

**2002 MANAGEMENT FRAMEWORK PLAN
AND SALMON RUNS' STATUS
FOR THE
HOOD CANAL REGION**



September 2002

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

Table of Contents

Introduction	Page 1
General	Page 1
Summary of the 2002 Runs and Fisheries	Page 1
2002 Fishery Management Periods	Page 3
Summary of Pre-Season Forecasts, Expected Harvests and Escapements	Page 5
Summer/Fall Chinook Salmon	Page 5
Summer Chum Salmon	Page 6
Coho Salmon	Page 7
Fall Chum Salmon	Page 8
Pre-Season Management Framework	Page 11
2002 Harvest Management Measures and Expected Fisheries	Page 11
Commercial Fisheries	Page 11
Hood Canal Mainstem	Page 12
Extreme Terminal Marine Areas	Page 13
Hood Canal Rivers	Page 14
Test and Evaluation Fisheries	Page 14
Recreational Fisheries	Page 14
Hood Canal Marine Areas (CRC Area 12)	Page 14
Extreme Terminal Marine Areas	Page 15
Hood Canal Rivers	Page 15
Other Recommended Measures	Page 15
Inseason Run Size Updates	Page 16
APPENDIX	Page 19
A. Preseason Forecasting Methods	Page 20
Summer/Fall Chinook Salmon	Page 20
Summer Chum Salmon	Page 22
Coho Salmon	Page 24
Fall Chum Salmon	Page 28

1. Introduction

1.1 General

This report has been prepared by the Point No Point Treaty Council (for the Skokomish Tribe and the Lower Elwha, Port Gamble, and Jamestown S'Klallams) and was reviewed and agreed to, by the Washington Department of Fish and Wildlife (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 2002 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' preseason 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 all 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 preseason 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' preseason 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 2002 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; 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 in-season. 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 for chinook salmon is anticipated in Areas 12C and in Area 12H where Hoodsport hatchery returns will provide for additional directed harvest.

Summer chum salmon are of very low abundance throughout this region and will provide no harvestable surplus in the Hood Canal “mainstem”. 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 broodstock requirements for the Quilcene National Fish Hatchery (QNFH) supplementation program are met.

Of the various 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, as well as those returning to natural spawning areas, are expected to be of sufficient abundance to support significant directed 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.

Preseason forecasts of abundance (Tables 3.1 - 3.5) are provided as a preseason estimate of harvest and 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 preseason forecasts for 2002 are detailed in Appendix A of this report. In most cases, the escapement goals indicate the currently accepted estimate of escapement abundance necessary to provide for future maximum sustainable harvest (MSH), under average progeny survival conditions. However, in the case of summer chum salmon, the goals are based on the targets 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 2002 recruits. That rate was established at a level equal to, or higher than, the minimum escapement rate allowable for the 2002 forecasted recruitment (55%), 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' preseason planned management framework.

2. 2002 Fishery Management Periods

AREA	SPRING CHINOOK	SUMMER CHINOOK	SUMMER CHUM	COHO	E. FALL CHUM	L. FALL CHUM	WINTER STLHD
9A	---	---	---	9/01-11/02	11/03-11/30	---	12/01-3/31
12A	---	---	9/01-09/27	8/30-10/12	10/13---	----12/28	---
12	4/16-7/13	7/14-9/05	9/01-9/22	9/10-10/19	10/20-11/20	---	---
12B	4/16-7/13	7/14-9/13	9/05-10/01	9/13-10/26	10/27-11/20	---	---
12C	4/16-7/13	7/14-9/18	8/26-10/01	9/18-10/26	10/27-11/27	---	---
12D	4/16-7/13	7/14-9/18	8/29-9/22	9/18-10/26	10/27-11/27	---	---
Quilcene R	---	---	9/05-10/13	9/01-10/19	11/12---	—01/09	12/07-4/15
Dosewallips Duckabush	---	8/11-9/21	9/07-10/12	9/21-11/16	11/17---	—12/28	12/07-4/15
Skokomish R	5/01-8/03	8/04-9/21	---	9/22-11/16	11/17-----	-----12/28	12/7-4/15
Union R.	---	---	9/02-10/06	9/22-11/16	11/17----	----12/28	12/07-4/15
Misc. HC Tribs.	—	8/11-9/21	---	9/22-11/16	11/17----	----12/28	12/07-4/15

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 2002, 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. This last

procedure, was 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

Fishery	Management / Production Units					Total
	Skokomish		Mid-Canal	Miscell.	Hoodspport	
	Natural	Hatchery	Natural	Natural	Hatchery	
Recruits	2,798	12,740	689	764	17,860	34,851
Canada	338	1,547	84	93	2,150	4,212
Alaska	0	0	0	0	0	0
S.Falcon Tr/Rec	1	4	0	0	6	11
N.Falcon Tr/Rec	105	477	26	29	664	1,301
P.S. Troll	7	31	2	2	43	85
SJF Rec.	74	337	18	20	469	918
Puget Sound Rec.	108	473	26	32	721	1,360
Puget Sound Net	32	148	8	9	206	403
Hood Canal Rec.	35	128	6	5	268	441
Hood Canal Net	40	181	2	11	251	485
Freshwater Rec.	287	1,313	1	1	0	1,602
Extreme Terminal Net	501	2,292	0	0	11,854	14,647
Mgt Unit Harvest	1,528	6,931	173	202	16,632	25,465
Mgmt Unit Escap..	1,271	5,809	516	564	1,230	9,390
Escapement Goal	1,650	2,250	750	n/a	1,800	6,450

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 for 2002, 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 #0802* 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. The escapement goals listed for the Hoodspport and George Adams/McKernan (Skokomish R.) hatcheries are those necessary to provide the required enhanced production in accordance

with the parties' 1998 enhancement planning proposed modifications to the Hood Canal Production Evaluation Program.

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	5,230	330	130	110	225	4,435	1,110
Mainstem HC	1,941	123	48	41	0	1,729	2,660
SE Hood Canal	675	43	17	26	0	590	300
Totals	7,846	495	195	176	225	6,754	4,070

Note: The Area 12A forecast includes the combined return of naturally reared and QNFH supplementation program summer chum.

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 2002 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 2002, 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 for 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 2002, 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. The U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and Tribes will cooperate in collecting (from the Area 12A fishery and the Quilcene freshwater areas) all usable, up to 200 pairs (if available), summer chum salmon for the purpose of natural run supplementation from the Quilcene National Fish Hatchery and the Big Beef Creek experimental reintroduction program.

3.4 Coho Salmon

Management / Production Units								
Fishery	12/12B/12C/12D Skokomish		9A ⁽¹⁾	12A ⁽¹⁾	Hood Canal Stocks' Subtotals		NonLocal	Total
	Natural	Hatchery	Aggregate	Aggregate	Hatchery & SecNat'l	Natural		
Recruits	34,424	9,987	8,723	13,279	31,989	34,424		66,413
Canada	319	116	93	123	332	319		651
S.Falcon Tr/Rec	35	18	12	21	51	35		86
N.Falcon Tr/Rec	2,068	1,051	1,149	1,383	3,583	2,068		5,651
P.S. Troll	52	18	22	22	62	52		114
Strait Rec.	1,385	1,626	1,708	1,971	5,305	1,385		6,690
SJI Rec.	0	7	32	17	56	0		56
Area 9 Rec.	1,299	427	337	448	1,212	1,299		2,511
S. Sound Rec.	665	235	251	260	746	665		1,411
Strait Net	844	263	237	306	806	844		1,650
SJI Net	132	24	28	32	84	132		216
No. Sound Net	45	13	10	18	41	45		86
So. Sound Net	1,382	383	385	466	1,234	1,382		2,616
Hood Canal Rec.	836	197	149	293	639	836	69	1,544
HC Rivers Rec.	273	185	0	1,113	1,297	273		1,570
HC Mainstem Net	2,585	537	119	198	854	2,585	303	3,742
Area 9A Net ⁽¹⁾	2,144	270	2,541	183	2,994	2,144	1,173	6,311
Area 12A Net ⁽²⁾	233	39	0	4,737	4,776	233		5,009
Skokomish R Net	995	743	0	0	743	995		1,738
Mgt Unit Harvest	15,292	6,152	7,073	11,591	24,815	15,292	1,545	41,652
Mgt Unit Escap.	19,132	3,835	1,650	1,689	7,174	19,132		26,306
Min. Escap. Goal	18,933	550	419	1,494				

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 normal-timed coho salmon runs returning to Hood Canal consist of several small natural components in all river systems, and 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 aggregate (natural and hatchery) Hood Canal run of December Age-2 (DA-2) recruits was forecast to be 91,166, consisting of 48,036 natural (46,495 primary and 1,541 secondary) and 43,130 hatchery coho. For 2002, the PNPTC Tribes and the WDFW jointly agreed to use the mean of the results obtained from each agency's pre-season forecast. The mean of the resulting range was 48,036 DA-2 and this was used to provide model input values for the 2002 PFMC/North of Falcon management planning process. The methods used to develop the 2002 Point No Point Treaty Council (PNPTC) and Washington Department of Fish and Wildlife (WDFW) Hood Canal coho forecasts are further detailed in Appendix A-3 of this report. Table 3.4 is based on the results of the preseason *FRAM* simulation run #0228, and does not include estimated natural mortality in 2002. 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 #0228. Further details concerning preseason fishing plans are shown in Section 4 of this report.

The escapement goals for Hood Canal primary natural coho are based on a maximum allowable exploitation rate (in all fisheries) of 45%, based on this year's predicted abundance. The expected escapements are those which would result after the application of the preseason established fishing regimes, to the 2002 forecasted abundance.

The escapement targets for hatchery (and secondary natural) management units are those necessary to meet the parties' agreed-upon enhanced production per the 1989 Hood Canal Production Evaluation MOU, as adjusted for 2002 in order to accommodate proposals to modify the brood origin of coho used in the Quilcene Bay and Port Gamble net pen programs.

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, it is also separated into two timing components, which are also 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, 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 2002 forecasts of all fall chum salmon returning to Hood Canal are described in Appendix A-4 of this report. Because of unusual and unanticipated delays in processing source data, the final forecast used for the 2002 season is based solely on the preliminary pre-season forecast generated by PNPTC, in February 2002, and is presented in Table 3.5.1.

Pre-terminal catches are expected to occur primarily during Treaty 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 2,820 at the Strait of

Juan de Fuca (SJF) and 3,880 at the San Juan Islands (SJI). This is assuming the preseason forecasted catch level of 6,740 chum salmon in the SJF, and the catch limit of 120,000 in SJI. 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 per day during the 1999-2001 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, egg volume quarantine limitations at Hoodspout Hatchery, plus providing a minimal in-river fishery, in the Skokomish River.

The expected escapement to the Little Boston Hatchery assumes a 95% 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 Hoodspout-George Adams-McKernan surplus. For late-fall chum, the expected escapements are those that would result after Hoodspout-timed chum have been taken from the portion of each late-fall management unit that overlaps the Hoodspout 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.

3.5 Fall Chum Salmon Summary

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	4,852	73	4,779	3,938	757	84	0
<i>AREA 12</i>							
Natural-Augmented	6,120	92	6,028	4,967	0	1,061	3,900
<i>AREA 12A</i>							
Natural	5,552	84	5,468	1,487	0	3,981	1,250
Hatchery	13,217	199	13,018	5,899	0	7,119	3,100
<i>AREA 12B</i>							
Natural-Augmented	80,257	1,211	79,046	21,493	0	57,553	18,750
<i>AREA 12C</i>							
Natural-Augmented	33,837	511	33,326	27,460	0	5,866	7,000
Hoodsport Hatchery	144,199	2,176	142,023	117,023	10,000	15,000	15,000
Enetai Hatchery	7,926	120	7,806	4,117	0	3,689	1,900
<i>AREAS 82G/J (Skokomish R.)</i>							
Natural	17,448	263	17,185	8,496	682	8,007	9,800
G.Adams-McKernan Hatchery	92,406	1,394	91,012	74,991	6,021	10,000	10,000
<i>AREA 12D</i>							
Natural-Augmented	40,802	616	40,186	33,112	0	7,074	13,550
Totals	446,616	6,740	439,876	302,983	17,460	119,433	84,250

4. Pre-Season Management Framework

4.1 2002 Harvest Management Measures and Expected Fisheries

In 2002, the condition of the salmon runs returning to the Hood Canal terminal areas requires that harvest management plans be conservative.

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 4,100 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 Hoodsport 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, chinook salmon fisheries will only be implemented in Area 12C and in the Hoodsport hatchery zone (Area 12H). Skokomish River (Area 82G) fisheries will also be implemented. Fisheries in Area 12C will be further restricted in order to provide protection for commingled summer chum salmon.

Fisheries directed at Hood Canal hatchery and natural 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 2002 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 2002. 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 2002, early-fall chum salmon runs managed at rates appropriate for the George Adams/McKernan, Hoodsport, 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, 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 2002 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 2002, from July 21 through August 24. Gillnets shall be restricted to 7" minimum mesh size after July 31. This fishery has been initially scheduled to operate up to 5 days per week through August 18 and up to 6 days a week thereafter. Additional fisheries may also be implemented in Area 12H, as necessary to harvest surpluses, from August 4 through September 28. This fishery shall be required to selectively release all chum salmon. In the 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 19. Beach seines may start no earlier than September 18 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 up to a week earlier, they will be required to release chum salmon, and in Area 12B, chinook salmon through September 30.

Area 12C gillnet fisheries for coho salmon have been initially planned to operate up to 5 days/week through October 26. 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 and chinook salmon through September 30.

During the fall chum management period, commercial fisheries in Area 12 will start on October 20, followed by the opening of Areas 12B and 12C, October 27. 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 27 (Areas 12B and 12C).

A hook and line Treaty Indian fishery may be implemented from October 27 through December 7 in Area 12H and Treaty Indian beach seine fisheries may be authorized for up to two days per week in Area 12H after November 3 and through December 7, if inseason information indicates an otherwise unharvestable surplus. The Hoodsport 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 on October 20. In Areas 12 and 12B, fisheries are anticipated to occur initially (first 3 weeks) for 1 day per week and, depending on in-season management considerations, for 2 days for the last 2 weeks, ending no later than November 20. Fisheries in Area 12C may follow for 1 day per week, as necessary, after November 10, ending no later than November 23. 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 and coho 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 concurrent with Area 12C, for coho salmon after 09/30, no commercial net fisheries are anticipated in 2002 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 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.

In Area 9A, Treaty coho fisheries may start after August 31, 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 November 30. Non-treaty coho fisheries (gillnet only) in this area shall operate inside Port Gamble Bay, continuously, from September 1 through November 2, and shall be required to release all chinook and chum salmon through 9/30, and maintain logbooks.

In the Quilcene/Dabob area (Area 12A), the intent of the managers 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 in 2002. An additional objective shall be to capture live summer chum salmon, from the marine area, for use in the joint brood stock program planned for 2002. This program has been developed cooperatively by PNPTC, WDFW, and USFWS. These agencies have also agreed that fisheries in Area 12A shall be closely 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. Additional requirements during the coho fisheries in this area shall include the requirement to turn over to brood stock collection crews all chum salmon captured. If brood stock collection crews are not available, all live chum salmon shall be released unharmed and any mortalities shall be reported to agency personnel. Any chum salmon retrieved dead, by Treaty fishers, shall be kept and recorded on fish receiving tickets, in order to facilitate their being accounted for.

In Area 12A, during the coho salmon management period, and extending into the fall chum salmon period, treaty and non-treaty beach seine and hook-and-line gear will be limited to daytime hours from August 25, through October 12, on a Monday through Friday schedule. The fishing area will be restricted to the area north of a east-west line through Point Whitney, in order to minimize the possibility of impact to milling Dosewallips River summer chum and chinook salmon. In addition to the above, treaty Indian gillnet fisheries may be implemented, starting the week of September 1, and 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 shall remain closed, in order to provide secondary protection. Openings in this area during the late fall chum salmon period may only occur if a harvestable hatchery surplus is identified.

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

No non-treaty commercial fisheries shall be authorized in these areas during 2002. 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 7/28 and shall continue through the coho and chum salmon season with a gillnet closure below SR 106, in order to protect any summer chum salmon dip ins. Weekly openings shall be up to 4 days/week through 9/30.

During the coho salmon management period, fisheries may start in the week of September 22, and may proceed on a schedule of no more than 4 days-per-week through November 10. During the first week of the coho season, the area downstream of SR 106 shall remain closed to gillnet gear.

During the fall chum salmon management period, fisheries of approximately 4-7 days per week may be authorized starting the week of November 17. At the end of the early-fall chum salmon fishery (after December 7), 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 8.

In Purdy Creek (Area 82J), net fisheries may be authorized during the passage of chinook or coho salmon returning to the George Adams Hatchery. However, 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 for chinook and chum salmon. Dip nets, hand lines, etc. will be allowed for the harvest of surplus coho salmon in areas upstream from Rogers Street. Beach seine gear may be authorized as necessary from September 8 through October 5, if 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 2002.

4.1.2 Test and Evaluation Fisheries

In 2002, no test fisheries are anticipated in any Hood Canal marine or freshwater areas.

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 14, 2003. From February 15 through April 10 the area will be open with a one fish possession limit (chinook 22" min size). From April 11 through April 30, 2002 the entire area will be closed.

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

In the Quilcene/Dabob area 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 Hoodspport 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, 2000. 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 Hoodspport 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 as outlined 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 30, with a one fish limit (12" min size); chum salmon may not be retained during this period. 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, and will have non-buoyant lure restriction and a requirement of single point barbless hooks. The Skokomish River shall be closed to salmon angling from December 16 through April 30.

The Big Quilcene River will be open above Rogers Street to salmon angling using selective gear rules, from August 16 through October 31 with a limit of 4 coho salmon (12" min size). Release of all chum and chinook shall 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 and will require single point barbless hooks. The Tahuya River downstream of mile marker 1 above the North Shore Road, will also be open from September 16 through October 31, with the two coho salmon limit 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 will likely require the modification on one or more elements of the preseason 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, these are designed to provide for in-season reassessment of the 2002 management plan and management measures. The parties recommend that additional tasks should be undertaken in order to ensure the health of the resource, facilitate future resource management decisions and action, as well as attempt to address a number of serious resource-related problems in this region. Therefore, the following 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 which are crucial to annual escapement, 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 WDFW and PNPTC Tribes 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.

In order to assess the recreational impact on chinook salmon, the WDFW Puget Sound Sampling Program will conduct a creel survey, separate from the catch record card estimates, to estimate harvest and effort in the Skokomish River. This creel survey will consist of interviewing all anglers who are exiting the fishery, thus obtaining a complete census of this site for the time period sampled.

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 increased to once per week in all areas, to improve the accuracy of estimates. Additional baseline samples should be obtained from summer and fall chum spawners for DNA analysis, in order to complete a baseline which contains both races in each river system where they are present.

4.3 Inseason Run Size Updates

For summer/fall chinook salmon, in the Hoodspout hatchery zone, 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 21-year period. Unfortunately no relationship was found to consequently improve on preseason estimates. Therefore the preseason 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 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 (if any) will be documented in memoranda to be exchanged between co-managers prior to agreement concerning their use.

APPENDIX

A. Preseason Forecasting Methods

A-1. Summer/Fall Chinook Salmon

The 2002 forecast of summer-run Hood Canal chinook salmon is the product of brood 1998 fingerling lbs released from WDFW facilities in 1999, multiplied by the average of post-season estimated terminal area return rates (terminal run / fingerling lbs released 3 yrs previous) for the last four return years (1998-2001), which are believed to represent current survival rates. The resulting terminal area run forecast is 24,037 chinook salmon. The Hood Canal forecast was apportioned to 21,098 hatchery fish (36.7% George Adams and 51.0% Hoodspport hatchery) and 2,939 (12.2%) natural fish based on the Hood Canal run reconstruction-based relative contribution of individual Hood Canal management units in the 1998-2001 return years. These estimates will be used as inputs to generate ocean recruit forecasts during preseason simulation modeling.

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	4B Run	Term/4B
1984	39,232	0.42295	16,593	17,252	0.96180
1985	40,098	0.50574	20,279	21,059	0.96296
1986	55,499	0.39329	21,827	22,874	0.95423
1987	50,811	0.51412	26,123	27,282	0.95752
1988	55,967	0.50753	28,405	29,771	0.95412
1989	65,510	0.38222	25,039	25,532	0.98069
1990	54,674	0.23280	12,728	12,865	0.98935
1991	100,366	0.18881	18,950	19,263	0.98375
1992	101,102	0.02929	2,961	2,997	0.98799
1993	89,517	0.05293	4,738	4,812	0.98462
1994	78,335	0.04785	3,748	3,849	0.97376
1995	82,895	0.11068	9,175	9,401	0.97596
1996	73,472	0.11065	8,130	8,166	0.99559
1997	32,571	0.23963	7,805	7,929	0.98436
1998	58,652	0.27938	16,386	16,479	0.99436
1999	89,149	0.32935	29,361	29,552	0.99354
2000	87,306	0.27121	23,678		
2001*	101,591	0.25686	26,095		
2002*	84,577				
Average 1998-2001		0.28420			
2002 Forecast			24,037		

(*) : 2001 and 2002 data are preliminary and subject to revision.

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	1,413	5,949	8,358	16,386
1999	0	900	112	376	2,637	11,939	13,397	29,361
2000*	0	438	237	189	1,134	5,424	16,256	23,678
2001*	0	326	636	214	2,497	12,273	10,149	26,095

Note: The 2000-2001 run reconstruction is preliminary and subject to revision.

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

Year	12A	12B	12C	12D	Skokomish	G.Adams	Hoodspport
1997	0.00346	0.00077	0.00192	0.00090	0.05791	0.24177	0.69327
1998	0.00269	0.01752	0.00903	0.01141	0.08623	0.36305	0.51007
1999	0.00000	0.03065	0.00381	0.01281	0.08981	0.40663	0.45629
2000	0.00000	0.01850	0.01001	0.00798	0.04789	0.22907	0.68654
2001	0.00000	0.01249	0.02437	0.00820	0.09569	0.47032	0.38893
'98 - 2001 Mean	0.00067	0.01979	0.01181	0.01010	0.07991	0.36727	0.51046

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

Hood Canal Production Unit	Terminal Run Forecast	Proportion
12B	478	0.01990
12C	285	0.01187
12D	244	0.01016
Skokomish	1,931	0.08035
Natural Subtotal	2,939	0.12228
George Adams	8,828	0.36727
Hoodsport	12,270	0.51046
Hatchery Subtotal	21,098	0.87772
Total	24,037	1.00000

Note: The forecasted proportions are derived from the 1998-2001 mean return.

A-2. Summer Chum Salmon

A-2.1 Natural Runs

The 2002 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.

The runs were forecasted as the mean of the last 4 years' (one four-year cycle) returns, as estimated by the current run reconstruction (Table A-2-a). Insufficient age-specific information is currently available for summer chum salmon. The forecasted recruitment, to all fisheries (domestic and Canadian) and escapement, for summer chum, is 1,941 for the Mainstem and 675 for the SE Hood Canal units, for a total of 2,616. Additionally, summer chum salmon are expected to return to Big Beef Creek, Hamma Hamma, and Lilliwaup (Mainstem unit) from supplementation and reintroduction projects. However, those numbers are small and not presently quantifiable.

A-3.2 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 at the Quilcene National Fish Hatchery. The forecasted recruitment, to all fisheries and escapement, is 5,230. Methods used to estimate the forecast are identical to those used for the 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	5,554	716	25,061
1979	7,844	734	817	9,395
1980	8,868	1,932	2,134	12,934
1981	4,334	761	477	5,572
1982	5,525	1,495	956	7,976
1983	544	2,348	597	3,489
1984	1,279	1,486	502	3,267
1985	1,768	1,026	1,420	4,214
1986	1,284	1,482	5,001	7,767
1987	150	2,721	1,030	3,901
1988	2,191	2,537	915	5,643
1989	615	1,597	2,187	4,399
1990	260	606	580	1,446
1991	702	1,153	321	2,176
1992	1,953	1,235	183	3,371
1993	402	183	283	868
1994	1,170	894	891	2,955
1995	4,394	4,822	760	9,976
1996	10,734	9,792	511	21,037
1997	681	8,199	493	9,373
1998	758	3,202	255	4,215
1999	778	3,554	174	4,506
2000	2,035	6,704	757	9,496
2001*	4,192	7,461	1,514	13,167
2002 Forecast ('98-'01 Mean)	1,941	5,230	675	7,846

* 2001 Data is preliminary and subject to revision.

A-3. Coho Salmon

A-3.1 Natural Runs

The forecasted recruitment of 2002 Hood Canal natural runs was based on linear regression models that related the return of wild jack coho at Big Beef Creek (BBC) to Hood Canal December Age 2 (DA2) recruits in the subsequent run year. The use of this alternative technique was the result of an independent review of the previously used forecast methodologies, done by Robert Conrad of the Northwest Indian Fisheries Commission (NWIFC). Two approaches were used by the Hood Canal Joint Technical Committee (HCJTC), the first related the total return of jacks to Hood Canal DA2 recruits (indicated below as model “A”); the second related the return of BBC origin jacks (shown as tagged) to Hood Canal DA2 recruits (indicated below as model “B”). Utilizing data from brood years 1983-1997 (Table A-3-a), each of the models were run through the origin as well as the intercept, and then further examined by jackknife hindcasting. The final form of each regression is shown below:

$$(A_1) \text{ Hood Canal Recruitment} = 383.7547 * (\text{Total Wild BBC Jacks})$$

$$(A_2) \text{ Hood Canal Recruitment} = 11358.397 + (351.3036 * (\text{Total Wild BBC Jacks}))$$

$$(B_1) \text{ Hood Canal Recruitment} = 493.5911 * (\text{BBC Tagged Wild Jacks})$$

$$(B_2) \text{ Hood Canal Recruitment} = 17841.7310 + (428.9081 * (\text{BBC Tagged Wild Jacks}))$$

Relevant statistics of each model used to derive the 2002 forecast are shown below.

Brood Years 1983-1997				
Model Type	Total Wild BBC Jacks		Tagged Wild BBC Jacks	
Model Version	A ₁	A ₂	B ₁	B ₂
F-Ratio at p = 0.000	172.445	29.333	164.236	29.143
Std Error of Estimate	35135.596	36023.741	35935.614	36105.0285
N	15	15	15	15
Intercept	0	11358.397	0	17841.7310
Slope	383.7547	351.3036	493.5911	428.9081
Correlation Coeff.	0.962	0.832	0.960	0.8316
2001 Jacks (X)	115	115	85	85
2002 Forecast (Y)	44,132	51,758	41,955	54,299

The PNPTC Tribes and the WDFW agreed to use the mean of the results obtained from model A_{1,2} through B_{1,2}, as advised by the HCJTC. The jointly recommended Hood Canal natural pre-season forecast is 48,036 and was used during simulation modeling and planning purposes in 2002. These recruits were subsequently apportioned to primary and secondary units on the basis of the distribution of their parent brood escapement. The results of this alternative model, were compared with previously used methodologies by the HCJTC; see PNPTC and WDFW (2001). During 2001, PNPTC forecast DA2 recruits using a recent years’ historical relationship between total emigrating smolts from Big Beef Creek

Table A-3-a. 2002 Hood Canal Natural Coho Forecast Data

Brood Year	Big Beef Creek Total Smolts	Big Beef Total Wild Jacks 1/	Big Beef Tagged Wild Jacks 1/	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	23,166
1997	20,967	96	85	54,929
1998	47,089	189	179	
1999	21,855	115	85	

1/ By definition, “total wild jacks” include “tagged jacks”, jacks which lost their tags, and unmarked/untagged wild jacks (only a portion of all Big Beef Creek wild coho smolts are tagged or marked), and “tagged wild jacks” include those with coded wire tags applied at Big Beef Creek.

and the following year's total recruits from RRTERM, using coded wire tag data; the 2002 forecast would have been 58,089 DA2 recruits. During 2001, WDFW forecast DA2 recruits from estimates of Hood Canal smolt production and marine survival; the 2002 forecast would have ben 44,700 DA2 recruits.

A-3.1.2 Distribution of the Natural Runs

Natural runs from all Hood Canal units except 9A and 12A are classified as Primary Management Units. Natural runs from areas 9A and 12A, as well as all hatchery units, are designated as Secondary. The total forecast of 48,036 natural December Age-2 recruits was apportioned into 46,495 from primary units and 1,541 from secondary units. This is based on the proportional distribution of the parent brood, BY 1999; of 96.79% in the primary management units and 3.21% in the secondary management units (Table A-3-b). This forecast does not include any coho produced in streams north of the latitude of Foulweather Bluff (*i.e.*, it does not include "Area 9 Independents" which are included in the Strait of Juan de Fuca forecasts).

Table A-3-b. Apportionment of the 2002 Hood Canal Natural Coho Forecast

Area	Escapement Capacity	Escapement BY 1999	Management Unit Type	Proportion of Brood Escapement	December Age-2 Recruits
12 / 12B	28.88%	8,687	Primary	31.68%	15,216
12C / 12D	31.66%	9,569	Primary	34.89%	16,761
Skokomish	29.01%	8,288	Primary	30.22%	14,517
9A	1.25%	210	Secondary	0.77%	368
12A	9.20%	670	Secondary	2.44%	1,174
Primary Subtotal	89.55%	26,544		96.79%	46,495
Secondary Subtotal	10.45%	880		3.21%	1,541
Grand Total	100.00%	27,424		100.00%	48,036

Table A-3-c. 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	0.05098	
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	11,860	0.02249	441,656	18,864	0.04271	452,203	7,289	0.01612	225,269	2,780	0.01234	
1997	534,554	22,738	0.04254	420,482	3,999	0.00951	437,222	22,986	0.05257	189,951	16,752	0.08819	
1998	502,266			391,765			368,399			208,000			
1999	493,992			432,847			428,995						
Average (1995-97)			0.02702				0.02562				0.03671	0.04223	
2002 Forecast:		13,349				11,091				15,748	0		

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

A-3.2 Hatchery Runs

The 2002 forecast, utilized survival rates from the 1995 through 1997 period of broods (Table A-3-c). 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-c).

The 2002 forecast of 43,130 hatchery reared December Age-2 coho recruits (Table A-3-c) was predicted from brood year 1999 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, this meant brood years 1995-1997. (Table A-3-c). The Quilcene Bay Sea Pen releases for brood year 1999 were unknown, due to a hole in the pen with associated high mortalities and unknown number released, therefore the forecasted return was estimated to be zero.

A-4. Fall Chum Salmon

The 2002 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 unusual and unanticipated delays in processing source data, the final forecast used for the 2002 season is based solely on the preliminary pre-season forecast generated by PNPTC, in February 2002.

A-4.1 Natural Runs

A-4.1.1 Natural Forecasts

The 2002 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 1991-1997. The mean recruit-per-spawner return rates were 0.77766, 1.49301, and 0.09466 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 trend of lower survival. The average rates of return were multiplied with the 1999, 1998, and 1997 brood escapements (43,106; 33,924; and 101,631, respectively) to estimate the total 2002 forecast of 183,181 Hood Canal natural fall chum returning to Puget Sound, prior to 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-b and A-4-c), 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 instream enhancement and supplementation efforts. The forecast of this latter component is described under "Hatchery runs" (Section A-4.2).

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	47,801	0.58853	1.63843	0.09530	2.32226
1969	30,070	0.55347	1.14769	0.09264	1.79380
1970	41,699	0.55972	1.58097	0.01314	2.15383
1971	41,138	0.58684	0.41253	0.33536	1.33473
1972	41,602	0.26600	1.27782	0.00000	1.54382
1973	27,870	1.77435	2.60442	0.07442	4.45319
1974	52,223	0.81058	4.42767	0.07083	5.30908
1975	16,265	7.39128	0.05031	0.00000	7.44159
1976	48,079	0.53106	0.21013	0.03284	0.77403
1977	26,074	2.64570	2.75209	0.13651	5.53430
1978	79,156	0.00000	0.60582	0.05651	0.66233
1979	14,323	1.90768	2.13505	0.00000	4.04273
1980	21,672	0.52235	2.16014	0.23079	2.91328
1981	14,310	3.51962	12.61473	0.63307	16.76742
1982	12,133	2.90541	7.14714	0.94505	10.99760
1983	7,120	9.05977	24.36484	1.13305	34.55766
1984	22,751	1.29322	5.88293	0.37653	7.55268
1985	50,909	0.47585	2.67123	0.33942	3.48650
1986	29,548	0.00000	3.15530	0.44358	3.59888
1987	24,483	0.00000	3.54539	1.04627	4.59166
1988	30,703	1.51417	8.58841	1.42979	11.53237
1989	24,872	0.11184	6.46375	5.71932	12.29491
1990	20,811	1.48264	8.26697	0.81942	10.56903
1991	44,745	0.59753	1.90687	0.12931	2.63371
1992	96,382	2.40549	4.20484	0.19860	6.80893
1993	67,770	1.07000	1.35159	0.10130	2.52289
1994	151,821	0.30530	0.88726	0.03062	1.22318
1995	119,344	0.58343	0.37619	0.01347	0.97309
1996	251,803	0.01674	0.23128		
1997	53,492	0.46516			
1998	101,631				
1999	33,924				
2000	43,106				
Mean: Brood Years 1968-97 (exclusive of outliers, in bold)					
All Odd Years	37,519	1.54877	2.92553	0.31037	5.22081
All Even Years	63,212	0.88008	3.35101	0.33879	4.85438
All Years	50,366	1.20290	3.15346	0.32510	5.03081
Mean: Brood Years 1991-97					
All Years	112,194	0.77766	1.49301	0.09466	2.83236
2002 Forecast		26,381	151,736	5,064	

Table A-4-b. 2002 Hood Canal Natural Fall Chum Parent Brood Escapement Distribution

Area	1999	1998	1997
9A	0.00%	0.00%	0.00%
12	4.33%	3.11%	2.61%
12A	14.82%	0.86%	6.65%
12B	27.51%	46.30%	54.24%
12C	25.86%	17.44%	10.90%
82G	8.54%	9.56%	13.62%
12D	18.94%	22.73%	11.97%

Table A-4-c. Apportionment of the 2002 Hood Canal Natural Fall Chum Run

Area	3's	4's	5's	Total
9A	0	0	0	0
12	1,142	4,719	132	5,993
12A	3,911	1,305	337	5,552
12B	7,256	70,254	2,746	80,257
12C	6,823	26,463	552	33,837
82G	2,252	14,506	690	17,448
12D	4,996	34,489	606	40,092
Total	26,381	151,736	5,064	183,181

A-4.2 Hatchery Runs.

The 2002 hatchery-origin returns (including in-stream augmentation) of fall-timed chum salmon were generally forecasted using average returns-at-age-per-pound released, to Puget Sound net fisheries and escapements, using historical run sizes from the chum database, historical releases from each facility, and applying them to releases from brood years 1997, 1998, and 1999. In estimating the returns, the following information was used for each facility. Off-station production, resulting from instream augmentation programs was estimated separately and included in 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: 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-4-d and A-4-e). The resulting forecast for 2002 is 838 fish. This forecast was apportioned to each area, according to the volume released from each brood year, and the resulting components were added to the corresponding natural run components.

Table A-4-d. Hood Canal Fall Chum, Off-Station Lbs. Planted

Area	BY 1999		BY 1998		BY 1997	
	Lbs	%	Lbs	%	Lbs	%
9A	0	0.00%	0	0.00%	0	0.00%
12	0	0.00%	100	15.95%	141	46.38%
12B	0	0.28%	0	0.00%	0	0.00%
12A	0	0.00%	0	0.00%	0	0.00%
12C	0	0.00%	0	0.00%	0	0.00%
Skokomish	0	0.00%	0	0.00%	0	0.00%
12D	141	99.72%	527	84.05%	163	53.62%
Total	141		627		304	

Table A-4-e. Apportionment of the 2002 Hood Canal Fall Chum Off-Station Forecast

Area	3's	4's	5's	Total
9A	0	0	0	0
12	0	121	6	127
12B	0	0	0	0
12A	0	0	0	0
12C	0	0	0	0
82G	0	0	0	0
12D	68	635	7	710
Total	68	756	14	838

A-4.2.2 Hatchery On-Station Forecasts

Hoodsport Hatchery: Mean return rate of age 3, 4, and 5 fish per pound planted at Finch Creek (1991-1997 broods) (Table A-4-f). The resulting forecast for 2002 is 144,199.

George Adams/McKernan Hatcheries: Mean return rate of age 3, age 4, and age 5 fish per pound released (1991-97 broods). The age specific return rate for brood 1995 age 3 was determined to be an outlier and was excluded from the estimation of the age specific mean return rates (Table A-4-g). The resulting forecast for 2002 is 92,406.

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-h). The resulting forecast for 2002 is based on the fingerling releases of 4,155 lbs (BY 99), 2,916 lbs (BY 98), and 3,511 lbs (BY 97), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 13,217.

Little Boston Hatchery and Port Gamble Pens: Mean return rate of age 3, age 4 and age 5 fish per pound planted at Hoodspport Hatchery (1965-1971 broods) (Table A-4-f). The resulting forecast for 2002 is based on the fingerling releases of 930 lbs (BY 99), 1,627 lbs (BY 98), and 400 lbs (BY 97), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 4,852.

Enetai Hatchery: Mean of the available return rates of age 3, age 4 and age 5 fish per pound planted (1993-1997 broods). (Table A-4-i). The resulting forecast for 2002 is based on the fingerling releases of 1,542 lbs (BY 99), 3,270 lbs (BY 98), and 4,068 lbs (BY 97), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 7,926.

The total forecast of on-station hatchery-origin fall chum for 2002 is 262,600.

Table A-4-f. Fall Chum Returns-per-Pound, by Age at Return from Hoodspport 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	0.05260	5.38779
1976	24,490	0.76752	1.81559	0.04156	2.62467
1977	21,883	3.99685	2.02135	0.02760	6.04580
1978	33,256	1.00286	2.34702	0.24485	3.59473
1979	24,238	2.98979	2.90330	0.21532	6.10841
1980	44,336	0.48750	2.24062	0.04039	2.76851
1981	23,589	3.18898	4.51989	0.36118	8.07005
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-f (cont'd). Fall Chum Returns-per-Pound,
by Age at Return from Hoodspport Hatchery Releases**

1985	39,279	2.92389	5.00571	0.20594	8.13554
1986	33,036	0.53259	2.21870	0.20579	2.95708
1987	40,323	0.42814	3.70925	0.14733	4.28472
1988	36,877	3.13408	7.16899	0.29712	10.60019
1989	35,149	0.71834	1.79583	0.50845	3.02262
1990	38,422	4.27142	7.01940	0.35332	11.64414
1991	39,379	3.01183	1.87143	0.07465	4.95791
1992	33,678	2.20262	3.93974	0.12569	6.26805
1993	33,920	1.77959	4.05824	0.17676	6.01459
1994	37,075	0.73984	1.96470	0.03943	2.74397
1995	37,583	1.29662	0.93342	0.02041	2.25045
1996	25,374	0.35824	1.82208		
1997	30,276	0.24969			
1998	37,534				
1999	33,197				
2000	34,067				
All Odd Years	23,632	1.69786	2.86299	0.17625	4.82762
All Even Years	27,502	1.33320	3.76318	0.13244	5.46971
All Years	25,509	1.52106	3.31309	0.15581	5.13831
All Years 65-71	2,655	0.95938	2.41136	0.09131	3.46205
All Years 72-97	31,662	1.67228	3.56557	0.17544	5.62722
All Years 91-97	33,898	1.37692	2.55351	0.08739	4.44699
2002 Forecast		45,710	95,843	2,646	144,199

**Table A-4-g. 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	0.11906	0.85416	0.15224	1.12546
1979	40,273	0.36791	0.61144	0.06724	1.04659
1980	24,418	0.30974	2.11088	0.05751	2.47813
1981	12,028	3.24503	4.43634	0.36758	8.04895
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	0.20496	1.75149
1988	31,083	1.45527	4.69548	0.54805	6.69880
1989	32,315	0.52919	2.25103	0.20309	2.98331
1990	17,032	0.47710	5.81499	0.39097	6.68306
1991	30,024	1.45064	1.20399	0.05349	2.70812
1992	25,235	1.44190	2.87208	0.09257	4.40655
1993	27,016	1.22051	2.81183	0.32053	4.35287
1994	27,723	0.54600	3.79484	0.03621	4.37705
1995	22,624	3.11094	1.06483	0.00397	4.17974
1996	23,138	0.26978	0.23378		
1997	27,884	0.03172			
1998	33,530				
1999	27,365				
2000	8,486				
Average Return Brood Years (1978-97) excluding outliers in bold.					
Odd Years	27,315	0.71746	2.19328	0.23352	3.48923
Even Years	25,906	0.72644	2.63300	0.15370	3.87427
All Years	26,610	0.72245	2.33378	0.18245	3.69308
All Years 91-97	26,235	0.82676	1.99689	0.10135	4.00487
2002 Forecast		22,624	66,956	2,826	92,406

Table A-4-h. 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

Table A-4-i. 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	0.75449	0.00000	0.93604
1977	5,785	1.53688	3.31116	n/a	
1978	6,514	1.40297	n/a	0.01175	
1979	2,666	n/a	0.62366	0.09225	
1980	3,053	0.43327	1.82058	0.10249	2.35634
1981	4,985	2.12474	2.89871	0.10103	5.12448
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	n/a	
1988	4,493	1.46308	n/a	0.08704	
1989	4,191	n/a	1.67962	0.06531	
1990	3,294	3.14615	6.08997	n/a	
1991	2,936	6.39302	n/a	0.06820	
1992	2,095	n/a	3.07907	0.10528	
1993	4,297	1.78080	2.42659	0.08406	4.29145
1994	6,809	1.38412	3.03970	0.00283	4.42665
1995	3,456	4.32699	0.34679	0.00916	4.68294
1996	2,302	0.40142	0.66456		
1997	4,068	0.21438			
1998	3,270				
1999	1,542				
2000	194				
Average (Brood Years 1976-97). Outliers (in bold) excluded.					
Odd Years	4,096	2.11907	2.13600	0.07197	
Even Years	4,521	3.57216	1.84244	0.05444	
All Years	4,309	1.72642	1.99786	0.06269	
All Years 93-97	4,186	1.62154	1.61941	0.03202	4.46701
2001 Forecast		2,500	5,295	130	7,926