

**2000 MANAGEMENT FRAMEWORK PLAN
AND
SALMON RUNS' STATUS
FOR THE
HOOD CANAL REGION**

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 2000 Runs and Fisheries | Page 1 |
| 2000 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 9 |
| Pre-Season Management Framework | Page 13 |
| 2000 Harvest Management Measures and Expected Fisheries | Page 13 |
| Commercial Fisheries | Page 13 |
| Hood Canal Mainstem | Page 14 |
| Extreme Terminal Marine Areas | Page 15 |
| Hood Canal Rivers | Page 16 |
| Test and Evaluation Fisheries | Page 16 |
| Recreational Fisheries | Page 16 |
| Hood Canal Marine Areas (CRC Area 12) | Page 16 |
| Hood Canal Rivers | Page 17 |
| Other Recommended Measures | Page 17 |
| Inseason Run Size Updates | Page 18 |
| APPENDIX | Page 19 |
| Preseason Forecasting Methods | Page 21 |
| Summer/Fall Chinook Salmon | Page 21 |
| Summer Chum Salmon | Page 23 |
| Coho Salmon | Page 25 |
| Fall Chum Salmon | Page 29 |

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 so 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 2000 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 (available for net fisheries and escapement, and excluding non-landed mortalities, troll, recreational, ceremonial and subsistence harvests not taken in net fisheries) are outlined in this report by management unit. For coho, chinook, and summer chum salmon, forecasts of abundance, anticipated harvests, and escapements, are based on the total anticipated recruits and all intercepting fisheries. Agreed-upon escapement goals, expected escapements (those that would result under the parties' management framework) for each management unit (natural and hatchery, primary and secondary), expected harvests, test and evaluation fishery requirements, and pre-season as well as in-season run assessment methods are included. Detailed information concerning the methods used to forecast the abundance of each run, as well as to obtain in-season abundance updates is presented in Appendix A.

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 contingency measures contemplated by the parties for use in-season, should the need arise.

1.2 Summary of the 2000 Runs and Fisheries

Of the runs returning to Hood Canal, the summer chinook and early fall chum runs 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, in 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. No directed harvest is planned, prior to the fishing season, for chinook salmon in Hood Canal terminal area fisheries.

A limited treaty fishery for chinook salmon is anticipated in Area 12C where Hoodspout hatchery returns will provide for some 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, 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 - 3.4) are provided as a preseason guide for harvest and conservation planning. It is generally recommended that harvests be conservative prior to obtaining in-season estimates of run abundance. The actual run sizes may deviate from the forecasts because of statistical variability, unusual rates of survival (high or low), or unanticipated changes in exploitation rates in prior fisheries. Methods used to derive the preseason forecasts for 2000 are detailed in Appendix A of this report. In most cases, the escapement goals indicate the currently accepted estimate of escapement abundance necessary to provide for future maximum sustainable harvest (MSH), under average progeny survival conditions. 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 2000 recruits. That rate was established at a level equal to, or higher than, the minimum escapement rate allowable for the 2000 forecasted recruitment (30%), under the stepped exploitation rate management approach, which has been implemented for Hood Canal (primary) natural coho. Expected escapements are those that would result from the stated forecasts after fisheries consistent with the parties' preseason planned management framework.

2. 2000 Fishery Management Periods

| AREA | SPRING CHINOOK | SUMMER CHINOOK | SUMMER CHUM | COHO | E. FALL CHUM | L. FALL CHUM | WINTER STLHD |
|--------------------------|----------------|----------------|-------------|-------------|--------------|--------------|--------------|
| 9A | --- | --- | --- | 09/10-11/04 | 11/05-12/02 | --- | 12/03-03/31 |
| 12A | --- | --- | 09/03-09/30 | 08/30-10/14 | 10/15----- | -----12/23 | --- |
| 12 | 04/16-07/15 | 07/16-09/05 | 09/03-09/23 | 09/10-10/14 | 10/15-11/20 | --- | --- |
| 12B | 04/16-07/15 | 07/16-09/12 | 09/03-9//30 | 09/14-10/21 | 10/22-11/20 | --- | --- |
| 12C | 04/16-07/15 | 07/16-09/19 | 08/27-09/30 | 09/17-10/28 | 10/29-11/27 | --- | --- |
| 12D | 04/16-07/15 | 07/16-09/19 | 08/27-09/23 | 09/17-10/28 | 10/29-11/27 | --- | --- |
| Quilcene R | --- | --- | 09/10-10/07 | 09/01-10/21 | 11/12----- | -----01/06 | 12/10-04/14 |
| Dosewallips Duckabush | --- | 08/13-09/20 | 09/10-10/14 | 09/22-11/11 | 11/12----- | -----12/30 | 12/10-04/14 |
| Skokomish R | 05/01-07/29 | 07/30-09/23 | | 09/24-11/11 | 11/12-12/04 | -----12/30 | 12/10-4/14 |
| Union R. | --- | | 09/10-09/30 | 09/22-11/11 | 11/12----- | -----12/30 | 12/10-04/14 |
| Misc. HC Tribs. | — | 08/13-09/23 | --- | 09/24-11/11 | 11/12----- | -----12/30 | 12/10-04/14 |

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 2000, 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

| Production Unit | Puget Sound Run | Pre-Term Harvest | Terminal Run | Terminal & Extr. Term Harvest | Expected Escapement | Min. Escapement Target |
|-----------------------|-----------------|------------------|---------------|-------------------------------|---------------------|------------------------|
| Area 12B (Natural) | 272 | 34 | 239 | 8 | 231 | 231 |
| Area 12C (Natural) | 67 | 8 | 59 | 3 | 56 | |
| Hoodspport (Hatchery) | 10,421 | 1,289 | 9,132 | 862 | 8,270 | 2,500 |
| Skokomish R | | | | | | |
| Natural | 2,277 | 282 | 1,996 | 1,002 | 994 | 800 |
| Hatchery | 8,672 | 1,072 | 7,599 | 4,545 | 3,054 | 2,500 |
| Area 12D (Natural) | 343 | 42 | 301 | 17 | 284 | |
| Totals | 22,052 | 2,727 | 19,326 | 6,437 | 12,889 | 6,031 |

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. Management planning expects to continue closures of directed chinook fisheries within Hood Canal catch areas in 2000.

The above table was prepared using the results of the final PFMC simulation model run FRAM #0800 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 (including commercial net, troll, marine and freshwater recreational). For further details on the methods used to estimate the above forecasts, see Appendix A-1. It is estimated that approximately 2,700 chinook, 12.4% of the run entering Puget Sound, will be harvested prior to entering Hood Canal. Escapement targets for natural spawning areas are based on the Order Re: Hood Canal Management Plan (Proc. 83-8) as well as preseason interagency agreements and are listed here primarily for reference purposes, since the preseason planning was based primarily on total exploitation rates. 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.

3.2 Summer Chum Salmon

| Management Unit | Total Recruits | CDN Harvest | WA Mixed Harvest | Terminal Harvest | Extr. Terminal Harvest | Expected Escapement | Minimum Escapement Threshold |
|-----------------|----------------|-------------|------------------|------------------|------------------------|---------------------|------------------------------|
| Quilcene/Dabob | 3,945 | 249 | 98 | 138 | 79 | 3,380 | 1,110 |
| Mainstem HC | 2,601 | 164 | 65 | 91 | 0 | 2,281 | 2,660 |
| SE Hood Canal | 442 | 28 | 11 | 16 | 0 | 388 | 300 |
| Totals | 6,988 | 441 | 174 | 245 | 79 | 6,049 | 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 2000 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 (evolutionarily 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 2000, 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 units are managed as secondary, additional attention is being given in the development of harvest management strategies to provide the needed protection for summer chum rehabilitation in the ESU.

In 2000, 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 USFWS, WDFW, and Tribes will cooperate in collecting (from the Area 12A fishery and the Quilcene freshwater areas) all usable, up to 300 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.

3.3 Coho Salmon

| Management / Production Units | | | | | | | |
|--------------------------------|-----------------------------|----------|--------------------------|--------------------------|------------------------|---------|--------|
| Fishery | 12/12B/12C/12D Skokomish | | 9A | 12A | Subtotals | | Total |
| | Natural | Hatchery | Aggregate ⁽³⁾ | Aggregate ⁽³⁾ | Hatchery & SecNat'l | Natural | |
| Recruits | 61,000 | 11,227 | 2,350 | 23,571 | 37,148 | 61,000 | 98,148 |
| Canada | 291 | 51 | 11 | 107 | 169 | 291 | 460 |
| S.Falcon Tr/Rec | 70 | 20 | 4 | 43 | 67 | 70 | 137 |
| N.Falcon Tr/Rec | 2,351 | 778 | 161 | 1,634 | 2,573 | 2,351 | 4,924 |
| P.S. Troll | 168 | 29 | 6 | 61 | 96 | 168 | 264 |
| Strait Rec. | 1,447 | 1,321 | 276 | 2,773 | 4,370 | 1,447 | 5,817 |
| SJI Rec. | 258 | 46 | 10 | 97 | 153 | 258 | 411 |
| Area 9 Rec. | 2,261 | 374 | 78 | 785 | 1,237 | 2,261 | 3,498 |
| S. Sound Rec. | 2,055 | 354 | 74 | 743 | 1,171 | 2,055 | 3,226 |
| Strait Net | 766 | 130 | 27 | 272 | 429 | 766 | 1,195 |
| SJI Net | 706 | 115 | 24 | 242 | 381 | 706 | 1,087 |
| No. Sound Net | 71 | 11 | 2 | 22 | 35 | 71 | 106 |
| So. Sound Net | 961 | 152 | 31 | 319 | 502 | 961 | 1,463 |
| Hood Canal Rec. | 582 | 98 | 20 | 206 | 324 | 582 | 906 |
| HC Rivers Rec. | 285 | 102 | 0 | 557 | 659 | 285 | 944 |
| HC Mainstem Net ⁽¹⁾ | 3,967 | 701 | 147 | 1,472 | 2,320 | 3,967 | 6,287 |
| Area 9A Net ⁽²⁾ | 497 | 67 | 1,394 | 99 | 1,560 | 497 | 2,057 |
| Area 12A Net ⁽²⁾ | 769 | 205 | 1 | 9,444 | 9,650 | 769 | 10,419 |
| Skokomish R. Net | 4,274 | 1,843 | 0 | 0 | 1,843 | 4,274 | 6,117 |
| Mgt Unit Harvest | 21,779 | 6,397 | 2,266 | 18,876 | 27,539 | 21,779 | 49,318 |
| Mgt Unit Escap. | 39,221 | 4,830 | 84 | 4,695 | 9,609 | 39,221 | 48,830 |
| Min. Escap. Goal | 18,300 | 550 | 200 | 2,400 | 3,150 | 18,300 | 21,450 |

- Notes: (1) The “Mainstem” harvest will also include harvest of 241 coho salmon from “non-local” management/production units which are not shown in the above table. The “9A Net” harvest will also include 300 coho salmon from “non-local” management/production units which are not shown in the above table.
- (2) The proportion of “natural” coho in these fisheries was estimated separately, through cohort reconstruction, therefore it is not in agreement with Puget Sound run reconstruction figures, published elsewhere.
- (3) 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(wild and hatchery) Hood Canal run of Age-3 recruits was forecast to be 98,148, consisting of 68,118 natural (61,000 primary and 7,118 secondary) and 30,030 hatchery coho. This reflects the parties agreed to model input values as documented in a MOU dated March 16, 2000 at the North of Falcon PFMC management process in year 2000. The methods used to develop the 2000 PNPTC Hood Canal coho forecasts are further detailed in Appendix A-3 of this report.

Table 3.3 is based on the results of the preseason FRAM model run #0024, and does not include estimated natural mortality in 2000. 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 model run #0024 and its associated Terminal Area Modules. 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 70%, 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 2000 forecasted abundance.

The escapement goals 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 2000 in order to accommodate proposals to modify the brood origin of coho used in the Quilcene Bay and Port Gamble net pen programs.

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, 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 2000 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 forecasts for this season were prepared during the last part of September and early October. Given this, unresolved methodological differences between the PNPTC and WDFW forecasts remain, and both versions are presented below.

Pre-terminal catches are expected to occur exclusively 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 5,800 at the Strait of Juan de Fuca (SJF) and 0 at the San Juan Islands (SJI). This is assuming the pre-season forecasted ceiling level of 50,000 chum salmon in the Strait (expected catch of less than 20,000), and the expectation of no fishery in the San Juans, given the low forecast of British Columbia "clockwork" runs. 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 rules contained in the court-adopted intertribal agreements (for SJF), and provisions of Annex IV, Ch. 6 of the PST and State-Tribal agreements (for SJI), as well as pre-season forecasts of abundance of chum salmon returning to Puget Sound and the "inside" areas of British Columbia.

The proportion of the escapement to be taken at the Hoodsport Hatchery versus the George Adams/McKernan Hatchery complex, is based on the management objectives of meeting the combined Hoodsport/Skokomish River hatchery escapement, 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 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, the goals form a management guideline for secondary management unit protection. The methodology used to develop the WDFW 1999 fall chum salmon forecast is described in Appendix A-4 of this report.

3.4.1 Fall Chum Salmon Summary (PNPTC Approach)

| Management and Production Units | "4B" Run | Pre-Term Harvest | Terminal Run | Terminal Harvest | Extr. Term Harvest | Expected Escapement | Escapement Goal |
|---------------------------------|----------------|------------------|----------------|------------------|--------------------|---------------------|-----------------|
| AREA 9A | | | | | | | |
| Natural | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hatchery | 4,091 | 33 | 4,058 | 3,494 | 507 | 57 | 0 |
| AREA 12 | | | | | | | |
| Natural-Augmented | 5,746 | 46 | 5,700 | 4,908 | 0 | 792 | 3,900 |
| AREA 12A | | | | | | | |
| Natural | 24,558 | 196 | 24,362 | 6,922 | 0 | 17,440 | 1,250 |
| Hatchery | 10,487 | 84 | 10,403 | 4,927 | 0 | 5,476 | 3,100 |
| AREA 12B | | | | | | | |
| Natural-Augmented | 230,763 | 1,840 | 228,923 | 65,054 | 0 | 163,869 | 18,750 |
| AREA 12C | | | | | | | |
| Natural-Augmented | 73,843 | 589 | 73,254 | 63,076 | 0 | 10,178 | 7,000 |
| Hoodsport Hatchery | 116,082 | 926 | 115,156 | 99,156 | 0 | 16,000 | 16,000 |
| Enetai Hatchery | 13,370 | 107 | 13,263 | 7,309 | 0 | 5,954 | 1,900 |
| AREAS 82G/J (Skokomish R.) | | | | | | | |
| Natural | 28,806 | 230 | 28,576 | 14,764 | 750 | 13,062 | 9,800 |
| G.Adams-McKernan Hat | 84,694 | 675 | 84,019 | 72,345 | 3,674 | 8,000 | 8,000 |
| AREA 12D | | | | | | | |
| Natural-Augmented | 134,857 | 1,075 | 133,782 | 115,194 | 0 | 18,588 | 13,550 |
| Totals | 727,296 | 5,800 | 721,496 | 457,149 | 4,931 | 259,416 | 114,250 |

3.4.2 Fall Chum Salmon Summary (WDFW Approach)

| Management and Production Units | "4B" Run | Pre-Term Harvest | Terminal Run | Terminal Harvest | Extr. Term Harvest | Expected Escapement | Escapement Goal |
|---------------------------------|----------------|------------------|----------------|------------------|--------------------|---------------------|-----------------|
| AREA 9A | | | | | | | |
| Natural | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hatchery | 2,934 | 33 | 2,901 | 2,565 | 303 | 33 | 0 |
| AREA 12 | | | | | | | |
| Natural-Augmented | 3,497 | 39 | 3,458 | 3,057 | 0 | 401 | 3,900 |
| AREA 12A | | | | | | | |
| Natural | 13,547 | 151 | 13,396 | 3,908 | 0 | 9,488 | 1,250 |
| Hatchery | 8,367 | 93 | 8,274 | 4,023 | 0 | 4,251 | 3,100 |
| AREA 12B | | | | | | | |
| Natural-Augmented | 112,519 | 1,250 | 111,269 | 32,478 | 0 | 78,791 | 18,750 |
| AREA 12C | | | | | | | |
| Natural-Augmented | 33,957 | 377 | 33,580 | 29,687 | 0 | 3,893 | 7,000 |
| Hoodsport Hatchery | 174,470 | 1,939 | 172,531 | 152,531 | 0 | 20,000 | 20,000 |
| Enetai Hatchery | 12,256 | 136 | 12,120 | 6,858 | 0 | 5,262 | 1,900 |
| AREAS 82G/J (Skokomish R.) | | | | | | | |
| Natural | 16,945 | 188 | 16,757 | 8,889 | 695 | 7,173 | 9,800 |
| G.Adams-McKernan Hat | 86,389 | 960 | 85,429 | 75,526 | 5,903 | 4,000 | 4,000 |
| AREA 12D | | | | | | | |
| Natural-Augmented | 57,069 | 634 | 56,435 | 49,893 | 0 | 6,542 | 13,550 |
| Totals | 521,950 | 5,800 | 516,150 | 369,415 | 6,901 | 139,834 | 114,250 |

4. Pre-Season Management Framework

4.1 2000 Harvest Management Measures and Expected Fisheries

In 2000, the condition of the salmon runs returning to the 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 5,000 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 were taken in response to the listing of Puget Sound chinook salmon as threatened, under the ESA. The Hood Canal chinook 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, chinook fisheries will only be implemented in Area 12C and in the Hoodsport hatchery zone. 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 stocks were pursued during the 2000 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 2000. The BCR is based on a series of management measures, which are expected to effectively reduce incidental impact to the summer chum 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 conservation and recovery of the Hood Canal mainstem management unit.

In 2000, early-fall chum 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 return. Therefore, significant harvests are expected during the early-fall chum management period.

4.1.1 Commercial Fisheries

All commercial fishery openings, restrictions, and closures outlined, are those which were scheduled 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, then 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 during the entire 2000 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 and 12B. However, a chinook-directed fishery in Area 12C (Jul. 16 - Aug. 24) will be implemented in 2000. Gillnets shall be restricted to 7" minimum mesh size after July 31. A Hoodspout hatchery zone fishery may also be implemented, as necessary to harvest surpluses, from July 30 through September 2. This fishery shall be required to selectively release all chum salmon. In the hatchery zone, hook-and-line gear may be operated continuously and beach seine gear may be operated during daylight hours, on Tuesdays and Thursdays. These preseason measures may be modified on the basis of in-season information.

During the coho management period, Area 12 may be open for gillnet gear after 9/24. In Areas 12B, 12C, and 12D (west of Madrona Pt.) gill net fisheries may start no earlier than the week of October 1. In all areas, selective gear may be used up to a week earlier and will be required to release chum salmon, as well as chinook salmon (in Areas 12 and 12B).

After 9/24 (Area 12) and 9/30 (Areas 12B, 12C, 12D), the fisheries have been initially planned to operate on a 4-5 days per week schedule. During these fisheries, the area within 500' from the western shore of Areas 12B and 12C, 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 (in Area 12B).

During the fall chum management period, commercial fisheries in Area 12 will start on October 15, followed by the openings of Areas 12B (October 22) and 12C (October 29). Treaty Indian fisheries in these areas will continue on a seven-days-per-week schedule for the remainder of the period, through November 18 (Areas 12 and 12B), and November 25 (Area 12C).

In addition to the mainstem set, drift gillnet and beach seine fisheries for early fall chum salmon, Treaty Indian beach seine fisheries may be authorized for up to two days per week in the Hoodspout Hatchery zone (after November 1, and through December 2) if inseason information indicates an otherwise unharvestable surplus. 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 the closure zone.

Non-treaty fisheries for fall chum and coho in Areas 12 and 12B will start the week of October 15. In Areas 12 and 12B, fisheries are anticipated to occur initially (first 2 weeks) for 1 day per week and, depending on in-season management considerations, for 2 days per week for the next two weeks, ending no later than November 18. Fisheries in Area 12C may follow, as necessary, after November 12, ending no later than the week of November 19. 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 to coho and chinook, 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 10/01, no commercial net fisheries are anticipated in 2000 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. Treaty fisheries will also target hatchery origin chum salmon. Also, 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 September 9, using set net 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 in this area shall operate inside Port Gamble Bay, continuously, from September 17, through October 28 and shall be required to release all chum salmon through 9/30.

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 2000. 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 2000. This program has been developed cooperatively by the Point No Point Treaty Council (PNPTC), Washington Department of Fish and Wildlife (WDFW), and the U.S. Fish and Wildlife Service (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 preseason 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 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 management period, and extending into the fall chum period, treaty and non-treaty fisheries will generally be limited to beach seine and hook-and-line gear, opened daytime hours from August 27, through October 14, 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 on a one day per week schedule, starting the week of August 27. The gill net fishery will be monitored during the season to evaluate harvest of hatchery coho and incidental chum catch. Inseason management measures will take into consideration summer chum 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 management period, Area 12A shall remain closed, in order to provide secondary protection. Openings in this area during the late fall chum period may only occur if a harvestable hatchery surplus is identified.

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

In the Skokomish River (Area 82G), during the chinook management period, fisheries may open from 7/30 and shall continue through the coho and chum season with a gillnet closure below SR 106 through 9/30, in order to protect any summer chum salmon dip ins.

During the coho management period, fisheries will start in the week of September 24, and may proceed on a 2-5 days-per-week schedule through the remainder of the coho management period. During the first week, the area downstream of SR 106 shall remain closed to gillnet gear.

During the fall chum management period, fisheries of approximately 4-7 days per week may be authorized starting the week of November 12. At the end of the early-fall chum fishery (after December 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 3.

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. From 9/3 through 10/21 hand held gear (dip nets, hand lines, etc.) may be allowed for the harvest of coho salmon in areas upstream from Rogers Street. No commercial net fisheries will be authorized in any of the other Hood Canal streams in 2000.

4.1.2 Test and Evaluation Fisheries

In 2000, no test fisheries are anticipated in any Hood Canal marine or freshwater areas. The sole exception may be a test fishery designed to collect biological information from steelhead salmon entering the Skokomish River, starting in the month of December. More detailed information on that test fishery may be found in the 2000-2001 Status Report on Steelhead.

4.1.3 Recreational Fisheries

4.1.3.1 Hood Canal Marine Areas (CRC Area 12)

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

From September 1 through October 15 the entire area shall be open with a two salmon bag limit, except for the Quilcene/Dabob bays area (north of a line drawn due east from Pt. Whitney), where a bag limit of 4

coho shall apply from 8/16 through 10/15. In all Hood Canal marine areas there will be a mandated release of all chinook and chum salmon, through 10/15, in order to avoid undue impacts to these runs which are predicted to return at levels lower than those needed to meet escapement requirements.

From October 16 through December 31, the bag limit shall remain at two fish, with daily retention of up to 1 chinook (22" min size) salmon. Area 12 will be closed to the taking of salmon, from January 1 through February 15, 2001. From February 16 through April 10 the area will be open with a one fish possession limit, from April 11 through April 30, 2001 the entire area will be closed.

In the Hoodspout Hatchery zone, described as waters within 2,000 feet of the mouth of Finch Creek (outside the year round closed area noted below), up to 2 chinook salmon may be retained, within the 4 salmon bag limit, from July 1 through December 15, 2000. Chum salmon may not be retained from 7/1 through 10/15. The Hoodspout Hatchery zone fishery shall be limited to daytime use only.

The area within 100 feet of Finch Creek (area marked with buoys), adjacent to the Hoodspout 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.

4.1.3.2 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 October 15 (6 fish bag limit, two adult limit of which no more than 1 can be an adult chinook). During this fishery, chum salmon may not be retained. From October 16, through December 15, same as above, except chum salmon may be retained.

The Big Quilcene River will be open to salmon angling August 16- October 31 with a limit of 2 coho salmon above Rogers street. Release of all chum and chinook shall be required.

The Duckabush River shall be open, downstream of the PUD power line crossing, from November 1 through December 15, with a two chum salmon bag limit, and the Dosewallips River shall be open downstream of the U.S. Hwy. 101 bridge from November 1 through December 15, with a two chum salmon bag limit.

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, designed to provide for in-season reassessment of the 2000 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:

During the coho fisheries in Areas 12 and 12B, from late September, through mid October, chum salmon tissue samples should be taken (up to 200 per week). Prior to October 11, this information will be used to attempt to distinguish the proportions of summer vs. fall chum salmon in the coho fishery bycatch. During this period, it is also recommended that the collection of additional GSI and DNA tissue samples, from chum salmon, be actively pursued using a purse seine test fishery in the Hood Canal mainstem. After October 11, any further sampling would be part of a continuing annual series whose goal is to assess the stock composition of the Hood Canal chum fisheries, with the specific objective being to assess the contribution of non-Hood Canal origin fall chum salmon, and their individual region of origin. At the same time, scale samples should be collected, in order to maintain a long data series on brood year survival and fishery contributions.

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.

Emphasis should be placed on the recovery of coded-wire tags from chinook and coho salmon in Hood Canal fisheries which are crucial to annual escapement, survival rate estimation and run reconstruction.

4.3 Inseason Run Size Updates

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

In the Quilcene area, in-river escapement estimates for coho and summer chum salmon shall be used in-season to assist in decision making regarding the potential adjustment of fishery restrictions.

For fall chum salmon returning to Hood Canal, fisheries may be adjusted on the basis of in-season information regarding treaty/nontreaty catch progression, as well as escapement progression into the Hoodsport hatchery.

APPENDIX

A. Preseason Forecasting Methods

A. Preseason Forecasting Methods

A-1. Summer/Fall Chinook Salmon

The 2000 forecast of summer-run Hood Canal chinook salmon is the product of brood 1996 fingerling lbs released from WDFW facilities, multiplied by the average of post-season estimated terminal area return rates (terminal run / fingerling lbs released 3 yrs previous) for the last five return years (1995-1999), which are believed to represent current survival rates. The terminal area forecast was expanded to the "Area 4B" run using the mean of the 1995-98 post-season estimated proportion (0.98757). The resulting terminal area run forecast is 18,917 chinook salmon, and the Area 4B forecast is 19,155. The Hood Canal Area 4B forecast of 19,155 was apportioned to 16,584 hatchery fish (39.3% George Adams and 47.3% Hoodspport hatchery) and 2,571 (13.4%) natural fish based on the Puget Sound run reconstruction-based relative contribution of individual Hood Canal management units in the 1995-99 return years. These estimates were then 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 | 0.34304 | 30,582 | | |
| 2000 | 87,306 | | 18,917 | 19,155 | |
| Average | | 0.21668 | | | 0.98757 |

(*) : 1999 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 | 873 | 116 | 334 | 2,794 | 12,651 | 13,814 | 30,582 |

Note: The 1999 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 |
|-----------------------|------------|------------|------------|------------|------------------|----------------|-------------------|
| 1995 | 0.00076 | 0.01123 | 0.00022 | 0.05351 | 0.15237 | 0.56632 | 0.21559 |
| 1996 | 0.00098 | 0.00295 | 0.00012 | 0.00012 | 0.12239 | 0.38130 | 0.49213 |
| 1997 | 0.00346 | 0.00077 | 0.00192 | 0.00090 | 0.05791 | 0.24177 | 0.69327 |
| 1998 | 0.00269 | 0.01751 | 0.00903 | 0.01141 | 0.08623 | 0.36305 | 0.51007 |
| 1999 | 0.00000 | 0.02855 | 0.00379 | 0.01092 | 0.09136 | 0.41367 | 0.45170 |
| '95 - '99 Mean | 0.00158 | 0.01220 | 0.00302 | 0.01537 | 0.10205 | 0.39322 | 0.47255 |

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

| Hood Canal Production Unit | 4B Run Forecast | Proportion |
|-----------------------------------|------------------------|-------------------|
| 12B | 236 | 0.01235 |
| 12C | 59 | 0.00306 |
| 12D | 298 | 0.01555 |
| Skokomish | 1,978 | 0.10327 |
| Natural Subtotal | 2,571 | 0.13423 |
| George Adams | 7,532 | 0.39322 |
| Hoodsport | 9,052 | 0.47255 |
| Total | 19,155 | 0.86577 |

Note: The forecasted proportions are derived from the 1995-1999 mean return.

A-2. Summer Chum Salmon

A-2.1 Natural Runs

The 2000 forecast of the Hood Canal natural summer-timed chum salmon returns was forecast as total recruitment to 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 8 years' (two four-year cycles) returns, as estimated by the current run reconstruction (Table A-2-a). No 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 2,601 for the Mainstem and 442 for the SE Hood Canal units, for a total of 3,043. Additionally, summer chum salmon are expected to return to Big Beef Creek (Mainstem unit) from an experimental reintroduction project. However, that number is small and not presently quantifiable.

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 at the Quilcene National Fish Hatchery. The forecasted recruitment to all fisheries and escapement is 3,945. 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 | 1,942 | 1,236 | 183 | 3,361 |
| 1993 | 397 | 183 | 284 | 864 |
| 1994 | 1,164 | 894 | 892 | 2,950 |
| 1995 | 4,394 | 4,822 | 760 | 9,976 |
| 1996 | 10,758 | 9,792 | 511 | 21,061 |
| 1997 | 680 | 8,199 | 493 | 9,372 |
| 1998 | 752 | 3,178 | 253 | 4,183 |
| 1999* | 717 | 3,257 | 161 | 4,135 |
| 2000 Forecast (‘92-‘99 Mean) | 2,601 | 3,945 | 442 | 6,988 |

* 1999 Data is preliminary and subject to revision.

A-3. Coho Salmon

A-3.1 Natural Runs

A-3.1.1 PNPTC Forecast

The forecast of Hood Canal natural runs was expressed in units of December Age-2 recruits, using a historical relationship between total emigrating smolts from Big Beef Creek (BBC) and the following year's total Hood Canal natural coho recruit volume (as estimated through cohort reconstruction, using coded wire tag data (CWT)). Hood Canal terminal catch and escapement were reconstructed using the RRTERM program which utilizes CWT data where available. The annual abundance of December Age-2 recruits was estimated as the sum of the third year mortalities plus escapement.

The 2000 forecast of December Age-2 coho recruits returning to natural spawning areas was initially based on the average of the Hood Canal December Age-2 recruits per Big Beef Creek smolt from brood year 1990, through brood year 1995 (two 3-year cycles), multiplied by the number of emigrating Big Beef Creek smolts, from brood year 1997. However, brood year 1991 was excluded from this calculation because of the exceptionally high rate of return, which may be unlikely to occur in 2000. This method is intended to be responsive to recent years' brood freshwater and marine survivals (Table A-3-a).

A-3.1.2 PNPTC/WDFW Coho Reconciliation of Forecasts for 2000

The WDFW prepared a forecast based on estimating a smolts per spawner ratio for brood year 1997, using BBC data. That ratio was then expanded to the rest of Hood Canal, using a habitat-based fixed proportion, to derive an estimate of total emigrating smolts which were then adjusted for estimated marine survival. We were unable to resolve technical differences between the two forecasts, therefore in order to reach agreement, several technical issues were compromised including the addition of a preliminary estimate of BY 1996 recruitment to the data series and limiting the forecast to using BY 94-96 data to reflect "very recent conditions".

The recruit estimates obtained from the PNPTC method of DA2/BBC emigrant and the WDFW method of 14.3 smolts per female spawner times the BY 97 total spawners, times the average of the WDFW estimated marine survival of BY 94-96, were averaged resulting in 65,058 primary Age 3 coho and 72,650 total natural coho (including secondary). Policy level decisions further adjusted these forecasts to 61,000 primary Age 3 and 68,118 total Age 3 coho, for use during the preseason 2000 PFMC and "North Of Falcon" simulation modeling and planning purposes. The above Age 3 forecasts correspond with 81,313 primary natural Dec. Age-2 and 90,802 total natural Dec. Age-2 coho salmon recruits.

A-3.1.3 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 90,802 natural December Age-2 recruits was apportioned into 81,313 from primary units and 9,489 from secondary units based on the proportion of escapement capacity in the primary management units (89.55% of the total) and the secondary management units (10.45% of the total) (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-a. 2000 Hood Canal Natural Coho Forecast Data

| Brood Year | Big Beef Crk Smolts (Tagged and Untagged) | Hood Canal Total Dec Age-2 Recruits | HC Recruits per BBC Smolt |
|----------------------|--|--|--|
| 1975 | 35,025 | | |
| 1976 | 17,619 | | |
| 1977 | 45,634 | | |
| 1978 | 20,715 | | |
| 1979 | 41,054 | | |
| 1980 | 25,225 | | |
| 1981 | 25,333 | | |
| 1982 | 36,636 | | |
| 1983 | 25,720 | 211,127 | 8.2087 |
| 1984 | 24,479 | 232,860 | 9.5126 |
| 1985 | 11,510 | 40,236 | 3.4957 |
| 1986 | 26,534 | 117,460 | 4.4268 |
| 1987 | 17,594 | 118,316 | 6.7248 |
| 1988 | 19,565 | 70,422 | 3.5994 |
| 1989 | 23,646 | 61,949 | 2.6199 |
| 1990 | 18,677 | 64,929 | 3.4764 |
| 1991 | 13,071 | 138,845 | 10.6224 |
| 1992 | 18,431 | 94,029 | 5.1017 |
| 1993 | 16,201 | 71,422 | 4.4085 |
| 1994 | 25,531 | 145,541 | 5.7006 |
| 1995 | 40,848 | 267,282 | 6.5433 |
| 1996 | 22,222 | 33,233 | 1.4955 |
| 1997 | 20,967 | | |
| 2000 PNPTC Forecasts | | | |
| '90,92-95 Mean | 23,938 | 105,801 | 5.0461 |
| '94-96 Mean | 29,534 | 96,025 | 4.5798 |

Note: BY 1996 values are preliminary and subject to revision.

Table A-3-b. Apportionment of the Consensus 2000 Hood Canal Natural Coho Forecast

| Area | Mean MSY Escapement Capacity | Management Unit Type | Proportion of Escapement Capacity | December Age-2 Recruits |
|---------------------------|------------------------------|----------------------|-----------------------------------|-------------------------|
| 12 / 12B | 6,921 | Primary | 28.88% | 26,224 |
| 12C / 12D | 7,587 | Primary | 31.66% | 28,748 |
| Skokomish | 6,953 | Primary | 29.01% | 26,342 |
| 9A / 12A | 2,504 | Secondary | 10.45% | 9,489 |
| Primary Subtotal | 21,461 | | 89.55% | 81,313 |
| Secondary Subtotal | 2,504 | | 10.45% | 9,489 |
| Grand Total | 23,965 | | 100.00% | 90,802 |

A-3.2 Hatchery Runs

The initial forecast, made by PNPTC, utilized survival rates from the 1990 through 1995 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 final 2000 forecast of 40,029 hatchery reared December Age-2 coho recruits (Table A-3-d) was predicted from brood year 1997 smolt releases multiplied by the average estimated marine survival rate for each facility's smolts from the two latest available brood years. In most cases, this meant brood years 1994 and 1995. In the case of the Quilcene Bay pens, the brood years used are 1993 and 1995 because there were no releases from brood year 1994 (Table A-3-c). This procedure was used as a compromise approach, following the "latest years available" approach used for natural runs. In the case of natural runs, broods 1994-1996 were used and the same series was used for hatchery runs, except that the brood year 1996 survival data were unavailable.

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 | <i>4,363</i> | <i>0.05098</i> | | |
| 1986 | 337,700 | 32,908 | 0.09745 | 429,141 | 29,183 | 0.06800 | 574,171 | <i>98,188</i> | <i>0.17101</i> | 193,522 | <i>16,075</i> | <i>0.08307</i> | | |
| 1987 | 298,000 | 28,068 | 0.09419 | 407,600 | 157,116 | 0.38547 | 753,390 | 75,121 | 0.09971 | 146,000 | <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 | | | | | |
| 1995 | 434,140 | 5,082 | 0.01171 | 342,828 | 5,324 | 0.01553 | 425,971 | 15,371 | 0.03608 | 220,000 | 795 | 0.00361 | | |
| 1996 | 527,317 | | | 441,656 | | | 452,203 | | | 225,269 | | | | |
| 1997 | 534,554 | | | 103,516 | | | 437,222 | | | 190,006 | | | | |
| Average (1990-95) | | | 0.05051 | | | | 0.05518 | | | | 0.07249 | 0.03333 | | |
| '94-'95 | | | 0.02800 | '94-'95 | | | 0.01931 | '94-'95 | | | 0.05010 | '93,'95 | | 0.00611 |

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

Table A-3-d. Hood Canal Consensus Hatchery Coho Forecast

| Facility | Return Rate to Dec-2 Recruitment | BY '97 Smolts Released | Dec-2 Recruits |
|------------------------|---|-------------------------------|-----------------------|
| G. Adams (Purdy Creek) | 0.02800 | 534,554 | 14,966 |
| Port Gamble Net Pens | 0.01931 | 103,516 | 1,998 |
| Quilcene National FH | 0.05010 | 437,222 | 21,905 |
| Quilcene Net Pens | 0.00611 | 190,006 | 1,160 |
| Totals: | | 1,265,298 | 40,029 |

A-4. Fall Chum Salmon

The 2000 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. Information used to generate the final forecasts was unavailable, until late September 2000. Therefore, given the fact that the runs and fishing season had already started in many Puget Sound areas, no attempt was made to reconcile the PNPTC and WDFW forecasts. The following descriptions of methods and source data are intended to provide documentation of the methods and approaches used.

A-4.1 Natural Runs

A-4.1.1 PNPTC Forecasting Approach

The 2000 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 1991-1996. The mean recruit-per-spawner return rates were 0.8293, 1.7505, and 0.1122 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 1997, 1996, and 1995 brood escapements (53,492; 251,803; and 119,344, respectively) to estimate the 2000 forecast of 498,528 Hood Canal natural fall chum returning to Area 4B.

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 in stream 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 | 20,871 | 1.48264 | 8.26697 | 0.80915 | 10.55876 |
| 1991 | 44,745 | 0.59753 | 1.95083 | 0.12931 | 2.67767 |
| 1992 | 96,382 | 2.38730 | 4.20484 | 0.19860 | 6.79074 |
| 1993 | 67,770 | 1.07000 | 1.35159 | 0.10130 | 2.52289 |
| 1994 | 151,821 | 0.30530 | 0.88726 | 0.01963 | 1.21219 |
| 1995 | 119,344 | 0.58343 | 0.35791 | | |
| 1996 | 251,803 | 0.03203 | | | |
| 1997 | 53,492 | | | | |
| 1998 | 101,631 | | | | |
| Mean: Brood Years 1968-96 (exclusive of outliers, in bold) | | | | | |
| All Odd Years | 36,378 | 1.63212 | 2.92750 | 0.33511 | 5.57845 |
| All Even Years | 63,216 | 0.87989 | 3.57385 | 0.33727 | 4.85156 |
| All Years | 50,260 | 1.22914 | 3.26264 | 0.33627 | 5.18705 |
| Mean: Brood Years 1991-96 (exclusive of outliers, in bold) | | | | | |
| All Years | 121,978 | 0.82927 | 1.75049 | 0.11221 | 3.30087 |

Table A-4-b. 2000 Hood Canal Natural Fall Chum Parent Brood Escapement Distribution

| Area | 1997 | 1996 | 1995 |
|------|--------|--------|--------|
| 9A | 0.00% | 0.00% | 0.00% |
| 12 | 2.61% | 1.02% | 0.12% |
| 12A | 6.65% | 4.51% | 12.95% |
| 12B | 54.24% | 45.69% | 39.75% |
| 12C | 10.90% | 15.08% | 19.02% |
| 82G | 13.62% | 5.05% | 3.70% |
| 12D | 11.97% | 28.65% | 23.36% |

Table A-4-c. Apportionment of the 2000 PNPTC Hood Canal Natural Fall Chum Run

| Area | 3's | 4's | 5's | Total |
|--------------|---------------|----------------|---------------|----------------|
| 9A | 0 | 0 | 0 | 0 |
| 12 | 1,158 | 4,500 | 16 | 5,674 |
| 12A | 2,950 | 19,875 | 1,734 | 24,558 |
| 12B | 24,060 | 201,369 | 5,323 | 230,753 |
| 12C | 4,835 | 66,460 | 2,547 | 73,843 |
| 82G | 6,042 | 22,268 | 496 | 28,806 |
| 12D | 5,310 | 126,300 | 3,129 | 134,739 |
| Total | 44,359 | 440,778 | 13,392 | 498,528 |

A-4.1.2 WDFW Forecasting Approach

The 2000 return of Hood Canal natural fall-timed chum salmon was forecast as a portion of the total return, of all Puget Sound natural chum. The anticipated Puget Sound return was estimated for each age group as follows: Three-year olds were estimated using the mean return per spawner, from odd numbered year broods (1968-1994 broods), times the mean proportion of the total, returning at age 3. Four year olds were estimated by using the 1999 estimated return of 3 year olds and expanding it to total anticipated brood survival (using the mean of the 1968-1994 even year broods), times the mean proportion of 4 year olds. Finally, the five year old return was estimated in a manner similar to that used for four year olds, using the 1998 return of 3 year olds plus the 1999 return of four year olds, expanding it to total anticipated brood survival (using the mean of the 1968-1994 odd numbered year broods), times the mean proportion of 5 year olds (Tables A-4-d and A-4-e).

Finally, the anticipated return, of each age group to Puget Sound, was apportioned to individual regions (including Hood Canal) and into regional production units, using the escapement distribution proportions, in each of the pertinent brood years. (Table A-4-f).

The resulting forecast for Hood Canal was 60,769, 158,145, and 18,342 fall chum salmon, aged 3, 4, and 5, respectively.

Table A-4-d. Puget Sound Mean Recruits per Spawner and Mean Age at Return per Brood Type

| Mean Puget Sound Fall Chum Salmon Return per Spawner and Return by Age (BY 68-94) | | | |
|--|---------------|----------------|---------------|
| | Odd BY | Even BY | All BY |
| Recruits / Spawner | 3.12092 | 2.85929 | 2.98487 |
| Mean Puget Sound Age Distribution per Brood (1968-94 Broods) | | | |
| Age 3 | 0.36401 | 0.17179 | 0.27121 |
| Age 4 | 0.56300 | 0.77589 | 0.66577 |
| Age 5 | 0.07300 | 0.05232 | 0.06301 |

Table A-4-e. Puget Sound Forecast of Fall Chum Salmon, Using the Sibling Return Method

| | Brood Escapement | Mean R/S | Return Completed | Proportion Completed | Mean Proportion at Age | Forecast Return |
|---------------|-------------------------|-----------------|-------------------------|-----------------------------|-------------------------------|------------------------|
| Age 3 (BY 97) | 167,816 | 3.121 | 0 | 0 | 0.36401 | 190,647 |
| Age 4 (BY 96) | | | 122,851 | 0.17179 | 0.77589 | 554,857 |
| Age 5 (BY 95) | | | 929,756 | 0.92701 | 0.07300 | 73,216 |

Table A-4-f. Apportionment of Puget Sound Natural Fall Chum Forecast to Hood Canal and Hood Canal Production Units

| | | Age 3 | | Age 4 | | Age 5 | Total |
|---|---------|---------|---------|---------|---------|--------|---------|
| Puget Sound Forecast | | 190,647 | | 554,857 | | 73,216 | 818,720 |
| Apportionment, Based on Brood Year Escapement Contribution | | | | | | | |
| Hood Canal | 0.31875 | 60,769 | 0.28502 | 158,145 | 0.25052 | 18,342 | 237,256 |
| 12 | 0.02608 | 1,585 | 0.01021 | 1,615 | 0.01210 | 222 | 3,421 |
| 12A | 0.06651 | 4,042 | 0.04509 | 7,131 | 0.12948 | 2,375 | 13,547 |
| 12B | 0.54244 | 32,963 | 0.45685 | 72,249 | 0.39752 | 7,291 | 112,503 |
| 12C | 0.10902 | 6,625 | 0.15078 | 23,845 | 0.19021 | 3,489 | 33,959 |
| 82G | 0.13622 | 8,278 | 0.05052 | 7,990 | 0.03704 | 679 | 16,947 |
| 12D | 0.11972 | 7,275 | 0.28654 | 45,315 | 0.23364 | 4,285 | 56,876 |

A-4.2 Hatchery Runs.

The 2000 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 1995, 1996, and 1997. In estimating the returns, the following information was used for each facility. Methods and results are shown separately for PNPTC and WDFW.

A-4.2.1 PNPTC Hatchery forecasts

Hoodsport Hatchery: Mean return rate of age 3, 4, and 5 fish per pound planted at Finch Creek (1991-1996 broods) (Table A-4-g). The resulting forecast for 2000 is 116,082.

George Adams/McKernan Hatcheries: Mean return rate of age 3, age 4, and age 5 fish per pound planted (1991-96 broods) (Table A-4-h). The resulting forecast for 2000 is 84,694.

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-i). The resulting forecast for 2000 is based on the fingerling releases of 3,511 lbs (BY 97), 2,180 lbs (BY 96), and, 4,097 lbs (BY 95), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 10,487.

Little Boston Hatchery and Port Gamble Pens: Mean return rate of age 3, age 4 and age 5 fish per pound planted at Hoodsport Hatchery (1965-1971 broods) (Table A-4-g). The resulting forecast for 2000 is based on the fingerling releases of 954 lbs (BY 97), 1,296 lbs (BY 96), and 550 lbs (BY 95), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 4,091.

Enetai Hatchery: Mean of the available return rates of age 3, age 4 and age 5 fish per pound planted (1991-1996 broods). The age specific return rates for age 3 (brood 1991) was determined to be an outlier and was excluded from the estimation of the age specific mean return rates (Table A-4-j). The resulting

forecast for 2000 is based on the fingerling releases of 4,068 lbs (BY 97), 2,302 lbs (BY 96), and 3,456 lbs (BY 95), which were used to estimate the return of 3, 4, and 5-year olds respectively, for a total return of 13,370.

The total forecast of hatchery-origin fall chum for 2000 is 228,723.

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 Hoodspport Hatchery (1965-1971 broods). (Table A-4-k and A-4-l). The resulting forecast for 2000 is 200 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 forecasted component.

A-4.2.2 WDFW Hatchery Forecasts

WDFW forecasts of returns, of 3 year old fall chum salmon, from hatchery releases were generally made by multiplying the BY 1997 lbs. released from each facility, by the mean recruit per pound for odd-numbered brood years for that facility. The forecast of 4 year old chum was made generally by multiplying the BY 1996 lbs. released from each facility, by the mean recruit per pound for even numbered years. Finally, the forecast of 5 year old return for forecast by multiplying the BY 1995 lbs. released from each facility, by the mean recruit per pound for odd-numbered years. An exception to this general approach concerns release pounds of fry, where $\frac{1}{2}$ the mean rate of return per pound was used. More specifically, the following information was used:

Hoodspport Hatchery: The 1972-1994 odd and even year brood means were multiplied with the pounds released, as indicated above. The resulting forecast was 62,622, 104,103, and 7,825; 3, 4, and 5 year olds respectively.

George Adams / McKernan Hatcheries: The 1976-1994 odd and even year brood means were multiplied with the pounds released, as indicated above. The resulting forecast was 22,763, 57,761, and 5,865; 3, 4, and 5 year olds respectively.

Quilcene Hatchery: The 1980-1994 odd and even year brood means were multiplied with the pounds released, as indicated above. The resulting forecast was 3,673, 4,551, and 144; 3, 4, and 5 year olds respectively.

Little Boston Hatchery and Port Gamble Pens: The 1965-1971 odd and even year brood means of the Hoodspport Hatchery (in some cases $\frac{1}{2}$ the rate was used) were multiplied with the pounds released, as indicated above. The resulting forecast was 833, 1,986, and 115; 3, 4, and 5 year olds respectively.

Enetai Hatchery: The 1977-1994 odd and even year brood means were multiplied with the pounds released, as indicated above. The resulting forecast was 7,636, 4,350, and 270; 3, 4, and 5 year olds respectively.

The total forecast of hatchery-origin fall chum for 2000 is 284,416.

Egg box and fry-augmented runs to streams of areas 12, 12B, 12C, 12D, 82G: The return from pounds released into Hood Canal streams (Table A-4-k) through egg-boxes, fry and fingerling releases was forecast by multiplying the lbs. released by the George Adams return rate (using $\frac{1}{2}$ the rate for eggs and fry), when releases were in south Hood Canal streams. In north Hood Canal streams, the rate of Quilcene Hatchery was used instead. For BY 97 and 95, the mean rate for 3 and 5 year olds from odd numbered

broods was used. No releases were made from BY 1996. The resulting forecast for 2000 is 299 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 forecasted component.

Table A-4-g. 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 | 0.24486 | 3.59474 |
| 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-g (cont'd). Fall Chum Returns-per-Pound,
by Age at Return from Hoodport 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 | | |
| 1996 | 25,374 | 0.35824 | | | |
| 1997 | 30,276 | | | | |
| 1998 | 37,534 | | | | |
| 1999 | | | | | |
| All Odd Years | 23,217 | 1.78837 | 2.86299 | 0.18664 | 4.99943 |
| All Even Years | 27,502 | 1.33320 | 3.89259 | 0.13244 | 5.66441 |
| All Years | 25,360 | 1.56079 | 3.36119 | 0.16048 | 5.23457 |
| All Years 65-71 | 2,655 | 0.95938 | 2.41136 | 0.09131 | 3.46205 |
| All Years 72-96 | 31,717 | 1.72918 | 3.63822 | 0.18248 | 5.77403 |
| All Years 91-96 | 34,502 | 1.56479 | 2.55351 | 0.10413 | 4.99613 |

**Table A-4-h. 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 | | |
| 1996 | 23,138 | 0.26978 | | | |
| 1997 | 27,884 | | | | |
| 1998 | 33,530 | | | | |
| Average Return Brood Years (1978-96) excluding outliers in bold. | | | | | |
| Odd Years | 27,251 | 0.81542 | 1.95976 | 0.23352 | 3.39058 |
| Even Years | 25,906 | 0.72644 | 2.89958 | 0.15370 | 3.87427 |
| All Years | 26,543 | 0.76308 | 2.45731 | 0.19361 | 3.66266 |
| All Years 91-96 | 25,960 | 0.98577 | 2.34951 | 0.12570 | 3.96115 |

Table A-4-i. 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-j. 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 | | |
| 1978 | 6,514 | 1.40297 | | 0.01175 | |
| 1979 | 2,666 | | 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 | | |
| 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 | | 0.06820 | |
| 1992 | 2,095 | | 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 | | |
| 1996 | 2,302 | 0.40142 | | | |
| 1997 | 4,068 | | | | |
| 1998 | 3,270 | | | | |
| Average (Brood Years 1976-96). Outliers (in bold) excluded. | | | | | |
| Odd Years | 4,098 | 2.39117 | 2.13600 | 0.08095 | |
| Even Years | 4,521 | 3.57216 | 2.01071 | 0.05444 | |
| All Years | 4,320 | 1.81537 | 2.08119 | 0.06604 | |
| All Years 91-96 | 3,649 | 1.97333 | 2.22304 | 0.06509 | |

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

| Area | BY 1997 | | BY 1996 | | BY 1995 | |
|--------------|---------|--------|---------|--------|---------|--------|
| | Lbs | % | Lbs | % | Lbs | % |
| 9A | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 12 | 141 | 56.50% | 0 | 17.21% | 87 | 7.36% |
| 12B | 0 | 28.25% | 0 | 12.33% | 227 | 19.20% |
| 12A | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 12C | 0 | 0.00% | 0 | 0.00% | 1 | 0.08% |
| Skokomish | 0 | 0.00% | 0 | 0.00% | 0 | 0.00% |
| 12D | 163 | 15.25% | 0 | 70.46% | 867 | 73.35% |
| Total | 304 | | 0 | | 1,182 | |

Table A-4-l. Apportionment of the 2000 Hood Canal Fall Chum Off-Station Forecast

| Area | 3's | 4's | 5's | Total |
|--------------|-----|-----|-----|-------|
| 9A | 0 | 0 | 0 | 0 |
| 12 | 68 | 0 | 4 | 72 |
| 12B | 0 | 0 | 10 | 10 |
| 12A | 0 | 0 | 0 | 0 |
| 12C | 0 | 0 | 0 | 0 |
| 82G | 0 | 0 | 0 | 0 |
| 12D | 78 | 0 | 40 | 118 |
| Total | 146 | 0 | 54 | 200 |