

**2006 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 2006 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 2006 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 will 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 well above the 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 - 3.4) 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 2006 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 2006 recruits. The escapement rate was established at a level equal to, or higher than, the minimum escapement rate allowable for the 2006 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. 2006 Fishery Management Periods

Area	Spring Chinook	Summer Chinook	Summer Chum	Coho	Early Fall Chum	Late Fall Chum	Winter Steelhead
9A	---	---	---	8/27-11/04	11/05-12/02	---	12/03-3/31
12A	---	---	8/27-09/27	8/27-10/14	10/15---	----12/23	---
12	4/16-7/15	7/16-9/05	9/01-9/22	9/10-10/14	10/15-11/20	---	---
12B	4/16-7/15	7/16-9/12	9/05-10/01	9/13-10/21	10/22-11/20	---	---
12C	4/16-7/15	7/16-9/16	8/26-10/01	9/17-10/28	10/29-11/27	---	---
12D	4/16-7/15	7/16-9/16	8/29-9/22	9/17-10/28	10/29-11/27	---	---
Quilcene R	---	---	9/03-10/02	9/01-10/21	11/12---	—12/30	12/10-4/15
Dosewallips Duckabush	---	8/13-9/23	9/03-10/12	9/24-11/11	11/12---	—1/06	12/10-4/15
Skokomish R	5/01-7/29	7/30-9/23	---	9/24-11/11	11/12-12/02	12/03-1/06	12/10-4/15
Union R.	---	---	9/02-10/06	9/22-11/11	11/12-12/09	---	12/10-4/15
Misc. HC Tribs.	—	8/13-9/23	---	9/24-11/11	11/12---	---12/30	12/10-4/15

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 Hoodport 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 Hoodport 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 2006, 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 3006)						
Fishery	Skokomish		Mid-Canal	Miscell.	Hoodspout	Total
	Natural	Hatchery	Natural	Natural	Hatchery	
Catch & Escapement Total	2,960	17,904	155	751	25,257	47,026
Canada	595	3,592	31	151	4,933	9,303
Alaska	0	0	0	0	0	0
S.Falcon Tr/Rec	2	13	0	1	19	34
N.Falcon Tr/Rec	122	736	6	31	1,063	1,959
P.S. Troll	24	146	1	6	202	380
SJF Rec.	16	97	1	4	136	254
Puget Sound Rec.	110	662	6	28	921	1,726
Puget Sound Net	35	209	2	9	288	543
Hood Canal Rec.	10	87	0	3	475	575
Hood Canal Net	43	261	1	11	358	674
Freshwater Rec.	449	2,713	0	0	9	3,170
Extreme Terminal Net	332	2,004	0	0	12,605	14,941
Mgmt Unit Harvest	1,738	10,521	49	243	21,010	33,559
Mgmt Unit Escapement	1,222	7,383	106	508	4,247	13,466
Minimum Escapement Target	1,200	2,000	104	n/a	1,800	5,104

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 #3006* 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 Summer Chum Salmon

Management Unit	Total Recruits	Canadian Harvest	Washington Preterminal Harvest	Terminal Harvest	Extreme Terminal Harvest	Expected Escapement	Minimum Escapement Threshold
Quilcene/Dabob	8,415	531	209	177	421	7,077	1,110
Mainstem HC	7,208	455	179	151	0	6,422	2,660
SE Hood Canal	4,157	262	103	158	0	3,633	300
Totals	19,780	1,249	492	486	421	17,132	4,070

Note: The forecast include the combined return of naturally reared and QNFH 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 2006 forecasts of summer chum salmon are described in Appendix A-2 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 2006, 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 2006, 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.

3.3 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 current test fisheries are intended to obtain more precise estimates of its entry pattern.

3.3 Coho Salmon

Harvest and Escapement by Management / Production Unit (FRAM 0619)								
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	59,804	22,659	3,551	32,425	58,635	59,804		118,439
Canada	1,463	1,200	115	1,234	2,549	1,463		4,012
S.Falcon Tr/Rec	40	37	2	43	82	40		122
N.Falcon Tr/Rec	1,581	1,277	315	2,138	3,730	1,581		5,311
P.S. Troll	51	23	3	29	55	51		106
Strait Rec.	2,234	2,341	554	3,934	6,829	2,234		9,063
SJI Rec.	0	13	16	68	97	0		97
Area 9 Rec.	1,671	739	91	1,043	1,873	1,671		3,544
P. Sound Rec.	867	439	46	627	1,112	867		1,979
Strait Net	535	228	35	309	572	535		1,107
SJI Net	85	62	6	99	167	85		252
No. Sound Net	146	80	7	100	187	146		333
So. Sound Net	1,906	756	110	1,062	1,928	1,906		3,834
Hood Canal Rec.	1,394	435	50	670	1,155	1,394	75	2,624
HC Rivers Rec.	1,501	1,625	0	9,035	10,660	1,501		12,161
HC Mainstem Net	5,548	1,672	23	596	2,291	5,548	363	8,202
Area 9A Net	1,889	365	1,717	499	2,581	1,889	761	5,231
Area 12A Net	186	43	0	4,719	4,762	186		4,948
Skokomish R Net	1,110	1,287	0	0	1,287	1,110		2,397
Mgt Unit Harvest	22,207	12,622	3,090	26,205	41,917	22,207	1,199	65,323
Mgt Unit Escap.	37,597	10,037	461	6,220	16,718	37,597		54,315
Min. Escap. Goal	20,931	550	218	1,579				

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 156,485, consisting of 79,667 natural (79,262 primary and 406 secondary) and 76,818 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 2006 Hood Canal coho forecasts are further detailed in Appendix A-3 of this report.

The above table is based on the results of the pre-season *FRAM* simulation run #0619, and does not include estimated natural mortality in 2006. 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 #0619. Further details concerning pre-season fishing plans 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 2006 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 2006.

3.4 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 Hoodspout 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 Hoodspout 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 Hoodspout/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 2006 forecasts of all fall chum salmon returning to Hood Canal are described in Appendix A-4 of this report. The pre-season summary, presented in Table 3.4, 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 1999-2005 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 Hoodspout Hatchery versus the George Adams/McKernan Hatchery complex, is based on the management objectives of meeting the combined Hoodspout/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.

3.4 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	6,843	71	6,771	6,298	426	47	0
<i>AREA 12</i>							
Natural	9,914	104	9,811	9,124	0	687	3,900
<i>AREA 12A</i>							
Natural	19,294	201	19,093	5,859	0	13,234	1,250
Hatchery	4,048	42	4,006	2,049	0	1,957	0
<i>AREA 12B</i>							
Natural	160,711	1,678	159,033	48,807	0	110,226	18,750
<i>AREA 12C</i>							
Natural	68,475	715	67,760	63,017	0	4,743	7,000
Hoodsport Hatchery	148,792	1,554	147,238	136,932	1,406	8,900	8,900
Enetai Hatchery	23,018	240	22,777	13,557	0	9,220	1,900
<i>AREAS 82G/J (Skokomish R.)</i>							
Natural	26,237	274	25,963	14,487	396	11,080	9,800
G.Adams-McKernan Hatchery	138,353	1,445	136,908	127,325	3,483	6,100	6,100
<i>AREA 12D</i>							
Natural-Augmented	62,736	655	62,080	57,735	0	4,345	13,550
Totals	668,421	6,980	661,441	485,190	5,711	170,540	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 2006 Harvest Management Measures and Expected Fisheries

In 2006, 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 Hoodspout 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 Hoodspout 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 2006 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 2006. 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 2006, early-fall chum salmon runs managed at rates appropriate for the George Adams/McKernan, Hoodspout, 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.

4.1.1 Commercial Fisheries

All commercial fishery openings, restrictions, and closures outlined, are those which were planned pre-season and evaluated as to their potential effect. 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.

In order to provide secondary protection for milling mature salmon, no Treaty marine nets will be permitted within 1,000 feet from the mouth of any stream which is not open to net fisheries. When non-treaty commercial fisheries are authorized, exclusion zones, per WAC 220-47-307, shall be utilized. These closures shall be in effect at all times throughout the 2006 fishing season.

4.1.1.1 Hood Canal Mainstem (Areas 12, 12B, 12C).

Per the *Hood Canal Salmon Management Plan*, no commercial net fisheries for salmon shall take place in Hood Canal marine areas throughout the spring chinook management period.

During the summer/fall chinook management period, and in accordance with Tribal-State pre-season planning, no fisheries will take place in Hood Canal Areas 12, 12B and 12D. However, a chinook-directed fishery, in Area 12C, will be implemented in 2006, from July 16 through August 24, for up to five days per week. Gillnets shall be restricted to 7" minimum mesh size after July 31, and beach seines will be closed after 8/20. Additional fisheries will also be implemented in Area 12H, as necessary to harvest surpluses, from August 6 through September 30. This fishery shall be required to selectively release all chum salmon. In Area 12H, hook-and-line gear may be operated continuously and beach seine gear may be operated during daylight hours, on Tuesdays and Thursdays. These pre-season measures may be modified on the basis of in-season information.

During the coho management period, in Area 12, gillnets may operate from September 25 through October 14. Beach seines may start no earlier than September 16 with release of chinook and chum through September 30. In Areas 12B, 12C, and 12D (west of Madrona Pt.) gillnet fisheries may start no earlier than October 1. While beach seines may be used in Area 12B starting 9/16 and in Area 12C no earlier than 9/21, they will be required to release chum salmon, and in Area 12B chinook salmon, through September 30.

Gillnet fisheries for coho salmon, in Area 12C, have been initially planned to operate up to 5 days/week, from October 1, through October 28, followed by up to 7 days per week thereafter. During coho salmon fisheries, the area within 500' from the western shore, to a point 2,000' south of Lilliwaup Creek (in addition to the stream-mouth closures indicated in Section 4.1.1), shall remain closed to gillnet gear, through October 10, in order to protect any milling summer chum and chinook salmon. Other gear, operating within 500' of the western shore will be required to release summer chum salmon through September 30.

During the fall chum management period, Treaty Indian commercial fisheries in Area 12 will start on October 15, followed by the opening of Areas 12B and 12C, on October 22. Area 12D will remain closed. Treaty Indian fisheries in these areas may continue on a seven-days-per-week schedule for the remainder of the period, through November 20 (Area 12), and November 26 (Areas 12B and 12C), unless inseason information indicates that a more restrictive schedule may be necessary.

A hook and line Treaty Indian fishery may be implemented from October 22 through December 2 in Area 12H and Treaty Indian beach seine fisheries may be authorized for up to two days per week (Tuesdays and Thursdays) in Area 12H, then Monday and Wednesday for the week of 11/19. However this schedule may be adjusted on the basis of inseason information. After 11/5, hatchery escapement control measures may be needed. The Hoodspout closure itself may also be modified as necessary to avoid wastage of fall chum salmon hatchery surplus. Periodic closures of the hatchery ladder may also be required, to avoid excessive on-station surplus, and to provide harvest opportunity in Area 12H.

Non-treaty fisheries for fall chum salmon in Areas 12 and 12B will start in the week of October 15. In Areas 12 and 12B, gillnet openings are anticipated to occur for 2 days per week (5 weeks), and purse seines for 1 day per week, followed by 2 days, reverting to 1 day per week for the final three weeks (5 weeks), depending on in-season management considerations, ending no later than November 18. Purse seine fisheries in Area 12C may follow for 1 day per week, as necessary after November 5, ending no later than November 25. Non-treaty gillnet openings in Area 12C may be implemented on a two days per week schedule, in the same weeks. Beach seine openings in Area 12H remained unresolved, during the

preseason planning process. Modifications to this schedule may occur based on inseason information and agreement between the parties. Non-treaty purse seines will be required to have a 5-inch strip, to reduce impacts on chinook salmon, and will be required to release all chinook salmon. Non-treaty gillnets will be required to have a 6 1/4-inch minimum mesh size.

Additional restrictions during the non-treaty fall chum fisheries, in all Hood Canal areas, will include a closure of those waters within 1,000' of the eastern shore of Hood Canal. When the southern portion of Area 12B, and Area 12C are open, those waters of Area 12B within a 1/4 mile radius of Anderson Creek, Duckabush, and Hamma Hamma Rivers, and those waters of Area 12C within a 1/4 mile radius of the Dewatto River will also be closed to protect any milling coho salmon. The Hoodsport and Enetai hatchery closures will also be in effect.

4.1.1.2 Extreme Terminal Marine Areas (Areas 9A, 12A, 12D).

In the extreme terminal marine areas of Hood Canal, commercial fisheries will be regulated to harvest (or provide protection) for specific runs returning to streams or hatcheries in each area.

In Area 12D, with the exception of the westernmost portion (west of Madrona Pt.), which may be opened to gillnets concurrent with Area 12C, for coho salmon after 9/30 (beach seines may operate concurrent with 12C as well), no commercial net fisheries are anticipated in 2006 because of the need to provide secondary protection to returning chinook, summer chum, and fall chum salmon.

In Area 9A, Treaty and non-treaty fisheries will harvest returning hatchery coho salmon. Treaty fisheries will also target hatchery origin fall chum salmon. In Port Gamble Bay, the area north of the fishery markers and south of the tribal dock, in the vicinity of the Little Boston Hatchery, shall be closed to all Treaty set net gear, in order to provide protection to returning hatchery escapement. For 2006, the Port Gamble S'Klallam Reservation beach area will be closed to non-treaty fishing.

In Area 9A, Treaty coho fisheries may start after August 19, using setnet gear. This fishery will operate continuously to the end of the coho management period, and will reopen under the same schedule, for chum salmon, and shall continue through December 2. Non-treaty coho fisheries (gillnet and skiff gillnet only) in this area shall operate inside Port Gamble Bay for 2 days in the week of 8/20 and thereafter continuously through October 28. Non-treaty fishers shall be required to release chinook and chum salmon through 9/30, as well as maintain logbooks. Non-treaty gillnet gear length will be limited to 100 fms. in length and 60 meshes depth.

In the Quilcene/Dabob area (Area 12A), the intent of the managers in 2006 will be to provide opportunity to harvest the surplus of Quilcene Bay-origin hatchery coho while protecting to the greatest extent feasible the survival and escapement of summer chum salmon expected to return to Area 12A. The co-managers have agreed that fisheries in Area 12A shall be monitored through the season, by obtaining all the information that would be needed to assess the effectiveness of pre-season planned measures as well as provide indications concerning the need for in-season adjustments. During this fishery, all live chum and chinook salmon, captured by hook and line or beach seine gear, through September 30, shall be released unharmed and any mortalities shall be reported to agency personnel.

In Area 12A, during the coho salmon management period, and extending into the fall chum salmon period, treaty beach seine and hook-and-line gear will be limited to daytime hours from August 20, through October 14, on a Monday through Friday schedule. Non-treaty fishers may only operate skiff gillnet gear, one day per week, from September 3, through October 14. In addition to the above, treaty Indian gillnet fisheries may be implemented, starting September 1, and initially limited to one day/week through September 30. Inseason management measures will take into consideration summer chum salmon

escapement projections and updates, as well as the need to harvest surplus coho salmon. On the basis of inseason information, gillnet fisheries may be maintained, expanded, or reduced, in accordance with procedures outlined in the summer chum salmon BCR.

During the fall chum salmon management period, Area 12A, south of a east-west line through Point Whitney (including Pt. Whitney lagoon) shall be opened for Treaty Indian harvest of early fall chum salmon, using the same opening schedules as Area 12.

4.1.1.3 Hood Canal Rivers (Areas 82F, 82G, 82J)

No non-treaty commercial fisheries shall be authorized in these areas during 2006. Commercial fisheries in Hood Canal rivers may be authorized for Treaty Indians as follows. In the Skokomish River (Area 82G), during the chinook salmon management period, fisheries may open from July 30, with a gillnet closure below SR 106, in order to protect any summer chum salmon dip ins. Weekly openings may be up to three days/week through 9/23.

During the coho salmon management period, fisheries may start in the week of September 24, and may proceed on a schedule of no more than 5 days-per-week through November 11. During September, the area downstream of SR 106 shall remain closed to gillnet gear.

During the fall chum salmon management period, fisheries of up to 7 days per week may be authorized starting the week of November 12. At the end of the early-fall chum salmon fishery (12/9), conservative management measures will be undertaken to minimize potential impacts to late-fall natural chum salmon. These measures shall continue for at least three weeks after the start of any winter steelhead fishery in the week of December 10.

In Purdy Creek (Area 82J), a weir may be operated by the Skokomish Tribe, subject to Co-Managers' agreement, to harvest surplus hatchery salmon returning to the George Adams Hatchery. Decisions to conduct fisheries in this area shall be based on in-season information indicating that sufficient chinook and/or coho salmon are available and are in excess of hatchery escapement needs, and escapement requirements will not be impacted.

The Big Quilcene River (Area 82F) shall be closed to all non-selective gear and retention of chum salmon will be prohibited. Dip nets, hand lines, etc. will be allowed for the harvest of surplus coho salmon in areas upstream from Rodgers Street, from September 3 through September 30. Beach seine gear may also be authorized as necessary, for the harvest of surplus coho salmon in the vicinity of the hatchery. No commercial net fisheries will be authorized in any of the other Hood Canal streams in 2006.

4.1.2 Test and Evaluation Fisheries

In 2006, a test fishery, from July 30 through October 7, should be conducted in Area 9A, in order to determine the entry pattern profile of coho salmon. This test is necessary because of the stock origin change in this area and the lack of consistent commercial fishery data.

4.1.3. Recreational Fisheries

4.1.3.1 Hood Canal Marine Areas - Mainstem Hood Canal (CRC Area 12)

From May 1 through June 30 all marine areas shall remain closed to salmon fishing. The area north of Ayock Pt. will remain closed through August 31, then will open with a 4 fish limit (coho only) through October 15. From July 1 through October 15, the area south of Ayock Point shall be open, with a 4 fish daily limit with retention of no more than 2 chinook salmon (22" min size) and no retention of chum salmon.

From October 16 through December 31, the bag limit shall be four fish, with no more than 1 chinook salmon (22" min size). Hood Canal will be closed to the taking of salmon, from January 1 through February 15, 2007. From February 16 through April 10 the area will be open with a one fish possession limit (chinook 22" min size). From April 11 through April 30, 2007 the entire area will be closed.

4.1.3.2 Extreme Terminal Marine Areas (Areas 12A, 12C, 12D, 12H)

In the Quilcene/Dabob area (Area 12A) a closure shall be in effect May 1 through August 15. From August 16 through October 15 this area will be open with a four fish limit (coho only). From October 16 through December 31 the limit shall be 4 fish, with no more than 1 chinook salmon (22"min size). Thereafter, this area's closures and openings shall match those of the mainstem.

In the Hoodsport Hatchery zone (Area 12H), described as waters within 2,000 feet of the mouth of Finch Creek (outside the year round closed area noted below), a daytime fishery shall be authorized with retention of up to 2 chinook salmon (>24" min size), within a 4 salmon bag limit, from July 1 through December 31, 2006. Chum salmon may not be retained from 7/1 through 10/15. At other times of the year this area shall match the mainstem regulations.

The area within 100 feet of Finch Creek (area marked with buoys), adjacent to the Hoodsport Hatchery, shall be closed year round, and the area within 100 yards of the Enetai Hatchery outfall shall be closed at all times. Waters within 100 feet of the Seabeck Highway bridge over Big Beef Creek shall be closed from August 1 through November 30.

4.1.3.3 Hood Canal Rivers.

In freshwater areas, all Hood Canal streams, except those indicated below, shall be closed to angling for salmon.

The Skokomish River shall be open downstream of the U.S. Hwy. 101 bridge from August 1 through September 13, with a one fish limit (12" min size); chum salmon may not be retained during this period. From September 14 through September 30, this area shall be closed to salmon fishing. From October 1 through October 15, the bag limit shall be 6 fish with a 12" min size (four adult limit of which only one may be an adult chinook). During these fisheries, chum salmon may not be retained. From October 16 through December 15, same as above, except that chum salmon may be retained. The fisheries described above, will be daytime only through November 30, and will have non-buoyant lure restriction and a requirement of single point barbless hooks. At all times, recreational gear may not be operated closer than 25 feet from Treaty gillnets. The Skokomish River shall be closed to salmon angling from December 16 through April 30, 2007.

The Big Quilcene River will be open between Rogers Street and the Hwy 101 bridge, during daylight hours, to salmon angling using selective gear and fair hooking rules, from August 16 through October 31 with a limit of 4 coho salmon (12" min size). Release of all chum and chinook salmon will be required.

The Duckabush River, downstream of the PUD power line crossing, and the Dosewallips River downstream of the U.S. Hwy. 101 bridge, shall be open from November 1 through December 15, with a two chum salmon only bag limit. The Dewatto River will be open downstream of the Dewatto/Holly Road crossing, from September 16 through October 31, with a two coho salmon limit (12" min. size) and will require single point barbless hooks. The Tahuya River downstream of mile 1 marker, above the North Shore Road, will also be open from September 16 through October 31, with a two coho salmon limit (12" min size) and a single point barbless hook requirement.

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 the 2005, updated for the 2006 fishery schedules. It performed well in nearly all cases, except for the 1997 and the 2004 fishery. 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	0.32795	29,236
2000	87,306	0.27240	23,782
2001	101,591	0.25803	26,214
2002	89,837	0.41251	37,059
2003*	106,363	0.30057	31,970
2004*	95,282	0.34299	32,681
2005*	92,989	0.51650	48,029
2006	76,768		
2007	89,952		
2008	95,366		
Average 2002-2005		0.39315	
2006 Forecast			30,181

(*) : 2003-05 return data are preliminary and subject to revision, following reconciliation of records.

The 2006 forecasted terminal run size of summer-run Hood Canal chinook salmon is the product of brood 2002 fingerling lbs released from WDFW facilities in 2003, 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 (2002-2005), which are believed to represent current survival rates (Table A-1-a). The resulting terminal area run forecast is 30,181 chinook salmon. The Hood Canal forecast was apportioned to 27,658 hatchery fish (42.1% George Adams and 57.9% Hoodspport Hatchery) and 2,523 (8.4% 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 2002-2005 return years (Table A-1-d). These estimates will be 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	900	112	376	2,512	11,939	13,397	29,236
2000	0	438	256	189	1,240	5,403	16,256	23,782
2001*	0	326	636	214	2,616	12,273	10,149	26,214
2002*	0	95	39	114	1,880	11,219	23,712	37,059
2003*	0	194	92	105	1,296	11,555	18,728	31,970
2004*	0	129	1,190	103	3,677	15,375	12,207	32,681
2005*	0	45	620	109	2,500	19,705	25,050	48,029

Note: The 2001-2005 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
2002	0.00000	0.00256	0.00105	0.00308	0.05073	0.30273	0.63984
2003	0.00000	0.00607	0.00288	0.00328	0.04054	0.36143	0.58580
2004	0.00000	0.00395	0.03641	0.00315	0.11251	0.47046	0.37352
2005	0.00000	0.00094	0.01291	0.00227	0.05205	0.41027	0.52156
'02 - 2005 Mean	0.00000	0.00338	0.01331	0.00295	0.06396	0.38622	0.53018

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

Hood Canal Production Unit	Terminal Run Forecast	Proportion
12B	102	0.00338
12C	402	0.01331
12D	89	0.00295
Skokomish	1,930	0.06396
Natural Subtotal	2,523	0.08360
George Adams	11,657	0.38622
Hoodsport	16,001	0.53018
Hatchery Subtotal	27,658	0.91640
Total	30,181	1.00000

Note: The forecasted proportions are derived from the 2002-2005 mean return.

A-2. Summer Chum Salmon

A-2.1 Natural Runs

The 2006 forecast of the Hood Canal natural summer-timed chum salmon returns was forecast as total recruitment to all fisheries and escapements returning to the Mainstem Hood Canal, 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 2001 - 03 and 2005 (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 7,208 for the Mainstem and 4,157 for the SE Hood Canal units, for a total of 11,365. 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.

A-2.2 Aggregate Runs - Quilcene/Dabob.

The run of fish returning to Quilcene/Dabob is an aggregate run which includes both naturally reared and supplementation fish, reared in previous years, at the Quilcene National Fish Hatchery. The forecasted recruitment, to all fisheries and escapement, is 8,415. Methods used to estimate the forecast are identical to those used for other Hood Canal units.

Table A-2-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	56,722	5,999	88,619
2005*	7,224	6,943	2,203	16,370
2006 Forecast **	7,208	8,415	4,157	19,780

* 2005 Data is preliminary and subject to revision. ** 2004 data were not used

A-3. Coho Salmon

A-3.1 Natural Runs

The forecasted recruitment of 2006 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 1983-2001 (Table A-3-a). The final form of the regression is shown below:

$$\text{Hood Canal Recruitment} = 66983.908 + (294.964 * (\text{BBC Tagged Jacks}))$$

Relevant statistics of the model used to derive the 2006 forecast are shown below.

Using Brood Years 1983-2001	
Multiple R	0.48176
R ²	0.23209
Adj. R ²	0.18619
Std Error of Estimate	63841.68
N	19
Intercept	66,983.908
Slope	294.964
2005 Jacks (X)	43
2006 Forecast (Y)	79,667

It should be noted that, for 2006, the pre-season forecast model used DA2 estimates (dependent variable) which were calculated by an earlier method, for brood years 1983-97, and a current method for all subsequent years (Table A-3-a). This discrepancy was unavoidable, because of time limitations and will be corrected during 2006.

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 79,667 natural DA2 recruits was thus apportioned into 79,262 from primary and 406 from secondary units, on the basis of parent brood spawner distribution (Table A-3-b).

Table A-3-a. 2006 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	112,737
2000	24,352	80	70	277,605
2001	36,060	350	257	202,564
2002	25,062	318	262	
2003	32,222	72	43	

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.

Table A-3-b. Apportionment of the 2006 Hood Canal Natural Coho Forecast

Area	Escapement Capacity	Escapement BY 2003	Management Unit Type	Proportion of Brood Escapement	December Age-2 Recruits
12 / 12B	28.88%	60,546	Primary	35.02%	27,901
12C / 12D	31.66%	66,697	Primary	38.58%	30,736
Skokomish	29.01%	44,757	Primary	25.89%	20,625
9A	1.25%	390	Secondary	0.23%	180
12A	9.20%	490	Secondary	0.28%	226
Primary Subtotal	89.55%	172,000		99.49%	79,262
Secondary Subtotal	10.45%	880		0.51%	406
Grand Total	100.00%	172,880		100.00%	79,667

Table A-3-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-3-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	4,363	<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	<i>30,269</i>	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	<i>24,903</i>	<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	40,014	0.08100	432,847	2,141	0.00495	428,995	33,289	0.07760	0			
2000	587,937	41,467	0.07053	432,161	6,059	0.01402	411,674	33,141	0.08050	210,627	15,195	0.07214	
2001	336,886	46,582	0.13827	409,221	4,808	0.01175	388,212	46,839	0.12065	90,000	2,569	0.02854	
2002	501,031			423,746			404,582			200,835			
2003	309,179			437,316			361,891			179,711			
Average (BY 1999-01)			0.09660				0.01024			0.09292			0.04924
2006 Forecast:			29,867				4,477			33,626			8,848

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-3.2 Hatchery Runs

The 2006 forecast utilized survival rates from the 1999 through 2001 period of broods (Table A-3-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-3-d). A program error was identified in the RRTERM model, causing a misallocation of the Quilcene area stocks. The error has been corrected in late 2004, and the RRTERM model was run for years from 1998 on, using an updated version of RRTERM. It will be re-run for all years, later in this year.

The 2006 forecast of 76,819 hatchery reared December Age-2 coho recruits (Table A-3-d) was predicted from the brood year 2003 smolt releases multiplied by the average estimated marine survival rate for each facility's smolts from the three latest available brood years. In all cases, except for Quilcene Bay Pens, this meant brood years 1999-2001 (Table A-3-d).

A-4. Fall Chum Salmon

The 2006 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 and 2004 fisheries, combined with the lack of age specific data from 2004, the forecasts are extremely preliminary and possibly biased.

A-4.1 Natural Runs

A-4.1.1 Natural Run Forecasts (PNPTC)

The 2006 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. The mean recruit-per-spawner return rates were 2.15983, 2.98708, and 0.09810, for 3, 4, and 5 year-olds respectively (Table A-4-a). These age specific rates were used because they may better reflect the recent trends of survival. However, given the problems identified above, including the lack of age information from 2004, 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, all rates were adjusted to 50% of the estimated mean. These adjusted rates of return were multiplied with the 2003, 2002, and 2001 brood escapements (150,252, 173,036, and 101,902; respectively) to estimate the total 2006 forecast of **425,693** 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-4-d and A-4-e), on the basis of relative proportion attributable to each production unit's spawners (brood year escapement), 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-4.2).

A-4.1.2 Natural Run Forecasts (WDFW)

The 2006 return of natural fall-timed chum salmon to Hood Canal was preliminarily forecast as a portion of the total return of all Puget Sound natural fall-timed chum. The Puget Sound return was initially forecast 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 2003 natural escapement by the mean odd-year brood R/S value to get a total return of 2003 brood offspring. That number was then multiplied by the mean return at age 3 for even-year broods, yielding the 2006 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 3,065,669 (Table A-4-b). However, given the lower than expected returns in 2005 and the lack of age information from 2004 and 2005, this estimated was reduced by 50%, to 1,532,834

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 **268,304** (Table A-4-c). The forecasts for individual production units are shown in Table A-4-f.

While the resulting estimates prepared by PNPTC and WDFW are significantly different, it should be noted that the difference is mainly due to the forecast of 3 year olds, whose estimate is heavily influenced by the choice of odd-even vs. average survival estimation. For preliminary preseason planning, we agreed to use an average of the two results. Table A-4-g.

Table A-4-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	1.48266	8.26712	0.69327	10.44305
1991	44,745	0.59754	1.58645	0.12973	2.31372
1992	96,381	2.21239	4.21551	0.20013	6.62803
1993	67,771	1.07477	1.38928	0.10130	2.56535
1994	151,821	0.30984	0.88726	0.03062	1.22772
1995	119,344	0.58343	0.37619	0.01541	0.97503
1996	251,803	0.01674	0.18578	0.00000	0.20252
1997	53,493	0.62363	2.02701	0.17179	2.82243
1998	101,632	1.52336	1.69466	0.02440	3.24242
1999*	33,923	4.75467	8.04086		
2000*	37,131	3.88075			
2001*	101,902				
2002*	173,036				
2003*	150,252				
2004*	169,991				
Mean: Brood Years 1968-00 (exclusive of outliers, in bold)					
All Odd Years	37,295	1.77111	3.18448	0.30040	5.02356
All Even Years	63,938	1.08190	3.24026	0.29005	4.43729
All Years	51,020	1.40497	3.21327	0.29488	4.71088
Mean: Brood Years 1996-00					
All Years	99,554	2.15983	2.98708	0.09810	1.81060
2006 Forecast (@ 0.5)		162,259	258,436	4,998	425,693

Table A-4-b. 2006 Puget Sound Natural Fall Chum R/S Based WDFW Forecast

Parent Brood	Age	Parent Escapement	Mean R/S¹	Estimated R/S (all ages)	Mean Age Composition¹	Natural Forecast
2001	5	572,576	3.11245	1,782,114	0.07026	125,211
2002	4	1,082,187	2.58517	2,797,637	0.76724	2,146,459
2003	3	698,551	3.11245	2,174,205	0.36519	793,998
					Total	3,065,669
Adjusted to 50% Prior to Use						1,532,834

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

Table A-4-c. 2006 WDFW Hood Canal Natural Chum R/S Forecasts

	R/S	HC Parent Escapement Proportion	HC Forecast by Age
Age 3 (2003 Brood) Forecast	396,999	0.21509	85,391
Age 4 (2002 Brood) Forecast	1,073,230	0.15990	171,609
Age 5 (2001 Brood) Forecast	62,606	0.18056	11,304
Total Forecast	1,532,834		268,304

Table A-4-d. 2006 Hood Canal Natural Fall Chum Parent Brood Escapement Distribution

Area	2003	2002	2001
9A	0.00%	0.00%	0.00%
12	3.88%	2.33%	1.33%
12A	3.79%	6.59%	5.32%
12B	41.97%	49.58%	26.32%
12C	24.33%	17.06%	20.37%
82G	6.56%	7.90%	13.81%
12D	19.47%	16.55%	32.85%

Table A-4-e. Apportionment of the PNPTC 2006 Hood Canal Natural Fall Chum Run

Area	3's	4's	5's	Total
9A	0	0	0	0
12	6,293	6,014	66	12,374
12A	6,151	17,026	266	23,444
12B	68,097	128,122	1,315	197,534
12C	39,481	44,092	1,018	84,591
82G	10,649	20,414	690	31,753
12D	31,589	42,767	1,642	75,998
Total	162,259	258,436	4,998	425,693

Table A-4-f. Apportionment of the WDFW 2006 Hood Canal Natural Fall Chum Run

Area	3's	4's	5's	Total
9A	0	0	0	0
12	3,312	3,994	150	7,455
12A	3,237	11,306	602	15,145
12B	35,837	85,077	2,975	123,888
12C	20,777	29,279	2,303	52,358
82G	5,604	13,555	1,562	20,721
12D	16,624	28,399	3,713	48,736
Total	85,391	171,609	11,304	268,304

Table A-4-g. Apportionment of the Joint 2005 Hood Canal Natural Fall Chum Salmon Forecasts

Area	PNPTC Forecast	WDFW Forecast	Joint Forecast
9A	0	0	0
12	12,374	7,455	9,914
12A	23,444	15,145	19,294
12B	197,534	123,888	160,711
12C	84,591	52,358	68,475
82G (Skokomish)	31,753	20,721	26,237
12D	75,998	48,736	62,367
Total	425,693	268,304	346,999

A-4.2 Hatchery Runs.

The 2006 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 2001, 2002, and 2003. 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.

A-4.2.1 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 Hoodspout Hatchery (1965-1971 broods). (Tables A-4-h and A-4-i). The resulting forecast for 2006 is 369 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 223 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-4-h. Hood Canal Fall Chum, Off-Station Lbs. Planted

Area	BY 2003		BY 2002		BY 2001	
	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%	0	0.0%	1	0.5%
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	191	100.0%	222	100.0%	205	99.5%
Total	191	100.0%	222	100.0%	206	100.0%

Table A-4-i. Apportionment of the 2006 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	92	268	9	369
Total	92	268	9	369

A-4.2.2 Hatchery On-Station Forecasts (PNPTC)

Hoodsport Hatchery: Mean return rate of age 3, 4, and 5 fish per pound planted at Finch Creek (1995-2000 broods) (Table A-4-j). The resulting forecast for 2006 is **130,289**. 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 (1978-2000 broods) (Table A-4-k). The resulting forecast for 2006 is **144,579**. 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 3, age 4 and age 5 fish per pound planted at Walcott Slough (1965-1974 and 1979-1984 broods). The age specific return rates for age 3 and age 5 (brood 1968) were determined to be outliers and were excluded from the estimation of the age specific mean return rates (Table A-4-l). The resulting forecast for 2006 is based on the fingerling releases of 2,740 lbs. and (BY 2002), 3,557 lbs. (BY 2001), which were used to estimate the return of 4, and 5-year olds respectively (the QNFH ceased production of fall chum, following the BY 2002 release), for a total return of **7,949**.

Little Boston Hatchery and Port Gamble Pens: Mean return rate of age 3, age 4 and age 5 fish per pound planted at Hoodspout Hatchery (1965-1971 broods) (Table A-4-j). The resulting forecast for 2006 is based on the fingerling releases of 1,699 lbs (BY 2003), 1,890 lbs (BY 2002), and 1,444 lbs (BY 2001), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of **6,319**.

Enetai Hatchery: Mean return rates of age 3, age 4 and age 5 fish per pound planted (1976-1999 broods). (Table A-4-m). The resulting forecast for 2006 is based on the fingerling releases of 3,264 BY 2003), 7,081 lbs (BY 2002), and 5,321 lbs. (BY 2001), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of **22,440**. 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-4-o and indicate a total forecast of on-station hatchery-origin fall chum, for 2006, of **311,577**.

A-4.2.3 Hatchery Forecasts (WDFW)

The 2006 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 2003 brood year chum by the long-term, odd-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 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-4-n. The WDFW total Hood Canal hatchery on-station forecast is **330,530**.

**Table A-4-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-4-j (cont'd). Fall Chum Returns-per-Pound,
by Age at Return from Hoodspout 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		
2000*	34,067	0.19623			
2001*	35,033				
2002*	35,574				
2003*	33,231				
All Odd Years	24,164	1.81083	2.85927	0.17110	4.71527
All Even Years	28,424	1.34803	3.72541	0.12312	5.30587
All Years	26,294	1.57943	3.27997	0.14783	5.01057
All Years 65-71	2,655	0.95938	2.41136	0.09131	3.46205
All Years 72-00	32,000	1.72909	3.49712	0.16305	5.41203
All Years 95-00	33,005	1.41104	2.29370	0.05146	3.28335
2006 PNPTC Forecast		46,890	81,596	1,803	130,289
2006 WDFW Forecast		68,365	92,222	6,708	167,295

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

**Table A-4-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		
2000	8,486	5.17945			
2001	31,946				
2002	30,996				
2003	32,631				
Average Return Brood Years (1978-00) excluding outliers in bold.					
Odd Years	27,319	1.55045	2.89606	0.20966	4.31851
Even Years	25,082	1.50965	2.79302	0.20310	4.17216
All Years	26,152	1.52916	2.84209	0.20622	4.24185
All Years 95-00	23,823	3.18031	2.71588	0.16118	5.12093
2006 PNPTC Forecast		49,898	88,093	6,588	144,579
2006 WDFW Forecast		45,076	80,353	6,698	132,127

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

Table A-4-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	2006 Forecast
BY 2001	3,557	336
BY 2002	2,740	7,613

Table A-4-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				
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	1.81817	2.27934	0.06876	3.89200
All Years 95-00	2,928	2.04947	1.64172	0.08358	3.39259
2006 PNPTC Forecast		5,935	16,140	366	22,440
2006 WDFW Forecast		7,411	15,713	471	23,595

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

Table A-4-n. Summary of WDFW 2006 Hood Canal Hatchery Fall Chum Forecasts

Facility	Age 3	Age 4	Age 5	Total
Little Boston Hatchery	1,429	5,786	151	7,366
Quilcene National Hatchery	0	0	147	147
Hoodsport Hatchery	68,365	92,222	6,708	167,295
G. Adams / McKernan Hatchery	45,076	80,353	6,698	132,127
Enetai Hatchery	7,411	15,713	471	23,595
12D Streams - Augmentation	66	145	12	223
Total	122,347	194,219	14,187	330,753

Table A-4-o. Summary of PNPTC 2006 Hood Canal Hatchery Fall Chum Forecasts

Facility	Age 3	Age 4	Age 5	Total
Little Boston Hatchery	1,630	4,557	132	6,319
Quilcene National Hatchery	0	7,613	336	7,949
Hoodsport Hatchery	46,890	81,596	1,803	130,289
G. Adams / McKernan Hatchery	49,898	88,093	6,588	144,579
Enetai Hatchery	5,935	16,140	366	22,440
Total	104,353	198,000	9,224	311,577

Table A-4-p. Apportionment of the 2006 Joint Hood Canal Hatchery Fall Chum Salmon Forecasts

Facility	PNPTC Forecast	WDFW Forecast	Joint Forecast
Little Boston Hatchery	6,319	7,366	6,843
Quilcene National Hatchery	7,949	147	4,048
Hoodsport Hatchery	130,289	167,295	148,792
G. Adams / McKernan Hatchery	144,579	132,127	138,353
Enetai Hatchery	22,440	23,595	23,018
Total	311,577	330,530	321,054

B. Inseason Run Assessment Methods

The fall chum salmon is the only run, among those returning to Hood Canal in 2006, 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 2, when the first inseason updated estimate of abundance will be made, using cumulative purse seine catches through the week of 11/5, the pre-season terminal run size forecast will serve as the estimate of the run entering Hood Canal.

On November 2, 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 10/15, 10/22 and 10/29. 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 11/5. The caution in using this update is necessary because of its significant percent error as well as a measurable tendency to overestimate abundance at run sizes similar to that predicted for Hood Canal in 2006. This initial assessment will use the following linear regression model:

$$\text{Hood Canal Preliminary Terminal Area Run Size} = (5.7565 * CC_{1015-1102}) + 58763.964$$

The initial assessment model is a linear regression of cumulative purse seine catches through 11/4, 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 the last two seven day periods ending on 11/4, had fisheries. The data used are shown in Table B-1-b. Adjusted R² for this regression is 0.7855.

The final fall chum salmon run size assessment will be made on or before November 9, using the cumulative catch made by purse seines, from October 15, through the week of November 5 (four 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 three of the first four weeks. 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 9 is as follows:

$$\text{Hood Canal Terminal Area Run Size} = (4.0632 * CC_{1015-1109}) + 46278.6927$$

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	0.8008	0.9259
R ² Adjusted	0.7855	0.9206
Std Error	158171.47	93194.04
N	15	16
β ₀	58763.9640	46278.6927
β ₁	5.7565	4.0632

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

Year	Terminal Run	Cum. PS Catch 10/15 - 11/4	Cum. PS Catch 10/15 - 11/11
1981	175,743	15,415	16,414
1982	227,075	45,816	57,061
1983	172,028	39,496	56,243
1984	422,580		89,553
1986	500,085	71,102	128,288
1987	788,232	165,917	165,917
1988	547,158	64,683	140,421
1989	424,447	64,805	95,095
1990	288,364	44,476	57,389
1993	587,069	78,920	119,770
1998	569,463	136,785	181,081
1999	150,677	25,770	25,779
2000	152,220	15,921	15,921
2001	790,421	86,293	157,457
2002	983,854	159,717	188,588
2003	1,298,577	161,632	310,865