**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 Review Team

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Subject: 2005 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 2005. This interim report is relatively brief, providing information currently available.

## Stock Assessment

*Escapement:* Spawning ground surveys were conducted 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 summer chum regions during 2005. Results of the surveys are summarized in Table 1 and regional escapement estimates for the period 1974 through 2005 are described in Table 2.

The escapements of Hood Canal and Strait of Juan de Fuca summer chum remained relatively high in 2005. A total of 25,439 summer chum escaped to the region's streams (including fish collected for hatchery broodstock); 15,757 spawners to Hood Canal streams and 9,682 spawners to Strait of Juan de Fuca streams (Tables 1 and 2).

**Table 1. Preliminary estimates of summer chum salmon spawner escapement for Hood Canal and Strait of Juan de Fuca streams, 2005.**

| Stream | Natural spawner escapement | Brood-stock | Total escapement | Comments |
|---|---|---|---|---|
| **Hood Canal** | | | | |
| Anderson Cr. | 0 | | 0 | No fish observed |
| Big Beef Cr. | 1,124 | 0 | 1,124 | Trap + AUC downstream of trap + 11 adults from NOAA-F study |
| Dewatto R. | 23 | | 23 | AUC |
| Tahuya R. | 4 | | 4 | AUC |
| Union R. | 1,885 | 102 | 1,987 | Trap |
| Skokomish R. | 5 | | 5 | AUC; probably minimum estimate |
| Lilliwaup R. | 951 | 98 | 1,049 | AUC adjusted for broodstock |
| Hamma Hamma R. | 1,272 | 142 | 1,414 | AUC adjusted for broodstock |
| John Cr. | 0 | | 0 | No fish observed |
| Fulton Cr. | 3 | | 3 | Peak live count |
| Duckabush R. | 818 | | 818 | AUC |
| Dosewallips R. | 2,658 | | 2,658 | AUC |
| Big Quilcene R. | 5,702 | 104 | 5,806 | AUC; broodstock for NMFS research study in Big Beef Cr. |
| Little Quilcene R. | 866 | | 866 | AUC |
| **Strait of Juan de Fuca** | | | | |
| Chimacum Cr. | 1,396 | | 1,396 | AUC + 24 in Kala Pt. Lagoon |
| Snow Cr. | 832 | | 832 | Trap + AUC downstream of trap |
| Salmon Cr. | 6,142 | | 6,142 | Trap + redds downstream of trap; incl. 6 morts in trap |
| JCL Cr. | 1,247 | 63 | 1,310 | Trap + redds downstream of trap; incl. 24 pre-esc. loss |
| Dungeness R. | 2 | | 2 | 2 dead on 10/11/05, RM 0.0-2.2 |
| **Hood Canal total** | **15,311** | **446** | **15,757** | |
| **SJFuca total** | **9,619** | **63** | **9,682** | |
| **HC / SJFuca total** | **24,930** | **509** | **25,439** | |

**Table 2.** **Escapement (including hatchery broodstock) for Hood Canal and the Strait of Juan de Fuca summer chum salmon stocks, 1974-2005.**

| Return year | Hood Canal escapement | Strait of Juan de Fuca escapement | HC/SJF combined |
|---|---|---|---|
| 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 |

*Run Size:* To determine the total numbers of salmon returning to specific production areas, fish that are harvested in mixed stock and terminal fisheries must be allocated to the streams from which they originated. This allocation is done through a post-season process called "run re-construction," which splits the harvests in each catch area into the numbers of fish that likely were contributed by the individual stocks or management unit thought to be transiting the area. All estimated harvests for each stock or management unit are added to the escapement for that grouping to derive the estimated total return or run size for each year. 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 2005 along with an updated run size estimate for 2004 are provided in an appendix to this report. Table 3 summarizes the estimates of run sizes with escapements by region for 2005. Table 4 and Figures 1 and 2 show Hood Canal and Strait of Juan de Fuca total run sizes from 1974 through 2005.

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 since1974 (HC/SJF combined). The cyclic pattern was reflected in the pre-season forecast for 2005 which was about 25,000 total recruits (with about 18,000 total recruits for Hood Canal and about 6,800 total recruits for Strait of Juan de Fuca) compared to the actual return of about 26,000 recruits in 2005.

**Table 3. Regional summer chum run sizes for 2005.**

| | |
|---|---|
| Hood Canal Region | |
| Natural escapement | 15,311 |
| Terminal run size | 16,315 |
| Hood Canal total run size | 16,378 |
| Strait of Juan de Fuca Region | |
| Natural escapement | 9,619 |
| Terminal run size | 9,682 |
| Strait of Juan de Fuca total run size | 9,719 |

**Table 4. Total run sizes for Hood Canal and the Strait of Juan de Fuca summer chum salmon stocks, 1974-2005.**

| Return year | Hood Canal run size | Strait of Juan de Fuca run size | HC/SJF combined |
|---|---|---|---|
| 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 | 88,643 | 9,362 | 98,004 |
| 2005 | 16,378 | 9,719 | 26,097 |

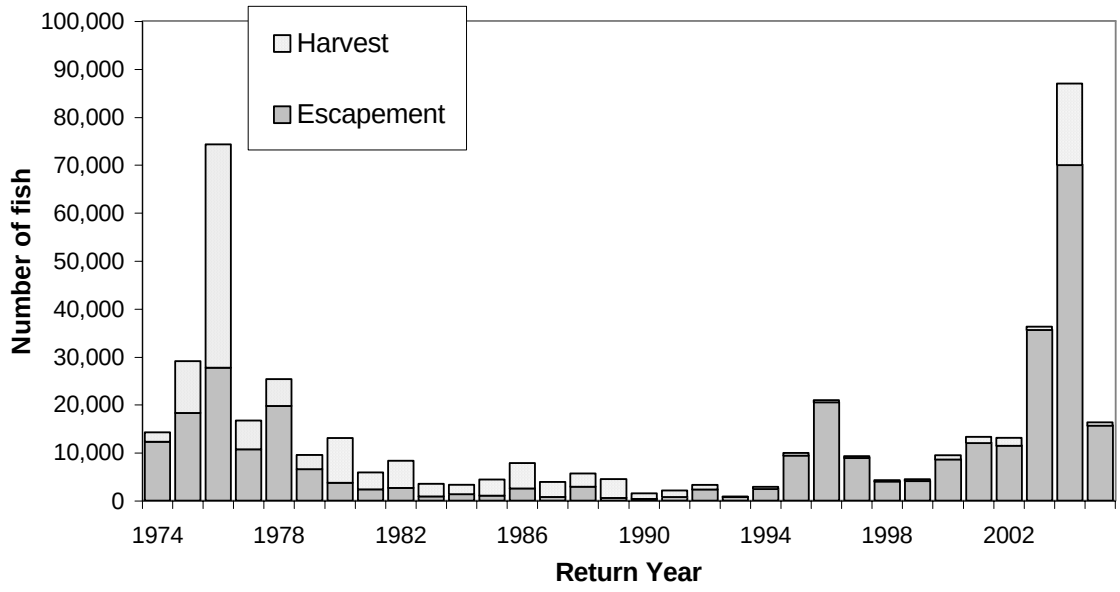


**Figure 1. Hood Canal summer chum salmon run size (escapement + harvest), 1974-2005.**

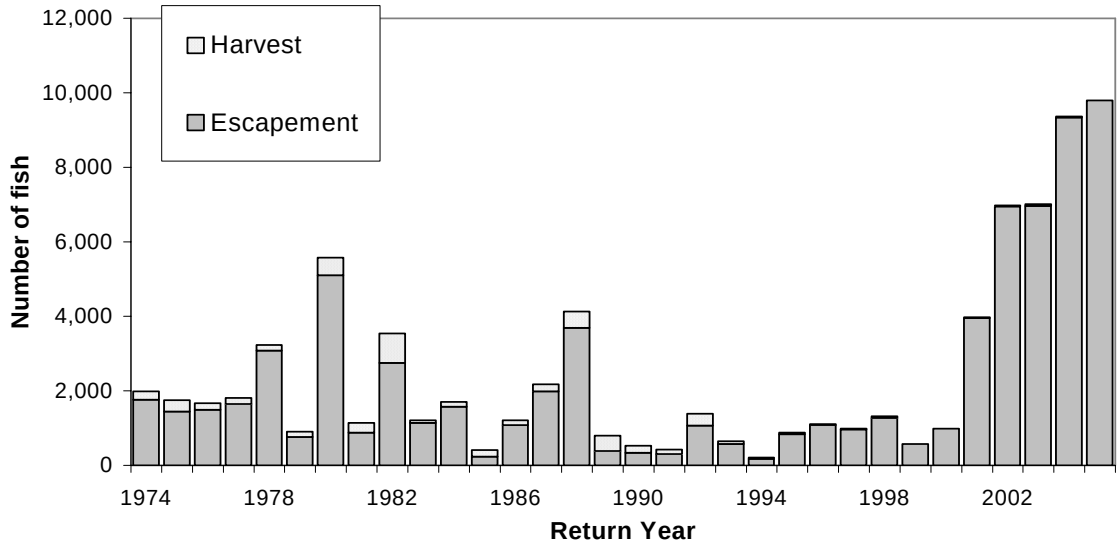


**Figure 2. Strait of Juan de Fuca summer chum salmon run size (escapement + harvest), 1974-2005.**

*Genetic Stock Identification:* During 2005, the Co-managers continued DNA collections for summer chum spawners throughout the region. Table 5 shows the number of DNA samples collected in 2005 as well as the number of samples collected for otoliths and scales. The sampling locations and collection methods are also shown in the table. Only limited funding is currently identified for the processing and analysis of these or other archived samples.

**Table 5. Genetic, otolith, and scale collections made from adult summer chum salmon in eastern Strait of Juan de Fuca and Hood Canal streams, 2005.**

| | | GSI | Sample size | | | | |
|---|---|---|---|---|---|---|---|
| **Stream** | **WRIA** | **code** | **Allozyme** | **DNA [3]** | **Otolith** | **Scales** | **Collection method** |
| Dungeness River | 18.0018 | - - - | 0 | 0 | 0 | 0 | Foot survey |
| Jimmycomelately[1] | 17.0825 | 05 IH | 0 | 63 | 300 | 300 | Trap, foot survey |
| Salmon Cr.[1] | 17.0245 | 05 II | 0 | 11 | 400 | 400 | Trap, foot survey |
| Snow Cr. | 17.0219 | 05 IJ | 0 | 0 | 169 | 176 | Foot survey |
| Chimacum Cr.[1] | 17.0203 | 05 IK | 0 | 0 | 246 | 248 | Foot survey |
| Thorndyke Cr. | 17.0170 | - - - | 0 | 0 | 0 | 0 | Foot survey |
| Little Quilcene R. | 17.0076 | 05 IL | 0 | 0 | 199 | 233 | Foot survey |
| Big Quilcene R.[1] | 17.0012 | - - - | 0 | 0 | 0 | 192 | Foot survey |
| Quilcene Bay [2] | - - | NMFS | 0 | 104 | 104 | 104 | Seine |
| Dosewallips R. | 16.0442 | 05 IM | 0 | 113 | 284 | 352 | Foot survey |
| Duckabush R. | 16.0351 | 05 IN | 0 | 55 | 167 | 173 | Foot survey |
| Fulton Cr. | 16.0332 | - - - | 0 | 0 | 1 | 1 | Foot survey |
| Hamma Hamma R.[1] | 16.0251 | 05 IO | 0 | 246 | 377 | 455 | Seine, foot survey |
| Lilliwaup R.[1] | 16.0230 | 05 IP | 0 | 192 | 319 | 332 | Trap, foot survey |
| Little Lilliwaup | 16.0228 | - - - | 0 | 0 | 1 | 1 | Foot survey |
| Skokomish R. | 16.0001 | - - - | 0 | 1 | 2 | 2 | Foot survey |
| Union R.[1] | 15.0503 | 05 IR | 0 | 107 | 184 | 184 | Trap, foot survey |
| Tahuya R. | 15.0446 | - - - | 0 | 0 | 0 | 0 | Foot survey |
| Dewatto R. | 15.0420 | 05 LY | 0 | 0 | 9 | 9 | Foot survey |
| Stavis Cr. | 15.0404 | - - - | 0 | 0 | 0 | 0 | Foot survey |
| Big Beef Cr.[1] | 15.0389 | 05 IQ | 0 | 38 | 146 | 146 | Trap, foot survey |
| Little Anderson | 15.0377 | - - - | 0 | 0 | 0 | 0 | Foot survey |
| **Totals** | | | **0** | **930** | **2,908** | **3,308** | |

[1] Stream has supplementation or reintroduction program.
[2] Broodstock collection for NOAA-Fisheries research project at Big Beef Cr.
[3] Some additional scale samples can also be used for DNA analysis.

*Biological Data (Age):* Age composition determined from scale collections for summer chum salmon in eastern Strait of Juan de Fuca and Hood Canal streams during 2005 are presented in Tables 6a, 6b, and 6c. Of particular interest is the high proportion of age-3 fish from the 2002 brood in the 2005 return; estimated to be about 72% overall (Table 6c). The 2002 brood will contribute to the 2006 return as age-4 fish.

**Tables 6a-c. Preliminary 2005 Hood Canal and Strait of Juan de Fuca summer chum age composition data (based on scale data only).**

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**Table 6a. Scale samples (numbers) by age**

| Stream | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|
| Big Beef Cr. | 4 | 144 | 30 | 1 | 179 |
| Dewatto Cr. | 0 | 8 | 1 | 0 | 9 |
| Union R. | 2 | 135 | 34 | 5 | 176 |
| Skokomish R. | 0 | 1 | 1 | 0 | 2 |
| Lilliwaup | 0 | 285 | 41 | 2 | 328 |
| Hamma Hamma R. | 0 | 354 | 62 | 35 | 451 |
| Duckabush R. | 0 | 117 | 25 | 30 | 172 |
| Dosewallips R. | 0 | 187 | 40 | 121 | 348 |
| B. Quilcene R. | 0 | 165 | 27 | 0 | 192 |
| L. Quilcene R. | 1 | 148 | 48 | 35 | 232 |
| Chimacum Cr. | 3 | 176 | 67 | 2 | 248 |
| Snow Cr. | 1 | 128 | 33 | 1 | 163 |
| Salmon Cr. | 3 | 263 | 129 | 5 | 400 |
| JCL Cr. | 8 | 124 | 167 | 1 | 300 |
| Dungeness R. | 0 | 0 | 0 | 0 | 0 |
| **Total** | **22** | **2,235** | **705** | **238** | **3,200** |

**Table 6b. Scale samples (percentages) by age**

| Stream | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Big Beef Cr. | 2.2% | 80.4% | 16.8% | 0.6% |
| Dewatto Cr. | 0.0% | 88.9% | 11.1% | 0.0% |
| Union R. | 1.1% | 76.7% | 19.3% | 2.8% |
| Skokomish R. | 0.0% | 50.0% | 50.0% | 0.0% |
| Lilliwaup | 0.0% | 86.9% | 12.5% | 0.6% |
| Hamma Hamma R. | 0.0% | 78.5% | 13.7% | 7.8% |
| Duckabush R. | 0.0% | 68.0% | 14.5% | 17.4% |
| Dosewallips R. | 0.0% | 53.7% | 11.5% | 34.8% |
| B. Quilcene R. | 0.0% | 85.9% | 14.1% | 0.0% |
| L. Quilcene R. | 0.4% | 63.8% | 20.7% | 15.1% |
| Chimacum Cr. | 1.2% | 71.0% | 27.0% | 0.8% |
| Snow Cr. | 0.6% | 78.5% | 20.2% | 0.6% |
| Salmon Cr. | 0.8% | 65.8% | 32.3% | 1.3% |
| JCL Cr. | 2.7% | 41.3% | 55.7% | 0.3% |
| Dungeness R. | 0.0% | 0.0% | 0.0% | 0.0% |

**Table 6c. Escapement estimates by age**

| Stream | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|
| Big Beef Cr. | 25 | 904 | 188 | 6 | 1,124 |
| Dewatto Cr. | 0 | 20 | 3 | 0 | 23 |
| Union R. | 23 | 1,524 | 384 | 56 | 1,987 |
| Skokomish R. | 0 | 3 | 2 | 0 | 5 |
| Lilliwaup | 0 | 911 | 131 | 6 | 1,049 |
| Hamma Hamma R. | 0 | 1,110 | 194 | 110 | 1,414 |
| Duckabush R. | 0 | 556 | 119 | 143 | 818 |
| Dosewallips R. | 0 | 1,428 | 306 | 924 | 2,658 |
| B. Quilcene R. | 0 | 4,990 | 816 | 0 | 5,806 |
| L. Quilcene R. | 4 | 552 | 179 | 131 | 866 |
| Chimacum Cr. | 17 | 991 | 377 | 11 | 1,396 |
| Snow Cr. | 5 | 653 | 168 | 5 | 832 |
| Salmon Cr. | 46 | 4,038 | 1,981 | 77 | 6,142 |
| JCL Cr. | 35 | 541 | 729 | 4 | 1,310 |
| Dungeness R. | 0 | 0 | 0 | 0 | 2 |
| **Total** | **154** | **18,223** | **5,578** | **1,474** | **25,429 a/** |

a/ total esc. = 25,439; no scales for Tahuya or Fulton

*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 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 otolith marked. Examination of otoliths or fin clip ratios from spawned adults provides a method to estimate the number of hatchery-origin and natural-origin recruits. 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 (non-target) drainages.

As has been typical in recent years (WDFW and PNPTT 2003, WDFW and PNPTC 2004), the supplemented Quilcene summer chum stock experienced another strong escapement during 2005, with a total of 5,806 spawners. In 2005, about 89% of Big Quilcene summer chum were unmarked indicating that about 5,200 of the returning fish were natural-origin recruits (pers. comm. T. Kane, U. S. Fish and Wildlife Service, Jan. 2006).

In 2005, more than 2,000 summer chum adults were examined for adipose-clips in 14 streams surveyed in Hood Canal and the Strait of Juan de Fuca. Adipose-clipped summer chum were observed in 7 of the 14 streams surveyed, including Big Quilcene, Little Quilcene, Dosewallips, Duckabush, Hamma Hamma, and Lilliwaup rivers in Hood Canal and Jimmycomelately Creek along the Strait of Juan de Fuca (Tables 7a and 7b). Preliminary analysis indicates that 85% of Quilcene supplementation program fish returned to the Big and Little Quilcene rivers (the streams of origin for the Quilcene supplementation program) and 15% returned to other streams in the Evolutionarily Significant Unit (ESU) (Table 7c).

**Tables 7a-c. Preliminary 2005 Hood Canal summer chum adipose-clip composition data (based on scale data only). 1/**

**Table 7a. Adipose (AD)-clip percentages in samples by age**

| | AD-clip composition by age | | | | |
|---|---|---|---|---|---|
| **Stream** | **2** | **3** | **4** | **5** | **Total** |
| JCL Cr. | 0% | 0.8% | 0% | 0% | 0.3% |
| Salmon Cr. | 0% | 0% | 0% | 0% | 0% |
| Snow Cr. | 0% | 0% | 0% | 0% | 0% |
| Chimacum Cr. | 0% | 0% | 0% | 0% | 0% |
| L. Quilcene R. | 0% | 5.4% | 18.8% | 0% | 7.3% |
| B. Quilcene R. | 0% | 11.7% | 11.3% | 0% | 11.7% |
| Dosewallips R. | 0% | 2.7% | 0% | 2.5% | 2.3% |
| Duckabush R. | 0% | 2.6% | 8.0% | 0% | 2.9% |
| Hamma Hamma R. | 0% | 2.8% | 3.2% | 0% | 2.7% |
| Lilliwaup R. | 0% | 0.4% | 0% | 0% | 0.3% |
| Skokomish R. | 0% | 0% | 0% | 0% | 0% |
| Union R. | 0% | 0% | 0% | 0% | 0% |
| Dewatto R. | 0% | 0% | 0% | 0% | 0% |
| Big Beef Creek | 0% | 0% | 0% | 0% | 0% |

**Table 7b. Expanded AD-clip estimates in spawner escapement by age**

| | AD-clip numbers in escapement by age | | | | |
|---|---|---|---|---|---|
| **Stream** | **2** | **3** | **4** | **5** | **Total** |
| JCL Cr. | 0 | 4 | 0 | 0 | 4 |
| Salmon Cr. | 0 | 0 | 0 | 0 | 0 |
| Snow Cr. | 0 | 0 | 0 | 0 | 0 |
| Chimacum Cr. | 0 | 0 | 0 | 0 | 0 |
| L. Quilcene R. | 0 | 30 | 34 | 0 | 63 |
| B. Quilcene R. | 0 | 584 | 92 | 0 | 676 |
| Dosewallips R. | 0 | 38 | 0 | 23 | 61 |
| Duckabush R. | 0 | 14 | 10 | 0 | 24 |
| Hamma Hamma R. | 0 | 31 | 6 | 0 | 38 |
| Lilliwaup | 0 | 3 | 0 | 0 | 3 |
| Skokomish R. | 0 | 0 | 0 | 0 | 0 |
| Union R. | 0 | 0 | 0 | 0 | 0 |
| Dewatto Cr. | 0 | 0 | 0 | 0 | 0 |
| Big Beef Cr. | 0 | 0 | 0 | 0 | 0 |
| **Totals** | **0** | **705** | **142** | **23** | **869** |

**Table 7c. Distribution of Big/Little Quilcene supplementation program returns in the Hood Canal summer chum salmon ESU. 1/**

| | Age | | | | |
|---|---|---|---|---|---|
| | **2** | **3** | **4** | **5** | **Total** |
| Quilcene supplementation program returns to Big and Little Quilcene rivers | | | | | |
| Number | 0 | 614 | 126 | 0 | 739 |
| % | - - | 87% | 89% | 0% | 85% |
| Quilcene supplementation program returns to other streams | | | | | |
| Number | 0 | 91 | 16 | 23 | 130 |
| % | - - | 13% | 11% | 100% | 15% |

1/ Only summer chum fry reared in the Big/Little Quilcene R. supplementation program are marked with an adipose-clip prior to release.

In addition, otolith samples were collected from about 2,900 summer chum adults returning to these streams during 2005 (Table 5) and examination of otolith samples is currently in progress at the WDFW Otolith Lab. Mark data (AD-clips and otoliths combined) indicated that 74% and 83% of the summer chum returning in 2003 and 2004, respectively, were wild (i.e., of natural origin). Preliminary mark data indicates ~70% of summer chum were of natural origin during 2005. The high proportions of natural-origin recruits in recent years indicates that increases in summer chum escapements and run sizes are due to contributions by both natural-origin and supplementation-origin fish.

Harvest Management

The SCSCI established annual fishing regimes 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 Base Conservation Regime (BCR) is to initiate rebuilding by providing incremental increases in escapement over time while providing a limited opportunity for fisheries conducted for the harvest of other species. The BCR has been 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 in U.S. waters, and nearly 90% of the total recruitment of the run of each management unit.

The SCSCI established that annual abundance evaluations would be performed for both management units and stocks. Management units (MUs) are made up of one or more stocks that are aggregated in recognition of practical and biological limitations to available data and how fisheries can be effectively managed. In the case of Hood Canal-Strait of Juan de Fuca summer chum, all of the MUs contain only one stock except the Mainstem Hood Canal MU (which is comprised of the Dosewallips, Duckabush, Hamma Hamma, and Lilliwaup stocks). Critical status thresholds are defined for MUs, for both total run size and spawning escapement, and minimum escapement flags are defined for the stocks within the Mainstem MU. An MU is considered to be in critical status when its abundance 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 flags are useful benchmarks to check for poor performance of any one stock's escapement and is necessary for years when the

overall MU abundance is sufficiently high that the critical abundance threshold would not be triggered but escapement of one or more individual stocks may be extremely low. Minimum escapement flags within the Mainstem MU are 736, 700, 1042, and 182 summer chum for the Dosewallips, Duckabush, Hamma Hamma, and Lilliwaup stocks, respectively (see SCSCI Section 1.7.3).

Harvest management results again can be described as very good during 2005, the sixth year in which the Base Conservation Regime was implemented. Table 8 provides a preliminary overview for 2005 of the pre-season estimates that triggered the various management responses, as well as the post-season estimates of results. Table 9 shows the estimated annual harvest of summer chum salmon during 2005, by management unit and fishery. Table 10 provides the estimated exploitation rates by fishery, in 2005, relative to BCR targets. As indicated, the information for 2005 is preliminary and subject to revision, once commercial catch data are verified and recreational catch data are included.

The 2005 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 stock's escapement triggered its minimum escapement flag.

In 2005, post-season estimates of recruitment were higher than the pre-season forecasts for all MUs, except Quilcene and SE Hood Canal. The expected escapements for all management units were exceeded in 2005. Estimated exploitation rates for each management unit during 2005 were well below the target exploitation rates of the Base Conservation Regime (Table 8).

Exploitation rates during 2005 were well below the BCR targets for Canadian fisheries, U.S. preterminal fisheries, and Hood Canal terminal area fisheries (Table 10). In Quilcene Bay (Marine Area 12A), there is an extreme terminal fishery managed on a stepped fishing schedule based on an in-season assessment of natural escapement; no fishery-specific exploitation rate is defined in the BCR, but an exploitation rate of 5% is expected, at the first step. During 2005, in-season information indicated that the escapement to the Big/Little Quilcene rivers would exceed 2,500 summer chum, additional days per week of gillnet fishing for coho were scheduled, and the summer chum exploitation rate was 3.5% in Quilcene Bay (Table 10).

During the 2005 season, except for the additional gillnet fishing for coho in Quilcene Bay (described above) and provisions made to harvest hatchery coho in the Quilcene River (immediately downstream of the hatchery), no changes were made from the initially adopted plans.

The escapement rate was 99.6% for each Strait of Juan de Fuca MU in 2005. In Hood Canal during 2005, the escapement rate was 96.1% for the Quilcene MU, 98.1% for the Mainstem Hood Canal MU, and 90.4% for the SE Hood Canal MU.

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

| Management Category | Sequim | Discovery | Chimacum | Quilcene | Mainstem Hood Canal | SE Hood Canal |
|---|---|---|---|---|---|---|
| Critical Runsize Threshold [1] | 220 | 930 | na | 1,260 | 3,980 | 340 |
| Preseason Runsize Forecast | 605 | 5,329 | 870 | 8,355 | 5,911 | 3,795 |
| Postseason Runsize Estimate [2] | 1,315 | 7,001 | 1,401 | 6,943 | 7,227 | 2,203 |
| Forecast Error | -54.0% | -23.9% | -37.9% | 20.3% | -18.2% | 72.3% |
| Expected Escapements [3] | 1,199 | 6,385 | 1,278 | 5,888 | 6,439 | 1,925 |
| Est. Escapement | 1,310 | 6,974 | 1,396 | 6,672 | 7,089 | 1,991 |
| BCR Escapement Target Exceedance | 9.2% | 9.2% | 9.3% | 13.3% | 10.1% | 3.4% |
| BCR Target Exploitation Rate | 8.8% | 8.8% | na | 15.2% [4] | 10.9% | 12.6% |
| Estimated Exploitation Rate [2] | 0.4% | 0.4% | 0.4% | 3.9% | 1.9% | 9.6% |

[1] See SCSCI Section 1.7.3, Table 1.9

[2] 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%.

[3] 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".

[4] Expected exploitation rate; Quilcene Bay (12A) managed on a stepped fishing schedule (see text)

**Table 9. Summer chum salmon harvest, in 2005, by management unit and fishery. [1]**

| Fishery | Sequim | Discovery | Chimacum | Quilcene | Mainstem Hood Canal | SE Hood Canal |
|---|---|---|---|---|---|---|
| Canada | 3 | 17 | 3 | 17 | 18 | 5 |
| U.S. Mixed | 2 | 10 | 2 | 10 | 10 | 3 |
| Terminal | 0 | 0 | 0 | 0 | 110 | 204 |
| Extreme Terminal | 0 | 0 | 0 | 244 | 0 | 0 |

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

**Table 10. Post-season assessment of summer chum exploitation rates for 2005, by fishery, relative to Base Conservation Regime (BCR) target levels.**

| Fishery | Exploitation Rates | |
|---|---|---|
| | BCR Target (range) | 2005 Est. [1] |
| Canada | 6.3% (2.3%-8.3%) | 0.2% |
| Preterminal U.S. (Juan de Fuca & San Juans) | 2.5% (0.5%-3.5%) | 0.1% |
| Preterminal U.S. (Hood Canal) | 2.5% (0.5%-3.5%) | 0.1% |
| Hood Canal Terminal (12, 12B, 12C, 12D) | 2.1% (0.5%-3.5%) | 1.9% |
| Quilcene Bay (12A) | 5.0% [2] | 3.5% |

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

[2] Expected exploitation rate; managed on a stepped fishing schedule (see text)

Artificial Production

During 2005, 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 2005. No broodstock were collected at Big Beef Creek for the reintroduction program there due to a misunderstanding with University of Washington (UW) staff about the co-managers' intent to continue the program during 2005; this will be remedied during 2006.

Supplementation or reintroduction programs have been terminated on several streams, because they have met the individual projects' 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).

A summary is provided in Table 11of brood year 2005 summer chum broodstock collections and egg takes for supplementation programs. Fed fry are scheduled for release from these programs during spring, 2006. In addition, the second year of a reproductive success study conducted by NOAA Fisheries in an artificial stream channel at the UW Big Beef Creek Research Station should result in the release of some unfed summer chum fry in addition to those produced by natural summer chum spawners in Big Beef Creek.

**Table 11. Summer chum salmon broodstock collections and egg takes for supplementation programs, brood year 2005.**

| Brood year | Stream | Broodstock | | | Natural spawners | Percent removed | Estimated eggs | | Planned release date |
|---|---|---|---|---|---|---|---|---|---|
| | | Males | Females | Total | | | Green | Eyed | |
| 2005 | JCL Cr. | 33 | 30 | 63 | 1,247 | 4.8% | 87,804 | 80,027 | April 2006 |
| 2005 | Hamma Hamma R. | 71 | 71 | 142 | 1,272 | 10.0% | 191,240 | 148,600 | March 2006 |
| 2005 | Lilliwaup R. | 49 | 49 | 98 | 951 | 9.3% | 124,200 | 116,842 | March 2006 |
| 2005 | Union R. a/ | 51 | 51 | 102 | 1,885 | 5.1% | 125,533 | 122,175 | March 2006 |

a/ Fry reared at and released into Tahuya River as reintroduction program


Summary

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. The reduced return of summer chum in 2005 is not a decline in production, but rather represents a normal response to the 4-year cycle displayed by these fish. 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), that require strong production performance of natural origin recruits over three generations (12 years), and the recent years of large returns do not at this time meet the recovery goals. 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 2006) will contain a detailed discussion of progress towards full recovery.


References


Point No Point Treaty (PNPT) Tribes and Washington Department of Fish and Wildlife (WDFW). 2003. Interim summer chum salmon recovery goals. Supplemental Report No. 5, Summer Chum Salmon Conservation Initiative – An Implementation Plan to Recover Summer Chum in the Hood Canal and Strait of Juan de Fuca. October 2003. Wash. Dept. Fish and Wildlife. Olympia, WA. 36 p.

Washington Department of Fish and Wildlife (WDFW) and Point No Point Treaty (PNPT) Tribes. 2000. Summer Chum Salmon Conservation Initiative - An Implementation Plan to Recover Summer Chum in the Hood Canal and Strait of Juan de Fuca Region. Wash. Dept. Fish and Wildlife. Olympia, WA. 800 p.

Washington Department of Fish and Wildlife (WDFW) and Point No Point Treaty (PNPT) Tribes. 2001. Annual report for the 2000 summer chum salmon return to the Hood Canal and Strait of Juan de Fuca region. Supplemental Report No. 3, Summer Chum Salmon

Conservation Initiative - An Implementation Plan to Recover Summer Chum in the Hood Canal and Strait of Juan de Fuca Region. December 2001. Wash. Dept. Fish and Wildlife. Olympia, WA. 123 p.

Washington Department of Fish and Wildlife (WDFW) and Point No Point Treaty (PNPT) Tribes. 2003. Report on summer chum salmon stock assessment and management activities for 2001 and 2002. Supplemental Report No. 4, Summer Chum Salmon Conservation Initiative – An Implementation Plan to Recover Summer Chum in the Hood Canal and Strait of Juan de Fuca. October 2003. Wash. Dept. Fish and Wildlife. Olympia, WA. 219 p.

Washington Department of Fish and Wildlife (WDFW) and Point No Point Treaty Council (PNPTC). 2004. 2003 Progress report on Hood Canal summer chum salmon. Memorandum dated September 9, 2004. 22 p.

Washington Department of Fish and Wildlife (WDFW) and Point No Point Treaty Council (PNPTC). 2005. 2004 Progress report on Hood Canal summer chum salmon. Memorandum dated February 10, 2005. 15 p.

# Appendix

## Summer Chum Salmon Run Reconstruction Tables, 2004 - 2005

**2004**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvest | | | | | | | 18,430 | | 16 | 4 | | | | | 3 | 16 | 123 | 76 |

| Mgmt Unit | Prod. Unit | Escape-ment | Brood-stock | 82G/J | 12D | 12C | 82F | 12A | 12B | 12 | 9A | Discov | Se-quim | Terminal | Seattle (Area 10) | Admir-alty (Area 9) | US Conv. Areas | Cana-dian Area 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Skokomish | Skokomish | 24 | | 24 | | 24 | | | 24 | 24 | 24 | | | 24 | 24 | 24 | 24 | 24 |
| 12D | Tahuya | 8 | | | 8 | 8 | | | 8 | 8 | 8 | | | 5,985 | 5,986 | 5,987 | 5,994 | 5,999 |
| | Union | 5,876 | 100 | | 5,976 | 5,976 | | | 5,976 | 5,977 | 5,977 | | | | | | | |
| 12A | L. Quilcene | 3,045 | | | | | | 4,516 | 4,516 | 4,517 | 4,517 | | | 56,596 | 56,598 | 56,607 | 56,678 | 56,722 |
| | B. Quilcene | 35,000 | 108 | | | | 35,108 | 52,067 | 52,067 | 52,077 | 52,079 | | | | | | | |
| 12-12B-12C | Big Beef | 1,852 | 64 | | | | | | 1,916 | 1,916 | 1,916 | | | 25,840 | 25,841 | 25,845 | 25,877 | 25,898 |
| | Anderson | 1 | | | | | | | 1 | 1 | 1 | | | | | | | |
| | Dosewallips | 11,549 | | | | | | | 11,549 | 11,551 | 11,552 | | | | | | | |
| | Duckabush | 8,637 | | | | | | | 8,637 | 8,639 | 8,639 | | | | | | | |
| | Hamma | 2,628 | 63 | | | | | | 2,691 | 2,691 | 2,692 | | | | | | | |
| | Lilliwaup | 922 | 95 | | | 1,017 | | | 1,017 | 1,017 | 1,017 | | | | | | | |
| | Dewatto | 23 | | | | 23 | | | 23 | 23 | 23 | | | | | | | |
| Chimacum | Chimacum | 1,139 | | | | | | | | | | | | 1,139 | | 1,139 | 1,141 | 1,142 |
| Discovery | Snow | 396 | | | | | | | | | | 396 | | 6,417 | | 6,418 | 6,426 | 6,431 |
| | Salmon | 6,021 | 0 | | | | | | | | | 6,021 | | | | | | |
| Sequim | Jimmy-comelately | 1,601 | 61 | | | | | | | | | | 1,662 | 1,662 | | 1,662 | 1,664 | 1,666 |
| Dungeness | Dungeness | 123 | | | | | | | | | | | | 123 | | 123 | 123 | 123 |
| Totals | | **78,845** | 491 | 24 | 5,984 | 7,048 | 35,108 | 56,583 | 88,425 | 88,441 | 88,445 | 6,417 | 1,662 | 97,786 | 88,448 | 97,805 | 97,928 | **98,004** |
| Hood Canal | | 69,565 | 430 | | | | | | | | | | | 88,445 | 88,448 | 88,462 | 88,754 | 88,643 |
| E. Strait | | 9,280 | 61 | | | | | | | | | | | 9,341 | | 9,343 | 9,354 | 9,362 |

| | | | | | | | | | | | | | | | Seattle (Area 10) | Admir-alty (Area 9) | US Conv. Areas | Cana-dian Area 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mgmt Unit | Prod. Unit | Escape-ment | Brood-stock | 82G/J | 12D | 12C | 82F | 12A | 12B | 12 | 9A | Discov | Sequim | Terminal | | | | |
| **2005** | Harvest | | | | | 314 | | 244 | | | | | | | | 2 | 37 | 62 |
| Skokomish | Skokomish | 5 | | 5 | | 6 | | | 6 | 6 | 6 | | | 6 | 6 | 6 | 6 | 6 |
| 12D | Tahuya | 4 | | | 4 | 4 | | | 4 | 4 | 4 | | | 2,195 | 2,195 | 2,195 | 2,198 | 2,203 |
| | Union | 1,885 | 102 | | 1,987 | 2,190 | | | 2,190 | 2,190 | 2,190 | | | | | | | |
| 12A | L. Quilcene | 866 | | | | | | 898 | 898 | 898 | 898 | | | 6,916 | 6,916 | 6,917 | 6,926 | 6,943 |
| | B. Quilcene | 5,702 | 104 | | | | 5,806 | 6,018 | 6,018 | 6,018 | 6,018 | | | | | | | |
| 12-12B-12C | Big Beef | 1,124 | 0 | | | | | | 1,124 | 1,124 | 1,124 | | | 7,199 | 7,199 | 7,199 | 7,209 | 7,227 |
| | Anderson | 0 | | | | | | | 0 | 0 | 0 | | | | | | | |
| | Dosewallips | 2,658 | | | | | | | 2,658 | 2,658 | 2,658 | | | | | | | |
| | Duckabush | 821 | | | | | | | 821 | 821 | 821 | | | | | | | |
| | Hamma | 1,272 | 142 | | | | | | 1,414 | 1,414 | 1,414 | | | | | | | |
| | Lilliwaup | 951 | 98 | | | 1,156 | | | 1,156 | 1,156 | 1,156 | | | | | | | |
| | Dewatto | 23 | | | | 25 | | | 25 | 25 | 25 | | | | | | | |
| Chimacum | Chimacum | 1,396 | | | | | | | | | | | | 1,396 | | 1,396 | 1,398 | 1,401 |
| Discovery | Snow | 832 | | | | | | | | | | 832 | | 6,974 | | 6,975 | 6,984 | 7,001 |
| | Salmon | 6,142 | 0 | | | | | | | | | 6,142 | | | | | | |
| Sequim | Jimmycome-lately | 1,247 | 63 | | | | | | | | | | 1,310 | 1,310 | | 1,310 | 1,312 | 1,315 |
| Dungeness | Dungeness | 2 | | | | | | | | | | | | 2 | | 2 | 2 | 2 |
| Totals | | **24,930** | 509 | 5 | 1,991 | 3,382 | 5,806 | 6,916 | 16,315 | 16,315 | 16,315 | 6,974 | 1,310 | 25,997 | 16,315 | 25,999 | 26,036 | **26,097** |
| Hood Canal | | 15,311 | 446 | | | | | | | | | | | 16,315 | 16,315 | 16,316 | 16,339 | 16,378 |
| E. Strait | | 9,619 | 63 | | | | | | | | | | | 9,682 | | 9,683 | 9,696 | 9,719 |