoodsport Hatchery	44,690	103,923	4,789	153,402
G. Adams / McKernan Hatchery	32,738	75,941	4,776	113,455
Enetai Hatchery	10,414	6,852	472	17,738
12D Streams - Augmentation	8	111	9	128
Total	89,235	189,722	10,411	289,368

Table A-5-o. Summary of PNPTC 2007 Hood Canal Hatchery Fall Chum Forecasts

Facility	Age 3	Age 4	Age 5	Total
Little Boston Hatchery	1,724	3,634	172	5,530
Quilcene National Hatchery	0	0	258	258
Hoodsport Hatchery	43,198	76,222	3,619	123,038
G. Adams / McKernan Hatchery	38,138	92,740	6,392	137,270
Enetai Hatchery	13,553	5,359	592	19,504
Total	96,613	177,954	11,034	285,601

Table A-5-p. Apportionment of the 2007 Joint Hood Canal Hatchery Fall Chum Salmon Forecasts

Facility	PNPTC Forecast	WDFW Forecast	Joint Forecast
Little Boston Hatchery	5,530	4,419	4,975
Quilcene National Hatchery	258	226	242
Hoodsport Hatchery	123,038	153,402	138,220
G. Adams / McKernan Hatchery	137,270	113,455	125,363
Enetai Hatchery	19,504	17,738	18,621
Total	285,601	289,240	287,420

B. Inseason Run Assessment Methods

The fall chum salmon is the only run, among those returning to Hood Canal in 2007, for which an acceptable model for estimating abundance during the season has been found. For all other runs, inseason management approaches will be as detailed in section 4.3 of this report.

B-1. Fall Chum Salmon

Prior to November 1, when the first inseason updated estimate of abundance will be made, using cumulative purse seine catches through the week of 10/29, the pre-season terminal run size forecast will serve as the estimate of the run entering Hood Canal.

On November 1, there will be an initial inseason assessment of terminal area run abundance, using the cumulative catch in Areas 12 and 12B, from purse seines in the weeks of 10/21 and 10/28. That estimate must be used primarily as indicator of whether the run is significantly higher, or lower than forecast and will assist the co-managers in determining the need for fishery schedule adjustments in the week of 11/4. The caution in using this update is necessary because of its significant percent error as well as a measurable tendency to overestimate abundance at lower run sizes. This initial assessment will use the following linear regression model:

$$\text{Hood Canal Preliminary Terminal Area Run Size} = (6.403938 * CC_{1021-1031}) + 141870.6$$

The initial assessment model is a linear regression of cumulative purse seine catches through 11/3, against terminal area run sizes. Data used to estimate this model include cumulative purse seine catches in the 1981 - 2003 period, using only those years in which at least management week 44 was open to seine fishing and excluding 1997 because of unusually high gear efficiency. The data used are shown in Table B-1-b. Adjusted R² for this regression is 0.7643.

The final fall chum salmon run size assessment will be made on or before November 8, using the cumulative catch made by purse seines, from October 21, through the week of November 4 (three weeks). This update will be based on a linear regression model relating terminal run size to cumulative purse seine catch in Areas 12 and 12B, based on the fisheries in the 1981 - 2003 period, using only those years in which purse seine fisheries operated in this area during at least two of the first three weeks and included management week 45. 1997 was excluded from both models because in that year, fishing efficiency in the first three weeks was more than twice the long term average, possibly because the run entry was uniquely skewed. The assessment model for November 8 is as follows:

$$\text{Hood Canal Terminal Area Run Size} = (4.744321 * CC_{1021-1110}) + 57171.0943$$

The updated run abundance entering the terminal area will represent the final inseason estimated total abundance. The run distribution between the various production units shall be assumed to be as forecast pre-season.

Table B-1-a shows the regression statistics for the update models. Table B-1-b shows the data series used to develop the models.

Table B-1-a. Summary Statistics of the Fall Chum Inseason Abundance Estimation Model

Measurement	Initial Update Model	Final Update Model
R ²	0.7791	0.9158
R ² Adjusted	0.7643	0.9102
Std Error	155850.60	96101.35
N	17	17
β ₀	141870.5961	57171.0943
β ₁	6.4039	4.7443

Table B-1-b. Inseason Fall Chum Salmon Abundance Estimation Data

Year	Terminal Run	Cum. PS Catch Mgmt Wks 43-44	Cum. PS Catch Mgmt Wks 43-45
1981	175,743	9,357	15,579
1982	227,075	29,399	45,816
1983	172,028	11,690	39,481
1984	422,580		74,859
1985	400,797	33,356	
1986	500,085	71,102	128,288
1987	788,232	100,826	165,917
1988	547,158	32,583	64,683
1989	424,447	62,118	92,408
1990	288,364	44,453	57,366
1993	587,069	14,744	79,406
1995	574,890	62,010	96,233
1998	569,463	110,692	136,785
1999	150,677	20,064	25,779
2000	152,220	12,857	15,921
2001	790,421	79,745	150,909
2002	983,854	114,540	188,588
2003	1,298,577	161,632	240,965