

**2006 MANAGEMENT FRAMEWORK PLAN
AND
SALMON RUNS' STATUS
FOR THE
STRAIT OF JUAN DE FUCA REGION**

Joint Report

Prepared by:

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(for the Port Gamble and Jamestown S'Klallam Tribes)
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with assistance from:

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1. Introduction

1.1 General

This report has been prepared by the Point No Point Treaty Council (for the Port Gamble, and Jamestown S'Klallams), was reviewed and agreed to, by the Washington Department of Fish and Wildlife, the Lower Elwha Klallam and the Makah Tribe and is intended to fulfill the parties' reporting requirements under the provisions of Section 5.2 of the Puget Sound Salmon Management Plan. This report is intended to facilitate the management of the 2006 runs of Strait of Juan de Fuca-origin salmon in that region, as well as document the methodologies used. This report covers all species of salmon (except steelhead) for the Strait of Juan de Fuca Tributaries. The regional "Management Framework" (Section 4.0) documents the parties' pre-season management framework (2005-06 State / Tribal Agreed to Fisheries Document, NWIFC, April, 2006) understandings.

This report outlines the forecasted total abundance, by management unit, for each species, except fall chum salmon. For fall chum salmon forecasts include only fish taken in net fisheries and escapement, and exclude non-landed mortalities, troll, recreational, ceremonial and subsistence harvests not taken in net fisheries. Agreed-upon escapement goals, expected escapements (those that would result under the parties' management framework) for each management unit (natural and hatchery, primary and secondary), expected harvests, test and evaluation fishery requirements, and pre-season and inseason run assessment methods are included. Detailed information concerning the methods used to forecast the abundance of each run are presented in Appendix A. Information concerning methods used to obtain inseason estimates of abundance is presented in Appendix B.

The parties' pre-season management framework outlines the anticipated measures to be taken in Strait of Juan de Fuca near-terminal, terminal, and extreme terminal commercial and recreational fisheries for the harvest and protection of salmon runs returning to this region. The framework also includes contingency measures contemplated by the parties for use inseason, should the need arise.

1.2 Summary of the 2006 Runs and Fisheries

All of the runs returning to the Strait of Juan de Fuca rivers and streams (except for coho salmon in the Elwha River and the Dungeness Bay and River, and chinook salmon returning to the Elwha River) will be managed on the basis of natural production. Of the various runs of salmon, only the coho returning to the Dungeness River are expected to be of sufficient abundance to support significant directed fisheries in the terminal areas. However, all runs may be harvested incidentally in fisheries for other runs and/or species in preterminal and terminal areas. In 2006, management measures were taken in fisheries to reduce impacts to Puget Sound chinook salmon and Hood Canal - Strait of Juan de Fuca summer chum salmon, currently listed as threatened, under provisions of the Endangered Species Act.

Pre-season forecasts of abundance are provided as a guide for fisheries and conservation planning (Tables 3.1 - 3.4). The actual run sizes entering Puget Sound may deviate from the forecasts because of statistical variability, unusual rates of survival (high or low), or unanticipated changes in exploitation rates in prior fisheries. Methods, used to derive the 2006 pre-season forecasts, are detailed in Appendix A of this report. In most cases, the escapement goals indicate the currently accepted estimate of escapement abundance necessary to provide for future maximum sustainable harvest (MSH), under average progeny survival conditions. However, in the case of summer chum salmon, the goals are based on the target escapement rates established in SCSCI. In the case of chinook salmon, the targets are those established in the *Puget Sound Comprehensive Chinook Management Plan* (PSCCMP). In the case of coho salmon

returning to natural spawning areas, the escapement goal is that which would result from the rate of escapement allowance established for the 2006 recruits. The escapement rate was established at a level equal to, or higher than, the minimum escapement rate allowable for the 2006 forecasted recruitment (60%), under the stepped exploitation rate management approach, which has been implemented for Strait of Juan de Fuca natural (primary) coho. Expected escapements are those that would result from the stated forecasts after fisheries consistent with the parties' pre-season planned management framework.

With the exception of Dungeness River-origin coho, no runs returning to the Strait of Juan de Fuca tributaries in 2006 are expected to have a significant harvestable surplus available for harvest in directed fisheries. Therefore, the parties' management framework has focused on the need to provide opportunity to limited fisheries while striving to maintain protective and rehabilitative measures for Strait of Juan de Fuca salmon returning to natural spawning areas (See Section 4.0 of this report).

2. 2006 Fishery Management Periods

Area	Chinook	Summer Chum	Coho	E. Fall Chum	L. Fall Chum	Winter Steelhead
6D & Dungen. I	07/23-09/16	---	09/17-10/28	10/29-12/02	---	12/03-3/31
Dungeness II	08/06-09/23	---	09/24-10/28	10/29-12/09	---	12/10-04/15
Elwha	07/16-09/09	---	09/10-11/04	11/05-12/09	---	12/10-04/15
Discovery-Sequim Tributaries	---	09/18-10/22	10/23-12/29	---	---	12/03-04/30
Hoko-Sekiu	09/10-11/10	---	09/28-11/11	11/12-12/09	---	12/10-03/31
Misc. SJF Tributaries	09/10-11/10	---	09/28-11/11	11/12-12/15	11/30-12/31	12/03-04/15

Notes: Region I of the Dungeness River (Dung. I), extends from the Schoolhouse Bridge, downstream to the river mouth. It is located in the area of tidal influence, and therefore it is managed concurrent with the rest of Dungeness Bay (Area 6D). Shaded portions in the above table indicate no adjustment to eliminate overlaps/gaps was applied.

The management periods defined above describe, for each area, the time intervals during which regulatory actions will be directed to meet the conservation and allocation requirements for adult salmon of each species, taking into consideration the catches (actual and/or expected) of that species, outside its management period. Since many runs extend over lengthy periods of time, with small portions of the runs available at the extreme ends of the annual entry pattern, it is impractical to attempt to take management actions directed at these stocks throughout their entire entry while continuing to simultaneously manage fisheries on other species and stocks. In managing fisheries, the parties shall attempt to apportion the harvest throughout each management period in order to achieve catch and escapement from all segments of each run.

For 2006, the above management periods have been derived by the following steps: first the central 80% of the average entry pattern for each species, for each area where that species is found, was used as the "base" management period. The source of this information comes from a 1995 analysis of entry pattern information based on historical harvest and spawner entry, which was reviewed by the affected parties. Next, "overlaps" and "gaps" between the periods were eliminated, generally by halving. The resulting "start" and "end" dates for each period were often adjusted to begin on the nearest Sunday and end on Saturday, in order to facilitate weekly fisheries management actions.

Finally, management periods should not be viewed as inflexible and may be adjusted in-season by agreement of the parties, on the basis of in-season information indicating a shift in run timing for a particular stock.

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

3.1 Summer/Fall Chinook Salmon

Strait of Juan de Fuca Chinook Salmon Management / Production Units

Fishery	Elwha R.	Dungeness R.	Hoko R.	Total
	Aggregate	Supplemented	Supplemented	
Recruits	3,915	1,174	983	6,073
Canada	832	249	208	1,289
Alaska	187	56	47	290
S.Falcon Tr/Rec	0	0	0	0
N.Falcon Tr/Rec	13	4	3	20
P.S. Troll	9	3	2	13
No. Snd + Strait Recreational	21	7	11	39
Cntl. + So. Sound Recreational	17	5	4	26
Puget Sound Net	20	6	4	30
6D Net	0	0	0	0
FW Recreational	0	0	0	0
FW Net	6	0	0	6
Mgmt Unit Harvest	1,104	330	279	1,713
Extreme Terminal Natural Mortality	51	0	0	51
Mgmt Unit Escap.	2,761	845	704	4,309
Min. Escap. Goal	2,459	751	630	3,841

The abundance of any runs returning to rivers other than the Dungeness, Elwha, and Hoko, is quite uncertain. Estimates of pre-terminal harvests and terminal run size are based on FRAM run #3006. The initial Dungeness River forecast was for chinook salmon expected to return to the terminal area. The Elwha run was been forecast as a single unit because a portion of the progeny of natural spawners is taken for hatchery brood stock, and conversely, a portion of the hatchery return spawns in the river. Methods used to forecast the Dungeness, Elwha and Hoko River runs are further detailed in Appendix A-1 of this report.

In 1999, Puget Sound chinook salmon were listed as threatened as defined by NMFS (50 CFR part 424) and ESA Section 4(d). The Dungeness and Elwha Rivers are included in this ESU and are essential to recovery. Protective measures include no terminal area fisheries directed at chinook salmon in these systems.

Escapement goals are those outlined in the Puget Sound Comprehensive Chinook Management Plan-Harvest Management Component and given the forecasted 2006 abundance, require that the total

southern U.S. exploitation rate be limited to less than 10%. Methods used to estimate the expected escapement, and the escapement distribution, after anticipated pre-spawning mortalities and broodstock removals in the Elwha River, are detailed in Appendix A-1. The expected escapement in the Hoko River includes any brood take by the Makah Tribe for in-river run augmentation. In all cases, no harvestable surplus is indicated under the current exploitation rate based management approach, therefore no commercial or recreational fisheries directed at chinook salmon are anticipated in the extreme terminal areas.

3.2 Summer Chum Salmon

Production Unit	Total Recruits	CDN Harvest	WA Preterminal Harvest	Expected Escapement	Escapement Goal
Chimacum Creek	993	63	25	906	91.2 % of recruits
Discovery Bay	6,377	402	159	5,816	91.2 % of recruits
Sequim Bay	868	55	22	792	91.2 % of recruits
Totals	8,238	519	206	7,513	

The methods used to develop the 2006 forecasts of summer chum salmon returning to the streams of Discovery Bay and Sequim Bay are detailed in Appendix A-2 of this report. The escapement targets of the Base Conservation Regime (BCR), of the Summer Chum Salmon Conservation Initiative, are those which would result on the average given application of the exploitation rate based regime. The 2006 summer chum run was forecast as total recruits to all fisheries and escapement. In addition to the Discovery Bay and Sequim Bay production units, Chimacum Creek is also expected to receive returns from a reintroduction program. The 2006 forecast of these returns is based on only a few years' data, therefore it should be considered conservatively.

In 1999, the Hood Canal-Strait of Juan de Fuca ESU summer-run chum salmon was listed as threatened by NMFS (50 CFR part 223) and the ESA Section 4(d). The Hood Canal-Strait of Juan De Fuca ESU includes tributaries of Sequim Bay, Discovery Bay, and the Dungeness River. While the volume of anticipated recruits exceeds the currently established recovery thresholds for these populations, in accordance with the co-managers' recovery plan, no additional harvest will be planned or anticipated.

3.3 Coho Salmon

The coho salmon runs returning to the Strait of Juan de Fuca tributaries consist of several small component natural runs in all river systems, as well as hatchery-supported returns to the Elwha and Dungeness Rivers. The Dungeness origin run are the only ones which were predicted to have significant harvestable numbers of coho salmon, sufficient to support directed fisheries in the terminal and extreme terminal areas in 2006. The return to the Elwha River is expected to be very low in 2006, because of low hatchery releases. Other runs, while indicating a harvestable surplus in the aggregate, are composed of numerous small components.

Methods used to develop the forecasts for the 2006 season are summarized in Appendix A-3 of this report. Expected harvest numbers refer to the total anticipated harvests from both incidental and targeted fisheries which were modeled pre-season in FRAM run #0619. In 2006, given the expected returns of coho to the Strait primary units, the tribal and state co-managers considered the significantly lower expected interceptions in Canadian fisheries and structured the pre-season management framework to achieve a total exploitation rate of less than 40% for Strait of Juan de Fuca "primary" production units, which are managed for wild coho salmon. The escapement goals for aggregated management units are those necessary to meet the parties' agreed-upon enhanced production.

Strait of Juan de Fuca Coho Salmon Management / Production Units

Fishery	Miscellaneous Natural		Elwha R.	Dungeness R.	Subtotals		Total
	Eastern Natural	Western Natural	Aggregate ⁽¹⁾	Aggregate ⁽¹⁾	Natural	Hatchery & Secondary Natural	
Recruits	3,865	22,118	2,276	18,156	25,983	20,432	46,415
Canada	64	362	35	502	426	537	963
Alaska	1	5	0	4	6	4	10
S.Falcon Tr/Rec	11	69	8	85	80	93	173
N.Falcon Tr/Rec	100	590	65	677	690	742	1,432
P.S. Troll	1	6	0	4	7	4	11
Strait Rec.	154	886	177	2,278	1,040	2,455	3,495
SJI Rec.	0	0	0	0	0	0	0
Admiralty Rec.	5	25	1	22	30	23	53
N. Sound Rec.	0	0	0	0	0	0	0
S. Sound Rec.	4	22	2	19	26	21	47
Hood Canal Rec.	0	0	0	0	0	0	0
Strait Net	62	355	30	256	417	286	703
San Juans Net	5	27	1	35	32	36	68
Admiralty Net	0	0	0	0	0	0	0
No. Sound Net	1	4	0	2	5	2	7
So. Sound Net	5	30	1	30	35	31	66
Hood Canal Net	5	26	0	24	31	24	55
SJF Rivers Rec.	0	0	596	2,416	0	3,012	3,012
6D Net	0	0	0	4,091	0	4,091	4,091
Elwha/Dungen. Net	0	0	615	0	0	615	615
Miscell. Net	0	10	0	0	10	0	10
Mgmt Unit Harvest	418	2,417	1,531	10,445	2,835	11,976	14,811
Mgmt Unit Exp. Escapement	3,447	19,701	745	7,711	23,148	8,456	31,604
Min. Escap. Goal	2,319	13,271	1,482	997	15,590	2,479	18,069

Notes: (1) The Elwha R. "Aggregate" is composed of 21.3% secondary wild, and 78.7% hatchery coho salmon. The Dungeness R. "Aggregate" is composed of 30.7% secondary wild and 69.3% hatchery coho salmon.

3.4 Fall Chum Salmon

Production Unit	"4B" Run	Pre-Terminal Harvest	Terminal Run	Extr. Terminal Harvest	Expected Escapement	Escapement Goal
Dungeness R.	528	27	500	0	500	500
Deep Crk.	528	27	500	0	500	500
Pysht R.	1,742	91	1,651	13	1,638	1,650
Miscellaneous	1,003	52	951	23	927	900
Totals	3,800	198	3,602	36	3,566	3,550

Methods used to develop the forecasts of fall-timed chum salmon returning to the Strait of Juan de Fuca streams in 2006 are detailed in Appendix A-4 of this report. The final forecast for 2006 is the average of the forecast results, for each individual unit, obtained by PNPTC and WDFW, using different forecasting methods, shown in Appendix A-4 of this report. The expected harvests refer to the total incidental catch from these runs during preterminal and terminal area fisheries directed at other species and stocks. For 2006, no directed fishery is anticipated in the terminal or extreme terminal areas. The escapement goals are based on the overall escapement goal of 3,550 fall chum salmon for the region, as re-apportioned in 1987 on the basis of relative stock strength. These escapement goals are treated as interim, pending the development of more accurate escapement targets.

4. Pre-Season Management Framework

4.1 2006 Harvest Management Measures and Expected Fisheries

In 2006, the condition of the salmon runs returning to the Strait of Juan de Fuca terminal areas requires that harvest management plans be conservative in all respects. The expected return of most runs in 2006 is very low and only coho salmon returning to the Dungeness area will be sufficiently abundant to warrant directed fisheries, within the constraints of low status exploitation rate limits. In particular, the planned restrictions on Canadian fisheries (designed to protect British Columbia coho salmon) combined with improved escapements of wild coho to Strait streams, have afforded us the opportunity to implement exploitation rate based management for wild coho, by adopting conservative management practices.

4.1.1 Commercial Fisheries

In the Strait of Juan de Fuca, treaty Indian troll fisheries are anticipated, from 6/16 through 9/30, in Areas 5, 6 (west of Green Pt.), and Area 6C. During that period, chum salmon will be released and the following areas shall be closed to trolling: 1,000 ft. radius around stream mouths, Freshwater Bay, Port Angeles Harbor and Hoko Bay from Kydaka Pt. to Shipwreck Pt. From 10/1 through 10/31, treaty Indian troll fisheries will be closed. From 11/1 through 4/15/2007 fisheries are anticipated in Areas 5, 6, 6C, as well as Area 4B, with the following restrictions: 1,000 ft. radius closure around stream mouths. During this period, fisheries will be adjusted to stay within harvest guidelines, as assessed by FRAM #3006.

In preterminal (mixed stock) areas, a treaty Indian drift gillnet fishery, directed at Fraser River sockeye salmon, in Areas 4B, 5 and 6C is planned after 7/16, to end no later than 9/9. In Area 6, Treaty Indian gillnet fisheries for Fraser River sockeye salmon are also anticipated in the month of August. Drift gillnet fisheries for coho salmon will operate in Areas 4B, 5 and 6C, from the end of the Fraser Panel control, through October 7, with the chum salmon fishery following at 5 days per week, from October 8 through November 11. The coho fishery shall be managed to ensure that the pre-season estimated incidental and directed coho catch is not greatly exceeded. In order to accomplish this, openings may vary from 2 to 5 days per week.

Treaty Indian commercial net fisheries in the nearshore marine areas of the Strait of Juan de Fuca generally occur from Angeles Point to Neah Bay (Areas 4B, 5, 6C), using set net gear, for chinook salmon. These fisheries harvest a mixture of passing stocks as well as concentrations of local stocks. The only marine terminal area in this region is Dungeness Bay (Area 6D) and fisheries in this area consist primarily of treaty set net and non-treaty skiff gillnet fisheries which target coho salmon runs returning to the Dungeness River. In extreme terminal areas (rivers), treaty Indian set net, hook-and-line, and occasionally drift net fisheries take place.

During the 2006 season, treaty Indian set net fisheries for chinook salmon, in Areas 4B, 5 and 6C, will operate from June 18 through August 12 (August 19 in Area 6C). A 6.5" minimum mesh size restriction shall be used in order to avoid the capture of Lake Washington sockeye. In these areas, Hoko Bay will be closed from Kydaka Pt. to Shipwreck Pt., and Freshwater Bay, south of a line between Angeles Pt. and Observatory Pt., will be closed, in addition to a closure of 1,000 ft. around all stream mouths.

In Area 6D, no commercial fisheries will take place during the chinook and fall chum salmon management periods in order to maximize the protection necessary to these weak runs. Treaty Indian fisheries for coho salmon are planned for Area 6D from 9/21 through 10/28, with daytime only gillnet fishing and a requirement of chinook and chum salmon release through 10/10. A non-treaty skiff gill net fishery is also planned from 9/21 through 10/28 with non-retention of chinook and chum salmon. These fishery

schedules may be extended, on the basis of inseason information. Specific conservation measures are intended to provide additional protection to ESA listed chinook and summer chum salmon. During fisheries for coho salmon, an area closure within 1,500 feet seaward from each mouth of the Dungeness River, will be used to further limit the harvest of non target species as well as concentrated schools of coho salmon milling at the river mouth. If surveys indicate a high likelihood of fishing impact to chinook and or summer chum salmon, additional measures may be employed including time-area restrictions, gear restrictions etc., as necessary. During this fishery, fishers will be required to attend to their gear at all times, when release of non target species is in effect. Inseason, the extent and duration of the coho fishery will be determined by the fishing effort and the inseason estimate of the coho run abundance entering the terminal area.

Of the various extreme terminal areas (rivers) along the Strait of Juan de Fuca, treaty Indian commercial fisheries are anticipated only in the Elwha River and, if necessary, in the Dungeness River. All other rivers shall remain closed to commercial salmon fishing at all times prior to the 2005-2006 winter steelhead salmon season.

In the Dungeness River (Area 76A), downstream of the Dungeness Hatchery intake (R.M. 11.3), if a harvestable surplus of coho is available, fisheries of up to 3 days per week may be authorized using selective gear only (any gear that is capable of releasing salmon alive), starting no earlier than October 16. This restriction will be necessary because of low water conditions and the potential impact on non-target species in need of protection. The extent and duration of such fisheries will depend on the findings of in-season stream surveys.

A treaty net fishery for coho in Area 76B (Elwha River) has been planned to occur from 9/10 through 11/4, however given the low forecasted return, inseason information will be used to guide this fishery. The start of the coho fishery may also be "shaped", to the extent necessary, to avoid unnecessary impacts to chinook escapement and broodstock collection. In order to ensure that coho escapement needs are met, the fishery will be restricted to areas upstream of the Elwha Hatchery during the last half of October (if the hatchery escapement goal has not already been achieved).

4.1.2 Test Fisheries

No test fisheries, directed at salmon, are anticipated in any Strait of Juan de Fuca terminal areas, during the 2006 season.

4.1.3 Recreational Fisheries

Marine area recreational fisheries in mixed-stock areas of the Strait of Juan de Fuca are detailed in 2006/2007 Sport Fishing Rules Pamphlet (WDFW 2006). Area 6 recreational fisheries in 2006 were modified to exclude the November 2 salmon (1 chinook) limit fishery in November and include an October 2 salmon (1 chinook) limit fishery. Area 6D will be closed to angling from May 1 through September 30 and will then open with a two fish bag limit on coho only through October 31. It shall then be closed to salmon fishing from November 1 through April 30, 2007.

In freshwater areas, all Strait of Juan de Fuca streams, except for the Elwha River and the Dungeness River, shall be closed to recreational fishing for salmon. The Elwha River will be closed from 3/1 through 9/30. This closure will provide additional protection to the ESA listed Elwha chinook salmon stock. Angling, for coho salmon only, will be permitted from October 1 through November 15, with a six fish bag limit (four adults, 12" min. size). In the Dungeness River, angling for salmon will be permitted downstream of the Dungeness Hatchery intake, at RM 11.3, from October 16 through December 31, with a four fish bag limit (12" min. size). At other times, the Dungeness River will remain closed to angling

for salmon (except steelhead). The Hoko River shall be closed to the taking of salmon and gamefish gear shall be restricted to fly fishing during the months of September and October.

4.2 Other Recommended Measures

In addition to routine fishery planning, monitoring, stock and harvest assessment and fishery regulation, the parties recommend that additional tasks should be undertaken in order to ensure the health of the resource, facilitate future resource management decisions and action, as well as attempt to address a number of serious resource-related problems in this region. Therefore, the following are recommended:

Intensive spawner surveys in summer chum drainages (Discovery Bay, Sequim Bay, Chimacum Creek, Dungeness River) should be continued in 2006 to determine the number, age, sex ratio, and distribution of spawners. In the Dungeness system, sufficient information concerning summer chum salmon is lacking. Therefore surveys of similar intensity and scope should be conducted. Mixed stock fisheries directed at other species should also be monitored and sampled for otolith marked chum salmon, from the various supplementation programs, to gain information on the incidence and origin of summer chum interceptions. The in-stream supplementation program, utilizing native spawners, in JimmyComeLately Creek, should be continued.

Federal, State, and Tribal fisheries agencies, and private organizations developed and implemented a captive brood stock program designed to rehabilitate chinook salmon runs to the Dungeness River. The primary goal of this recovery program has been to increase the number of fish spawning naturally in the river while maintaining the genetic characteristics of the existing Dungeness stock. The long term success of this program will depend on the continuing efforts to monitor and assess stock status, determining and correcting the factors that currently limit production (including habitat degradation), and designing and implementing long term monitoring and evaluation plans designed to determine the effectiveness of the recovery effort, as well as assist in improving management of the resource. The 2006 run will be the fifth return of 5 year olds returning from the broodstock program. There is a need to measure these returns as accurately as possible to evaluate initial success of the program. These efforts should be continued in accordance with the Dungeness River Chinook Rebuilding Plan. Specifically, in 2006, releases of smolts should be tagged, using CWT's. Consideration should be given to removing the adipose fin from a portion of the release, in order to ensure that these fish are sampled, if taken in Alaska and / or British Columbia fisheries. Their downstream emigration should be monitored using smolt traps. Finally, studies to determine critical freshwater habitat for this species should be implemented.

In the Dungeness River, stream surveys should be used to verify clearance of chinook salmon from any anticipated fishing areas.

In the Elwha River, a tribal project designed cooperatively with the USNPS, the USFWS, and the WDFW, is aimed at the restoration of native fall chum salmon and will collect up to 75,000 fall chum salmon eggs (depending on availability). Eyed eggs from the captured brood will be distributed to instream incubators, in Bosco Slough and Boston Charlie creeks.

Although none have been proposed for 2006, limited test or evaluation fisheries, or instream surveys, are recommended to assess the Pysht and Lyre rivers' fall chum runs, to document run timing and age composition, and to evaluate assumptions concerning the relation of the Pysht River as an escapement index area to other tributaries in the Strait of Juan de Fuca region.

4.3 Inseason Run Size Updates

During the 2006 season, no inseason updates of run abundance will be provided for chinook, summer chum, and fall chum salmon returning to the miscellaneous Strait of Juan de Fuca streams. Since no directed fisheries are planned or anticipated for any of these runs, and no inseason management action is contemplated, the pre-season forecasted returns to the terminal areas will be sufficient.

For coho salmon returning to the Elwha River, no method has been found to provide inseason updates of the estimate of abundance with sufficient accuracy. Therefore, inseason harvest management actions will be controlled by time and area closures designed to provide closed periods in the area between the Elwha Hatchery and the river mouth when the major escapement influx is most likely to occur, based on historical information.

For coho salmon returning to the Dungeness River system, an inseason update of terminal run abundance will be performed if satisfactory cumulative catch per cumulative landing information from the gillnet fishery in area 6D is available. Methods that will be used to derive the inseason estimate, for 2006, are detailed in Appendix B. If sufficient fishing effort data are not available, the fishery will be managed in-season on the basis of subjective estimates of abundance, escapement progress, and fishing effort.

APPENDIX

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

A. Pre-Season Forecasting Methods

A-1. Chinook Salmon

Given the fact that the forecasted returns of the Strait of Juan de Fuca chinook salmon are being entered into the FRAM simulation model as a single population, the forecasted return the terminal areas, in 2006, was forecasted as a single quantity, which was then apportioned to individual populations, given their recent years' performance. This approach is believed to lessen the errors caused by summing individual stock forecasts. The forecast was made using the mean terminal area return in the last four years (2002 - 2005) and was also apportioned using the relative distribution in the same period, which may better reflect recent survival rates and the increasing proportional contribution from the Dungeness stock. The resulting Terminal Run Size (TRS) forecast for 2006, is 4,204 region total (Table A-1-a), apportioned to Hoko (782), Elwha (2,616), and Dungeness (806) (Table A-1-b).

Table A-1-a. Strait of Juan de Fuca Chinook Salmon TRS

Year	Hoko	Elwha	Dungeness	Strait ETRS
1986	839	3,159	254	4,252
1987	606	6,220	133	6,959
1988	820	8,667	372	9,859
1989	862	5,704	95	6,661
1990	498	3,606	361	4,465
1991	1,032	3,761	199	4,992
1992	755	4,002	154	4,911
1993	908	1,669	54	2,631
1994	447	1,580	65	2,092
1995	925	1,814	163	2,902
1996	1,274	1,877	183	3,334
1997	919	2,534	52	3,505
1998	1,722	2,411	110	4,243
1999	1,688	1,642	75	3,405
2000	731	1,913	218	2,862
2001	946	2,246	453	3,645
2002	686	2,416	633	3,735
2003	1,100	2,305	640	4,045
2004	1,088	3,443	1,014	5,545
2005	283	2,130	1,079	3,492
2006 Forecast (2002-05 Avg.)				4,204

Table A-1-b. Proportional Distribution of Strait of Juan de Fuca Chinook TRS

Year	Hoko	Elwha	Dungeness
1986	0.197	0.743	0.060
1987	0.087	0.894	0.019
1988	0.083	0.879	0.038
1989	0.129	0.856	0.014
1990	0.112	0.808	0.081
1991	0.207	0.753	0.040
1992	0.154	0.815	0.031
1993	0.345	0.634	0.021
1994	0.214	0.755	0.031
1995	0.319	0.625	0.056
1996	0.382	0.563	0.055
1997	0.262	0.723	0.015
1998	0.406	0.568	0.026
1999	0.496	0.482	0.022
2000	0.255	0.668	0.076
2001	0.260	0.616	0.124
2002	0.184	0.647	0.169
2003	0.272	0.570	0.158
2004	0.196	0.621	0.183
2005	0.081	0.610	0.309
2002 - 05 Avg.	0.183	0.613	0.189
2006 Forecast Distribution	782	2,616	806

Table A-1-c. Dungeness River Chinook Salmon Forecast Data

Return Year	Escapement	Area 6D Harvest	Recreational Catch	Terminal Run
1986	238	9	7	254
1987	100	4	29	133
1988	335	5	32	372
1989	88	1	6	95
1990	310	0	51	361
1991	163	19	17	199
1992	153	1	0	154
1993	43	1	10	54
1994	65	0	0	65
1995	163	0	0	163
1996	183	0	0	183
1997	50	0	2	52
1998	110	0	0	110
1999	75	0	0	75
2000	218	0	0	218
2001	453	0	0	453
2002	633	0	0	633
2003	640	0	0	640
2004	1,014	0	0	1,014
2005	1,077	2	0	1,079

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

Return Year	Extreme Terminal Run	Natural Spawning Escapement	Hatchery Broodstock	Prespawning Mortality	Terminal Harvest
1986	3,159	855	1,414	858	32
1987	6,220	1,642	1,989	2,262	327
1988	8,667	5,228	2,167	478	794
1989	5,704	3,035	1,892	560	217
1990	3,606	1,644	1,312	224	426
1991	3,761	1,642	1,719	108	292
1992	4,002	479	743	2,637	143
1993	1,669	633	929	7	100
1994	1,580	163	1,053	330	34
1995	1,814	524	626	662	2
1996	1,877	364	1,244	267	2
1997	2,534	1,578	939	10	7
1998	2,411	720	1,638	51	2
1999	1,642	903	699	23	17
2000	1,913	715	1,136	62	0
2001	2,246	655	1,553	38	0
2002	2,416	863	1,513	40	0
2003*	2,305	1,045	1,182	78	0
2004	3,443	2,075	1,329	39	0
2005	2,130	723	1,396	7	4

Harvest does not include Recreational Catch

(*) The 2003-04 estimates are preliminary and subject to revision

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

Return Year	Hatchery Voluntary Escapement	Natural Spawners	In-River Gross Escapement	Gaff-Seine Removals	In-Hatchery Prespawning Mortality	In-River Prespawning Mortality
1986	1,285	855	1,842	505	376	482
1987	1,283	1,642	4,610	1,138	432	1,830
1988	2,089	5,228	5,784	506	428	50
1989	1,135	3,035	4,352	905	148	412
1990	586	1,644	2,594	886	160	64
1991	970	1,642	2,499	857	108	n/a
1992	97	479	3,762	672	26	2,611
1993	165	633	1,404	771	7	0
1994	365	163	1,181	749	61	269
1995	145	524	1,667	518	37	625
1996	214	364	1,661	1,177	147	120
1997	318	1,578	2,209	624	3	7
1998	138	720	2,271	1,551	51	0
1999	113	903	1,512	609	23	0
2000	177	715	1,736	1,021	62	0
2001	195	655	2,051	1,396	38	0
2002	473	863	1,943	1,080	40	0
2003	314	1,045	1,991	946	78	n/a
2004	515	2,075	2,928	853	39	0
2005	211	723	1,915	1,192	7	0

In order to estimate the potential escapements in 2006, the forecasted return to the Elwha River was further apportioned, using the 2002-2005 mean proportions (Table A-1-e), as follows: Of the forecasted 2,576, **0.3%** (8) are expected to be harvested; **17.17%** (442) are expected to voluntarily return to the Elwha Rearing Channel, and **82.53%** (2,126) to the river. The voluntary hatchery return is expected to be reduced by **11.05%** (49), to account for average on-station pre-spawning mortality, leaving 394 hatchery spawners. The in-river escapement was not reduced for in-river pre-spawning mortality, based on recent years' survival. However, the 2,126 in-river escapement was reduced by **48.59%** (1,033) to account for broodstock removals (gaff & seine), leaving an anticipated in-river spawning escapement of 1,093 chinook salmon and an anticipated hatchery broodstock total of 1,427.

A-1.3 Hoko River

Table A-1-f. Hoko River Chinook Salmon Forecast Data.

Return Year	Hoko River Escapement	Commercial Catch	Recreational Catch
1986	801	38	0
1987	581	25	0
1988	776	37	7
1989	842	17	3
1990	493	5	0
1991	1,006	16	10
1992	740	9	6
1993	894	14	0
1994	428	11	8
1995	905	20	0
1996	1,265	5	4
1997	891	20	8
1998	1,722		0
1999	1,688		0
2000	731		0
2001	946		0
2002	686		0
2003	1,100		0
2004	1,088		
2005	283		

A-2. Summer Chum Salmon

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

Year	Discovery	Sequim	Chimacum	Eastern Strait Total
1974	1,494	492		1,986
1975	1,374	373		1,747
1976	1,264	409		1,673
1977	1,364	446		1,810
1978	2,413	828		3,241
1979	699	201		900
1980	4,127	1,447		5,574
1981	879	261		1,140
1982	2,771	771		3,542
1983	946	272		1,218
1984	1,311	397		1,708
1985	304	108		412
1986	890	327		1,217
1987	1,673	508		2,181
1988	2,952	1,177		4,129
1989	441	355		796
1990	432	98		530
1991	253	172		425
1992	592	802		1,394
1993	520	124		644
1994	196	18		214
1995	647	234		881
1996	1,075	31		1,106
1997	923	62		985
1998	1,206	101		1,307
1999	532	7	38	577
2000	879	55	52	986
2001	2,811	262	909	3,982
2002	6,072	42	867	6,981
2003	6,003	450	563	7,016
2004	6,431	1,666	1,142	9,239
2005*	7,001	1,315	1,401	9,717
2006 Forecast:	6,377	868	993	8,238

*The 2005 estimate is preliminary and subject to revision

The 2006 return of summer-timed chum to the Discovery, Chimacum and Sequim Management Units was forecasted as a 4 year mean (2002-2005) of the total recruitment, of each unit, to all fisheries and escapement (Table A-2-a). The forecasts are 6,377 fish to the Discovery MU, 868 fish to Sequim MU and 993 to the Chimacum MU. Recruits to the Dungeness / Graywolf system are few and unquantifiable at this time.

A-3. Coho Salmon

A-3.1 Natural Runs

The method used to develop the 2006 forecasted return of naturally reared coho salmon, for primary units, relied on an estimate of emigrating smolts (2005 emigration), multiplied by an estimate of marine survival.

A-3.1.1 Naturally reared smolts

For primary units in the Western Strait of Juan de Fuca, the number of smolts from five production units, comprising 19.03% of the total, was measured and expanded to 260,809 smolts for the sub-region (Table A-3-a). For primary units in the Eastern Strait of Juan de Fuca, the number of smolts from two production units, comprising 16.31% of the total, excluding Snow Creek, was measured and expanded to 35,365 wild smolts for the sub-region (Table A-3-a). To those, we added 10,245 smolts from the Snow Creek supplemented natural emigration, bringing the sub-region total to 45,610 smolts (Table A-3-c). The total number of estimated smolts, produced from all primary units, is estimated at 306,419.

The number of emigrating smolts from secondary units (Elwha River and Dungeness River) was estimated by extrapolation, using the ratio of the natural escapement of the secondary units to that of the primary units in the parent brood year (2003) (Table A-3-b). This resulted in an estimate of 71,076 smolts, from secondary natural units.

A-3.1.2 Marine Survival

The forecasted survival value of 11.37%, to DA2 recruitment, was obtained by estimating an average recruits/smolt relationship, using escapement in parent years 1999-2001 and smolt emigration in years 2001-2003 with associated DA2 recruitment in return years 2002-2004. Applying this marine survival value to the estimates of 2005 emigrating smolts, resulted in an estimate of 34,833 primary December-Age 2 (DA2) coho recruits (5,185 Eastern and 29,648 Western) (Table A-3-c) and an estimate of 8,080 DA2 coho recruits from secondary units (658 Elwha and 7,422 Dungeness) (Table A-3-d).

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

2005 Smolt Trapping	Enumerated Smolts	Enumerated Proportion of Total Potential	Estimated Total Smolts
Snow Crk. (Suppl. Nat.)	10,245		10,245
Jimmycomelately Crk	2,220		
Siebert Crk	3,547		
East Total w/o Snow	5,767	0.16307	35,365
Salt Crk	10,567		
E. Twin R.	15,340		
W. Twin R.	11,943		
Deep Crk	10,062		
Johnson Crk	1,731		
West Total	49,643	0.19034	260,809
E+W+Snow Total	55,410		306,419

Table A-3-b. Estimation of Marine Survival

	RY 2002	RY 2003	RY 2004
Primary, Parent Escapement (RY-3)	7,145	17,547	29,048
Secondary, Parent Escapement (RY-3)	1,339	5,107	6,226
Primary Proportion	0.84217	0.77457	0.82350
Primary Smolts (RY-1)	285,427	264,724	287,687
Primary Recruits (RY)	27,710	28,745	38,943
Marine Survival	0.09708	0.10858	0.13537
Primary Escapement (RY)	20,117	17,042	19,755
Secondary Escapement (RY)	2,218	3,953	1,232
Mean Smolt to Recruit Survival			0.11368

Table A-3-c. Primary Natural Management Units Summary

Primary Management Units	Measured Wild Smolts	Proportion of Total Potential Measured	Estimated Total Smolts w Snow	DA2's Using Mean Marine Survival
East Strait	5,767	0.16307	45,610	5,185
West Strait	49,643	0.19034	260,809	29,648
SJF Summary	55,410		306,419	34,833

Table A-3-d. Secondary Management Units Summary

Secondary Management Units	2003 Natural Escapement	2003 Brood Escapement Proportion	Estimated DA2's
Elwha	322	0.081	658
Dungeness	3,631	0.919	7,422
Total Secondary	3,953	1.000	8,080

A-3.2 Hatchery Runs

The 2006 returns of Strait of Juan de Fuca hatchery coho were predicted using the estimated 2002-04 (3 years - 1 brood cycle) average smolt survival to DA2 recruits, applied to the 2005 smolt releases (Table A-3-e). More specifically, the following sources of information were selected:

Dungeness Hatchery: 2002-2004 average recruits per smolt (0.03276) (Table A-3-e). Given a release of 512,450 smolts, the 2006 forecast is 16,786 DA2 recruits.

Elwha Hatchery: 2002-2004 average recruits per smolt (0.01383) (Table A-3-e). Given a release of 175,380 smolts, the 2006 forecast is 2,425 DA2 recruits.

The total hatchery-origin pre-season forecast value of 19,211 DA2 recruits (17,751 Age 3 ocean) will be used for simulation modeling and pre-season planning.

**Table A-3-e. Strait of Juan de Fuca Hatchery Coho Contribution
to Puget Sound Net Fisheries and Escapements**

Run Year	Dungeness Hatchery			Elwha Hatchery		
	Smolts Released	DA 2 Recruits	R/Sm	Smolts Released	DA 2 Recruits	R/Sm
1979	796,100			1,387,900		
1980	399,200			837,900		
1981	679,700			1,168,700		
1982	929,400			2,845,100		
1983	106,590			2,756,200		
1984				567,800		
1985	188,000			751,000		
1986	298,000			645,400		
1987	320,000			836,000		
1988	748,600	20,948	0.02798	728,500	5,260	0.00722
1989	301,700	25,401	0.08419	240,700	15,017	0.06239
1990	359,050	20,811	0.05796	413,500	12,320	0.02979
1991	342,700	12,102	0.03531	768,600	3,522	0.00458
1992	296,400	14,058	0.04743	688,600	9,848	0.01430
1993	433,700	9,789	0.02257	755,600	4,913	0.00650
1994	340,000	8,923	0.02624	580,000	2,504	0.00432
1995	680,000	26,830	0.03946	707,700	10,250	0.01448
1996	808,700	29,804	0.03685	801,000	13,705	0.01711
1997	871,600	16,596	0.01904	722,200	11,988	0.01660
1998	774,600	12,301	0.01588	643,037	6569	0.01022
1999	877,300	6,073	0.00692	867,379	9,438	0.01088
2000	788,600	42,393	0.05376	645,856	4,962	0.00768
2001	865,700	52,851	0.06105	684,856	15,237	0.02225
2002	550,700	17,588	0.03194	494,610	12,419	0.02511
2003	565,300	26,894	0.04757	662,231	3,461	0.00523
2004	505,750	9,486	0.01876	724,594	8,074	0.01114
2005	509,300			661,700		
2006	512,450			175,380		
Average(2002-04):			0.03276	Average (2002-04):		0.01383
2006 Forecast DA2's			16,786	2,425		

**Table A-3-f. Coho Salmon Spawning Escapements to
Primary Natural Spawning Areas of the Strait of Juan de Fuca**

Year	E. Strait	W. Strait	Total
1986			9,883
1987			4,860
1988			4,332
1989			7,222
1990			4,030
1991			3,752
1992			6,126
1993			3,329
1994			2,503
1995			6,386
1996			5,035
1997			5,788
1998	1,313	14,237	15,550
1999	1,314	5,831	7,145
2000	2,180	15,367	17,547
2001	2,539	26,509	29,048
2002	3,002	17,115	20,117
2003	3,249	13,793	17,042
2004	7,752	12,003	19,755

Note: Escapement estimation methods changed in 1998. Therefore prior estimates are not directly comparable

A-4. Fall Chum Salmon

A-4.1 Natural Fall Chum Salmon Forecast (PNPTC)

The 2006 return of fall-timed chum salmon to the Strait of Juan de Fuca tributaries was forecasted by PNPTC, in the aggregate, as the average of the natural and off-station runs observed in the years 2000 through 2004 (Table A-4-a). The resulting forecast of **2,323**, was apportioned on the basis of historical escapement survey data which resulted in the following proportions: Pysht River (46%), Dungeness River (14%), Deep Creek (14%), and miscellaneous, including Elwha R. and Lyre R. (26%) (Table A-4-e).

A-4.2 Natural Fall Chum Salmon Forecast (WDFW)

The 2006 return of wild fall-timed chum salmon to Strait of Juan de Fuca streams was forecast as a portion of the total return of all Puget Sound natural fall-timed chum. The Puget Sound return was initially forecast using parent brood escapements, long-term odd/even-year specific average R/S values, and long-term odd/even-year specific mean proportions returning at age for 3, 4, and 5-year old returns. For example, the three-year old forecast was derived by multiplying the 2003 wild escapement by the mean odd-year brood R/S value to get a total return of 2003 brood offspring. That number was then multiplied by the mean return at age 3 for even-year broods, yielding the 2006 age 3 return forecast. This was repeated for 4 and 5-year old components, and all three were summed to obtain a total Puget Sound forecast of 3,065,669 (Table A-4-b). However, given the lack of age information for 2004 and 2005, and the lower return in 2005, from relatively high escapements, the forecast was reduced by 50% to 1,532,834.

The return of each age group to Puget Sound was apportioned to individual regions (including the Strait of Juan de Fuca), using proportions of the parent escapement of each brood into each unit. The resulting forecast for Strait of Juan de Fuca natural fall chum salmon is 5,277 (Table A-4-c). The forecasts for individual production units are shown in Table A-4-d.

Final forecasts, given the small difference in the results obtained by the two methods, were made using the mean of the results obtained by the PNPTC and WDFW, for each production unit. (Table A-4-d)

Table A-4-a. Strait of Juan de Fuca Historical Fall Chum Salmon "4B" Runs

Return Year	Fall Chum Run Size	Return Year	Fall Chum Run Size
1980	5,862	1993	5,775
1981	6,518	1994	2,564
1982	6,744	1995	610
1983	1,765	1996	2,162
1984	8,280	1997	3,927
1985	8,330	1998	1,535
1986	1,922	1999	1,313
1987	7,269	2000	269
1988	13,962	2001	1,737
1989	4,331	2002	5,198
1990	1,220	2003	1,177
1991	1,941	2004	3,233
1992	5,654	2005	
Average (All Yrs.):			3,722
PNPTC Average 2000-04:			2,323
Std. Dev. (00-04):			1,730

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

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

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

Table A-4-c. 2006 WDFW Puget Sound Natural Chum R/S, Sibling and Average of Forecasts

	R/S	SJF Parent Escapement Proportion	SJF Forecast by Age
Age 3 (2003 Brood) Forecast	396,999	0.00144	572
Age 4 (2002 Brood) Forecast	1,073,230	0.00423	4,540
Age 5 (2001 Brood) Forecast	62,606	0.00264	165
Total Forecast (4B)	1,532,834		5,277

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

Area	Proportion	PNPTC Forecast	WDFW Forecast	Joint Forecast
Pysht R	0.458	1,065	2,418	1,742
Dungeness R	0.139	323	733	528
Deep Creek	0.139	323	733	528
Miscellaneous	0.264	613	1,392	1,003
Total		2,323	5,277	3,800

B. Inseason Run Assessment Methods

The Dungeness River coho salmon is the only run among those returning to the Strait of Juan de Fuca tributaries for which an acceptable model for estimating abundance during the season has been found. For all other runs the pre-season forecast will serve as the in-season estimate of abundance.

B-1. Dungeness Coho Salmon

Prior to October 8, the pre-season terminal run size forecast will serve as the estimate of the run entering Dungeness Bay (Area 6D). For the Dungeness River coho salmon, run size updates will be estimated on October 5, if there has been sufficient fishing effort from September 16 through October 4, using catch and landing data through October 4. Fishing effort and harvest will be considered sufficient if more than eight fishers are participating in this fishery, for the period under consideration. The update will be based on a linear regression model relating total terminal run size (including all terminal and extreme terminal commercial and recreational catches and escapements) to cumulative catch per cumulative landings (treaty and nontreaty) in Area 6D. The regression is based on run sizes and catches from the 1985 - 2005 period with 2001 excluded, because it is a statistical outlier. The update model for October 5 is as follows:

$$6D \text{ Run Size} = 1194.166 + (380.193 * CC/CL \text{ through } 10/4)$$

The updated run abundance entering the terminal area will represent the total abundance. The hatchery to natural ratio shall be assumed to be as forecast pre-season.

Table B-1-a shows the regression statistics for the update model. Table B-1-b shows the data series used to develop this model. The database used to develop this model includes catches and landings by gillnets (treaty and nontreaty) from the observed years.

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

Using Data through Oct. 4	
R ²	0.735104
R ² Adjusted	0.720387
Std Error	3782.895
N	20
β ₀	1194.166
β ₁	380.193
P(β ₀ = 0)	0.419

Table B-1-b. Inseason Coho Abundance Estimation Data for Area 6D.

Year	Dungeness Bay Run Size			Catch	Landings	CC/CL
	Hatchery	Natural	Total			
1979	5,035	1,387	6,422			
1980	13,513	3,721	17,234			
1981	16,534	4,553	21,087			
1982	21,815	6,007	27,822			
1983	10,279	2,830	13,109			
1984	1,199	330	1,529			
1985	3,708	1,021	4,729	747	70	10.67
1986	4,725	1,301	6,026	2,039	91	22.41
1987	5,938	1,635	7,573	1,455	88	16.53
1988	5,006	1,378	6,384	2,325	145	16.03
1989	5,474	1,507	6,981	1,696	104	16.31
1990	4,477	1,233	5,710	636	89	7.15
1991	4,496	1,238	5,734	1,729	126	13.72
1992	2,835	781	3,616	578	55	10.51
1993	3,321	914	4,235	52	11	4.73
1994	2,496	687	3,183	768	29	26.48
1995	11,636	3,204	14,840	496	22	22.55
1996	7,912	2,179	10,091	426	21	20.29
1997	12,806	3,526	16,332	172	9	19.11
1998	7,527	2,073	9,600	2,200	70	31.43
1999	4,289	1,181	5,470	443	17	26.06
2000	25,554	7,036	32,590	6,422	80	80.28
2001	27,394	7,543	34,937	3,915	79	49.56
2002	10,235	2,818	13,053	971	49	19.82
2003	16,225	4,468	20,693	1,756	43	40.84
2004	5,650	1,556	7,206	999	59	16.93
2005*	4,037	1,112	5,149	687	53	12.96