Washington Department of Fish and Wildlife **Point No Point Treaty Council**

To: NOAA-Fisheries Service Sustainable Fisheries Division, Salmon Recovery Division, Northwest Fisheries Science Center, and Puget Sound Technical Recovery Team

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Subject: 2006 progress report on Hood Canal and Strait of Juan de Fuca summer chum salmon

This memorandum report is intended to provide information on management activities pertaining to stock assessment and harvest of Hood Canal and Strait of Juan de Fuca summer chum for the year 2006. This interim report is relatively brief, providing information currently available.

Stock Assessment

Escapement: Spawning ground surveys were conducted in 2006 throughout the summer chum return period to estimate the abundance of summer chum spawners for all known stocks in the Hood Canal and Strait of Juan de Fuca regions. Results of the surveys are summarized in Table 1 and regional escapement estimates for the period 1974 through 2006 are described in Table 2.

The escapements of Hood Canal and Strait of Juan de Fuca summer chum remained relatively high in 2006. A total of 34,999 summer chum escaped to the region's streams (including fish collected for hatchery broodstock); 26,753 spawners to Hood Canal streams and 8,246 spawners to Strait of Juan de Fuca streams (Tables 1 and 2).

Table 1. Estimates of summer chum salmon spawner escapement for Hood Canal and Strait of Juan de Fuca streams, 2006.

Region / Stream	Natural spawner escapement	Brood-stock	Total escapement	Comments
Hood Canal				
Big Beef Cr.	809	0	809	Trap + AUC downstream of trap
Stavis Cr.	14		14	Redds + live count
Dewatto R.	69		69	AUC
Tahuya R.	749		749	AUC
Union R.	2,736	100	2,836	Trap
Skokomish R.	8		8	Live count, 8/31-9/29/06
Lilliwaup R.	1,523	92	1,615	AUC adjusted for broodstock
Eagle Cr.	49		49	Live + dead count, 9/28/06
Hamma Hamma R.	2,873	143	3,016	AUC adjusted for broodstock
John Cr.	0		0	No fish observed
Fulton Cr.	0		0	No fish observed
Duckabush R.	3,135		3,135	AUC
Dosewallips R.	2,577		2,577	AUC
Big Quilcene R.	9,504		9,504	AUC
Little Quilcene R.	2,372		2,372	AUC
Strait of Juan de Fuca				
Chimacum Cr.	2,026		2,026	AUC + 20 dead in Kala Pt. Lagoon
Snow Cr.	598		598	Trap + AUC downstream of trap
Salmon Cr.	4,894		4,894	Trap + redds downstream of trap; incl. 1 mort in trap
JimmyComeLately Cr.	660	65	725	Trap + redds downstream of trap; incl. 11 morts downstream
Dungeness R.	3		3	3 live on 9/28/06, RM 0.3-3.2
Hood Canal total	**26,418**	**335**	**26,753**	
SJFuca total	**8,181**	**65**	**8,246**	
HC / SJFuca total	**34,599**	**400**	**34,999**	

Table 2. **Escapement (including hatchery broodstock) for Hood Canal and the Strait of Juan de Fuca summer chum salmon stocks, 1974-2006.**

Return year	Hood Canal escapement	Strait of Juan de Fuca escapement	HC/SJF ESU escapement
1974	12,281	1,768	14,049
1975	18,248	1,448	19,696
1976	27,715	1,494	29,209
1977	10,711	1,644	12,355
1978	19,710	3,080	22,790
1979	6,554	761	7,315
1980	3,777	5,109	8,886
1981	2,374	884	3,258
1982	2,623	2,751	5,374
1983	899	1,139	2,038
1984	1,414	1,579	2,993
1985	1,109	232	1,341
1986	2,552	1,087	3,639
1987	757	1,991	2,748
1988	2,967	3,690	6,657
1989	598	388	986
1990	429	341	770
1991	747	309	1,056
1992	2,377	1,070	3,447
1993	756	573	1,329
1994	2,429	178	2,607
1995	9,462	839	10,300
1996	20,490	1,084	21,574
1997	8,972	962	9,934
1998	4,001	1,269	5,270
1999	4,114	573	4,687
2000	8,649	983	9,612
2001	12,044	3,955	15,999
2002	11,454	6,955	18,409
2003	35,696	6,959	42,655
2004	69,995	9,341	79,336
2005	15,757	9,682	25,439
2006	26,753	8,246	34,999

Run Size: In order to estimate the annual return to specific production areas, fish harvested in mixed stock and terminal fisheries were allocated to management units from which they likely originated. This was accomplished through a post-season process called "run reconstruction," which apportions the harvests in each fishery into the numbers of fish that likely were contributed by the individual management units assumed to be contributing to the fishery. The total return was then estimated by summing the apportioned harvest impacts and escapement estimates. A discussion of the run re-construction methodology can be found in the SCSCI Appendix Report 1.3 (WDFW and PNPTT 2000). Run size estimates for 2006 along with updated estimates for 2005 are provided in an appendix to this report. Table 3 summarizes the estimated run sizes and spawning escapements, by region, for 2006. Table 4 and Figures 1 and 2 show Hood Canal and Strait of Juan de Fuca total run sizes from 1974 through 2006.

This year's relatively large return was anticipated, as was the reduction in production levels from the record return of 96,335 summer chum recruits during 2004. The 2004 return represented a peak year in the strong 4-year cycle exhibited by these stocks, and it has been typical for lower returns to occur in the return years preceding and following the peak. In Table 4, it can be seen that this pattern has occurred with seven of the eight cycle peaks since 1974 (HC/SJF combined). The cyclic pattern was reflected in the pre-season forecast for 2006 which was about 32,000 total recruits (with about 23,500 total recruits for Hood Canal and about 8,500 total recruits for Strait of Juan de Fuca) compared to the actual return of about 37,700 recruits in 2006.

During 2006, there were several major flood events in Hood Canal and Strait of Juan de Fuca streams during the summer chum egg incubation and pre-emergence periods. We anticipate that there may be some effect on survival rates for the 2006 brood that could affect the return of summer chum adults during 2009 and 2010.

Table 3. Regional summer chum run sizes in 2006.

Hood Canal Region	
Spawning escapement	26,753
Terminal run size	29,351
Hood Canal total run size	29,468
Strait of Juan de Fuca Region	
Spawning escapement	8,246
Terminal run size	8,246
Strait of Juan de Fuca total run size	8,279

Table 4. **Total run sizes for Hood Canal and the Strait of Juan de Fuca summer chum salmon, 1974-2006.**

Return year	Hood Canal run size	Strait of Juan de Fuca run size	HC/SJF ESU run size
1974	14,222	1,985	16,207
1975	29,113	1,747	30,860
1976	74,220	1,673	75,893
1977	16,688	1,810	18,498
1978	25,344	3,240	28,584
1979	9,513	900	10,413
1980	13,026	5,574	18,600
1981	5,875	1,139	7,014
1982	8,331	3,540	11,871
1983	3,545	1,217	4,762
1984	3,372	1,707	5,079
1985	4,424	411	4,835
1986	7,832	1,217	9,049
1987	3,971	2,181	6,152
1988	5,680	4,129	9,809
1989	4,473	795	5,268
1990	1,564	528	2,092
1991	2,199	424	2,623
1992	3,376	1,394	4,770
1993	871	643	1,514
1994	2,959	214	3,173
1995	9,984	882	10,866
1996	21,056	1,106	22,162
1997	9,373	985	10,358
1998	4,274	1,316	5,590
1999	4,527	577	5,104
2000	9,506	987	10,493
2001	13,375	3,982	17,357
2002	13,170	6,981	20,151
2003	36,332	7,015	43,347
2004	88,644	9,362	98,006
2005	16,104	9,734	25,838
2006	29,468	8,279	37,747

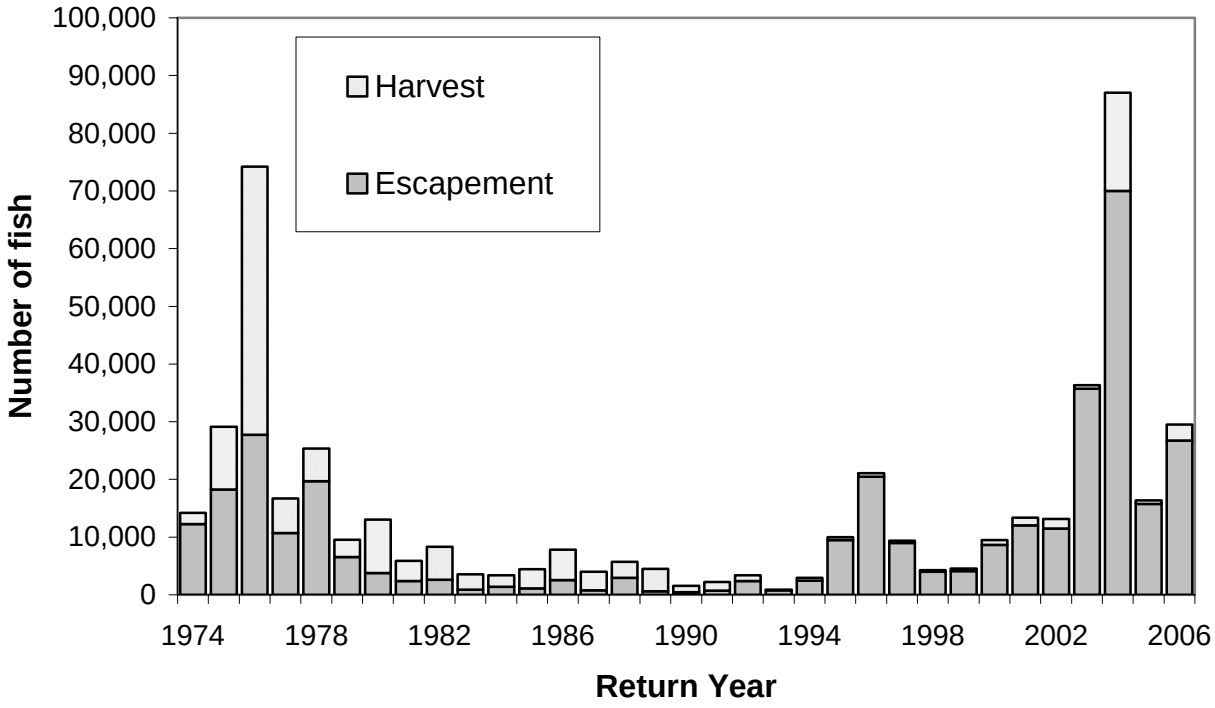

Figure 1. Hood Canal summer chum salmon run size (escapement + harvest), 1974-2006.

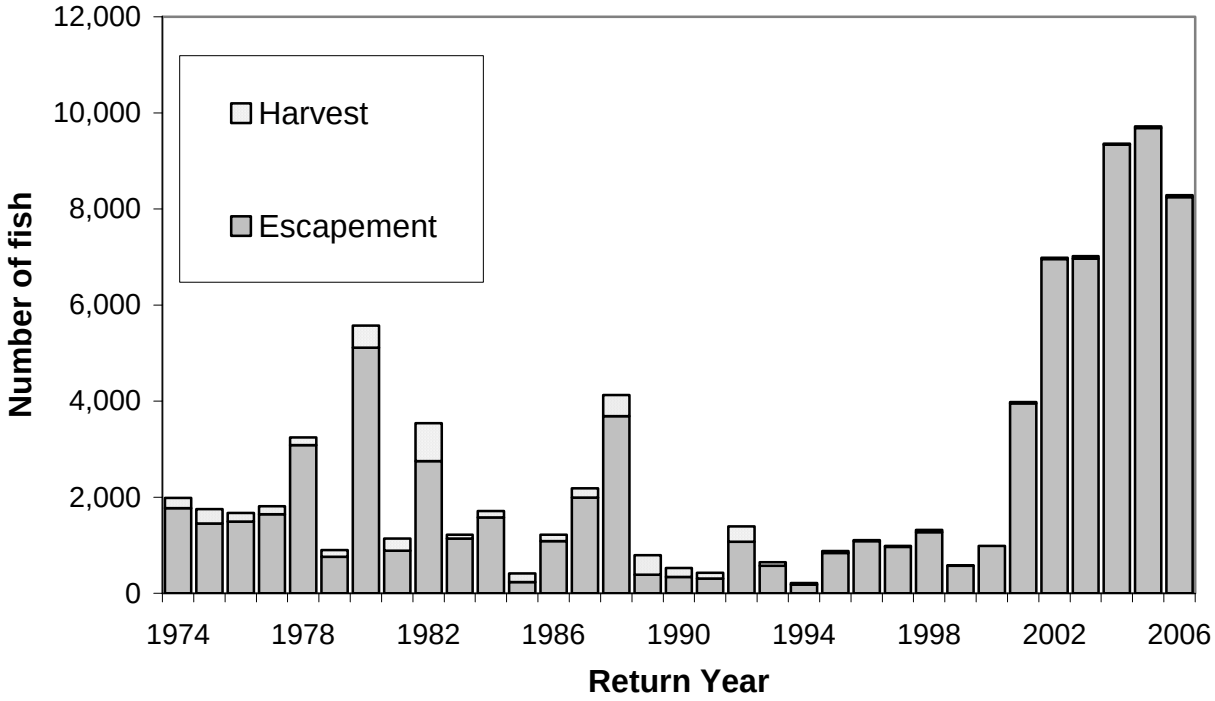

Figure 2. Strait of Juan de Fuca summer chum salmon run size (escapement + harvest), 1974-2006.

Genetic Stock Identification: During 2006, the Co-managers continued DNA collections from summer chum spawners throughout the ESU. Table 5 provides a summary of the 2006 DNA sample collections, as well as the numbers of otolith and scale samples collected. The sampling locations and collection methods are also indicated. However, limited funding is currently available for the processing and analysis of these and earlier archived samples.

Table 5. Genetic, otolith, and scale collections from adult summer chum salmon in Strait of Juan de Fuca and Hood Canal streams, 2006.

		GSI	Sample size				
Stream	**WRIA**	**code**	**Allozyme**	**DNA [2]**	**Otolith**	**Scales**	**Collection method**
Dungeness River	18.0018	- - -	0	0	0	0	Foot survey
Jimmycomelately[1]	17.0825	05 IH	0	65	253	254	Trap, foot survey
Salmon Cr.[1]	17.0245	05 II	0	0	400	400	Trap, foot survey
Snow Cr.	17.0219	05 IJ	0	0	160	160	Foot survey
Chimacum Cr.[1]	17.0203	05 IK	0	0	250	255	Foot survey
Thorndyke Cr.	17.0170	- - -	- -	- -	- -	- -	- - -
Little Quilcene R.	17.0076	05 IL	0	0	175	229	Foot survey
Big Quilcene R.[1]	17.0012	- - -	0	0	0	213	Foot survey
Dosewallips R.	16.0442	05 IM	0	110	309	333	Foot survey
Duckabush R.	16.0351	05 IN	0	146	343	411	Foot survey
Fulton Cr.	16.0332	- - -	- -	- -	- -	- -	Foot survey
Hamma Hamma R.[1]	16.0251	05 IO	0	336	508	579	Seine, foot survey
Lilliwaup R.[1]	16.0230	05 IP	0	308	504	534	Foot survey
Little Lilliwaup	16.0228	- - -	0	0	0	0	Foot survey
Skokomish R.	16.0001	- - -	0	0	10	14	Foot survey
Union R.[1]	15.0503	05 IR	0	100	192	226	Trap, foot survey
Tahuya R.[1]	15.0446	- - -	0	0	141	157	Foot survey
Dewatto R.	15.0420	05 LY	0	0	25	25	Foot survey
Stavis Cr.	15.0404	- - -	0	0	0	0	Foot survey
Big Beef Cr.[1]	15.0389	05 IQ	0	0	160	200	Trap, foot survey
Little Anderson	15.0377	- - -	- -	- -	- -	- -	Foot survey
Totals			**0**	**1065**	**3430**	**3990**	

[1] Stream has supplementation or reintroduction program.

[2] Some additional scale samples can also be used for DNA analysis.

Biological Data (Age): Age composition, determined from scale collections and / or otolith analysis, for summer chum salmon in Strait of Juan de Fuca and Hood Canal streams during 2006 is presented in Table 6. There was considerable variation from stream to stream, but the overall age composition in 2006 was comprised of about 1% age 2, 46% age 3, 52% age 4, and 1% age 5 summer chum. Although sample sizes were generally very good, estimates of age composition likely improved as the proportion of the total escapement sampled increased. In addition, with sample sizes of 200 to 400 fish per stream, for a confidence level of 0.80-0.90, the confidence interval half-width was +/- 5%-10% (Thompson 1987).

Table 6. Strait of Juan de Fuca and Hood Canal summer chum salmon age composition, 2006.

	Escapement			Age composition			
Stream	Total	Sample size	% sampled	2	3	4	5
Dungeness [1]	3	0	0%	0.0%	66.7%	33.3%	0.0%
JCL	725	254	35%	4.7%	63.8%	29.5%	2.0%
Salmon	4,894	400	8%	1.3%	37.8%	57.9%	3.0%
Snow	598	160	27%	1.3%	46.2%	51.3%	1.3%
Chimacum	2,026	255	13%	1.6%	46.9%	51.2%	0.4%
L. Quilcene	2,372	229	10%	0.0%	70.7%	27.9%	1.3%
B. Quilcene [2]	9,504	213	2%	0.0%	45.4%	54.6%	0.0%
Dosewallips	2,577	333	13%	0.0%	33.7%	65.9%	0.4%
Duckabush	3,135	411	13%	0.3%	41.3%	57.8%	0.6%
Hamma	3,065	579	19%	0.4%	20.0%	79.3%	0.2%
Lilliwaup [3]	1,615	534	33%	0.0%	50.1%	49.1%	0.6%
Skokomish	8	8	100%	0.0%	14.3%	78.6%	7.1%
Union	2,836	226	8%	0.9%	60.9%	37.7%	0.5%
Tahuya	749	157	21%	2.5%	91.8%	5.1%	0.6%
Dewatto	69	25	36%	0.0%	76.0%	24.0%	0.0%
Big Beef [4]	823	200	24%	1.5%	66.8%	31.7%	0.0%
Strait of Juan de Fuca	8,246	1,069	13%	1.6%	43.0%	53.3%	2.1%
Hood Canal	26,753	2,915	11%	0.3%	47.1%	52.2%	0.3%
Total	34,999	3,984	11%	0.6%	46.1%	52.5%	0.8%

[1] No samples from Dungeness; age comp. based on JCL

[2] Big Quilcene was not sampled for otoliths.

[3] Lilliwaup includes escapement of 49 in Eagle Cr (which was not sampled).

[4] Big Beef Creek includes escapement of 14 in Stavis Cr. (which was not sampled).

Mark Recovery: As noted in the SCSCI and the SCSCI Supplemental Reports, hatchery supplementation techniques are being applied as a strategy to reduce the short-term extinction risk of summer chum salmon in the Hood Canal and Strait of Juan de Fuca regions and to aid in their recovery. Appropriate indigenous broodstocks are also being used to reintroduce summer chum to selected watersheds where they have recently been extirpated. The summer chum juveniles produced by each supplementation program are uniquely mass-marked prior to release. The supplementation fish were 100% adipose fin-clipped at Quilcene and fish from all other programs were 100% otolith marked. Examination of otoliths or fin clip proportions of spawned adults provides a method to estimate the proportion of hatchery-origin and natural-origin contributions. This analysis assists in determining 1) the contribution of fry released from each rearing strategy within each supplementation program to the target population and 2) the level of straying of supplementation program-origin fish to other drainages.

Otoliths were collected from summer chum salmon in Hood Canal and eastern Strait of Juan de Fuca streams and the fish were also examined for adipose fin clips, by WDFW and USFWS staffs, and staff or volunteers from the Hood Canal Salmon Enhancement Group (HCSEG), Long Live The Kings (LLTK), and the North Olympic Salmon Coalition (NOSC). Sampling was accomplished on the spawning grounds or after summer chum were spawned as broodstock for the supplementation/reintroduction programs. WDFW's Fish Program Otolith Laboratory conducted otolith analysis.

Due to some problems with otolith marking and/or collection of otolith reference samples, some adults collected during 2006 were positively identified as having originated from a supplementation program, but the otolith marks potentially matched the marks from two or more different programs. For this preliminary analysis, the program matching the stream of recovery was chosen if it was one of the identified possible sources. If it was not, then those fish were designated as strays. We plan to use DNA analysis to help identify the stream of origin for these "marked, indefinite origin" fish, but this analysis has not been completed. DNA analysis may thus help determine whether known supplementation-origin fish returned to their stream of origin or strayed to some other stream.

The actual numbers of otolith-marked or adipose-marked (AD-clipped) adults sampled were expanded based on the age-specific percentage of the total spawner escapement sampled for otolith marks or AD-clips in each stream. The expanded estimates likely improve as the percentage of the total escapement sampled increases (see Table 6).

This mark recovery analysis yields estimates of total numbers of natural-origin and supplementation-origin summer chum returning each year. For 2006 escapement, the number and percentage of natural-origin and supplementation-origin adults for each stream, management unit (MU), the Strait of Juan de Fuca and Hood Canal regions, and the ESU are shown in Table 7. Most supplementation-origin summer chum returned to their stream of origin during 2006, but some strayed to other streams. For example, of the total escapement of 725 summer chum to JCL Creek during 2006, 345 (48%) were natural-origin, 363 (50%) were supplementation-origin fish that returned to their stream of origin (i.e., to JCL Creek from the JCL supplementation program), and 2% were supplementation-origin fish that returned as strays (i.e., to JCL Creek from some other supplementation program). Of the total escapement of 11,284 summer chum to the Mainstem Hood Canal MU, 8771 (78%) were natural-origin, 1734

(15%) were supplementation-origin fish that returned to their stream of origin (i.e., from the Hamma Hamma, Lilliwaup, and Big Beef supplementation programs to those respective streams), and 779 (7%) were supplementation-origin fish that returned as strays (i.e., to the MU from some other supplementation program). For the Strait of Juan de Fuca region, Hood Canal region, and the ESU, summer chum escapement during 2006 was comprised of approximately 80% natural-origin adults, 17% supplementation-origin adults that returned to their streams of origin, and 3% supplementation-origin fish that returned as strays (Table 7). Mark data indicated that 74%, 83%, and 70% of the summer chum returning in 2003, 2004, and 2005, respectively, were of natural-origin (WDFW and PNPTC 2006). Note that these estimates do not account for possible straying of natural-origin fish to streams other than the stream of origin.

The number of natural-origin adults, supplementation-origin adults, and supplementation-origin strays, by age, is shown in Appendix Table 1 for 2006.

Table 7. Estimates of natural-origin and supplementation-origin escapement for Strait of Juna de Fuca and Hood Canal summer chum salmon, 2006.

					Supplementation-origin			
Management Unit (MU)	Stream	Total escapement	Natural-origin		To stream of origin [1]		As strays [1,2]	
			No.	%	No.	%	No.	%
	Dungeness [3]	3	3	100%	0	0%	0	0%
Sequim Bay	JCL	725	345	48%	363	50%	17	2%
Discovery Bay	Salmon	4,894	4,326	88%	449	9%	119	2%
	Snow	598	564	94%	15	3%	19	3%
	MU Total	5,492	4,890	89%	464	8%	138	3%
Port Townsend	Chimacum	2,026	1,474	73%	535	26%	16	1%
Quilcene/Dabob Bays	L. Quilcene	2,372	2,262	95%	98	4%	12	1%
	B. Quilcene [4]	9,504	8,619	91%	885	9%	0	0%
	MU Total	11,876	10,881	92%	983	8%	12	0%
Mainstem Hood Canal	Dosewallips	2,577	2,457	95%	0	0%	120	5%
	Duckabush	3,135	2,964	95%	0	0%	171	5%
	Hamma	3,065	2,707	88%	169	6%	189	6%
	Lilliwaup [5]	1,615	426	26%	953	59%	236	15%
	Dewatto	69	17	24%	0	0%	52	76%
	Big Beef [6]	823	200	24%	612	74%	11	1%
	MU Total	11,284	8,771	78%	1,734	15%	779	7%
	Skokomish	8	8	100%	0	0%	0	0%
SE Hood Canal	Union	2,836	1,667	59%	1,106	39%	64	2%
	Tahuya	749	58	8%	665	89%	26	3%
	MU Total	3,585	1,725	48%	1,771	49%	89	2%
Region								
Strait of Juan de Fuca		**8,246**	**6,712**	**81%**	**1,362**	**17%**	**172**	**2%**
Hood Canal		**26,753**	**21,385**	**80%**	**4,488**	**17%**	**880**	**3%**
HC/SJFuca ESU		**34,999**	**28,097**	**80%**	**5,850**	**17%**	**1,052**	**3%**

[1] Preliminary results; plan to check/verify with DNA analysis; also, excludes "otolith-marked, indefinite origin" fish

[2] Returning to other than stream of origin

[3] No samples from Dungeness; escapement assigned as NORs.

[4] Big Quilcene was not sampled for otoliths.

[5] Lilliwaup includes escapement of 49 in Eagle Cr (which was not sampled).

[6] Big Beef Creek includes escapement of 14 in Stavis Cr. (which was not sampled).

Harvest Management

The SCSCI established an annual fishing regime (referred to as the Base Conservation Regime or BCR) beginning in 2000 for Canadian, Washington pre-terminal, and Washington terminal area fisheries designed to minimize incidental impacts to summer chum salmon. The intent of the BCR is to initiate rebuilding of the summer chum runs, from the critical or near critical levels of the late 1990s, by establishing ceiling exploitation rates, to provide incremental increases in escapements over time while allowing a limited opportunity to harvest other species. The BCR was constructed using a conservative approach that would pass through to spawning escapement, on average, in excess of 95% of the Hood Canal-Strait of Juan de Fuca summer chum recruitment entering U.S. waters, and nearly 90% of the total recruitment of the run of each management unit.

The SCSCI requires annual post-season abundance assessments for each management unit. Where management units may contain more than one stock (Mainstem Hood Canal), it requires assessment of the abundance distribution among component populations. Critical abundance thresholds are defined for each MU, for both total run size and spawning escapement, and minimum escapement as well as escapement distribution "flags" are further defined for individual stocks within the Mainstem MU. An MU is considered to be in critical status when its run size or escapement in the most recent past return year is lower, or its forecast run size for the coming return year is projected to be lower, than the appropriate threshold value. Minimum escapement and escapement distribution flags are useful planning benchmarks to check for unbalanced performance of individual stocks of the Mainstem MU in years when the overall MU abundance exceeds the critical abundance threshold (see SCSCI Section 1.7.3).

Preliminary harvest management results for the 2005 season were previously reported in the 2005 progress report (WDFW and PNPTC 2006) and are included here following updates to the harvest data, as well as the addition of recreational harvest information (Tables 8, 9, 10, and 11).

Harvest management results again can be described as very good during 2006, the seventh consecutive year in which the Base Conservation Regime was implemented. Table 10 provides a preliminary overview for 2006 of the pre-season estimates that triggered the various management responses, as well as comparisons with the post-season estimates. Table 11 shows the estimated harvest of summer chum salmon during 2006, by management unit and fishery. Tables 12 and 13 provide the estimated exploitation rates by Management Unit and by fishery, respectively, for 2005 and 2006, relative to the BCR targets. As previously indicated, the information for 2006 is preliminary and will be revised, when commercial catch data are verified and recreational catch data are included.

The 2006 pre-season forecasts correctly predicted that no MU abundance would fall short of its critical threshold. Within the Mainstem Hood Canal MU, as predicted, no individual stock triggered a minimum escapement, or escapement distribution flag.

In 2006, the post-season estimates of recruitment were higher than the pre-season forecasts for Chimacum, Quilcene, and the Mainstem Hood Canal MUs and lower than the pre-season forecasts for the Sequim, Discovery, and SE Hood Canal MUs. The expected escapements for

all management units were exceeded in 2006.

The estimated exploitation rates, in 2006, for all management units, were well below the target exploitation rates of the Base Conservation Regime (Tables 10 and 12). Canadian, U.S. preterminal, and Hood Canal terminal area fisheries' exploitation rates were also well below their BCR target limits (Table 13). In Quilcene Bay (Marine Area 12A), there is an extreme terminal area fishery managed on a stepped fishing schedule based on the in-season assessment of projected escapement; no fishery-specific exploitation rate target is defined in the BCR, but an exploitation rate of 5% is expected, at the first step. During 2006, in-season information indicated that the escapement to the Quilcene MU would exceed 2,500 summer chum (SCSCI Table 3.33), and additional days per week of gillnet fishing for coho were initially scheduled. However, there was also a later reduction in beach seine and gillnet fishing for coho in Quilcene Bay to ensure adequate escapement of hatchery coho to Quilcene National Fish Hatchery. During 2006, the summer chum exploitation rate was 17.7% for the Quilcene MU, with 16.8% in Quilcene Bay. The estimated spawning escapement is 11,876 summer chum in the Quilcene MU (Tables 12 and 13). The 2006 total spawning escapement level in the Quilcene MU was over 400% of the interim recovery goal threshold.

During the 2006 season, except for the reduction in beach seine and gillnet fishing (described above), no changes were made from the initially adopted plans.

In 2006, the Strait of Juan de Fuca MUs escapement rate was 99.6%. In Hood Canal, the escapement rates were 82.3% for the Quilcene MU, and 99.1% for the Mainstem Hood Canal and the Southeast Hood Canal MUs.

Table 8. Post-season assessment of forecasts, recruitment, and escapement by summer chum salmon harvest management unit in the year 2005.

Management Category	Sequim	Discovery	Chimacum	Quilcene	Mainstem Hood Canal	SE Hood Canal
Preseason Recruit Forecast	605	5,329	870	8,355	5,911	3,795
Postseason Recruit Estimate [1]	1,317	7,012	1,404	6,962	7,127	2,002
Forecast Error	-54.1%	-24.0%	-38.0%	20.0%	-17.1%	89.6%
Expected Escapements [2]	1,201	6,395	1,280	4,241	6,350	1,750
Est. Escapement	1,310	6,974	1,396	6,672	7,089	1,991
BCR Escapement Target Exceedance	9.1%	9.1%	9.0%	57.3%	11.6%	13.8%
Estimated Exploitation Rate [1]	0.5%	0.5%	0.6%	4.2%	0.5%	0.5%

[1] Post season recruit estimates are preliminary and will be revised upwards when recreational harvest estimates are added. Estimates are rounded to nearest 1/10th of 1%.

[2] Expected escapements are generally those that would result from application of BCR expected exploitation rates. In the case of Quilcene, it was assumed that up to 50% of the entry after mid-September could have been considered "harvestable".

Table 9. Summer chum salmon harvest, in 2005, by management unit and fishery.

Fishery	Sequim	Discovery	Chimacum	Quilcene	Mainstem Hood Canal	SE Hood Canal
Canada	3	17	3	17	17	5
U.S. Mixed	4	21	4	21	21	6
Terminal	0	0	0	0	0	0
Extreme Terminal	0	0	0	252	0	0

Table 10. Post-season assessment of forecasts, recruitment, and escapement by summer chum salmon harvest management unit in the year 2006.

Management Category	Sequim	Discovery	Chimacum	Quilcene	Mainstem Hood Canal	SE Hood Canal
Preseason Recruit Forecast	868	6,377	993	8,415	7,208	4,157
Postseason Recruit Estimate [1]	728	5,514	2,034	14,426	11,382	3,616
Forecast Error	19.2%	15.7%	-51.2%	-41.7%	-36.7%	15.0%
Expected Escapements [2]	664	5,029	1,855	6,107	10,141	3,160
Est. Escapement	725	5,492	2,026	11,876	11,284	3,585
BCR Escapement Target Exceedance	9.2%	9.2%	9.2%	94.5%	11.3%	13.4%
Estimated Exploitation Rate [1]	0.4%	0.4%	0.4%	17.7%	0.9%	0.9%

[1] Post season recruit estimates are preliminary and will be revised upwards when recreational harvest estimates are added. Estimates are rounded to nearest 1/10th of 1%.

[2] Expected escapements are generally those that would result from application of BCR expected exploitation rates. In the case of Quilcene, it was assumed that up to 50% of the entry after mid-September could have been considered "harvestable".

Table 11. Summer chum salmon harvest, in 2006, by management unit and fishery. [1]

Fishery	Sequim	Discovery	Chimacum	Quilcene	Mainstem Hood Canal	SE Hood Canal
Canada	1	8	3	20	16	5
U.S. Mixed	2	14	5	37	29	9
Terminal	0	0	0	68	53	17
Extreme Terminal	0	0	0	2,425	0	0

[1] Post season harvest estimates are preliminary and will be revised upwards when recreational harvest estimates are added.

Table 12. Post season assessment of exploitation rates for 2005 and 2006, relative to BCR target levels for each management unit.

Management Unit	Exploitation Rates		
	BCR Target	2005 Est.	2006 Est. [1]
Sequim	8.8%	0.5%	0.4%
Discovery	8.8%	0.5%	0.4%
Chimacum	na	0.6%	0.4%
Quilcene	15.2%	4.2%	17.7%
Mainstem HC	10.9%	0.5%	0.9%
Southeast HC	12.6%	0.5%	0.9%

[1] Based on preliminary harvest data; recreational catch not included. Rates rounded to nearest 1/10th of 1%

Table 13. Post season assessment of exploitation rates for 2005 and 2006, relative to BCR target levels for each fishery.

Fishery	Exploitation Rates		
	BCR Target	2005 Est.	2006 Est. [1]
Canada	6.3%	0.2%	0.1%
U.S. Preterminal (SJF)	2.5%	0.3%	0.3%
U.S. Preterminal (HC)	2.5%	0.3%	0.3%
Hood Canal Mixed Terminal	2.1%	0.0%	0.5%
Quilcene Extreme Term. (Min.)	5.0% +	3.6%	16.8%
Quilcene Escapement (Range)	>2,500	6,672	11,876

[1] Based on preliminary harvest data; recreational catch not included. Rates rounded to nearest 1/10th of 1%

Artificial Production

Supplementation or reintroduction programs have been terminated on several streams, because they have met the individual project's production level goals specified in the SCSCI. Projects that have been terminated include Big Quilcene, Salmon Creek, Chimacum Creek, and Union River; the last fry releases from these programs occurred in 2004 (BY 2003).

During 2006, summer chum supplementation programs continued at Jimmycomelately Creek, Hamma Hamma River, and Lilliwaup River. A reintroduction program on the Tahuya River, using Union River broodstock, was also continued in 2006. There was no broodstock collection at Big Beef Creek during 2006, but the reintroduction program there may be reinitiated in the future as an outcome of discussions between the co-managers and the University of Washington.

A summary is provided in Table 14 of brood year 2006 summer chum broodstock collections, egg takes, and fed fry releases for supplementation programs.

Table 14. Summer chum salmon supplementation programs, brood year 2006.

Brood		Broodstock			Natural	Percent	Estimated eggs		Fed fry release		
year	Stream	Males	Females	Total	spawners	removed	Green	Eyed	No.	Size (g)	Date
2006	JCL	33	32	65	660	9.0%	92,412	80,851	79,428	1.0-1.2	March/April 2007
2006	Hamma Hamma	69	74	143	2873	4.7%	231,995	211,329	151,550	1.1-1.2	Feb./March 2007
2006	Lilliwaup	46	46	92	1523	5.7%	125,788	118,700	88,800	1.1-1.2	Feb./March 2007
2006 a/	Union/Tahuya	50	50	100	2736	3.5%	143,856	137,827	133,826	1.0-1.2	Feb./March 2007

a/ Fry reared and released into Tahuya R. as reintroduction program

Important objectives of the SCSCI include the monitoring and evaluation of the effects of supplementation on the natural summer chum populations and of the effectiveness of the programs in the recovery of summer chum (see section 3.2.2.4 of the SCSCI). The basic approach is to collect information that will help determine 1) the degree of success of each project; 2) if a project is unsuccessful, why it was unsuccessful; 3) what measures can be implemented to adjust a program that is not meeting objectives for the project; and 4) when to terminate a supplementation project.

Each project is to be fully consistent with the intent and implementation of the monitoring and evaluation component for supplementation programs identified in the SCSCI. The recommendations for monitoring and evaluation in the SCSCI respond to concerns regarding the uncertainty of summer chum supplementation and reintroduction effects by addressing the following four elements:

> *Element 1* - The estimated contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process;
> *Element 2* - Changes in the genetic, phenotypic, or ecological characteristics of populations (target and non-target) affected by the supplementation/reintroduction program;

Element 3 - The need and methods for improvement of supplementation/reintroduction activities in order to meet program objectives, or the need to discontinue a program because of failure to meet objectives; and
Element 4 - Determination of when supplementation has succeeded and is no longer necessary for recovery by collection and evaluation of information on adult returns.

Monitoring and evaluation were accomplished for each project, consistent with the above four elements, as follows:

Fish marking, mark recovery, and adult returns - The summer chum salmon juveniles (either embryos or fry) produced by each supplementation program have been mass-marked (otolith-marked or fin-clipped) prior to release. Spawning ground surveys were conducted throughout the summer chum escapement period to enumerate spawners and to collect information on fish origin and age composition. Examination of otoliths or fin clip ratios from spawned adults provides a method to estimate the number of supplementation (hatchery) fish versus the number of natural-origin (wild) fish, assists in determining the contribution of the supplementation program to the target sub-populations and the level of straying of supplementation-origin fish to other drainages.

During 2006, each supplementation program contributed to the return of summer chum adults. For example, supplementation-origin adults comprised 52%, 12%, 74%, and 92% of the total escapement to Jimmycomelately, Hamma Hamma, Lilliwaup, and Tahuya, respectively, during 2006. Overall, approximately 6,900 supplementation-origin adults (or about 20% of the total escapement) returned to Hood Canal and Strait of Juan de Fuca regions during 2006 (Table 7).

As noted earlier, most supplementation-origin summer chum returned to their stream of origin during 2006, but some strayed to other streams. For example, of the 471 supplementation-origin fish returning in 2006 from the JCL Creek supplementation program, 363 (77%) returned to JCL Creek, and 108 (23%) strayed to other streams. The proportion of supplementation-origin fish that returned to the stream of origin varied and ranged from 98% for the Lilliwaup program to 55% for the Hamma Hamma program (Table 15).

For the Strait of Juan de Fuca region, of the 1524 supplementation-origin fish returning in 2006 from Strait of Juan de Fuca programs, 1362 fish (89%) returned to their respective streams of origin and 162 fish (11%) were strays. Of these 162 strays, 120 returned to other Strait of Juan de Fuca streams and 42 returned to Hood Canal streams (Table 15). Thus, of the total escapement of 26,753 summer chum in Hood Canal, 42 fish (0.16%) were supplementation-origin strays from Strait of Juan de Fuca to Hood Canal.

For the Hood Canal region, of the 5,304 supplementation-origin fish returning in 2006 from Hood Canal programs, 4,488 fish (85%) returned to their respective streams of origin and 818 fish (15%) were strays. Of these 818 strays, all (100%) returned to other Hood Canal streams and none (0%) returned to Strait of Juan de Fuca streams (Table 15).

For the ESU, approximately 86% of supplementation-origin fish returned to their stream of origin (Table 15).

Most straying of supplementation-origin fish occurred between neighboring streams within the region of origin. The number of supplementation-origin summer chum straying to streams other than their program stream of origin during 2006 is shown, by age, in Appendix Table 2. For example, some supplementation-origin strays were recovered (1) from Jimmycomelately in Salmon, Snow, and Duckabush, (2) from Salmon in Jimmycomelately, Chimacum, and Hamma Hamma, (3) from Quilcene in Dosewallips, Duckabush, Hamma Hamma, and Lilliwaup, (4) from Hamma Hamma in Dosewallips, Duckabush, Lilliwaup, and Union, (5) from Lilliwaup in Dosewallips, Hamma Hamma, and Dewatto, and (6) from Union in Hamma, Lilliwaup, Big Beef, and Dewatto (Appendix Table 2). Again, we plan to use DNA analysis to help check/verify the stream and region of origin for strays and for some "otolith-marked, indefinite origin" fish (which are not included in Table 15).

Table 15. Preliminary estimates of the number and proportion of supplementation-origin summer chum adults that returned from each program to the stream of origin or as strays, 2006.

Stream of supplementation program	Supplementation-origin adult escapement				
	Total no.	To stream of origin [1]		As strays [1,2]	
		No.	%	No.	%
Strait of Juan de Fuca					
JCL	471	363	77%	108	23%
Salmon	485	464	96%	21	4%
Chimacum	568	535	94%	33	6%
SJFuca total	1,524	1,362	89%	162	11%
Hood Canal					
B. Quilcene	1,328	983	74%	345	26%
Hamma	310	169	55%	141	45%
Lilliwaup	975	953	98%	22	2%
Big Beef	750	612	82%	138	18%
Union	1,176	1,106	94%	70	6%
Tahuya	765	665	87%	100	13%
Hood Canal total	5,304	4,488	85%	816	15%
ESU Total	6,828	5,850	86%	978	14%
Summary of region-to-region strays [1,3]					
SJFuca-to-SJFuca				120	
SJFuca-to-Hood Canal				42	
Hood Canal-to-Hood Canal				816	
Hood Canal-to-SJFuca				0	

[1] Preliminary results; plan to check/verify with DNA analysis; also, excludes "otolith-marked, indefinite origin" fish

[2] Returning to other than stream of origin; see Appendix Table 2

[3] Returning to other than region of origin; see Appendix Table 2

Genetic and age sampling - In order to detect any changes in genetic characteristics of populations, periodic allozyme and/or DNA samples have been collected from summer chum since most supplementation programs were started, for comparison to earlier baseline collections (before supplementation). Analysis of allozyme samples has been completed (Kassler and Shaklee 2003; see Appendix Report 3 of SCSCI Supplemental Report No. 4 (WDFW and PNPTT 2003)). DNA samples have been analyzed (1) to develop a baseline for summer chum (Small and Young 2003; see Appendix Report 4 of SCSCI Supplemental Report No. 4 (WDFW and PNPTT 2003)) and (2) to identify the origin of otolith-marked adults designated as "marked, indefinite origin" and, more generally, to track potential straying impacts from supplementation programs (Small et al., in prep.). Scales were also collected to age the adult fish during 2006; see Biological Data (Age) section, above.

Broodstocking, egg sources, incubation and rearing - To fully represent the demographics of donor populations, summer chum broodstock are collected randomly as the fish arrive at temporary fish traps operated by WDFW or project cooperators (e.g., Jimmycomelately Creek and Union River), or by beach seining in the lower reaches of the stream (e.g., Lilliwaup R., Hamma Hamma R.) in proportion to the timing, weekly abundance, and duration of the total return. Fish not retained for broodstock are released upstream of trap sites or returned to the stream to spawn naturally. Incubation and rearing protocols are designed to produce the most summer chum fry in the shortest amount of time in the hatchery, while producing fish that are as genetically and ecologically similar as possible to the founding natural population. Survival is measured to compare against survival rate objectives previously established to measure the effectiveness of each program.

In 2006, all programs met their broodstock and egg take objectives. Fed fry met size at release and time at release criteria (Table 11). The Jimmycomelately and Union/Tahuya programs achieved the survival rate objectives for each life stage from green egg to eyed egg to swim-up fry to release. Survival from green egg to fry release was 86% for the Jimmycomelately program and 93% for Tahuya program during 2006. The Hamma Hamma and Lilliwaup programs each met the 90% green egg-to-eyed egg survival objective, but there was substantial loss from eyed egg-to-fry release. Consequently, for each of these two programs, survival from eyed egg-to-release was approximately 72-75% (compared to the program objective of 89.5%) and survival was approximately 65%-71% from green egg-to-release (compared to the program objective of 85%). As usual, all programs will be discussed and reviewed prior to initiation of brood year 2007 programs.

Hatchery operations - Records of fish cultural operations are maintained and compiled. Project sponsors in collaboration with WDFW, summarize protocols and procedures, temperature unit records by developmental stage, ponding dates, feeding, rearing and release methods, and production and survival data, and recommend facility or protocol improvements.

Fish health - Fish health is monitored by a WDFW fish health specialist in accordance with procedures in the Co-managers' disease control policy (NWIFC and WDFW 1998). Summer chum broodstock are sampled for the incidence of viral pathogens, there has been no significant mortality of broodstock or juveniles from unknown causes, and the health of fry from all projects prior to release has been good.

Summary and Conclusions

The improved summer chum salmon returns and escapements to Hood Canal and Strait of Juan de Fuca streams, enhanced by strong returns to various supplementation programs, and combined with the high percentage of natural origin recruits in recent years suggest a substantial reduction of the extinction risk for this Evolutionarily Significant Unit (ESU). For example, the 4-year average total escapement has increased from 2,367 summer chum (1988-1991) to 45,606 summer chum (2003-2006). From 2001 to 2006, supplementation-origin fish accounted for about 46%, 40%, 26%, 17%, 30%, and 20% of summer chum escapement which also means that natural-origin spawners comprised about 54%, 60%, 74%, 83%, 70%, and 80% during these same years. Due to successful reintroduction programs, spawners now return to three streams (i.e., Chimacum Creek, Big Beef Creek and Tahuya River) where they had been recently extirpated. In addition, extinction risk has decreased for each of the eight extant stocks in the ESU; i.e., from 1985-1988, there were 4, 2, and 2 stocks at high, moderate, and low risk of extinction compared to 0 high risk, 2 moderate risk, and 6 low risk stocks during 2001-2004 (Adicks et al. 2005).

While all of the above events are very positive results for the summer chum salmon recovery effort, they do not yet constitute full recovery.

The co-managers have developed interim recovery goals for summer chum salmon (PNPTT and WDFW 2003, HCCC 2005), that require strong production performance of natural origin recruits over three generations (12 years), and the recent years of improved escapement and recruitment are not sufficient to meet the recovery goals. In addition, the NMFS Puget Sound Technical Recovery Team (PSTRT) has defined and recommended viability criteria for the ESU and its two independent component populations (i.e., Hood Canal and Strait of Juan de Fuca). The ESU and population viability criteria are expressed in terms of risk of extinction over a 100-year time frame and the aim of the criteria is to describe viability characteristics that are necessary to ensure a high probability of ESU persistence (Sands et al. 2007). The PSTRT has reviewed the co-managers' interim goals and concluded that they were compatible with, and could be viewed as intermediate steps to achieving, the long-term viability criteria. The PSTRT analyses also strongly support the use of the local stocks (subpopulations) identified by the co-managers for recovering the ESU (NMFS 2007).

Many of the management changes that have taken place in the Hood Canal summer chum salmon recovery planning area within the last few years have proven to be beneficial. Harvest and hatchery management measures implemented by the co-managers have been consistent with the SCSCI and effective. A key premise of the SCSCI is that, in addition to harvest and hatchery management actions, "commensurate, timely improvements in the condition of habitat critical for summer chum salmon survival are necessary to recover listed populations to healthy levels". Some habitat protection and restoration measures identified in the HCCC summer chum recovery plan (HCCC 2005) have been implemented and more are planned and will be needed to support long-term, self-sustaining summer chum salmon populations.

The co-managers are now completing a 5-year review of the Summer Chum Salmon Conservation Initiative, and that document (due in the summer of 2007) will contain a more detailed discussion of progress towards full recovery.

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Appendix Table 1. 2006 Hood Canal summer chum escapement, and expanded estimates of numbers of natural-origin recruits (NOR), supplementation-origin recruits returning to their stream of origin (SOR), and supplementation-origin stray (SOS) recruits (returning to a stream other than their stream of origin) escaping to streams in Hood Canal and the Strait of Juan de Fuca.

	Total	Age 2			Age 3			Age 4			Age 5			Total		
	escapement	NOR	SOR	SOS	NOR	SOR	SOS	NOR	SOR	SOS	NOR	SOR	SOS	NOR	SOR	SOS
Dungeness [1]	3				2			1						3		
JCL	725	17	14	3	253	201	9	72	139	3	3	9	3	345	363	17
Salmon	4,894	61		0	1,474	354	24	2,692	70	70	98	24	25	4,326	449	119
Snow	598	8		0	265	4	7	288	11	8	4	0	4	564	15	19
Chimacum	2,026	32		0	635	306	8	808	221	8	0	8	0	1,474	535	16
L. Quilcene	2,372	0		0	1,645	21	12	596	67	0	21	11	0	2,262	98	12
B. Quilcene [2]	9,504	0		0	3,979	339	0	4,640	546	0	0	0	0	8,619	885	0
Dosewallips	2,577	0		0	807		62	1,641		58	10		0	2,457	0	120
Duckabush	3,135	9		0	1,209		85	1,727		86	18		0	2,964	0	171
Hamma	3,065	13	0	0	588	7	19	2,100	162	170	6	0	0	2,707	169	189
Lilliwaup [3]	1,615	0	0	0	139	577	94	288	370	135	0	3	6	426	953	236
Skokomish	8	0		0	1		0	6		0	1		0	8	0	0
Union	2,836	26		0	1,127	582	19	501	523	45	13	0	0	1,667	1,106	64
Tahuya	749	0	19	0	26	646	15	27		11	5		0	58	665	26
Dewatto	69	0		0	6		47	11		6	0		0	17	0	52
Big Beef [4]	823	12	0	0	61	489	0	127	123	11	0	0	0	200	612	11
Total	34,999	179	33	3	12,215	3,527	402	15,525	2,232	610	178	55	37	28,097	5,850	1,052

Due to problems with otolith marking, some fish were identified as having originated from a supplementation program, but their marks could potentially match the marks from two or more different programs. For this analysis, the program matching the stream of recovery was chosen, if it was one of the possibilities. If it was not, then that fish was assigned to the stray category, and listed as marked, indefinite origin for remaining calculations.

[1] No samples from Dungeness; assigned to be NORs.

[2] Big Quilcene was not sampled for otoliths , only AD-clips.

[3] Lilliwaup includes escapement of 49 in Eagle Cr (which was not sampled).

[4] Big Beef Creek includes esc. of 14 in Stavis Cr. (which was not sampled).

Appendix Table 2. Expanded numbers of supplementation-origin summer chum escaping to streams other than their streams of origin in 2006.

Program of origin — Age 2

Stream of escapement	JCL	Salmon	Chimacum	Hamma	Lilliwaup	Union	Big Beef	Big Quilcene	Marked, origin indefinite	Total
JCL		3								3
Salmon										0
Snow										0
Chimacum										0
L. Quilcene										0
B. Quilcene										0
Dosewallips										0
Duckabush										0
Hamma										0
Lilliwaup										0
Dewatto										0
Big Beef										0
Skokomish										0
Union										0
Tahuya										0
Totals	0	3	0	0	0	0	0	0	0	3

Program of origin — Age 3

Stream of escapement	JCL	Salmon	Chimacum	Hamma	Lilliwaup	Union	Big Beef	Big Quilcene	Marked, origin indefinite	Total
JCL									9	9
Salmon	12								12	24
Snow									7	7
Chimacum		1							7	8
L. Quilcene									12	
B. Quilcene										
Dosewallips								52	10	62
Duckabush								69	17	86
Hamma						5	13			18
Lilliwaup			7	27		10	43		7	94
Dewatto					6	25	3		14	48
Big Beef										0
Skokomish									0	0
Union									19	19
Tahuya								9		9
Totals	12	1	7	27	6	40	59	130	114	384

Program of origin — Age 4

Stream of escapement	JCL	Salmon	Chimacum	Hamma	Lilliwaup	Union	Big Beef	Big Quilcene	Marked, origin indefinite	Total
JCL		3								3
Salmon	70									70
Snow	4								4	8
Chimacum		8								8
L. Quilcene										0
B. Quilcene										0
Dosewallips				10	10			28	10	58
Duckabush	18			18				49		85
Hamma		6			6	12	21	119	6	170
Lilliwaup				64		4	55	13		136
Dewatto						3	3			6
Big Beef						11				11
Skokomish										0
Union				22					22	44
Tahuya			11							11
Totals	92	17	11	114	16	30	79	209	42	610

Program of origin — Age 5

Stream of escapement	JCL	Salmon	Chimacum	Hamma	Lilliwaup	Union	Big Beef	Big Quilcene	Marked, origin indefinite	Total
JCL			3							3
Salmon			12						12	24
Snow	4									4
Chimacum										0
L. Quilcene										0
B. Quilcene										0
Dosewallips										0
Duckabush										0
Hamma										0
Lilliwaup								6		6
Dewatto										0
Big Beef										0
Skokomish										0
Union										0
Tahuya							0		0	0
Totals	4	0	15	0	0	0	0	6	12	37
Total	108	21	33	141	22	70	138	345	168	1034

Summary by region

	Age 2	Age 3	Age 4	Age 5	Total
SJF-to-SFJ	3	13	85	19	120
SJF-to-HC	0	7	35	0	42
HC-to-HC	0	262	448	6	716
HC-to-SJF	0	0	0	0	0

Appendix Table 3. Hood Canal and Strait of Juan de Fuca Summer Chum Salmon Run Reconstruction, 2005 and 2006

Year															*Management Unit & Total Run Summaries*				
															Terminal	**Seattle (Area 10)** (HC-SJF)	**Admiralty (Area 9)** (HC-SJF)	**U.S. Conv. Areas** (HC-SJF)	**CDN Area 20** (HC-SJF)
2005			**Harvest**		8	0	0	0	252	0	0	0	0	0		0	22	56	62
				********** **Run Abundance by Location** **********															
	Mgmt Unit	**Prod. Unit**	Escapement	Broodstock	82G/J	12D	12C	82F	12A	12B	12	9A	Discov.	Sequim					
	Skokomish	Skokomish	5		13		13			13	13	13			*	13	13	13	13	13
	12D	Tahuya	4			4	4			4	4	4				1,991	1,991	1,993	1,997	2,002
		Union	1,885	102		1,987	1,987			1,987	1,987	1,987								
	12A	L. Quilcene	866						899	899	899	899				6,924	6,924	6,930	6,945	6,962
		B. Quilcene	5,702	104				5,806	6,025	6,025	6,025	6,025								
	12-12B-12C	Big Beef	1,124	0						1,124	1,124	1,124				7,089	7,089	7,095	7,110	7,127
		Anderson	0							0	0	0								
		Dosewallips	2,658							2,658	2,658	2,658								
		Duckabush	821							821	821	821								
		HammaHamma	1,272	142						1,414	1,414	1,414								
		Lilliwaup	951	98			1,049			1,049	1,049	1,049								
		Dewatto	23				23			23	23	23								
	Chimacum	Chimacum	1,396													1,396		1,397	1,400	1,404
	Discovery	Snow	832										832			6,974		6,980	6,995	7,012
		Salmon	6,142	0									6,142							
	Sequim	Jimmycomelately	1,247	63										1,310		1,310		1,311	1,314	1,317
	Dungeness	Dungeness	2													2		2	2	2
	Totals		24,930	509	13	1,991	3,076	5,806	6,924	16,017	16,017	16,017	6,974	1,310		25,699	16,017	25,721	25,777	25,838
		Hood Canal Portion	15,311	446												16,017	16,017	16,031	16,065	16,104
		E. Strait Portion	9,619	63												9,682		9,690	9,711	9,734

Year																*Management Unit & Total Run Summaries*				
																Terminal	Seattle (Area 10) (HC-SJF)	Admiralty (Area 9) (HC-SJF)	U.S. Conv. Areas (HC-SJF)	CDN Area 20 (HC-SJF)
2006			Harvest		35	0	0	0	2,425	0	100	38	0	0			0	0	96	54
			********** Run Abundance by Location **********																	
	Mgmt Unit	Prod. Unit	Escapement	Broodstock	82G/J	12D	12C	82F	12A	12B	12	9A	Discov.	Sequim						
	Skokomish	Skokomish	8		43		43			43	43	43			*	43	43	43	43	43
	12D	Tahuya	749			749	749			749	752	753				3,602	3,602	3,602	3,611	3,616
		Union	2,736	100		2,836	2,836			2,836	2,846	2,849								
	12A	L. Quilcene	2,372						2,856	2,856	2,866	2,870				14,369	14,369	14,369	14,405	14,426
		B. Quilcene	9,504	0				9,504	11,445	11,445	11,484	11,499								
	12-12B-12C	Big Beef	823	0						823	826	827				11,337	11,337	11,337	11,366	11,382
		Anderson	0							0	0	0								
		Dosewallips	2,577							2,577	2,586	2,589								
		Duckabush	3,135							3,135	3,146	3,150								
		HammaHamma	2,922	143						3,065	3,075	3,079								
		Lilliwaup	1,523	92			1,615			1,615	1,621	1,623								
		Dewatto	69				69			69	69	69								
	Chimacum	Chimacum	2,026													2,026		2,026	2,031	2,034
	Discovery	Snow	598										598			5,492		5,492	5,506	5,514
		Salmon	4,894	0									4,894							
	Sequim	Jimmycomelately	660	65										725		725		725	727	728
	Dungeness	Dungeness	3													3		3	3	3
	Totals		34,599	400	43	3,585	5,312	9,504	14,301	29,213	29,313	29,351	5,492	725		37,597	29,351	37,597	37,693	37,747
		Hood Canal Portion	26,418	335												29,351	29,351	29,351	29,426	29,468
		E. Strait Portion	8,181	65												8,246		8,246	8,267	8,279