  

PUBLIC UTILITY DISTRICT NO. 1 *of* CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

April 13, 2009

VIA ELECTRONIC FILING

Honorable Kimberly D. Bose, Secretary, and
Nathaniel J. Davis, Sr., Deputy Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street NE
Washington, DC 20426

Subject: Rocky Reach Hydroelectric Project, FERC No. 2145-060
Annual Report of Activities under the Anadromous Fish Agreement and Habitat Conservation Plan for Calendar Year 2008

Dear Secretary Bose and Deputy Secretary Davis:

Public Utility District No. 1 of Chelan County, Washington (Chelan PUD), licensee for Rocky Reach Hydroelectric Project No. 2145 (Rocky Reach Project) respectfully submits the attached progress report in accordance with Article 10 of Appendix B of the *Order on Offer of Settlement and Issuing New License* (License) issued on February 19, 2009.[1]

The 50-year Anadromous Fish Agreement and Habitat Conservation Plan (HCP) Agreement[2] for the Rocky Reach Project was filed with the Federal Energy Regulatory Commission (Commission) on November 24, 2003, and approved by the Commission at 107 FERC ¶ 61,280 (2004) and 107 FERC ¶ 61,281 (2004),[3] and prescribed by National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service pursuant to Section 18 of the Federal Power Act. Article 10 of Appendix B of the new License requires Chelan PUD to file with the Commission: (1) the final annual and comprehensive progress reports developed pursuant to the HCP; and (2) the final results of all studies and testing pursuant to the HCP.[4]

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[1] 126 FERC ¶ 61,138 (2009).
[2] 107 FERC ¶ 61,280 (2004).
[3] 107 FERC ¶ 61,281 (2004).
[4] Article 10 of Appendix B supersedes License Article 410 of *Order Amending License* issued June 21, 2004. Pursuant to License Article 404 of *Order Modifying and Approving Plan for Assessing Operation Effects of the Juvenile Bypass System* issued January 26, 2003 and *Order Amending License* issued April 12, 2002, the reporting requirements were incorporated as Section 1.1 of the progress report. This information will now be reported under new License Article 402. *Operations Plan*.

The progress report is intended to fulfill the License requirements and Section 4.8 of the HCP requiring an annual report of progress toward achieving the no net impact (NNI) goal described in Section 3 of the HCP, and includes a discussion of the agreements and other common understandings based upon completed studies and work in 2008. A copy of this report is being submitted by copy of this letter with the National Marine Fisheries Service as specified in Section 9.8 of Appendix E of the License.

Please forward any questions regarding this filing or requests for additional information to the Licensing and Compliance Manager, Chelan PUD, 327 North Wenatchee Avenue, Wenatchee, Washington 98801.

Sincerely,

MSmith

Michelle Smith
Licensing and Compliance Manager
michelle.smith@chelanpud.org
(888)663-8121, Ext. 4180

cc: Keith Truscott, Chelan PUD
Erich Gaedeke, FERC
Bryan Nordlund, NMFS
HCP Coordinating Committee
HCP Hatchery Committee
HCP Tributary Committee

Attachments:
Annual Report, Calendar Year 2008, of Activities under the Anadromous Fish Agreement and Habitat Conservation Plan

Appendix A	Habitat Conservation Plan Coordinating Committees Meeting Minutes and Conference Call Minutes
Appendix B	Habitat Conservation Plan Hatchery Committees Meeting Minutes and Conference Call Minutes
Appendix C	Habitat Conservation Plan Tributary Committees Meeting Minutes
Appendix D	List of Rocky Reach HCP Committee Members
Appendix E	Statements of Agreement for Coordinating Committees
Appendix F	Statements of Agreement for Hatchery Committees
Appendix G	Shuswap River Hatchery Information
Appendix H	Broodstock Collection Protocols
Appendix I	2008 Chelan PUD Action Plan
Appendix J	2008 Annual Financial Report for the Plan Species Accounts
Appendix K	Monitoring and Evaluation of the Chelan County PUD Hatchery Programs – 2007 Annual Report

ANNUAL REPORT
CALENDAR YEAR 2008
OF ACTIVITIES UNDER THE ANADROMOUS FISH AGREEMENT
AND HABITAT CONSERVATION PLAN

ROCKY REACH HYDROELECTRIC PROJECT
FERC LICENSE NO. 2145

Prepared for

Federal Energy Regulatory Commission
888 First Street N.E.
Washington, D.C. 20426

Prepared by

Anchor QEA, LLC
1423 Third Avenue, Suite 300
Seattle, Washington 98101
and
Public Utility District No. 1
of Chelan County, Washington
327 N. Wenatchee Ave
P.O. Box 1231
Wenatchee, Washington 98807

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April 2009

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1 INTRODUCTION

On June 21, 2004, the Federal Energy Regulatory Commission (FERC) approved an Anadromous Fish Agreement and Habitat Conservation Plan (HCP) for the Rocky Reach Hydroelectric Project (Rocky Reach – FERC License No. 2145) on the Columbia River in Washington State, operated by Chelan County Public Utility District No 1 (Chelan PUD). The HCP provides a comprehensive and long-term adaptive management plan for species addressed in the plan (Plan Species) and their habitat. This document is intended to fulfill Article 413(a) (Section 4.8 of the HCP) requiring an annual report of progress toward achieving the No Net Impact (NNI) goal described in Section 3 of the HCP, and common understandings based upon completed studies including those conducted as research/development for NNI progress or those not considered valid due to extenuating circumstances (HCP, Section 5.2.3).

The signatories of the Mid-Columbia HCPs (HCPs of the Wells, Rocky Reach, and Rock Island hydroelectric projects) meet as combined Coordinating Committees, Hatchery Committees, and Tributary Committees to expedite the process of overseeing and guiding HCP implementation. Minutes from the monthly meetings are compiled in Appendices A (Coordinating Committees), B (Hatchery Committees), and C (Tributary Committees); Appendix D lists members of the Rocky Reach Committee. In addition, there is a Policy Committee whose function is to provide dispute resolution for issues arising in the Coordinating, Hatchery, or Tributary Committees. The Policy Committees did not meet in 2008. The Coordinating Committee for the Rocky Reach HCP oversaw the preparation of this fifth Annual Report for calendar year 2008, which covers the period from January 1 to December 31, 2008. (The first four Annual Reports covered January 1 to December 31, 2004 through 2007, respectively.)

1.1 FERC Article 404 Reporting

Article 404 of the January 26, 2003 FERC order modifying and approving the plan for assessing the effects of operation of the Juvenile Fish Bypass System (JFBS) directs Chelan PUD to provide an annual report to FERC summarizing the results of the previous year's assessment and a schedule for the next year's assessment; it also requires a report of any changes to the operations and maintenance of the JFBS. FERC agreed with Chelan PUD on

January 25, 2007 (188 FERC 62061), that Article 404 reporting would be combined with this Annual Report document. Accordingly, this report also includes results of the 2008 JFBS assessment and plans for the 2009 assessment.

1.1.1 2008 Studies and Results

In 2008, juvenile sockeye salmon survival studies were conducted at Rocky Reach Dam. The overall project survival estimate was 92.02 percent (standard error of 0.212) as assessed with acoustic tags. Survival was estimated using test conditions of increased flow at turbine units 1 and 2, and reduced flows through the remaining units, and then a conventional loading (typical) scheme for all units under the experimental control condition. Results indicated that passage was not increased through the desired surface collector route in the test condition versus the conventional loading condition (Table 1).

Table 1
Passage Proportions by Treatment

Route	Passage		P-value (2-tailed)
	Conventional	Treatment	
Surface Collector	0.4641 (0.0367)	0.3631 (0.0349)	0.0461
Bypass Screens	0.0324 (0.0130)	0.0579 (0.0169)	0.2317
Powerhouse	0.4701 (0.0367)	0.5632 (0.0360)	0.0701
Spillway	0.0335 (0.0135)	0.0158 (0.0090)	0.2753

1.1.2 2009 Schedule and Study Plan

Information from previous juvenile salmon survival studies was used as the foundation for 2009 study plans and schedules, which will be reviewed and approved by the Coordinating Committee prior to the 2009 spring migration period. Research planned for 2009 at Rocky Reach includes estimation of juvenile sockeye project survival, route-specific passage information, and analysis of diel passage at the JFBS for all salmonids (study details to be determined; see Section 2.3.2.3). Chelan PUD will also continue to evaluate run-timing, species composition, and physical condition of run-of-river (ROR) sockeye at the juvenile sampling facility. As in the last several years, no Chinook studies are proposed for 2009; the

Coordinating Committee previously agreed to defer additional yearling Chinook survival studies until optimal passage conditions for juvenile sockeye salmon are better understood. In the case of subyearling Chinook, the Committee previously concluded that there will be no studies until a suitable tagging methodology is developed.

1.1.3 2008 Juvenile Fish Bypass Operation

The Rocky Reach JFBS operated in 2008 from April 1 through September 4 to cover 95 percent of the outmigration of the spring and summer juvenile salmon and steelhead. Multiple studies were conducted during the 2008 biological evaluation. The first priority and primary goal was to ensure that the system was safe for fish prior to and during the juvenile outmigration. Marked fish releases with hatchery summer Chinook yearlings were conducted in late March to verify that the system was working properly and to locate any areas where descaling, injury, or mortality might occur. Ongoing sampling at the juvenile sampling facility (JSF) was conducted throughout the outmigration to 1) ensure that the system remained safe for migrating juveniles and 2) collect standardized juvenile fish capture data to supplement Rocky Reach passage estimates generated using the computer model, RealTime (University of Washington). The bypass capture rate, along with outputs from RealTime and species composition data, was used to guide decisions to initiate fish spill operations at the dam. The JSF was also utilized to collect ROR fish for the 2008 acoustic tag studies (survival and fish passage efficiency evaluations at Rocky Reach and Rock Island Dams).

In the year-end report evaluating the system, the fish bypass efficiency estimate (45.7 percent) for acoustic-tagged sockeye was the highest recorded since operation of the JFBS began in 2003. Season-wide estimate for all species in 2008 for descaling, injury, or mortality was as follows: descaling – 0.10 percent; injury – 0.23 percent; and mortality – 0.06 percent. Neither descaling nor injury nor mortality exceeded critical thresholds over three consecutive days of sampling, and no marked fish releases through the bypass system were required in 2008. Season-wide descaling, injury, and mortality estimates (combined) for each species remained below 1.0 percent. As shown in Table 2, the JFBS operated effectively within criteria, and in compliance with permit limits. Chelan PUD concludes that the surface collector continues to be more effective at bypassing smolts when compared to the intake screen system during the spring and summer outmigration periods.

Table 2
Season-wide Estimates of Descaling, Injury, and Mortality based on Biological Monitoring at the Rocky Reach Juvenile Sampling Facility, 2008

Species	Percent Descaled	Percent Injury	Percent Mortality
Yearling Chinook	0.08	0.18	0.07
Subyearling Chinook	0.16	0.38	0.11
Steelhead	0.27	0.57	0.00
Sockeye	0.04	0.09	0.05
Coho	0.08	0.45	0.00

1.1.4 2009 Juvenile Fish Bypass Operation

In 2009, the JFBS operations will vary slightly from the operations carried out from 2005 through 2008 in that the JFBS will conduct species composition monitoring 24 hours per day, 7 days per week, over a 30-day period covering 95 percent of the sockeye migration period. Operations before and after the sockeye migration period will be as in past years, and maintenance will be the same as in 2005 through 2008. Additionally, there are no proposed structural or design changes to the JFBS for 2009.

2 PROGRESS TOWARD MEETING NO NET IMPACT

The Rocky Reach HCP requires preparation of an Annual Report that describes progress toward achieving the performance standard of NNI for each Plan Species. The NNI standard consists of two components: 1) 91 percent combined adult and juvenile project survival achieved by project improvement measures implemented within the geographic area of the project; and 2) 9 percent compensation for unavoidable project mortality provided through hatchery and tributary programs, with 7 percent compensation provided through hatchery programs and 2 percent through tributary programs (Section 3.1 of the HCP). Section 5.2 of the HCP states that given the present inability to differentiate between the sources of adult mortality, initial compliance with the combined adult and juvenile survival standard will be based on the measurement of 93 percent juvenile project survival or 95 percent juvenile dam passage survival (described further in Sections 3 and 5 of the HCP).

The following sections of this chapter describe progress made in 2008 toward achieving the HCP objectives as they relate to phase designations, decision making, continued implementation of the juvenile and adult passage plans, hatchery project improvements, and implementation of the tributary program.

2.1 Status of Phase Designations for Current Plan Species

A major feature of the Rocky Reach HCP is what is termed "a phased implementation of measures to achieve the survival standards." Briefly, Phase I consists of a 3-year minimum period in which studies are conducted to determine annual survival rates for each of the Plan Species. Following the completion of 3 years of valid studies, the Rocky Reach HCP Coordinating Committee will determine whether the survival standard has been achieved. Depending on the results of this determination, the Chelan PUD will proceed to either Phase II or Phase III.

Under Phase II, the Rocky Reach HCP Coordinating Committee would have determined that the standards have not been met, and Chelan PUD is responsible for evaluating additional tools to improve survival. Under Phase III, the Rocky Reach HCP Coordinating Committee would have determined that the survival standards have been achieved, and the PUD is required to re-evaluate survival at 10-year intervals. It should be noted that juvenile survival studies conducted during Phase I testing may result in different phase designations for each of the Plan Species.

During 2008, Chelan PUD continued juvenile survival testing, which was begun in 2004 at Rocky Reach. Coho salmon are designated as in Phase III (Standards Achieved – Interim Value); steelhead are designated as in Phase III, and sockeye salmon are still being tested. The Coordinating Committee has agreed to defer additional yearling Chinook survival studies until optimal passage conditions for juvenile sockeye salmon are better understood. Current phase designations for all Plan Species are summarized in Table 3.

Table 3
Current Phase Designations for Rocky Reach HCP

Plan Species	Phase Designation	Date
Upper Columbia River (UCR) steelhead	Phase III Standards Achieved	October 24, 2006
UCR yearling spring Chinook	Phase III Provisional Review	June 24, 2008
UCR subyearling summer/fall Chinook	Phase III Additional Juvenile Studies	June 24, 2008
Okanogan River sockeye	Phase II Additional Tools	November 30, 2005
Coho	III Standards Achieved –Interim Value	June 20, 2007

2.2 2008 HCP Decisions

Throughout 2008, the Rocky Reach Coordinating, Hatchery, and Tributary Committees made and noted a number of agreements during meetings in order to document HCP decisions and support the future achievement of NNI. These agreements are summarized in Table 4 and are discussed in the remainder of this report.

Table 4
2008 Decisions for Rocky Reach HCP

Date	Agreement	HCP Committee	Reference
Jan. 22, 2008	Approval of the Study Plan for the Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2008	Coordinating	Appendix E; Appendix A, Jan. 22, 2008
Feb. 20, 2008	Approval of Statement of Agreement Regarding Pilot Study for Partial Water Reuse (for 2008)	Hatchery	Appendix F; Appendix B, Feb. 20, 2008
Feb. 29, 2008	(Conference call) Approval of Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam for 2008	Coordinating	Appendix F; Appendix B, Feb. 29, 2008
Mar. 11, 2008	Approval of Chiwawa Rearing/Acclimation Facility – Wenatchee Steelhead Feasibility Criteria (Report Issue Date – 03-03-08)	Hatchery	Appendix F; Appendix B, Mar. 11, 2008
Mar. 25, 2008	Approval of the 2008 Fish Spill Plan, Rocky Reach and Rock Island Dams	Coordinating	Appendix E; Appendix A, Mar. 25, 2008
Mar. 25, 2008	Approval of the 2008 Rocky Reach Study Plan	Coordinating	Appendix E; Appendix A, Mar. 25, 2008
Mar. 25, 2008	Approval of Final Report: Acoustic-Tag Investigations of Sockeye Salmon Smolt Survival and Migration Dynamics at Rocky Reach in 2007	Coordinating	Appendix E; Appendix A, Mar. 25, 2008
Mar. 25, 2008	Approval of Final Report: Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2007	Coordinating	Appendix E; Appendix A, Mar. 25, 2008
Mar. 25, 2008	Approval of Final Report: Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2006	Coordinating	Appendix E; Appendix A, Mar. 25, 2008
Nov. 19, 2008	Approval of Statement of Agreement Regarding use of Blackbird Pond for Steelhead Rearing	Hatchery	Appendix F; Appendix B, Nov. 19, 2008
Dec. 8, 2008	Approval of Statement of Agreement Regarding Pilot Study for Partial Water Reuse (for 2009)	Hatchery	Appendix F; Appendix B, Dec. 8, 2008 Conf call minutes
Dec. 17, 2008	Approval of Statement of Agreement Regarding Okanogan Sockeye Requirement	Hatchery	Appendix F; Appendix B, Dec. 17, 2008

The following sections of this chapter chart progress in 2008 toward achieving the HCP objectives as they relate to project improvement measures, hatchery programs, and tributary programs.

2.3 Project Operations and Improvements

This section summarizes project operations and progress toward achieving the project survival standard at Rocky Reach Dam in 2008.

2.3.1 Operations

The Coordinating Committees approved the 2008 Chelan PUD Spill Plan in March 2008 (Appendix A and E). The Coordinating Committees also agreed in March that Chelan PUD could conduct a powerhouse operations test for juvenile sockeye in the spring. The study was conducted as per the 2008 study plan for this species (Appendix A and E) and took place from May 13 through June 6. The spill operations in 2008 were implemented in a manner necessary to conduct the survival study under selected powerhouse operations and still manage fluctuating river in-flow conditions. The purpose of the experiment was to test conditions for maximizing survival through the powerhouse, and continuing to increase passage through the surface collector. During the test, turbine units 1 through 11 at Rocky Reach were operated in blocks of time at two different discharge levels (treatment and control), with units 1 and 2 operated at higher discharge (14 kcfs) during the treatment time blocks to increase attraction to the surface collector. During control time bocks, the units were operated for best efficiency in normal bypass mode with units 1 and 2 set at lower discharge levels (12 kcfs). Study results were presented in Section 1.1.1 of this report.

The juvenile bypass system operated from April 1 through September 4, 2008, during the outmigration of juvenile salmon and steelhead at Rocky Reach. Spill for summer-migrating subyearling Chinook at Rocky Reach Dam began on June 8, 2008, at 0001 hours and continued uninterrupted for 85 days through August 31, covering 95.01 percent of the subyearling Chinook outmigration. The target level for summer spill was 9 percent of the estimated daily average river flow. Actual spill for this 85-day period averaged 13.39 percent of the total river flow (9 percent + 4.39 percent unavoidable headwater spill). Columbia River average river flow past Rocky Reach Dam during the spill period was 135,320 cubic feet per second (cfs), and the daily average spill rate was 18,120 cfs. Spring spill for the 24-day juvenile sockeye test at Rocky Reach Dam began on May 14, 2008, and continued through June 7. The sockeye 95 percent passage date was May 31, and the steelhead 95 percent passage date was May 30. Columbia River daily average river flow past Rocky Reach Dam during the spill period was 191,096 cfs.

2.3.1.1 Pikeminnow Predator Control

Chelan PUD used passive overflow weir traps to capture pikeminnow in the Rocky Reach and Rock Island fish ladders between June 2 and September 5. This effort resulted in the capture and removal (euthanized on site) of 5,023 pikeminnow. Incidental catch of summer Chinook mini-jacks was 44 fish at Rocky Reach. The total Chinook ladder passage during the trapping period at Rocky Reach was 29,022 fish (0.15 percent of passages captured). All summer Chinook were released into the respective Project forebay with no injuries or mortalities observed. No spring Chinook were encountered or trapped at Rocky reach or Rock Island. Sockeye were also incidentally captured. A total of 193 sockeye were captured at Rocky Reach from a total passage of 111,695 fish that passed during trapping (bi-catch rate of 0.17 percent). All sockeye were released unharmed in the forebay of the Project. Two juvenile bull trout (smaller than 12 inches) were incidentally captured at Rocky Reach. Both fish were released in good condition into the forebay above the fishway exit. From September 22 through October 11, Chelan PUD again assisted Douglas PUD by collecting lamprey at Rocky Reach for a ladder passage study at Wells Dam. The same overflow weir traps at Rocky Reach were used to collect the lamprey. During this effort, an additional 243 pikeminnow were captured and removed from the Rocky Reach ladder. No salmonid bi-catch occurred in this period.

The Northern pikeminnow predator control work will continue in 2009, including ladder trapping at Rocky Reach and Rock Island adult fish ladders, and the use of long-line angling during the pre- migration period to target large pikeminnow staging in deep reservoir areas that are difficult to capture with other gear types. A pilot long-line effort during the late fall season will take place in 2009 to evaluate the potential for additional pikeminnow control. Following completion of the long-lining in early spring, the USDA hook-and-line angling program will commence during the peak of juvenile salmonid migration. Chelan PUD will also continue to provide contract funding for the East Wenatchee Rotary Club Pikeminnow Derby.

The total harvest of pikeminnow in 2008 from Rocky Reach and Rock Island reservoirs was 73,860 fish. Harvest from the various control efforts in 2008 were as follows: USDA hook-and-line angling – 42,158 fish; Columbia Research long-line angling – 21,509 fish; East Wenatchee Rotary Club pikeminnow derby – 4,474 fish; pikeminnow trapping in Rocky Reach and Rock Island adult ladders – 5,266 fish; angling at the Rocky Reach juvenile surface collector – 453 fish.

2.3.2 Assessment of Project Survival

The HCP requires that Chelan PUD shall work toward 91 percent combined adult and juvenile project survival at Rocky Reach Dam achieved by project improvement measures implemented within the geographic area of the project. Progress toward this objective is described below.

2.3.2.1 Adult Passage Monitoring

The HCP acknowledges that no scientific methodology currently exists that would allow the Rocky Reach HCP Coordinating Committee to assess adult project survival for Plan Species (presumed to be 98 percent). This is because available methods are unable to differentiate between mortality caused by the project versus other sources of non-detection (such as mortality from natural causes, injuries resulting from passage at downstream projects, or injuries sustained by harvest activities; or fish not detected for other reasons, such as spawning in locations downstream from Rocky Reach Dam). However, the Rocky Reach HCP Coordinating Committee is able to evaluate information to assess whether or not there is a high likelihood that the adult survival rates are being achieved. Table 5 details detections at Priest Rapids Dam of known-origin adult steelhead and Chinook salmon that were Passive Integrated Transponder tagged (PIT-tagged), the number of those adults redetected at Wells Dam, the estimated conversion rate (Priest Rapids Dam to Wells Dam), and average per project (i.e., four dams and four reservoirs) conversion rates.

These conversion rates are best viewed as a minimum survival estimate between the two detection sites because they encompass mortalities from all sources and non-detected fish (as described above) between the two detection sites. They do not include any indirect or delayed mortality that might occur upstream of Wells Dam (the redetection site). The per-project conversion rate exceeded 98 percent for steelhead and spring and summer Chinook salmon (that is, mortalities from all sources averaged less than 2 percent through each project. Data for fall Chinook and sockeye are not available. As noted above, this 2 percent figure reflects a combination of mortality attributable to both non-project related causes (e.g., recreational and tribal harvest, tailrace spawning, and disease) and dam passage, as well as non-detections resulting from straying and spawning below Wells Dam. For this reason, it is highly probable that the actual conversion rate for adult Plan Species exceeds the 98 percent per-project assumption set forth in the HCP.

Table 5
Adult Conversion Rates for All Available Release Groups

Stock Species	Priest Rapids Dam	Wells Dam	Priest Rapids to Wells Total Conversion Rate	Priest Rapids to Wells Average Per Project Conversion Rate[1]
All Releases[2] Summer Steelhead 2004-2008	5,356	4,983	93.0%	98.2%
All Releases[3] Spring Chinook 2003-2008	427	396	92.7%	98.1%
All Releases[4] Summer Chinook 2003-2004	15	14	93.3%	98.3%

Source: Columbia River DART website: http://www.cbr.washington.edu/dart/pit_obs_adult_conrate.html

1 Calculated as Priest Rapids Dam to Wells Dam Total Conversion Rate to the fourth root (four dams and four pools). Adults detected at Wells Dam that were not also detected at Priest Rapids Dam were excluded from the analysis.

2 Summer steelhead released into the Okanogan and Methow River Systems—PIT-tag release site designations: CHEWUR, METHR, OKANR, OMAKC, SIMILR, TWIS2P, TWISPR, BEAV2C, WINT, LIBBYC, METTRP, and STAPAC. Please note that many fish detected at Priest Rapids in 2007 will not pass Wells Dam until spring of 2008.

3 Spring Chinook salmon released into Methow River System—PIT-tag release site designations: CHEWUP, METH, METHR, TWISPP, TWISPR, BEAV2C, WINT, and METTRP.

4 Summer Chinook salmon released into Columbia River System above Wells Dam—PIT-tag release site designations: OKANR.

2.3.2.2 Completed Studies 2008

In February 2008, the Coordinating Committee approved the study plan for juvenile sockeye survival studies (Appendix A and E), which included estimating survival through Rocky Reach Dam using a triple release model, under two turbine-loading conditions: the conventional loading condition, and an increased flow in Powerhouse Units 1 and 2. The project survival estimate was 92.02 percent (standard error of 0.212) as assessed with acoustic tags. Survival was also estimated under these conditions for various passage routes. Results indicated that passage was not increased through the desired surface collector route in the test condition versus the conventional loading condition. The Coordinating Committees received these survival estimates in November 2008, and are expected to review and approve the reports in 2009. In addition to survival studies, route-specific passage was also investigated.

In January 2008, the Rocky Reach HCP Coordinating Committee approved the 2008 study plan for the Rocky Reach JFBS (Appendix A and E). As discussed in Section 1.1.3 of this report, the JFBS operated effectively and in compliance with required permits.

2.3.2.3 Planned Studies 2009

As in previous years, the Rocky Reach Coordinating Committee oversaw research to identify measures to increase passage survival of juvenile sockeye salmon in 2008. Additional testing will occur in 2009; the Rocky Reach Coordinating Committee will continue to oversee this research. Specifics of these studies will be determined by the Coordinating Committees prior to study commencement, but research is currently expected to include estimation of project survival and route-specific passage for sockeye to improve survival of juveniles, as well as evaluation of run-timing, species composition, and physical condition of run-of-river sockeye at the juvenile sampling facility. The study will likely consist of comparing results from both day/night releases because release timing at Wells may be affecting results of testing. This testing is needed because release timing has traditionally been around noon on the day of release, and thus fish may be in the forebay of Rocky Reach during the daytime the next day when predators tend to be more active. During these tests, the powerhouse would be operated according to the "Waterview" condition with no spill. There will also be hydroacoustic monitoring of diel fish passage patterns at the entrance to the JFBS and species composition sampling 24 hours per day, 7 days per week (30 day period) at the JFBS.

The Rocky Reach Coordinating Committee previously agreed to place a priority on sockeye salmon testing, and will resume survival standard testing for both sockeye salmon and yearling Chinook salmon when conditions for higher survival of sockeye have been identified.

2.3.3 Maintenance and Improvements

Maintenance and improvements at Rocky Reach Dam in 2008 were largely in the category of repairs. This work occurred according to Chelan PUD's fishway maintenance schedule. In early winter, one of the three attraction water pumps at Rocky Reach Dam was reconditioned and began operations in March.

Planned improvements include reconditioning the other two attraction water pumps in 2009/2010 and 2010/2011, respectively. Other items to be addressed during the next fishway outage include the following:

- Automating the upper fishway picket barriers
- Removing the antiquated fish counting platforms and infrastructure
- Changing the middle spillway entrance gate operators from pneumatic to electric
- Installing the dewatering pump in the spillway entrance pool and cleaning the floor diffusers
- Removing the antiquated stilling wells and replacing them with look-down transducers

In addition, 2009 will be the sixth year for the preventative maintenance underwater inspection schedule for the Rocky Reach surface collector. The sixth year's items include all of the items on the annual list as well as the 3-year list.

2.4 Hatchery Compensation

As required by the HCP, Chelan PUD continued funding and capacity support for hatchery production in 2008 to compensate for unavoidable project mortality. Section 8.1 of the HCP outlines a Hatchery Compensation Plan with two hatchery objectives for Chelan PUD: 1) to provide hatchery compensation for Plan Species; and 2) to implement specific elements of the hatchery program consistent with the overall objectives of rebuilding natural populations and achieving NNI.

To improve coordination, a representative from Grant PUD and the facilitator of the Priest Rapids Coordinating Committees (PRCC) are invited to the monthly Hatchery Committees meetings. In addition, they receive meeting announcements, draft agendas, and meeting minutes. This practice benefits the Hatchery Committees through increased coordination and sharing of expertise. The Grant PUD representative and PRCC facilitator have no voting authority.

Broodstock Collection Protocols were reviewed by the Hatchery Committees in April 2008 (for Chinook, sockeye, and steelhead) and were implemented at program hatcheries (Appendix H); in-season revisions were made as needed in coordination with the Hatchery Committees. Hatchery compensation in 2008 included the release of 2,332,474 juveniles (1,447,474 smolts plus 885,000 sockeye fry from Shuswap River Hatchery) from hatcheries associated with the Rocky Reach Project (Table 6).

2.4.1 Hatchery Production Summary

Table 6 summarizes and compares HCP hatchery production objectives and actual 2008 production levels.

Table 6
Production Level Objectives for Rocky Reach HCP Hatchery Programs

Species	Program	Final Rearing Site	Rocky Reach Production Level Objectives (2004-2013)	Total Smolt Releases for Rocky Reach in 2008 (No. of fish)	Total Smolt Releases from Final Rearing Site
Spring Chinook	Methow	Methow Hatchery	144,000[1]	109,191	449,777[2]
Summer Chinook	Turtle Rock Island Yearlings	Turtle Rock Island (and net pen experiment in 2008)	200,000	143,214[3]	143,214
	Turtle Rock Island Sub-yearlings	Turtle Rock Island	1,180,000	439,806[4]	439,806[4]
	Turtle Rock Island Sub-yearlings (Accelerated Growth)	Turtle Rock Island	450,000	392,024[4]	392,024[4]
Steelhead	Wenatchee	Turtle Rock Island	200,000	153,345[5]	306,690
Sockeye	Okanogan	Shuswap Hatchery	300,000[6]	885,000 [7]	885,000 [7]

1 Combined with the Rock Island HCP, Wells HCP, and Grant PUD Biological Opinion production obligation, the spring Chinook production at the Methow Fish Hatchery totals 550,071 smolts.

2 There were 449,777 spring Chinook smolts released at an average of 19.1 fpp from the Methow Hatchery (C. Snow WDFW 2008, pers. comm.). The target release of 550,071 fish was a combination of Wells NNI (61,071) and the sharing agreements with Chelan PUD (288,000) and Grant PUD (201,000). This is 81.7 percent of the numerical target for release for 2008. The shortfall was equally applied to the three programs giving Wells NNI 49,936; Chelan PUD 235,489; and Grant PUD 164,352 fish in 2008.

3 99,271 of the total smolt releases in 2008 were transferred to net pens and released into Chelan River.

4 Insufficient broodstock are collected to meet the current production level due to a shortage of incubation and rearing space between Eastbank, Turtle Rock, and the Rocky Reach Annex. An additional significant impact to the existing production is coagulated yolk due to the lack of chilled incubation.

5 Combined with the Rock Island HCP, the Wenatchee steelhead production totals 400,000 smolts (smolt production allocated evenly between the two HCPs). Insufficient females were collected and spawned to meet the expected 400,000 smolt release (however, total broodstock goal of 208 fish was met). Additionally, poor green egg-to-eye survival contributed to the shortage.

6 Combined with the Rock Island HCP, the Okanogan sockeye production requirement totals 591,040 fish (production allocated between the two HCPs). By agreement of the HCP Hatchery Committee, this production requirement is satisfied for Okanogan sockeye by funding of the Okanogan Skaha sockeye reintroduction program until otherwise determined by the HCP HC.

7 Fry release numbers, not smolts. The Hatchery Committee Statement of Agreement from July 20, 2005 agreed that Chelan PUD will provide the funding and capacity to rear and monitor a portion of the Skaha Lake reintroduction program equivalent to a release of 591,040 smolts from Skaha Lake, thus meeting Okanogan sockeye mitigation responsibility for both Rocky Reach and Rock Island HCPs. The fry-smolt conversion rate was initially set for 40% - 50% and Chelan PUD's funding and capacity requirement is for 1,182,080 – 1,477,600 fry, until completion of four years of monitoring to determine actual fry-smolt conversion rates. Fry production is the total for both Grant and Chelan PUDs combined. In 2008, 885,000 fry were released into Skaha Lake.

2.4.2 Hatchery Planning

The following sections detail 2008 actions that were relevant to planning for hatchery operations supporting the HCP.

2.4.2.1 M&E Plan Implementation

In 2005, the Rocky Reach and Rock Island Hatchery Committees approved a Monitoring and Evaluation (M&E) Plan for evaluation of Chelan PUD hatchery programs to assist in the determination of whether the specific hatchery objectives defined by the HCP are being met (M&E Plan titled: *Conceptual Approach to Monitoring and Evaluating the Chelan County Public Utility District Hatchery Programs*). Implementation of this M&E Plan began in 2006 and continues in accordance with two documents: the *Analytical Framework for Monitoring and Evaluating PUD Hatchery Programs*, which was prepared in 2006 and which identifies the analytical strategies and methods for the M&E Program; and the document *Chelan County PUD Hatchery Monitoring and Evaluation Work Plan 2008 (*M&E Work Plan), which is prepared annually and describes the M&E activities for the next calendar year, anticipating that adaptive modification of the plan may be necessary in future years. The Hatchery Committees approved the M&E Work Plan for next year (2009) in October 2008. Similar to previous years, Chelan PUD provided an M&E Annual Report documenting M&E activities in 2007, titled *Monitoring and Evaluation of the Chelan County PUD Hatchery Programs* (Appendix K). A similar report will be prepared in 2009 for 2008 hatchery evaluation.

2.4.2.2 Okanogan Sockeye Mitigation

In 2008, Chelan PUD provided a fourth year of funding for a portion of the Skaha Lake Sockeye Salmon Reintroduction Program (current obligation for Okanogan sockeye salmon mitigation is 591,040 smolts for both Rocky Reach and Rock Island HCPs combined). The Shuswap River Hatchery compensation included the release of 885,000 sockeye fry from the Hatchery (Appendix G).

In December 2008, the Hatchery Committees agreed that the Okanagan Nation Alliance 2006-2017 Experimental Reintroduction of Sockeye Salmon into Skaha Lake (Canada) will be a component of Chelan PUD's Okanogan Sockeye obligation (artificial propagation and monitoring and evaluation) until 2017, unless new information becomes available and the Committees agree otherwise. A comprehensive analysis and determination of project contribution will proceed in 2013, as described in the SOA dated July 20, 2005.

2.4.2.3 Partial Water Re-Use Pilot Study

Chelan PUD conducted a pilot study to test the rearing of 100,000 Wells summer Chinook from the Chelan PUD's hatchery compensation program on a partial water re-use system. The Hatchery Committees agreed that Chelan PUD would implement the study as described in a first year "proof of concept" test, and then would review results with WDFW fish health staff and the Hatchery Committees before a potential second year of study would be proposed (Appendix F). Results indicated that fish condition was good, dissolved oxygen levels were high, carbon dioxide and ammonia were low, and disease was not a problem. Based on the results, Chelan PUD will be conducting an additional year of study in 2009.

2.4.2.4 Hatchery and Genetic Management Plans

In October of 2008 the National Marine Fisheries Service requested that the Rocky Reach Hatchery Committee prepare updated Hatchery and Genetic Management Plans (HGMPs) for Wenatchee basin federal and ESA-listed species hatchery programs. NMFS will use the new HGMPs to determine whether the current Biological Opinions and Incidental Take Permits will require amendment or modification, or will require a new consultation. The HCP-HC is currently compiling information and preparing a schedule to completing these documents by June of 2009.

In preparing the new HGMPs, NMFS requested that the HCP-HC consider the recommendations of the Hatchery Scientific Review Group (HSRG) as well as other documents (i.e., Interior Columbia Basin Technical Recovery Team [ICTRT] documents and the Federal Columbia River Power System [FCRPS] Supplemental Comprehensive Analysis). The HSRG conducted a review of the Upper Columbia River hatcheries in spring 2008, and represented preliminary findings to the regional fisheries managers in May of 2008. A final set of recommendations are expected in February 2009. Preliminary recommendations include developing localized broodstocks, and aggressively limiting the numbers of hatchery origin fish on the spawning grounds. Additional recommendations call for culling of high-

ELISA (high bacterial kidney disease [BKD]) spring Chinook from broodstocks when programs are not broodstock-limited.

2.4.2.5 Objective 9 of the Hatchery M&E Plan - BKD

Throughout 2007, the Hatchery Committees engaged in discussions regarding the management of BKD as it pertains to HCP hatchery operations (Objective 9 of the Hatchery M&E Plan). At the close of last year (2007), the Hatchery Committees had tasked the HETT with developing a detailed study plan to test the effects of BKD antigen levels and rearing density on life cycle survival. In early 2008, the Hatchery Committees considered various study designs and venues for a potential study. In April, WDFW released its 2008 broodstock collection protocols which indicated that eggs from high BKD females would be culled and monitoring would be conducted in order to better understand the potential effect of culling on the prevalence of BKD in returning adult fish. At that point, the Hatchery Committees anticipated that the proposed culling of these eggs would, at least temporarily, alleviate the capacity constraints associated with the current WDFW BKD rearing strategy, thereby forestalling the urgent need for the BKD study. No further alternatives for a BKD study were proposed, and no timeline was proposed for future discussion on the topic.

2.4.2.6 Objective 10 of the Hatchery M&E Plan - NTTOC

The Committees began addressing the interaction of Plan Species with non-target taxa of concern (NTTOC; Objective 10 of the Hatchery M&E Plan). At the close of 2008, the Committees agreed to conduct an expert panel review in late spring 2009 with a risk-based model that the WDFW has previously developed and applied in the Yakima River basin (Ham and Pearsons, 2001, Fisheries 26: 15-23). The Committees agreed on species interactions to be analyzed and risk containment objective categories for these species, as well as potential panel members for the exercise, as noted in the meeting minutes from November. The final documentation for this decision will appear in the January 2009 minutes.

2.4.2.7 Steelhead Reproductive Success Study

A steelhead reproductive success study is required by the HCP in Section 8.5.3. In 2008, NMFS provided additional guidance for conducting Upper Columbia River Steelhead reproductive success research that can be used to guide the Hatchery Committees development and review of a study plan. In late 2008, the Hatchery Committees were working to develop and agree upon a study plan that would address key points, aiming to produce by February 2009 an agreed-to set of objectives and goals for the study.

2.4.2.8 Hatchery Evaluation Technical Team

Last year (2007), the HETT was tasked with making recommendations to the Hatchery Committees on reference streams (now called control groups) for the Chelan PUD M&E program. In 2008, the HETT completed a draft control group analysis for the Chiwawa, Methow, Chewuch, and Twisp Rivers. The HETT looked at correlation coefficients for effect sizes, and also at productivity and abundance. The next step is for the HETT to provide a list of recommended control groups for steelhead and sockeye. The Hatchery Committees will then consider these recommendations in their selection of control groups for the M&E program.

2.4.2.9 Hatchery Facilities Issues and Actions

In winter 2008, Chelan PUD was continuing a study from 2006 evaluating operation of the Chiwawa Hatchery on Chiwawa River water to the fullest extent possible in order to reduce straying to adjacent populations. This includes use of a water-warming manifold to reduce ice in the water intake system. Testing was ongoing in winter 2008 according to the protocols used in 2006 to evaluate manifold operations. Chelan PUD will soon be compiling and providing information from these tests to the Hatchery Committees.

Chelan PUD made significant progress in the design and planning for the Chiwawa steelhead acclimation ponds in 2008. The PUD prepared a Chiwawa Feasibility Report that was finalized in May that would guide further design of the facility.

The Hatchery Committees provided approval of the Trout Unlimited development of Blackbird Island Pond as a Wenatchee steelhead acclimation site (Appendix F) for up to 50,000 juvenile steelhead annually from 2009 to 2013. Substantial improvements were made to the pond in the fall of 2008 and final modifications will be completed in the spring of 2009 to have fish on station in late spring 2009.

In July 2008, the Hatchery Committees provided approval of the use of Bonaparte Ponds to rear up to 100,000 summer Chinook smolts from the Similkameen program (Appendix F). The agreement was based upon successful development of a well to provide water to prevent icing of the pond. Chelan PUD funded the well field feasibility study, and the Bonneville Power Administration, as part of the Chief Joe Hatchery program, funded the installation and completion of the balance of the water warming system.

In 2008, PIT-tag detectors were installed at Tumwater Dam, Chiwawa River, Entiat River, and Peshastin Creek. Data from these detectors will be used to track fish timing and abundance in these areas; the detectors were primarily installed to aid with the enumeration of hatchery origin steelhead into these systems as part of the process for identifying suitable control streams.

2.5 Tributary Committees and Plan Species Accounts

As outlined in the Rocky Reach HCP, the signatory parties designated one member each to serve on the Tributary Committee. The Rock Island, Rocky Reach, and Wells Tributary Committees met on a regularly scheduled basis as a collective group to enhance coordination and minimize meeting dates and schedules. Subject items requiring decision making were voted on in accordance with the terms outlined in the specific HCPs. With few exceptions during 2008, the Tributary Committees met monthly. The initial focus of the Tributary Committees was to adopt operating procedures, which provide a mechanism for decision making on various issues related to the Committees, and which were provided in the 2005 HCP Annual Report (Anchor 2005)[1], and most recently updated in March of 2008. The Tributary Committees also developed policies for soliciting, reviewing, and approving project proposals (Anchor 2005); this document was last updated in September of 2007. The policies document provides formal guidance to project sponsors on submission of proposals for projects to protect and restore habitat of Plan Species within the geographic scope of the

[1] Anchor Environmental, L.L.C. 2005. Annual Report, Calendar Year 2005, of Activities Under the Anadromous Fish Agreement and Habitat Conservation Plan. Wells Hydroelectric Project, FERC license no. 2149. Prepared for FERC by Anchor Environmental L.L.C. and Public Utility District No. 1 of Douglas County.

HCP. The Committees established two complementary funding programs, the General Salmon Habitat Program and the Small Projects Program.

In 2008, the Committees outlined a general strategy for monitoring the effectiveness of habitat actions funded through the Plan Species Accounts. Under Section 7.5 of the Anadromous Fish Agreement and Habitat Conservation Plans, each of the three project operators (for Rock Island, Rocky Reach, and Wells) are required to provide up to $200,000 to each of their respective Tributary Assessment Programs, which are separate from the Plan Species Accounts. The Programs were established to monitor and evaluate the relative performance of tributary enhancement projects approved by the Committees and funded directly by the Plan Species Accounts. Simply stated, the Programs are intended to make sure that dollars allocated to the Plan Species Accounts are used in an effective and efficient manner. To that end, the Committees established the following draft guidelines for funding effectiveness monitoring projects.

- The Committees intend to focus on the effects of off-channel habitat actions on the rearing and spawning of salmonids.
- The Committees intend to focus monitoring efforts at the reach or project scale where a signal is more likely to be detected.
- The Committees are interested in measuring changes in fish abundance, distribution, and size, and changes in physical/environmental performance metrics that are linked directly to the habitat action.
- The Committees recommend that changes in response variables be compared to spatial and/or temporal reference or control conditions.
- The Committees are interested in partnering with existing monitoring programs.

Based on these draft guidelines, in April 2008, the Committees solicited effectiveness monitoring proposals from the Yakama Nation and the Okanagan Nation Alliance (see Section 2.6.5).

In October 2008, the Committees conducted a post-implementation project inspection with the Upper Columbia Regional Technical Team (RTT). The Committees visited the Entiat Instream Habitat Improvements Project, Entiat River Off-Channel Rearing Habitat Project, Alder Creek Culverts, Nason Creek Off-Channel Project, Dryden Fish Enhancement Channel

Migration Zone Project, Lower Wenatchee Complexity Channel Migration Zone sites 12 and 13 projects, Beebe Creek Channel Reconfiguration Project, Omak Creek Restoration Project, Hancock Springs, and Fulton Dam. The Committees and the RTT jointly compiled their observations and provided those to the sponsors. Those notes are appended to this report in Appendix C.

2.5.1 Regional Coordination

Similar to the Hatchery Committees, and to improve coordination, a representative from Grant PUD and the facilitator of the PRCC were invited to the Tributary Committees' monthly meetings. In addition, Grant PUD receives meeting announcements, draft agendas, and meeting minutes. This practice benefits the Tributary Committees through increased coordination and sharing of expertise. The Grant PUD representative and PRCC facilitator have no voting authority. The Tributary Committees, through the Coordinating Committees, also invited American Rivers and the Confederated Umatilla Tribes to participate in annual coordination meetings. Both parties contributed to the development of the HCP, yet elected not to sign the document. Neither of these parties participated in the deliberations of the Tributary Committees in 2008.

The Tributary Committees also coordinate with the Upper Columbia Salmon Recovery Board (UCSRB). Coordination is typically between the chairperson of the Tributary Committees and the Executive Director or Associate Director of the UCSRB. In addition, some members of the Committees regularly attend the UCSRB meetings to foster coordination in developing and selecting projects for funding. Moreover, some members of the Committees are also members of the Upper Columbia Regional Technical Team, which increases coordination in selecting projects for funding. Many of the policies and procedures of the Salmon Recovery Funding Board (SRFB) and Tributary Committees are complementary, and annual funding rounds by these funding entities have been coordinated over the last several years.

2.5.2 Fiscal Management of Plan Species Accounts

The Tributary Committees set up methods for the long-term management of the Plan Species accounts for each HCP. The Rocky Reach Tributary Committee appointed the accounting firm LeMaster and Daniels, PLLC to perform the necessary tasks for fiscal management of

Rocky Reach Plan Species Account. These tasks include, but are not limited to, the following: (1) develop a long-term approach to maintain the funds and to carry out tax calculations and reporting; (2) conduct the daily management of activities (such as processing of invoices); and (3) provide technical expertise on financial matters to the committees. The beginning balance of the Rocky Reach Plan Species Account on January 1, 2008 was $1,076,168.79, interest accrued during 2008 was $41,752.66, funds disbursed for projects in 2008 totaled $101,664.58, and $4,688.84 was paid to LeMaster and Daniels and Chelan PUD for account administration during 2008, resulting in an ending balance of $1,306,988.03 on December 31, 2008. The 2008 Annual Financial Report for this Plan Species Account is provided in Appendix K.

The Rocky Reach Tributary Committee delegated signatory authority to the chairperson for processing of payments for invoices approved by the Committee, with the Coordinating Committee Chairperson serving as the alternate. Chelan PUD recognizes the uniqueness of the Tributary Committee decision-making process and delegation of signatory authority to the Chairperson, and the Chelan PUD subsequently has provided funding necessary to assign reasonable liability insurance to the Tributary Chairperson.

2.5.3 General Salmon Habitat Program

The Tributary Committees established the General Salmon Habitat Program as the principle mechanism for funding projects. The goal of the program is to fund habitat protection and restoration projects that contribute to the rebuilding of the Plan Species. An important aspect of this program is to assist project sponsors in developing practical and effective applications for relatively large projects. Many habitat projects are increasingly complex in nature and require extensive design, permitting, and public participation to be feasible. Often, a reach-level project involves many authorities and addresses more than one habitat factor. Because of this trend, the General Salmon Habitat Program was designed to fund relatively long-term projects. There is no maximum financial request in the General Salmon Habitat Program; the minimum request is $50,000, although the Committees may provide lesser amounts during a phased project.

In an effort to coordinate with ongoing funding and implementation programs within the region, the Tributary Committees used the previously established technical framework and review process for this area and worked with the other funding programs to identify cost-sharing procedures.

2.5.3.1 2008 General Salmon Habitat Projects

The Tributary Committees announced their 2008 funding cycle in March, with pre-proposal applications due on June 2, 2008 and full proposals due on August 8, 2008. The Tributary Committees received and reviewed 13 pre-proposal applications. The Committees selected eight projects that they believed warranted full proposals, and dismissed four projects because they were either inconsistent with the intent of the Tributary Fund or did not have strong technical merit. The remaining pre-proposal application was withdrawn by the project sponsor.

In August, the Tributary Committees received eight full proposals to the General Salmon Habitat Program. Most of these were "cost-shares" with SRFB or other funding entities. By December, one proposal was withdrawn by the project sponsor. Of the remaining seven proposals, the Committees approved funding for five projects. The following table (Table 7) identifies the projects, sponsors, amounts requested from Tributary Funds, and, if funded, which Plan Species Account supported the project.

Table 7
General Salmon Habitat Program Projects Reviewed by the Tributary Committees in 2008

Project Name	Sponsor	Cost Share	Request from T.C.	Plan Species Account
Lower Icicle Conservation Easement	Chelan-Douglas Land Trust	$1,006,200	$300,000	Not Funded
Twisp River Conservation Acquisition II	Methow Salmon Recovery Foundation	$261,814	$220,000	Rock Island
Poorman Creek Barrier Removal	Methow Salmon Recovery Foundation	$137,831	$53,748	Wells
Twisp River Riparian Protection	Methow Conservancy			
Zinn Property		$244,992	$104,996	Rock Island
Buckley Property		$209,593	$89,825	Rocky Reach
Pampanin Property		$71,071	$48,649	Wells
Neighbor-Vasques Property		$205,000	$55,000	Wells
Speir Property		$55,983	$23,993	Wells
Cashmere Pond Off-Channel Habitat Project	Chelan County Natural Resource Dept	$664,966	$249,110	Rock Island
Middle Stillwater Design Only	Cascadia Conservation District	$64,253	$253,887	Not Funded
Below the Bridge (Keystone Diversion/Moody Canyon)	Cascadia Conservation District	$248,998	$150,000	Rocky Reach

In 2008, the Rocky Reach Tributary Committee agreed to fund the following projects:

- One of the five conservation easements under the Twisp River Riparian Protection Project for the amount of $89,825 (with cost share the total cost of the three easements was $299,418). This project will purchase a conservation easement on the Buckley Property located along the Twisp River. The easement would prohibit home-building, road-building, industrial or commercial use, timber harvest or vegetation alteration, land surface or watercourse alteration, water pollution or activities that cause pollution, and motorized recreational use. In the absence of the easement, this property would likely be sub-divided and developed in the near future. The conservation of this property along with the other properties already conserved by the Methow Conservancy and WDFW would protect a total of 5.8 river miles along the lower Twisp River Assessment Unit.

- Below the Bridge (Keystone Diversion/Moody Canyon) Project for the amount of $150,000 (with cost share the total cost of the project was $398,998). This project will upgrade the existing Keystone Diversion and improve habitat diversity in the lower Entiat River by adding large woody debris (LWD) and boulder clusters. The existing push-up dam will be replaced with a rock-wing dam that will direct water into a sluiceway. Habitat diversity will be increased by placing in the river two LWD structures made up of five logs each and one engineered log jam consisting of 30 logs. The project also will place five boulder clusters in the river. In addition, native trees and shrubs will be planted in the riparian area. The project is located on both sides of the river between river miles 1.0 and 1.5.

2.5.4 Small Projects Program

The Small Projects Program has an application and review process that increases the likelihood of participation by private stakeholders that typically do not have the resources or expertise to go through an extensive application process. The Committees encourage small-scale projects by community groups, in cooperation with landowners, to support salmon recovery on private property. Project sponsors may apply for funding at any time, and in most cases, will receive a notification of funding within 3 months. The maximum contract allowed under the Small Projects Program is $50,000.

2.5.4.1 2008 Small Projects

In 2008, the Tributary Committees received five requests for funding under the Small Projects Program. Four projects were approved for funding. No funding decision was made on the remaining project, because the Committees requested additional information that has yet to be provided. The following table (Table 8) identifies the projects, sponsors, amounts requested from Tributary Funds, and, if funded, which Plan Species Account supported the project.

Table 8
Projects Reviewed by the Tributary Committees under the Small Projects Program in 2008

Project Name	Sponsor	Cost Share	Request from T.C.	Plan Species Account
Riparian Regeneration and Restoration Initiative	Methow Conservancy	$7,200	$15,537	Wells
Entiat PUD Canal Log-Boom Installation	Cascadia Conservation District	$3,500	$7,160	Rocky Reach
Fort-Thurlow Pump Project	Methow Salmon Recovery Foundation	$41,150	$7,000	Wells
Goodman Livestock Exclusion Project	Okanogan Conservation District	$100	$7,980	Wells
Sleepy Hollow Reserve Protection Feasibility Assessment	Chelan County NRD	$5,000	$20,000	No Decision*

*The Committees requested additional information from the sponsor that has yet to be provided.

In 2008, the Rocky Reach Tributary Committee agreed to fund the following small project:

- Entiat PUD Canal Log-Boom Installation Project for the amount of $7,160 (with cost share the total cost of the project was $10,660). This project will allow continuous flow into the restored side channel by installing a log-boom that will reduce or eliminate large woody debris from clogging the entrance to the channel.

2.5.5 Tributary Assessment Program

In April the Committees invited the Yakama Nation to submit a proposal to monitor the effectiveness of the Nason Creek Oxbow Project and the Okanagan Nation Alliance to submit a proposal to monitor the Okanagan River Restoration Initiative Project. Only the Okanagan Nation Alliance responded to the request for proposals. The Wells Tributary Committee agreed to fund monitoring of the Okanagan River Restoration Initiative.

3 HCP ADMINISTRATION

In 2005 and 2006, Mid-Columbia Forums (Forum) were held as a means of communicating and coordinating with the non-signatories and other interested parties on the implementation of HCP. Current non-signatory parties at the time of the 2006 meeting included the Confederated Tribes of the Umatilla Reservation and American Rivers. Similar to 2007, these parties were invited by letter in 2008 to attend a Forum, in conformity with the 2005 FERC Order on Rehearing 109 FERC 61208 and in accordance with the offer to non-signatory parties of non-voting membership in HCP Tributary and Hatchery Committee processes. The parties indicated no interest in attending a Forum in 2008, and thus no forum was held in 2008.

APPENDIX A

HABITAT CONSERVATION PLAN COORDINATING COMMITTEES MEETING MINUTES AND CONFERENCE CALL MINUTES

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Chuck Peven

Date: February 26, 2008

Re: Final Minutes of January 22, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel in SeaTac, Washington, on Tuesday, January 22, 2008, from 12:30 pm to 4:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final November 27 and December 11 Meeting Minutes by email to the Committees (Item I).
- Chuck Peven will provide the Committees with background information on run-timing, prevalence of descaling injuries, and diel distributions of juvenile salmonids from data collected at the Rocky Reach Juvenile Fish Bypass System (JFBS; Item III-B).
- Chuck Peven will invite members the Fish Bypass Oversight Team (FBOT) to the next Coordinating Committees meeting to discuss the overall strategy for Rocky Reach sockeye testing (Item III-C).
- The Coordinating Committees will send comments to Chuck Peven as soon as possible regarding the *Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam in 2008 (*Item III-C).
- Chuck Peven will email the Chelan PUD 2008 Action Plan to Ali Wick for distribution to the Committees (Item III-F).
- Rick Klinge will update the hatchery release numbers and will send a revised version of the 2008 Bypass Operating Plan Memorandum to Ali Wick for distribution to the Committees (Item IV-A).

- Tom Kahler will send the revised calculations for the adult salmonids dam conversion rates to Ali Wick for inclusion in the HCP Annual Reports (IV-D).
- Ali Wick will compile a list of all reports currently out for review by the Committees as well as dates that comments are due; this list will be regularly updated and will be included along with the list of meeting Action Items that are distributed to Committees members following each monthly meeting (Item V-C).

DECISION SUMMARY

- The Coordinating Committees approved the Statement of Agreement (SOA) and *Study Plan for the Biological Evaluation of the Rocky Reach Fish Bypass System* (Item III-A; Attachment B).
- The Coordinating Committees approved the SOA and *Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10 Percent Spill Operation* (Item III-B; Attachment C).

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

Mike Schiewe welcomed everyone to the meeting, and the meeting minutes from November 27 and December 11 were approved with revisions. Ali Wick will distribute the final minutes by email to the Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees have finalized funding decisions for the 2007 funding cycle. A total of six projects were identified for funding: one from the Rocky Reach Plan Species account, four from the Rock Island account, and one from the Wells account. Of these six, the Wells HCP tributary project (the Okanagan River Restoration Initiative) received the largest funding amount. The Tributary Committees also discussed monitoring objectives relevant to the Tributary Fund projects.

At the last Hatchery Committees meeting, the Hatchery Committees focused on the following items:

- The Hatchery Committees discussed the Chelan PUD proposal for a partial water reuse study using Wells summer Chinook, and will soon be considering a decision on whether to go forward with the study.
- Chelan PUD is working on design of steelhead acclimation ponds at the Chiwawa facility, and will be providing the feasibility study and preliminary drawings to the Hatchery Committees soon.
- The Hatchery Committees will be providing a letter to the Upper Columbia Salmon Recovery Board to update them on the Hatchery Committees progress on identifying reference streams.
- Trout Unlimited is developing Blackbird Island Pond as a potential acclimation site for a portion of the HCP production of Wenatchee steelhead. Trout Unlimited understands the need to coordinate this activity with the Hatchery Committees, and toward this end Rollie Schmitten and others involved in the project will be attending the next Hatchery Committees meeting to brief the group.
- The Hatchery Committees approved Douglas PUD's 2008 Action Plan.
- Grant PUD has sent its annual request to Douglas PUD for access to the Wells and Methow hatchery facilities to raise Upper Columbia River (UCR) steelhead, and UCR spring-run Chinook salmon.
- For permit compliance, Kirk Truscott at Washington Department of Fish and Wildlife (WDFW) is drafting a Request for Concurrence letter for the Hatchery Committees' draft interim bacterial kidney disease (BKD) management strategy.
- The Douglas PUD Wells Hatchery screen and Twisp weir projects are proceeding well.
- WDFW updated the Hatchery Committees on the first year results of rearing Turtle Rock summer Chinook (Broodyear 2005) in net pens at Chelan Falls.
- The Colville Tribes have made their annual request to WDFW to release 25,000 steelhead smolts in Salmon Creek this spring.
- The Hatchery Committees discussed the inconsistent results of dam counts for coho salmon at several Mid-Columbia dams during the past year (e.g., Rock Island counts of coho were approximately 5000 fish higher than those at Priest Rapids). The Committees discussed that these counts may be caused by fish counters misidentifying coho salmon.
- The Yakama Nation (YN) is currently considering the feasibility of reintroducing sockeye into Lake Cle Elum.

- The YN is discussing a proposal for steelhead kelt reconditioning with the Federal Columbia River Power System (FCRPS) Action Agencies.
- YN staff are further developing the Wenatchee basin steelhead smolt acclimation concept proposal that was presented to the Hatchery Committees at the last Committees meeting. The YN is now identifying and evaluating potential acclimation sites.
- Over the next few months the Hatchery Committees will be developing a plan for addressing Objective 10 of the HCP Monitoring and Evaluation (M&E) Plans; this objective involves defining and evaluating risks of HCP supplementation to Non-Target Taxa of Concern (NTTOC).
- The Hatchery Evaluation Technical Team (HETT) is working on the following:
    - Developing a list of potential facilities where the draft BKD study plan could be implemented
    - Developing a list of potential spring Chinook reference streams/populations for use in M&E evaluations

III Chelan PUD (Chuck Peven)

A. *DECISION ITEM: SOA and Study Plan for the Biological Evaluation of the Rocky Reach Fish Bypass System*

Chuck Peven introduced this topic and the Committees approved the study plan and SOA with minor revisions.

B. *DECISION ITEM: SOA and Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10 Percent Spill Operation*

Chuck Peven introduced this topic and answered several questions by Committees members about the study plan. In response to an inquiry about scale loss, Peven noted that the criterion to determine whether an individual fish is "descaled" (at least 20% loss on one side of a fish) used for the Rocky Reach Bypass was the same as that used at all the smolt monitoring program (run by the FPC) sites . He noted that the percent of fish that are considered descaled, rarely exceeds 2 to 4%, and that at those levels the operators look hard to identify any problems. Another question involved information previously collected on diel distribution, and how that information was used in establishing the sample schedule. In addition to addressing these questions, Peven agreed to provide the Committees with background information on run-timing, prevalence of descaling, and diel distribution of plan species from previous year's operations at the Rocky Reach JFBS. The Committees approved the study plan and SOA.

C. Study Proposal for Sockeye Salmon Testing at Rocky Reach in 2008

Chuck Peven introduced the *Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam in 2008*. The study focuses on evaluating a dam operation that is designed to maximize the proportion of sockeye that pass the dam via the JFBS, and also maximizes turbine survival by specifying turbine loading of specific units and how all units are run in tandem. Bryan Nordlund asked Peven to confirm that conditions being tested would be implementable in the long run; Peven confirmed that the FBOT is aware of this issue and takes this into consideration when planning studies. Peven also agreed to ask FBOT to summarize past testing at Rocky Reach for the Committees and address questions about future directions. Peven indicated that he would develop a report. The Committees requested that selected FBOT members attend the next Coordinating Committees meeting to review this information and answer questions. The Coordinating Committees will send comments to Chuck Peven as soon as possible regarding the study.

D. Briefing Paper on Path Forward for Subyearling Chinook Phase Designation

Mike Schiewe introduced this topic, recalling that the Coordinating Committees intended to document the process for designating the phase for subyearling Chinook under the HCP. The briefing papers are still under development.

E. NPCC Fish and Wildlife Amendment Process

Chuck Peven updated the group that Chelan and Douglas PUDs were working together to include language in the Northwest Power and Conservation Council (NPCC) Fish and Wildlife Plan to acknowledge the HCPs to a greater degree.

F. Chelan PUD 2008 Action Plan

Chuck Peven provided a handout of the Chelan PUD 2008 Action Plan for discussion at the next meeting. Peven will email this to Ali Wick for distribution to the Committees.

IV Douglas PUD (Rick Klinge and Tom Kahler)

A. 2008 Juvenile Bypass Operating Plan

Rick Klinge provided the Committees with a draft memorandum summarizing the proposed 2008 Juvenile Bypass Operating Plan. This is a draft for discussion and Klinge will update the release numbers and will send a revised version to Ali Wick for distribution to the Committees.

B. 2008 Douglas PUD Action Plan Agreement

Rick Klinge introduced this topic and provided handouts of the previously distributed Douglas PUD 2008 Action Plan, which establishes significant dates for the HCP year. Important actions for this year are the construction and installation of a flow-directing baffle in the west fishway, as well as the placement of a lamprey structure to aid in evaluation. The Coordinating Committees approved the plan; the Hatchery and Tributary Committees have also previously approved elements of the plan that were germane to their responsibilities.

C. Land Use Policy Change

Tom Kahler updated the group that Douglas PUD had recently made a change to their land use policy. The new policy limits dock construction on Douglas PUD-owned land adjacent to the Wells reservoir. This change was made following PUD concerns that the proliferation of residential docks would impact survival of migrating summer and fall Chinook. Section 5 of the Wells HCP requires Douglas PUD, when making land-use decisions, to consider cumulative impacts in order to meet the conservation objectives of the HCP. The new policy went into effect in December 2007 after being approved by the Douglas PUD Board of Commissioners, following two months of deliberations, including substantial public comment. Chuck Peven noted that Chelan PUD is aware of this issue, but is in a different position because Chelan PUD does not own the land adjacent to the reservoir.

D. Adult Conversion Rates on the DART Website

Tom Kahler updated the group that the adult fish count data for Wells Dam that are listed on the Columbia River Data Access in Real Time (DART) website are incomplete. He noted that this fact affects the estimation of adult passage conversion rates included in HCP Annual Reports. Kahler described that there are PIT (Passive Integrated Transponder) tag detectors on both ladders and ladder traps at Wells Dam. He further noted that although the ladder detectors are highly efficient (circa 100 percent), the west-ladder trapdetectors has recently not been. The west ladder trap PIT tag detector has been reading tags at around 2 percent efficiency, but the fish are manually checked by hatchery staff. It was recently determined that these manually-collected data are not being incorporated into the DART database. Douglas PUD is working with DART to rectify this situation. Tom Kahler will send these revised numbers to Ali Wick for use in the Annual Reports.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Agreements

- The Committees agreed with the Douglas PUD 2008 Action Plan.

B. Meeting Schedule

The upcoming meetings are set as follows:

- February 26 in SeaTac, 9:30 am to 4:00 pm
- March 25 in SeaTac
- April 22 in SeaTac

C. Reports out for Review

Ali Wick will compile a list of reports currently out for review as well as dates that comments are due, and will send a list out to the Committees. This item will become a standing item on the Action Item list.

VI List of Attachments

Attachment A – List of Attendees

Attachment B – Statement of Agreement – Approval of the Study Plan for the Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2008.

Attachment C – Statement of Agreement for Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10 Percent Spill Operation

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Chuck Peven *	Chelan PUD
Jerry Marco * (by conference call)	Colville Confederated Tribes
Rick Klinge *	Douglas PUD
Tom Kahler *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Carmen Andonaegui *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

ATTACHMENT B

STATEMENT OF AGREEMENT – APPROVAL OF THE STUDY PLAN FOR THE BIOLOGICAL EVALUATION OF THE ROCKY REACH JUVENILE FISH BYPASS SYSTEM 2008

FINAL

January 22, 2008

Statement of Agreement – Approval of the Study Plan for the Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2008
Rocky Reach HCP Coordinating Committees

Agreement Statement: The Rocky Reach HCP Coordinating Committee approves the study plan and agrees that Chelan PUD should implement the work in the document entitled, **"Study Plan for the Rocky Reach Juvenile Fish Bypass System."**

ATTACHMENT C

STATEMENT OF AGREEMENT FOR STUDY PLAN TO ESTIMATE ROCK ISLAND PROJECT SURVIVAL FOR YEARLING CHINOOK, STEELHEAD, AND SOCKEYE DURING A 10 PERCENT SPILL OPERATION

FINAL

Rock Island HCP Coordinating Committees
Statement of Agreement
Chelan County PUD
Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation

January 22, 2008

Statement

The Rock Island HCP Coordinating Committee has reviewed the Chelan County PUD document, "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation,*" and accepts the plan for 2008 testing.

Background

On December 8, 2006, the Committees approved a Statement of Agreement for testing a 10% spill operation (10% SOA) in 2007 at Rock Island Dam to assess yearling Chinook survival. The SOA outlined an agreed to project survival testing plan for 2008 and 2009 (spill level and species studied) based on results of the 2007 test. Given the 2007 project survival results for yearling Chinook (97.25%), the SOA calls for 10% spill operation for 2 additional years study of yearling Chinook and a first year's study of steelhead. In addition, the Committees agreed that that additional testing using paired-release study for sockeye is necessary to accurately evaluate project survival. Therefore, sockeye salmon will also be included in the 2008 project survival testing. For reference, the "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation*") has been attached (Attachment A.1).

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Chuck Peven

Date: March 27, 2008

Re: Final Minutes of February 26, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel in SeaTac, Washington, on Tuesday, February 26, 2008, from 9:30 am to 3:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Chuck Peven will report back to the Coordinating Committees with background information on descaling criteria, diel distribution by species, and run timing with regard to operation of the Rocky Reach Juvenile Fish Bypass System (JFBS; January Meeting).
- Keith Truscott will send the final version of the Chelan PUD 2008 Action Plan to Ali Wick for distribution to the Committees (Item I-A).
- Chuck Peven will send the study report from the 1996 balloon tag study of juvenile survival through the turbines at Rocky Reach to Ali Wick for posting on the ftp site, at Carmen Andonaegui's request (Item I-E).
- Carmen Andonaegui will send the tagging protocols for Grant's recent survival studies to Ali Wick for distribution to the Committees (Item I-E).
- Ali Wick will distribute the final January 23 Meeting Minutes by email to the Committees (Item II).
- Rick Klinge will send the final 2008 Douglas PUD Bypass Operating Plan to Ali Wick for distribution to the Committees (Item IV-A).
- Rick Klinge will send a revised draft summary of Plan Species phase designations for the Wells Project HCP to Ali Wick for distribution to the Committees (Item IV-B).

- Rick Klinge will send Ali Wick the link to the Final Environmental Impact Statement (FEIS) for the HCPs and if not posted on the ftp site, Wick will post it there (Item IV-B).

DECISION SUMMARY

There were no decision items at this meeting.

I Chelan PUD

A. Acceptance of Chelan PUD 2008 Action Plan

Keith Truscott introduced the Chelan PUD 2008 Action Plan, which was previously distributed to the Coordinating Committees. The Committees accepted the plan with revisions discussed at the meeting. Keith Truscott will send the final version out to Ali Wick for distribution to the Committees.

B. Pikeminnow Trapping Plan

Keith Truscott introduced this topic that Chelan PUD is proposing again in 2008 to implement the pikeminnow ladder trapping plan similar to 2007, with some modifications. The plan has been sent out to the Coordinating Committees for their review and comment. Chelan PUD is proposing four traps at Rock Island and two at Rocky Reach. Truscott mentioned that Chelan PUD will carefully monitor all incidental catch of non-target species, in particular to document any small salmonids that would be entrained in the traps. He verified that in the past years when using the traps to collect lamprey, a few (<10) small salmonids (~130 millimeters, likely rainbow trout) were trapped as well as one Chinook mini-jack. Truscott said that he would send out periodic trapping updates (weekly at first, and then dependent upon catch) to the Committees during the study. Bryan Nordlund requested that Truscott coordinate with him on the final location of the traps on the ladder weirs at Rock Island Dam.

C. Fishway Maintenance Update

Keith Truscott updated the group that he had received an update from Thad Mosey on recent fishway maintenance work. The attraction water pump at Rocky Reach Dam has been installed and is on schedule for a startup date of March 3. Two attraction water pump gear boxes at the RI right bank fishway were rehabilitated last year, all three attraction water pumps will be operational by March 1.

D. Phase Designation Summary Paper

Keith Truscott gave background on this topic, which the Coordinating Committees had discussed several meetings back, about the need for preparing documentation for phase designation at HCP projects. He is currently working to prepare such a document for Rocky Reach and Rock Island HCPs and will keep the group updated on this work. Mike Schiewe noted that a document for Wells HCP will be discussed during Douglas PUD's time today.

E. Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam in 2008

Chuck Peven provided an introduction to the Fish Bypass Optimization Team (FBOT) and their efforts to design study operations for Rocky Reach Dam, described in the *Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam in 2008.* Peven noted that the purpose of the document distributed by email last week was to provide a comprehensive summary of past results of Rocky Reach sockeye studies. He then turned his attention to the 2008 study plan, and reviewed the various hypotheses for improving survival that had been considered in developing the proposed operation for 2008. Tracy Steig and Al Giorgi (both FBOT members) then joined the presentation, discussing the results supporting each of the hypotheses evaluated thus far. Looking at all testing conducted since 2003, the FBOT has concluded the following for sockeye passage through Rocky Reach:

- Mortality in the Rocky Reach reservoir is high because of large numbers of exotic predators, with the highest sockeye mortality probably occurring in the upper reaches of the reservoir. Predation is also occurring in the Wells Dam tailrace.
- The project survival estimate for sockeye is biased low due to tagger handling effects, and this will be addressed in 2008 studies.
- Sockeye distribution in the forebay is not significantly affected by spill/no-spill conditions. Spill is generally an inefficient tool for passage.
- It is not clear whether spill (including block loading configurations) alters conditions within the tailrace that increases sockeye mortality. Block loading does affect sockeye survival through the powerhouse.
- Structural devices in the forebay and dam will be tested in the future to attempt to increase Fish Bypass Efficiency (FBE); expansion of the 3-D array in the forebay will

help inform this. Pilot testing for the reef net concept is ongoing this year in the Okanogan River.

- Adding a second entrance to the existing system in the vicinity of powerhouse units 3 and 4 is unlikely to significantly increase FPE.
- The concept of modifying the surface collector has not been tested yet.
- Shutting off Units 1 and 2 does not enhance surface collector sockeye passage. Changes in turbine operations in 2007 increased surface collector passage.
- Simple modeling of the High Flow operating condition shows that higher sockeye passage densities are focused directly toward the surface collector, while the Water View condition shows higher densities along the powerhouse wall.
- Increasing the number of pumps and the amount of flow into the surface collector would likely cause only a small change in the zone of entrainment upstream of the surface collector entrance.
- Collection efficiency is high for fish that move to within 300 feet of the surface collector entrance; and a long-term goal is to get more sockeye into this zone.
- Project survival is ultimately determined by a combination of powerhouse survival and surface collector survival, and the proportion of fish that pass via each of these routes. The FBOT is working to determine what actions can be tested for increasing both powerhouse survivals, as well as increasing sockeye passage efficiency through the surface collector.

At Carmen Andonaegui's request, Chuck Peven will send the study report from the 1996 balloon tag study of juvenile survival through the turbines at Rocky Reach to Ali Wick for posting on the ftp site. Also, Carmen Andonaegui will send the tagging protocols for Grant County PUD's recent survival studies to Ali Wick for distribution to the Coordinating Committees.

For 2008, Chelan PUD is proposing a study operation similar to that of 2007 with no spill, but with modified turbine operations, the addition of an acoustic array in the Rocky Reach forebay, a refined method of estimating juvenile dam passage survival (JDPS), and offsite efforts to investigate structural options to influence fish guidance. All of the Committees members present indicated their acceptance of the proposal, with the exception of Bryan Nordlund who requested additional time to review the information presented today. The Committees agreed to a conference call on Friday, February 29, at 10:00 am to discuss any further concerns.

II Approval of Meeting Minutes and Agenda (Mike Schiewe)

The January 23 Meeting Minutes were approved with several revisions. Ali Wick will distribute the final meeting minutes by email to the Coordinating Committees.

III Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees are working through several administrative matters associated with previously approved and awarded projects. There has been some discussion about developing a closer interaction between the Tributary Committees and the Bureau of Reclamation's (BOR's) Entiat and Wenatchee Interdisciplinary Teams (IDTs). The Committees decided not to participate directly, but will invite BOR staff periodically to Tributary Committees meetings. The Tributary Committees are continuing to work on a Monitoring and Evaluation (M&E) program for funded projects.

At the last Hatchery Committees meeting, the Hatchery Committees focused on the following items:

- The Hatchery Committees reviewed and approved the pilot water reuse study plan for 2008. The discussion included settling on a tagging approach appropriate to the study.
- The Hatchery Committees received a presentation from the Icicle Chapter of Trout Unlimited on the group's ongoing efforts to develop Blackbird Island Pond for steelhead acclimation. The group anticipates that the ponds should be available by next year. Discussion is still ongoing regarding managing any residualized fish that may remain in the ponds.
- Chelan PUD will soon be distributing the Chiwawa Steelhead Acclimation Ponds Feasibility Study for Hatchery Committees' review and comment. Permitting for the Chelan Falls and the Chiwawa facilities will likely proceed on similar timelines.
- Washington Department of Fish and Wildlife (WDFW) and the Yakama Nation (YN) are collaborating on a draft white paper describing a Joint Fisheries Parties (JFP)

management plan for spring Chinook production in the Wenatchee basin; a major focus of the plan will be broodstock management.

- The Tumwater Passive Integrated Transponder tag (PIT-tag) coil has now been installed and is either working now or will be shortly.
- Chelan PUD may not be able to operate Tumwater Dam on a year-round basis, and will be working with WDFW on this issue.
- Construction is underway building the cofferdam for the Twisp weir project, and the Wells Hatchery Screen project is now complete.
- Douglas PUD is reconfiguring the PIT-tag detector associated with the west ladder trap; as currently positioned, it is subject to vibration and electromagnetic interference, and near 100 percent detection is anticipated following this upgrade.
- Douglas PUD is considering converting from individual water certificates for each of the wells to one that applies to an entire wellfield at the Wells and Methow hatcheries. Douglas PUD plans to request letters of support from individual Hatchery Committee members to Washington State Department of Ecology (Ecology) to support this conversion.
- National Marine Fisheries Service (NMFS) researchers are requesting permission to sample about 300 yearling and subyearling Chinook smolts from each of the Upper Columbia hatchery programs. The fish will be sacrificed to measure serum factors that can be used to predict precocious maturation of males. The Hatchery Committees provisionally agreed with this study subject to ESA review.
- The YN is working on a proposal for kelt reconditioning; this activity will eventually involve trapping kelts at the PUD dams.
- The YN is planning to request summer Chinook eggs from Wells Hatchery for rearing and release at Prosser Dam in the Yakima basin. The Hatchery Committees agreed that this proposal is acceptable in concept; the Committees anticipated that the Colville Tribes would want to review this proposal from a tribal policy perspective.
- The YN (along with the other Columbia River Treaty Tribes) is considering a 10-year Memorandum of Agreement (MOA) with the Federal Columbia River Power System (FCRPS) Action Agencies (BOR, U.S. Army Corps of Engineers [USACE], and Bonneville Power Administration [BPA]) to fund a wide range of fishery projects and activities.

- WDFW and Chelan PUD are planning to meet to discuss the timeline for continued testing and possible purchase of additional ultrasound units for determining the gender of early returning fish.
- The Hatchery Committees agreed that WDFW can continue net pen rearing of Turtle Rock Summer Chinook in 2008, employing the same protocols and schedule as were used in 2007.
- The Hatchery Committees are discussing locations for a potential bacterial kidney disease (BKD) study (Cle Elum or Methow hatcheries).
- The Hatchery Committees will soon be reviewing WDFW's proposal to conduct trapping-efficiency trials for spring Chinook in the Methow basin.
- The Hatchery Evaluation Technical Team (HETT) is close to completing the work on reference stream (reference populations) analysis for Chiwawa River spring Chinook.
- The Hatchery Committees are considering the best approach to engage the Entiat Watershed Planning Unit regarding reference populations for the M&E program.

IV Douglas PUD (Rick Klinge and Tom Kahler)

A. Acceptance of 2008 Juvenile Bypass Operating Plan

Rick Klinge introduced the 2008 Juvenile Bypass Operating Plan that was distributed to the Coordinating Committees in January. The bypass will begin at 0000 hours on April 12 and run until August 26 at 2400 hours. The Committees concurred with this plan. Klinge will send the final plan to Ali Wick for distribution to the Committees.

B. Summary of Phase Designation

Rick Klinge updated the group that Douglas PUD is working on a summary document that reviews the history of phase-designation decisions for the Wells Project, documents a periodic review of technology and other experimental considerations affecting survival studies for subyearling Chinook and sockeye salmon. Chelan PUD is developing a similar document for the Rock Island and Rocky Reach projects. Coordinating Committees members provided comments on a preliminary draft distributed by Douglas PUD. Rick Klinge will send a revision of the document to Ali Wick for distribution prior to the next meeting. Klinge will also send Wick the link to the FEIS for the HCPs and if not posted on the ftp site, Wick will post it there.

C. Update on Wells Hatchery Water Intake Screen

Tom Kahler updated the group that the Wells Hatchery Water Intake Screen project is complete and operational.

D. Update on Fish Ladder Service

Rick Klinge updated the group that the Wells fish ladder was brought back into service on February 19 after winter maintenance. Service is still needed on the PIT-tag detection system at the west ladder broodstock trap. Douglas PUD will be moving the PIT-tag coil into the ladder sometime this spring, after the parts for the coil arrive. The upper portion of the ladder will be dewatered to install the new coils.

E. JFP Letter of Support on Wellfield Water Certificiates

Rick Klinge introduced this topic that Douglas PUD is considering converting from individual water certificates for each well to one certificate that applies to an entire wellfield at the Methow and Wells hatcheries. Douglas PUD plans to request letters of support from individual Coordinating and Hatchery Committees members to Ecology for this conversion, and will be providing template letters for members to modify and send.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Agreements

The Committees accepted the Chelan PUD 2008 Action Plan with revisions discussed at the meeting.

B. Meeting Schedule

The upcoming meetings are set as follows:

- March 25 from 12:30 pm to 4:30 pm in SeaTac
- April 22 from 9:30 am to 4:30 pm at Wells Dam (location details TBA)
- May 27 in SeaTac (time TBA)

C. Reports Out for Review

Ali Wick reminded the group that the FBOT document *Survival Testing and Fish Bypass Evaluation at Rocky Reach Dam Beginning in 2003* is out for review until April 18. An update on other review documents includes the following:

- *Monitoring and Evaluation of the Chelan County PUD Hatchery Programs* is out for review until May 2.
- Rocky Reach/Rock Island Annual HCP Report documents are also both out for review until March 14.

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Al Giorgi	BioAnalysts
Chuck Peven *	Chelan PUD
Keith Truscott *	Chelan PUD
Duncan Hay	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Rick Klinge *	Douglas PUD
Tom Kahler *	Douglas PUD
Tracy Steig	HTI
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Carmen Andonaegui *	WDFW

* Denotes Coordinating Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Rocky Reach and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Chuck Peven

Date: March 27, 2008

Re: Final Minutes of February 29, 2008 Rocky Reach and Rock Island Coordinating Committees Conference Call

The Rocky Reach and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCP) Coordinating Committees met by conference call on Friday, February 29, 2008 from 10:00 am to 11:00 am to review the *Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam For 2008*. Attendees are listed in Attachment A.

I Welcome (Mike Schiewe)

Mike Schiewe welcomed the group and stated that the purpose of the call was to review the *Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam for 2008*, and work toward approval of this study plan for 2008. At the February 26 Coordinating Committees, all of the members committee that were present (save Bryan Nordlund) had provisionally approved the study plan; Nordlund had requested additional time to consider the proposed study after the presentation from the Chelan PUD Fish Bypass Optimization Team (FBOT) on the previous years investigations.

Bryan Nordlund raised several concerns about the study plan. One was whether the 7.5 percentage point reduction in powerhouse survival under the block loading condition (a 2007 result) could be compensated for by expected improvements in tailrace egress conditions. He suggested that perhaps a computational model could be used more effectively to help sort out anticipated changes in tailrace flows and fish egress conditions associated with different turbine operations. He also emphasized the importance of developing a better understanding of tailrace egress conditions under a variety of flow conditions that would be optimize powerhouse survival and remain sustainable to define long-term operations of the Rocky Reach powerhouse. In addition, Nordlund and Chuck Peven discussed the various turbine operations that would potentially provide the best turbine survival test conditions. Nordlund expressed reservations that the proposed study operation may not optimize project survival. He noted that although the operation of Turbine Units 1 and 2 at 16 kcfs would probably increase the percent of fish entering the fish bypass system, he was concerned that this benefit will be partially and may be totally offset by higher turbine mortality associated with operating these units at 16 kcfs as compared to, for example 11 or 12 kcfs, as indicated by past direct turbine survival studies and confirmed through last season's test results. Nordlund also indicated that he considers the addition of turbine screens in Units 3 and 4 and addition of a second entrance gate to have high potential for an increment of survival improvement (he had calculated up to a 0.85% survival improvement, if fish that currently pass through Units 3 and 4 were guided into the bypass system by new screens, and this improvement could only increase if a new entrance in this vicinity were successful). Lastly, Nordlund indicated he had several minor comments that he would email to Peven for incorporation into the document. To conclude this discussion, Nordlund noted that he still had concerns with the study as proposed, but did not want to stand in the way of the study going forward. Thus, he chose to abstain from voting.

Bob Rose, who was unable to attend the February 26 Coordinating Committee, after hearing the discussion on this call and talking with other members of the Committee, indicated that he shared many of Nordlund's concerns, but would support the study as proposed by Chelan.

Thus with one abstention, and the remainder of the Coordinating Committees approving the study plan, Chelan PUD will proceed with implementing the study as proposed.

At the close of the call, Mike Schiewe noted that there was a short list of Chelan PUD study reports that have been out for review for several months and about which much discussion has already taken place, but the Committees had yet to formally accept the documents. He wanted to let Coordinating Committees know that in order to keep track of decisions, these documents would be up for approval at the next meeting as a matter of process.

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Chuck Peven	Chelan PUD
Keith Truscott *	Chelan PUD
Bryan Nordlund *	NMFS
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Chuck Peven

Date: April 30, 2008

Re: Final Minutes of March 25, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel in SeaTac, Washington, on Tuesday, March 25, 2008, from 12:30 pm to 4:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final February 26 Meeting Minutes and February 29 Conference Call Minutes to the Coordinating Committees (Item I).
- Chelan PUD will provide final reports approved in Statements of Agreement (SOAs) to Ali Wick to distribute to the Coordinating Committees (Item III-A).
- Keith Truscott will review the draft *Summary of Phase Designations of Plan Species under the Rock Island and Rocky Reach Hydroelectric Projects Habitat Conservation Plans* and send to Ali Wick for distribution to the Coordinating Committees (Item III-B).
- Tom Kahler will discuss the Douglas PUD letter regarding sockeye survival investigations with staff, and will likely redraft it in the form of a status white paper (Item IV-A).

DECISION SUMMARY

- The Coordinating Committees approved the following SOAs and associated documents:
  - Statement of Agreement for the Biological Evaluation of the Rocky Reach Juvenile Bypass System 2006 (Attachment B)

- Statement of Agreement for the Biological Evaluation of the Rocky Reach Juvenile Bypass System 2007 (Attachment C)
- Statement of Agreement for Survival of Yearling Chinook Salmon Smolts through the Rock Island Project in 2007; and Comparison of Sockeye Salmon Smolt Survival Estimates through Rock Island using Paired-Release and Single Release Methods (Attachment D)
- Statement of Agreement for Acoustic-Tag Investigations of Sockeye Salmon Smolt Survival and Migration Dynamics at Rocky Reach in 2007 (Attachment E)
- Statement of Agreement for Approval of the 2008 Fish Spill Plan, Rocky Reach and Rock Island Dams (Attachment F)
- Statement of Agreement for Approval of the 2008 Rocky Reach Study Plan (National Marine Fisheries Service [NMFS] abstained from voting on this item as discussed in the February 29 meeting minutes; Attachment G)

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

The February 26 Meeting Minutes and February 29 Conference Call Minutes were approved with several revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees were dealing with mostly administrative matters in the last month. The Committees also received two Small Projects Program applications: one from the Methow Conservancy (a riparian restoration initiative) and another from Cascadia Conservation District (a log-boom installation in the Entiat PUD Canal). The Wells Tributary Committee approved funding for the riparian project. For the log boom project, the Committees identified issues that require additional information from the sponsor, and no funding decision has been made at this time.

At the last Hatchery Committees meeting, the Hatchery Committees focused on the following items:

- Members of the Hatchery Committees drafted a support letter for Douglas PUD to send to Washington State Department of Ecology (Ecology) supporting Douglas PUD consolidating water right certifications for individual wells into a single certification for each wellfield.
- The Twisp Weir construction project is progressing well.
- The Hatchery Committees approved the feasibility report for the rearing ponds at Chiwawa, except Washington Department of Fish and Wildlife (WDFW), which requested some additional time to review the report. The project will now move forward into design.
- The Chelan PUD Annual Monitoring and Evaluation (M&E) Report is now posted to the ftp site and comments are due May 2.
- Chelan PUD and Yakama Nation (YN) have met and agreed to a plan for this year regarding the trap and leaf litter at Dryden; they will be evaluating the leaf litter situation again following this year.
- The Hatchery Scientific Review Group (HSRG) will be in the Upper Columbia in late April. The Hatchery Committees may be reviewing some of the information that the HSRG will be analyzing.
- The Ad Hoc Supplementation Technical Working Group is meeting to evaluate the effectiveness of supplementation programs in the Upper Columbia basin. NMFS and Columbia River Inter-Tribal Fish Commission (CRITFC) are the organizers of this group.
- The Hatchery Committees are looking at various sites for the potential bacterial kidney disease (BKD) study. The Cle Elum Hatchery is a potential option; however, BKD levels may not be high enough there to make the study worthwhile. The Methow Hatchery is another option, but production would have to be reduced substantially in order to accommodate the study there. WDFW will be evaluating potential rearing configurations that would optimize production at the hatchery while allowing a useful study setup.
- The Hatchery Committees now have a draft schedule and proposal for implementing Objective 10 of the M&E Plan and the Hatchery Evaluation Technical Team (HETT) will now proceed with the first steps.

- The YN has initiated discussions with the Okanagan Nation Alliance (ONA) to discuss partnering with ONA on egg take operations for Okanagan sockeye from Shuswap Hatchery in order to re-establish sockeye populations in the Yakima River.
- The YN is doing some background work with Chelan PUD on potential kelt reconditioning at Rocky Reach and Rock Island Dams.
- The YN has requested 250,000 summer Chinook eggs from WDFW with the intention to re-establish fall Chinook in the Yakima River. The Hatchery Committees discussed that this is not likely to impact HCP production or policy.
- WDFW will be conducting some trap-efficiency studies at Lake Wenatchee. These studies include marking sockeye captured at Lake Wenatchee and releasing them at the Monitor trap to look at trap efficiency at Monitor.
- The Hatchery Committees are discussing the steelhead reproductive success endpoints and the potential for a future study.
- WDFW and NMFS will be discussing the disposition of potential residualized steelhead at Blackbird Pond in light of the Endangered Species Act (ESA) permits.
- Non-HCP related NMFS staff have proposed a study on early maturation in mini-jacks that would require lethal sampling for hormone concentrations in blood. The HCP NMFS representative, Kris Petersen, was not in support of this study as it relates to listed fish because of the amount of take.
- The Joint Fisheries Parties (JFP) will be discussing why Chiwawa spring Chinook (a listed stock) are being ad-clipped.
- The HETT is currently working on reference streams for spring Chinook, and will soon begin the analysis for steelhead and sockeye.
- The ONA will attend the July Hatchery Committees meeting to discuss the year's progress on the Skaha sockeye program.
- Mike Schiewe will be meeting with the Upper Columbia Salmon Recovery Board (UCSRB) on April 24 to discuss HCP progress and work.

III Chelan PUD (Keith Truscott)

A. Housekeeping Item: SOAs for Approval

Keith Truscott introduced a number of SOAs that need to be approved for housekeeping purposes. The Coordinating Committees approved these SOAs.

- Statement of Agreement for the Biological Evaluation of the Rocky Reach Juvenile Bypass System 2006 (Attachment B)
- Statement of Agreement for the Biological Evaluation of the Rocky Reach Juvenile Bypass System 2007 (Attachment C)
- Statement of Agreement for Survival of Yearling Chinook Salmon Smolts through the Rock Island Project in 2007; and Comparison of Sockeye Salmon Smolt Survival Estimates through Rock Island using Paired-Release and Single Release Methods (Attachment D)
- Statement of Agreement for Acoustic-Tag Investigations of Sockeye Salmon Smolt Survival and Migration Dynamics at Rocky Reach in 2007 (Attachment E)
- Statement of Agreement for Approval of the 2008 Fish Spill Plan, Rocky Reach and Rock Island Dams (Attachment F)
- Statement of Agreement for Approval of the 2008 Rocky Reach Study Plan (NMFS abstained from voting on this item as discussed in the February 29 meeting minutes; Attachment G)

Chelan PUD will provide final reports approved in these SOAs to Ali Wick to distribute to the Committees.

B. Summary of Phase Designations for Plan Species under the Rocky Reach and Rock Island HCP

Keith Truscott introduced the document titled *Summary of Phase Designations of Plan Species under the Rock Island and Rocky Reach Hydroelectric Projects Habitat Conservation Plans*. This document has been provided to the Coordinating Committees as an informational summary on the phase designations of Plan Species for Rock Island and Rocky Reach HCPs. Truscott asked for comments from the Committees on this document. The Committees discussed several edits, including a statement documenting the most recent date that the technology available to conduct survival studies with subyearling Chinook salmon had been considered. Keith Truscott will send a new draft to Ali Wick for distribution to the Committees.

IV Douglas PUD (Tom Kahler)

A. Douglas PUD Response to Juvenile Sockeye Study

Tom Kahler reported that at the last meeting the Coordinating Committees had requested additional information on any Douglas PUD plans for future testing of juvenile sockeye survival at Wells Dam. Kahler noted that Douglas PUD has discussed the request internally and provided a letter to the Committees with this additional information. Tom Kahler requested feedback on the letter. Bryan Nordlund commented that the letter summarized past work effectively, but should provide more information on possible future actions and a path forward. Nordlund stated that Wells does have excellent dam passage documented, but there is no information on sockeye (or sub-yearling Chinook) survival through the Wells Pool, including the Okanangon Arm. The letter did not clarify how current sockeye tagging technology (such as employed by Grant and Chelan PUD's) is insufficient to complete such a study and this should be discussed by the Wells CC. Nordlund also commented that he had just received the letter this morning and has not reviewed it completely, and may have further comment. Carmen Andonaegui and Jerry Marco agreed that a better understanding of possible future investigations would be helpful. Kahler will discuss this letter internally with Douglas PUD and will likely provide it in the form of a status white paper.

B. Status of PIT-tag Detector Repair

Tom Kahler updated the group that Douglas PUD plans to repair the existing west ladder trap Passive Integrated Transponder tag (PIT-tag) detector, which will require dewatering the top portion of the west fish ladder. This will require a 2-day outage for the fish ladder during construction. Douglas PUD will update the Coordinating Committees when a firm date for the outage has been identified. Bryan Nordlund suggested that pumping around the affected ladder pools may allow this work to continue without completely dewatering the ladder. Tom Kahler said that he would discuss this with Rick Klinge and look into this option.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- April 29 from 10:00 am to 1:00 pm at Wells Dam
- May 27 from 12:30 to 4:30 pm in SeaTac

- June 24 from 12:30 to 4:30 pm in SeaTac

B. Reports Out for Review

Ali Wick reminded the group that the Fish Bypass Optimization Team (FBOT) document titled *Survival Testing and Fish Bypass Evaluation at Rocky Reach Dam Beginning in 2003* is out for review until April 18. In addition, the document titled *Monitoring and Evaluation of the Chelan County PUD Hatchery Programs* is out for review until May 2.

VI List of Attachments

Attachment A – List of Attendees

Attachment B – Statement of Agreement for the Biological Evaluation of the Rocky Reach Juvenile Bypass System 2006

Attachment C – Statement of Agreement for the Biological Evaluation of the Rocky Reach Juvenile Bypass System 2007

Attachment D – Statement of Agreement for Survival of Yearling Chinook Salmon Smolts through the Rock Island Project in 2007; and Comparison of Sockeye Salmon Smolt Survival Estimates through Rock Island using Paired-Release and Single Release Methods

Attachment E – Statement of Agreement for Acoustic-Tag Investigations of Sockeye Salmon Smolt Survival and Migration Dynamics at Rocky Reach in 2007

Attachment F – Statement of Agreement for Approval of the 2008 Fish Spill Plan, Rocky Reach and Rock Island Dams

Attachment G – Statement of Agreement for Approval of the 2008 Rocky Reach Study Plan

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Chuck Peven *	Chelan PUD
Keith Truscott *	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Carmen Andonaegui *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

ATTACHMENT B

STATEMENT OF AGREEMENT FOR THE BIOLOGICAL EVALUATION OF THE ROCKY REACH JUVENILE BYPASS SYSTEM 2006

Statement of Agreement
Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2006
Rocky Reach HCP Coordinating Committee
March 25, 2008

The Rocky Reach HCP Coordinating Committee has reviewed the 2006 Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System report and agrees with the findings stated in the report and accepts the report as final.

ATTACHMENT C

STATEMENT OF AGREEMENT FOR THE BIOLOGICAL EVALUATION OF THE ROCKY REACH JUVENILE BYPASS SYSTEM 2007

Statement of Agreement
Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2007
Rocky Reach HCP Coordinating Committee

March 25, 2008

The Rocky Reach HCP Coordinating Committee has reviewed the 2007 Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System report and agrees with the findings stated in the report and accepts the report as final.

ATTACHMENT D

STATEMENT OF AGREEMENT FOR SURVIVAL OF YEARLING CHINOOK SALMON SMOLTS THROUGH THE ROCK ISLAND PROJECT IN 2007; AND COMPARISON OF SOCKEYE SALMON SMOLT SURVIVAL ESTIMATES THROUGH ROCK ISLAND USING PAIRED-RELEASE AND SINGLE RELEASE METHODS

Rock Island HCP Coordinating Committee
Statement of Agreement
Survival of Yearling Chinook Salmon Smolts through the Rock Island Project in 2007; Comparison of Sockeye Salmon Smolt Survival Estimates through Rock Island using Paired-Release and Single-Release Methods
March 25, 2008

Statement

The Rock Island HCP Coordinating Committee has reviewed the Chelan County PUD reports, ***Survival of Yearling Chinook Salmon Smolts through the Rock Island Project in 2007;*** and ***Comparison of Sockeye Salmon Smolt Survival Estimates through Rock Island using Paired-Release and Single-Release Methods*** and agrees with the findings stated in the reports and accepts the reports as final.

Background

On December 8, 2006, the Committees approved a Statement of Agreement for testing a 10% spill operation (10% SAO) in 2007 at Rock Island Dam to assess yearling Chinook survival. A paired-release study design using acoustic tags was used to estimate project passage survival at Rock Island Dam. In addition, sockeye investigations (using similar acoustic tags) at the upstream Rocky Reach Dam enabled researchers to conduct a single-release analysis of sockeye passage survival at Rock Island Dam.

ATTACHMENT E

STATEMENT OF AGREEMENT FOR ACOUSTIC-TAG INVESTIGATIONS OF SOCKEYE SALMON SMOLT SURVIVAL AND MIGRATION DYNAMICS AT ROCKY REACH IN 2007

March 25, 2008

Rocky Reach HCP Coordinating Committee
Statement of Agreement
Acoustic-Tag Investigations of Sockeye Salmon Smolt Survival and Migration Dynamics at Rocky Reach in 2007

Statement

The Rocky Reach HCP Coordinating Committee has reviewed the Chelan County PUD report, ***Acoustic-Tag Investigations of Sockeye Salmon Smolt Survival and Migration Dynamics at Rocky Reach in 2007*** and agrees with the findings stated in the report and accepts the report as final.

ATTACHMENT F

STATEMENT OF AGREEMENT FOR APPROVAL OF THE 2008 FISH SPILL PLAN, ROCKY REACH AND ROCK ISLAND DAMS

Statement of Agreement – Approval of the 2008 Fish Spill Plan, Rocky Reach and Rock Island Dams
Rocky Reach and Rock Island HCP Coordinating Committees
March 25, 2008

Agreement Statement:
The Rocky Reach and Rock Island HCP Coordinating Committees approve the plan and agree that Chelan PUD should implement the work in the document entitled, **"2008 Fish Spill Plan, Rocky Reach and Rock Island Dams."**

ATTACHMENT G

STATEMENT OF AGREEMENT FOR APPROVAL OF THE 2008 ROCKY REACH STUDY PLAN

March 25, 2008

Statement of Agreement – Approval of the 2008 Rocky Reach Study Plan
Rocky Reach HCP Coordinating Committee

Agreement Statement: The Rocky Reach HCP Coordinating Committee, with one abstention (see meeting notes from February 29, 2008 Rocky Reach & Rock Island CC conference call) agrees that Chelan PUD should implement the study plan entitled, "***Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam for 2008***".

Study Plan Summary
In 2008, the District will continue monitoring and research activities to improve survival of juvenile sockeye salmon at Rocky Reach Dam. Based on the results from the 2007 study, the District will employ a two-pronged approach to improving survival; improve survival through the powerhouse, and continue to increase passage through the surface collector.

Three primary objectives are identified for the 2008 study:

1. Maximize survival of juvenile sockeye passing through the powerhouse.

In general, less than 10% of the fish passing the project go through Units 1 and 2, while approximately 30% of the fish pass through Units 3 - 5. It's believed that by running a block of turbines contiguously, it concentrates flow in the tailrace, creating a narrower, higher velocity water column, which would make it more difficult for predators to stage and await smolts passing through the powerhouse. Therefore, the District will operate units 3 - 5 at an average of 12.5 kcfs; the turbine discharge level which appeared to produce the highest direct survival in the 1996 balloon tag test.
Individual turbines:
Powerhouse block load design:
Units 1-2: average of 16 kcfs
Units 3-5: average of 12.5 kcfs
Units 6-7: average of 14 kcfs
Units 8-11: average of 17 kcfs

Powerhouse sequencing:
The powerhouse will operate with "soft constraints" on the use of turbines during the "test" condition. During this condition, Unit C1 (unit closest to the bypass entrance) would be the first on and the last off. As total river flow increases, Unit C2 and upper units would be added sequentially moving north (higher numbered units) up to the target

discharge, as flow increases. Essentially the same operation will occur as river flow decreases, only in reverse order from upper units to lower units, thus maintaining the desired test condition to have a sequential block of adjacent turbines operating.

During the "no test" condition, powerhouse turbine priority will be similar, except that flow will be spread through more turbines operating at lower flows, as selected by the normal operating program "Waterview".

Similar to 2007, the 2008 study will be conducted without spill to avoid confounding the comparison between powerhouse operations in 2007 and the proposed operation in 2008. The operation of the powerhouse through Waterview is the reference condition in both years (without spill).

2. Maximize passage of juvenile sockeye through the fish bypass system.

By running Units 1 and 2 at high flow (avg. 16 kcfs), it is believed that more fish will likely be drawn towards and pass through the surface collector. This was demonstrated in 2007 results by a greater percentage of fish passing through the collector during the test condition (39%) compared to the non-test condition (34%)

In addition to evaluating juvenile route-specific survival at Rocky Reach Project, the District has determined that additional behavioral information in the forebay is needed. Prior analyses suggest that fish that migrate closer to the right bank are more prone to enter and pass through the bypass system. However, previous hydrophone arrays upstream of the dam precluded detection in large areas between the Boat Restriction Zone (BRZ) and the acoustic array within the forebay. Therefore, extended acoustic arrays will be deployed in 2008 to monitor fish movement in more of the forebay between the BRZ and historical array.

3. *Establish a more-representative estimate of dam passage survival, as defined in the HCP, using an additional release of fish downstream of the dam.*

Currently, a triple release model is used to estimate dam passage survival, but this method does not include any measure of forebay mortality. The triple release model does not do an adequate job of estimating total dam passage survival because survival estimation begins at the concrete rather than in the forebay.

In 2008, an additional release group downstream of Rocky Reach will be used to estimate dam passage survival using an alternative paired release model. The new additional release of fish will occur at the Hydropark detection location.

The fish that are detected at the Rocky Reach BRZ will be used as a "virtual" release to estimate survival from the Rocky Reach BRZ to Hydropark. Concurrently, a paired release from Rocky Reach tailrace and at Hydropark will be used to estimate survival from the tailrace release to Hydropark. The ratio of those two survival estimates, one from the “virtual” release, and one from the paired release, will be the estimated dam passage survival.

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Rocky Reach and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Chuck Peven

Date: April 30, 2008

Re: Final Minutes of April 2, 2008 Rocky Reach and Rock Island Coordinating Committees Conference Call

The Rocky Reach and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCP) Coordinating Committees met by conference call on Wednesday, April 2, 2008 from 10:00 am to 11:00 am to review the repair options for failed hydraulic fittings associated with the Unit 1 and 2 bypass collection screens at Rocky Reach Dam.

I Welcome (Mike Schiewe)

Mike Schiewe welcomed the group and stated that the purpose of the call was to review the repair options for failed hydraulic fittings associated with the Unit 1 and 2 bypass collection screens at Rocky Reach Dam.

II Discussion of Repair Plan for Failed Hydraulic Fittings Associated with Unit 1 and 2 Bypass Collection Screens at Rocky Reach Dam

Keith Truscott updated the group that hydraulic fittings that control water-regulating gates in the intake screen (IS) system had failed at Rocky Reach Dam, and that the Chelan PUD needed to shut down the IS system for repair. Because this was the third hydraulic fitting failure in the last 2 weeks, Chelan PUD wanted to discuss the option of replacing the remaining fittings that were of similar design.

Bryan Nordlund asked about the nature of the fittings that were failing, and whether they were all the same brand and material. Keith Truscott indicated that there was a mix of two different fittings; one was stainless steel and the other mild steel. It appeared that it was the mild steel fittings that were failing.

Keith Truscott described the various options for making these repairs. The first option would include isolating the slide gate from the hydraulic pressure system and positioning it in a moderate or conservative fixed location to account for forebay fluctuation, allowing water to pass through the slide gate and on to the conduit pipe for fish passage. During the fitting repairs, one turbine unit would be in operation and one unit would be off. This is necessary to protect divers working in the open water column of the turbine unit. The benefit of this option would be that fish could still be collected in the IS system because one of the two turbine units would still be working. The second option would be to completely close the IS system down. The benefit of this option would be that it would eliminate any problems created by high forebay elevation. However, during closure, any fish entering the turbine intake would not be bypassed. Truscott said that Chelan PUD currently favors the second option. Under either option, Chelan PUD planned to replace all of the mild steel fittings with stainless steel fittings. He also confirmed that Chelan PUD is working to stabilize the forebay elevations. Chelan PUD believes the work could be completed by next Monday or Tuesday, working on one unit at a time.

The Coordinating Committees members present agreed that the second option would be acceptable as most fish are currently passing the surface collector, and they are in relatively low numbers at this time. Truscott agreed to update the Committees this Friday regarding any issues with the repair. At the end of the call, Truscott also updated the Committees that Chelan PUD was working on the Rock Island bypass system to improve the operation of a flow regulating gate (R11) thereby reducing the possibility of descale or injury of fish.

III List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Barry Keesee	Chelan PUD
Steve Hemstrom	Chelan PUD
Thad Mosey	Chelan PUD
Keith Truscott *	Chelan PUD
Bryan Nordlund *	NMFS
Jim Craig	USFWS
Carmen Andonaegui	WDFW

* Denotes Coordinating Committees member

ANCHOR ENVIRONMENTAL, L.L.C.

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Tracy Yount

Date: May 27, 2008

Re: Final Minutes of April 29, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at Wells Dam, on Tuesday, April 29, 2008, from 10:30 am to 12:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final March 25 Meeting Minutes and April 2 Conference Call Minutes to the Coordinating Committees (Item I).
- Carmen Andonaegui and Bob Rose will each work with Keith Truscott to clarify language in the Chelan PUD phase designation summary (Item III-B).
- Tom Kahler will provide an email update on progress regarding work on the west ladder Passive Integrated Transponder tag (PIT-tag) detector (Item IV-A).

DECISION SUMMARY

There were no decision items at this meeting.

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

The March 25 Meeting Minutes and April 2 Conference Call Minutes were approved with several revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees have developed a detailed schedule on funding decisions for 2008. The Wells Committee approved funding for a

Tributary Fund Small Project, the Fort-Thurlow Pump Project. This project provides a fully pressurized water system at an irrigation withdrawal on Beaver Creek, tributary to the Methow, thereby keeping 0.5 cfs in the creek. Several previously funded projects are being monitored by others for biological effects, including the Nason Creek Oxbow project, and the Committees requested proposals from those monitoring entities for consideration by the Committees as part of HCP Tributary Assessment Program.

At the last Hatchery Committees meeting, the Hatchery Committees focused on the following items:

- Chelan PUD has distributed the Chiwawa Feasibility Report and is working with Washington Department of Fish and Wildlife (WDFW) toward resolution of WDFW comments to the report. Key issues were: 1) water right and steelhead and Chinook rearing; 2) amount of steelhead rearing space; and 3) the mechanism for volitional release from the main ponds.
- Chelan PUD will soon provide preliminary drawings of the Chelan Falls rearing facility.
- Chelan PUD is completing a study on a conceptual model for the Eastbank Aquifer and is drilling wells at the Chelan Falls Hatchery, in order to inform their "bioprogramming" approach for hatchery facility management. The aquifer model is being developed by U.S. Geological Survey (USGS) and will be available in June.
- The Hatchery Scientific Review Group (HSRG) completed their visits in the Mid-Columbia during the week of April 21. The Hatchery Committees provided updated information to the HSRG to inform their review.
- The PIT-tag detection capability is now functioning at Tumwater Dam, and Chelan PUD is coordinating with Integrated Status and Effectiveness Monitoring Project (ISEMP) on this.
- Chelan PUD's sockeye counter efficiency study is now out for review by the Hatchery Committees.
- WDFW is conducting sockeye salmon trap efficiency tests at the Monitor Trap.
- WDFW and U.S. Fish and Wildlife Service (USFWS) have decided to stay with the current marking scheme for Chiwawa Hatchery fish, following some discussion regarding ad-clips of these fish.

- WDFW has released the 2008 broodstock protocols, which, among other issues, addresses culling of eggs of high bacterial kidney disease (BKD) hatchery females at Methow Hatchery. WDFW will still be discussing this internally.
- The Yakama Nation (YN) provided a proposal for use of Entiat Hatchery for steelhead kelt reconditioning.
- WDFW and YN are working on an improved mechanism to better communicate information on the timing of hatchery releases.
- The construction at the Twisp weir is complete.
- The Hatchery Evaluation Technical Team (HETT) has now provided recommendations for Chiwawa spring Chinook control groups (previously called reference streams).
- The HETT has now provided a recommendation for an analysis to inform Objective 10 of the Monitoring and Evaluation (M&E) Program (non-target taxa) to the Hatchery Committees. This recommendation included non-target taxa, containment objectives, and panel members for the analysis.
- National Marine Fisheries Service (NMFS) is working on providing some parameters for the Hatchery Committees to consider in a potential upcoming steelhead reproductive success study.
- The Hatchery Committees members have provided a letter to Washington State Department of Ecology (Ecology) confirming their support of the Blackbird Pond water right application and project.

III Chelan PUD (Tracy Yount and Keith Truscott)

A. Participation in Chicago Climate Exchange

Tracy Yount updated the group that Chelan PUD is now participating in the Chicago Climate Exchange (CCX) and discussed how it relates to this committee. The Exchange is a voluntary organization that is a trading platform for carbon offsets via “carbon financial instruments” (CFIs), the unit of exchange on the CCX. Chelan PUD’s role is as an offset provider for other members to purchase CFIs resulting from incremental increases in hydroelectric generation. The PUD intends to reinvest any revenues that come from the market into other carbon-reduction efficiencies. Chelan PUD is the first hydropower producer to join the CCX and has an audit process in place to validate their production. Tracy Yount will provide a link to Ali Wick for the document that discusses Chelan PUD’s revenue plan as it relates to the CCX. Tracy Yount noted that his purpose in bringing this to the committee is to communicate that Chelan PUD is both meeting its environmental obligations via the Endangered Species Act (ESA; through this Committee) and supporting technology to minimize climate impacts through the CCX. Yount clarified that due to the current scale and business sectors of the CCX membership, Chelan PUD expects that operational decisions at the dams will not depend on the CCX or vice versa.

B. Summary of Phase Designations for Plan Species under the Rocky Reach and Rock Island HCPs

Keith Truscott had previously sent out a revised summary of phase designations for plan species at Rocky Reach and Rock Island Dams, incorporating comments from Bryan Nordlund and Carmen Andonaegui. Bryan Nordlund said that Truscott had successfully incorporated his comments. Andonaegui had additional comments: 1) she requested that the document include a discussion of whether subyearling Chinook passing Rocky Reach and Rock Island Dam are expressing reservoir overwintering similar to subyearlings originating in the Snake River subbasin, and 2) she suggested that some references to the body of literature discussing Snake and Columbia River outmigration life histories might be appropriate. She and Truscott will work together to create that language. Bob Rose asked Truscott to include a discussion of how the Coordinating Committees came to the conclusion that subyearlings were not testable. Bob Rose will talk to Steve Parker on this issue and will get back to Truscott so that language can be finalized. Mike Schiewe said that once this document is finalized, the next step for the Committees is to develop a path forward for survival testing at Rocky Reach Dam.

C. 10 Percent Spill Study at Rock Island and Repairs at Rocky Reach

Keith Truscott updated the group that Chelan PUD has now conducted four of the six releases for the 10 percent spill study at Rock Island Dam. The study is going well so far.

At Rocky Reach, repair has been completed on the intake screen project with no further loss of pressure thus far. Chelan PUD is pleased with this outcome. Bryan Nordlund asked whether this fix is permanent. Truscott replied that Chelan PUD is unsure at this time, but will be re-evaluating this in the off-season. Jerry Marco asked whether Chinook numbers had picked up in the last few days. Truscott said that numbers had been increasing in past days.

IV Douglas PUD (Tom Kahler)

A. Timing Notification for work with PIT-Tag Detector on West Ladder Trap

Tom Kahler updated the group that the west ladder will be de-watered on Monday, May 5, for installation of the PIT-tag detector. The collection gallery will remain watered. Douglas PUD anticipates that the west ladder will be re-watered on May 7, but this depends on how the work goes. Tom Kahler will provide an email update on progress of the project.

V HCP Committees Administration (Mike Schiewe)

A. WDFW Representative

Carmen Andonaegui let the Coordinating Committees know that she has accepted a position with Anchor Environmental and today's meeting will be her last with the Coordinating Committees. The Committees are grateful for her work on the Committees over the past several years.

B. Meeting Schedule

The upcoming meetings are set as follows:

- May 27 from 12:30 to 4:30 pm in SeaTac
- June 24 from 12:30 to 4:30 pm in SeaTac
- July 22 from 12:30 to 4:30 pm in SeaTac

C. Reports Out for Review

Ali Wick reminded the group that *Monitoring and Evaluation of the Chelan County PUD Hatchery Programs* is out for review until May 2.

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Keith Truscott * (by conference call)	Chelan PUD
Tracy Yount	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Carmen Andonaegui *	WDFW
Bob Rose * (by conference call)	Yakama Nation

* Denotes Coordinating Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Steve Hemstrom

Date: June 24, 2008

Re: Final Minutes of May 27, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel in SeaTac, Washington, on Tuesday, May 27, 2008, from 12:30 pm to 2:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final April 29 Meeting Minutes to the Coordinating Committees (Item I).
- Keith Truscott will finalize the Chelan PUD phase designation summary paper and send to Ali Wick for distribution to the Coordinating Committees (Item IV-A).

DECISION SUMMARY

There were no decision items at this meeting.

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

The April 29 Meeting Minutes were approved with minor revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees did not meet last month.

At the last Hatchery Committees meeting, the Hatchery Committees focused on the following items:

- The Hatchery Evaluation Technical Team (HETT) has developed their recommendations for control groups for supplementation as per the Monitoring and Evaluation (M&E) Plan, and the Hatchery Committees are reviewing this information. These groups were the Naches River, Entiat River, Little Wenatchee River, Marsh Creek, and the Secesh River. The HETT will be working toward completing the analyses for the Twisp and Chewuch populations, followed by steelhead and sockeye.
- Douglas PUD is working to consolidate its well certificates into single well-field certificates for the Methow Hatchery and the Wells Hatchery (one for each) with the Washington State Department of Ecology (Ecology).
- The Hatchery Committees are finalizing the Chiwawa Feasibility report and Chelan PUD has applied for the water right with Ecology.
- The U.S. Geological Survey (USGS) Eastbank Aquifer study will be finalized soon, and USGS and Chelan PUD will be hosting an informational meeting on May 28 to discuss results.
- Chelan PUD will soon be meeting with Washington State Department of Transportation (WSDOT) to discuss erosion issues at Highway 2 adjacent to Tumwater Dam. The likely solution will be road engineering to stem the erosion.
- Chelan PUD is reviewing staffing for the 2008 sockeye spawner counter efficiency study.
- The Hatchery Committees supported the Washington Department of Fish and Wildlife (WDFW) proposal to release progeny of high-ELISA Chiwawa spring Chinook as marked subyearlings in Meadow Creek.
- The Yakama Nation and the Bonneville Power Administration (BPA) have signed a Memorandum of Agreement for a variety of new studies; Hatchery Committees' members are reviewing how best to coordinate BPA-funded projects with the HCPs.
- The Colville Tribes are currently developing a budget and proposal for rearing smolts in Bonaparte Ponds this fall.
- The Hatchery Committees discussed experimental strategies for a steelhead reproductive success study, including potential endpoints for the study.
- Hatchery Committees' members are discussing the Non-Target Taxa of Concern (NTTOC) process (Objective 10 of the M&E Plan) with their respective agencies to determine a path forward and a decision at the July meeting.

- Hatchery Committees' members will discuss the preliminary Hatchery Scientific Review Group (HSRG) recommendations within their organizations, and particularly those that may affect HCP programs.

III Douglas PUD (Rick Klinge and Tom Kahler)

A. Status on PIT-Tag Detector on West Ladder Trap

Tom Kahler reported that installation of a new Passive Integrated Transponder tag (PIT-tag) detector on the west ladder trap at Wells Dam had been completed. Douglas PUD is now monitoring the efficacy of the new setup by comparing detections at the ladder trap to those obtained by hand-wanding fish at the hatchery.

B. Debris Boom

Rick Klinge updated the group that Douglas PUD has initiated the bid process for construction of a debris boom at Wells Dam. He will keep the Coordinating Committees updated on the progress of this project.

C. Bypass Operation Update

Rick Klinge updated the group that the bypass has been running since April 12 as per the HCP Operating Plan. He said that once flows exceed 200 thousand cubic feet per second (kcfs), Douglas PUD will evaluate whether the barriers in the flow slots may be limiting the amount of spill at the dam. Klinge confirmed that removing these baffles does not affect passage opportunities and Douglas PUD will continue to monitor the situation during high flows.

IV Chelan PUD (Keith Truscott)

A. Summary of Phase Designations for Rocky Reach and Rock Island Plan Species

Keith Truscott updated the group that he has worked through the comments on the "white paper" summarizing phase designations for Rocky Reach and Rock Island Plan Species with Carmen Andonaegui. The paper was accepted by the Coordinating Committees at the last meeting. He will now finalize the paper and send to Ali Wick for distribution to the Committees. Rick Klinge commented that Douglas PUD would be preparing a paper discussing phase designation as well, for Committees review.

B. Rock Island Spill Update

Keith Truscott updated the group that Chelan PUD is several weeks away from concluding the Rock Island 10 percent spill study. Because of the late migration, Chelan PUD may be slightly short on the numbers for individual releases. Truscott also noted that the PUD was focusing extra attention on the tag-life issues, and that results would be adjusted accordingly. Steve Hemstrom noted that the run-timing program RealTime has predicted that spring Chinook passage is about 70 percent complete at Rock Island; at Rocky Reach, the program is predicting the spring Chinook run is about 50 percent complete.

C. USDA Pikeminnow Fishing Crews

Keith Truscott updated the group that the pikeminnow fishing crews are now working at the Rocky Reach and Rock Island projects and reservoirs.

D. Modernization of Powerhouse 1

Keith Truscott updated the group that Chelan PUD is evaluating the performance of the new turbine unit at Rock Island Dam, and based on that evaluation, they will be deciding whether changes are needed before proceeding with orders for additional replacement turbines.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- June 24 from 9:30 am to 12:00 pm in SeaTac
- July 22 from 9:30 am to 12:00 pm (update: this will be a conference call)
- August 26 from 9:30 am to 12:00 pm in SeaTac

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Keith Truscott *	Chelan PUD
Steve Hemstrom	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Bob Rose * (by conference call)	Yakama Nation

* Denotes Coordinating Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Steve Hemstrom

Date: July 22, 2008

Re: Final Minutes of June 24, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel in SeaTac, Washington, on Tuesday, June 24, 2008, from 9:30 am to 11:30 am. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final May 27 Meeting Minutes to the Coordinating Committees (Item I).
- Steve Hemstrom will provide to the Coordinating Committees an electronic version of the pikeminnow trapping handout from today (Item III-A).
- Keith Truscott will send out the final Rocky Reach and Rock Island Plan Species phase designation summary paper soon (Item III-B).

DECISION SUMMARY

There were no decision items at this meeting.

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

Mike Schiewe updated the group that Washington Department of Fish and Wildlife (WDFW) has been working to identify new representatives for the Coordinating Committees and Tributary Committees as soon as possible.

The May 27 Meeting Minutes were approved with minor revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees have been dealing with several administrative issues for funded projects, including modest cost increases and project schedules. Also, the Committees have received 13 pre-proposals for the 2008 round of the General Salmon Habitat Program. One project has subsequently been withdrawn, 4 have been returned to project sponsors as not likely to be funded, and 8 are under consideration for funding. The Committees' tour of projects in scheduled for June 23 to 25.

At the last Hatchery Committees meeting, the Hatchery Committees focused on the following items:

- The Hatchery Evaluation Technical Team (HETT) is working on compiling and analyzing data on potential control populations for the Twisp, Chewuch, and Methow spring Chinook populations.
- The Colville Tribes are working to develop a groundwater source for Bonaparte Pond that would minimize ice-over and facilitate winter fish rearing.
- The Hatchery Committees are discussing adult trap operations at Wells Dam as a way to minimize passage delay; in the future, WDFW and Douglas PUD staff will be discussing possible structure changes.
- WDFW has prepared a proposal for a steelhead reproductive study for the Hatchery Committees to consider during development of a study plan. This proposal will be discussed at the next meeting.
- WDFW is finalizing broodstock protocols for this year.
- The Joint Fisheries Parties (JFP) is preparing a white paper on Wenatchee Spring Chinook management that will be distributed for public review in July.
- The Hatchery Committees are continuing to consider approaches for conducting a sockeye spawner and counter efficiency study.
- Chelan PUD will be providing some funding to Trout Unlimited for the Blackbird Pond project.
- Okanagan Nation Alliance (ONA) will be presenting information on their Skaha Lake sockeye salmon program at the July 16 Hatchery Committees meeting. The Committees have previously approved Chelan PUD's partial funding of this program as a means for the PUD to meet its mitigation requirement for sockeye through the year 2013.

- Chelan PUD is working with Washington State Department of Transportation (WSDOT) to identify a solution for erosion issues at Highway 2 adjacent to Tumwater Dam.
- Douglas PUD is working to consolidate its well certificates into single well-field certificates for the Methow Hatchery and the Wells Hatchery (one for each) with the Washington State Department of Ecology (Ecology).
- Douglas PUD updated the group that developing a Chewuch trap is still on the radar, but is not a high priority at this time.
- Hatchery Committees' members are discussing the Non-Target Taxa of Concern (NTTOC) process (Objective 10 of the Monitoring and Evaluation [M&E] Plan) with their respective agencies to determine a path forward and a decision at the July meeting.
- Hatchery Committees' members are discussing the preliminary Hatchery Scientific Review Group (HSRG) recommendations within their organizations, and particularly those that may affect HCP programs.

III Chelan PUD (Keith Truscott)

A. Update on Pikeminnow Ladder Trapping

Steve Hemstrom provided a handout describing the pikeminnow trapping locations, with two traps each on an upper and lower weir at Rock Island. Hemstrom will provide additional information at a later time as the trapping progresses. Chelan PUD is working to increase efficiency at these traps. Steve Hemstrom will forward this handout to the group for their information.

B. Summary of Phase Designations for Rocky Reach and Rock Island Plan Species

Keith Truscott updated the group that he has completed the paper summarizing phase designations for Rocky Reach and Rock Island Plan Species. He explained that Phase III (Provisional Review) is the appropriate designation for yearling Chinook because this species has already undergone 2 years of testing (with results ranging from 91 to 93 percent survival), and that the Coordinating Committees have previously agreed to suspend further testing until research identifies operation that will improve sockeye passage survival (and also presumably yearling Chinook survival). The Committees accepted this document as final, and Keith Truscott will distribute this final version to the Committees.

IV Douglas PUD (Rick Klinge)

A. Bypass Operation Update

Rick Klinge updated the group that the Wells Dam bypass has been running since April 12 as per the HCP Operating Plan, and will run until August 26. Spring spill occurred until June 13. Spill has been occurring at approximately 30 percent to date, and the PUD intends to raise pool volume for the 4th of July holiday.

B. Debris Boom

Rick Klinge updated the group that bids have been received for the debris boom project. Douglas PUD will be reviewing the bids and the project will likely be constructed this winter after November 15.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- July 22 from 9:30 am to 12:00 pm by conference call
- August 26 from 9:30 am to 12:00 pm, location TBA
- September 23 from 9:30 am to 12:00 pm in SeaTac

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Keith Truscott *	Chelan PUD
Steve Hemstrom	Chelan PUD
Jerry Marco * (by conference call)	Colville Confederated Tribes
Rick Klinge	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Bob Rose * (by conference call)	Yakama Nation

* Denotes Coordinating Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Steve Hemstrom

Date: August 26, 2008

Re: Final Minutes of July 22, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met by conference call on Tuesday, July 22, 2008, from 9:30 am to 11:30 am. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final June 24 Meeting Minutes to the Coordinating Committees (Item I).
- Steve Hemstrom will provide the Coordinating Committees with a summary of run-timing and index counts to supplement spring spill information previously sent out to the group. (Item III-A).
- Bryan Nordlund asked to be invited to see the traveling fishway screens at Rock Island when dewatered, and Thad Mosey confirmed that he would do so (Item III-B).

DECISION SUMMARY

There were no decision items at this meeting.

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

The June 24 Meeting Minutes were approved with no revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees are reviewing details of projects for 2008 and will be conducting a tour on October 8 and 9 of completed projects previously funded by the SRFB and/or Tributary Committees.

At the last Hatchery Committees meeting, the Hatchery Committees focused on the following items:

- The Hatchery Committees received an update from Howie Wright of the Okanagan Nation Alliance on the Skaha sockeye reintroduction program.
- The Hatchery Committees received an update from Kim Hyatt of Department of Fisheries and Oceans – Canada on the Fish-Water Management Tool.
- The Hatchery Committees are reviewing a Colville Tribes proposal on rearing up to 100,000 summer Chinook at Bonaparte Pond.
- The Hatchery Committees received a report that the Twisp weir is working well and the Methow Hatchery should be able to meet program this year due to efficient broodstock collection.
- Representatives from the PUDs met with National Marine Fisheries Service (NMFS) staff in July to learn how NMFS would be evaluating and potentially implementing Hatchery Scientific Review Group (HSRG) recommendations. Hatchery Committees' members are discussing the preliminary HSRG recommendations within their organizations, and particularly those that may affect HCP programs.
- Chelan PUD is reconsidering the approach to the study design for the sockeye counter efficiency and spawner study. The Hatchery Committees will be reviewing this soon.
- Chelan PUD is reviewing information from the U.S. Geological Survey (USGS) Eastbank Aquifer study.
- Chelan PUD is working with Washington State Department of Transportation (WSDOT) to identify a solution for erosion issues at Highway 2 adjacent to Tumwater Dam.
- Washington Department of Fish and Wildlife (WDFW) may be using Grant PUD's ultrasound unit this year for gender ID of broodstock at Well Hatchery.
- The Hatchery Committees are discussing Passive Integrated Transponder tag (PIT-tag) placement in steelhead and its implications for future studies in the Monitoring and Evaluation (M&E) program.

- Because of broodstock limitations, the Chiwawa spring Chinook program may not meet program objectives this summer. Kirk Truscott will provide information on this soon to the Hatchery Committees.
- Hatchery Committees' members are considering how to proceed with implementing the Non-Target Taxa of Concern (NTTOC) process (Objective 10 of the M&E Plan); Mike Schiewe will be soliciting written recommendations from individual members on what are the priority interactions to focus on, and what should be the proposed risk containment levels.

III Chelan PUD (Keith Truscott)

A. Spring Spill Summary (Steve Hemstrom)

Steve Hemstrom provided an update on spring spill, which began April 17 and ended June 7. He had previously provided a handout by email with details on the spill. Hemstrom reviewed these details and will be sending out a summary of run-timing and index counts to supplement this information.

B. Fishway Maintenance Memorandum (Thad Mosey)

Keith Truscott introduced Thad Mosey to discuss the upcoming fishway maintenance schedule. There are two main items that will be completed this year, including maintenance of the attraction water system pump at Rocky Reach, and overhaul of the traveling fishway screens at the right bank fishway at Rock Island. The attraction water pump maintenance is scheduled to be completed in time to have the fishway operational by March 1, 2009. Dewatering procedures for the Rock Island fishway screen overhaul will begin on approximately December 1, 2008. As in previous years' overhaul work on adult fishways at Rock Island, at least one of the three ladders will remain operational for adult passage. All work will be completed in time for March 1 start-up. In addition, routine maintenance will be performed as described in the memorandum. Bryan Nordlund asked to be invited to see the traveling fishway screens at Rock Island when dewatered, and Thad Mosey confirmed that he would do so.

C. Ladder Trapping of Pikeminnow at Rocky Reach and Rock Island (Steve Hemstrom)

Keith Truscott provided an update on the numbers of fish trapped to date at Rock Island in the pikeminnow ladder traps. The non-target fish that have been captured in the traps include adult sockeye and Chinook salmon mini-jacks.

IV Douglas PUD (Rick Klinge and Tom Kahler)

A. Pikeminnow Removal Effort

Tom Kahler updated the group that the annual pikeminnow removal effort is going well, continuing with an annual target of 20,000 fish. Kahler reported that Douglas PUD anticipates meeting their target again this year.

B. Delayed Fish Counts from Wells Dam

Rick Klinge updated the group on the delay in reporting fish counts at Wells Dam. The "problem" is the result of large numbers of sockeye returning and the fish counters working a double shift to try to keep up. This situation is expected to be short term.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- August 26 from 9:30 am to 12:00 pm by conference call
- September 23 from 9:30 am to 12:00 pm in SeaTac
- October 28 from 9:30 am to 12:00 pm in SeaTac

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Keith Truscott *	Chelan PUD
Thad Mosey	Chelan PUD
Steve Hemstrom	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Bryan Nordlund *	NMFS
Bill Tweit *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Steve Hemstrom

Date: September 23, 2008

Re: Final Minutes of August 26, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met by conference call on Tuesday, August 26, 2008, from 9:30 am to 11:30 am. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final July 22 Meeting Minutes to the Coordinating Committees (Item I).
- Steve Hemstrom will send a final spill summary from Rock Island to the Coordinating Committees for their information, and will send one for Rocky Reach as it becomes available (Item III-A).
- Rick Klinge will provide an update on the analyses that Douglas PUD uses to predict that 95 percent of the subyearling migration has passed Wells Dam by August 26 of each year. Klinge also said that he will provide a complete bypass summary at the September meeting (Item IV-A).
- Rick Klinge will check with Douglas PUD engineering staff to evaluate whether sockeye are falling back through the supply channel or trash racks (Item IV-B).

DECISION SUMMARY

There were no decision items at this meeting.

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

The July 22 Meeting Minutes were approved with no revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees are reviewing details of potential projects for 2008.

At the last Hatchery Committees meeting, the group focused on the following items:

- The Hatchery Committees agreed to table the Non-target Taxa of Concern (NTTOC) discussion until next meeting so that the full Committees can discuss.
- The Hatchery Committees agreed that Douglas PUD can collect an additional 29 Wells summer Chinook broodstock to rear smolts for a potential dam passage survival study in spring 2010 (approximately 50,000 juveniles).
- As in previous years, the Hatchery Committees approved Grant PUD's request to rear 80,000 summer steelhead at the Wells Hatchery and 201,000 spring Chinook at the Methow Hatchery.
- Wells Hatchery staff have collected additional summer Chinook broodstock on behalf of the Yakama Nation (YN); the eggs from these fish are for possible use in a pilot program to enhance summer/fall Chinook production in the Yakima basin. Washington Department of Fish and Wildlife (WDFW) has provisionally approved the transfer as a one-year pilot program only, and is working with National Oceanic and Atmospheric Administration (NOAA) Fisheries to resolve potential Endangered Species Act (ESA) permit issues.
- Don Larsen and Brian Beckman from National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center attended the Hatchery Committees meeting to review some of their work examining life-history variability in Chinook salmon.
- Lake Wenatchee net pens had an unexpected release due to a tear thought to have been caused by a recreational fishing lure caught in the net. The tear has been repaired.
- Chelan PUD is working with the manager of the PIT-tag Information System (PTAGIS) database to improve access to Passive Integrated Transponder tag (PIT-tag) data from the Peshastin and Entiat PIT-tag arrays.
- Chelan PUD will be drafting a Statement of Agreement (SOA) on bacterial kidney disease (BKD) management for Chiwawa spring Chinook for the Hatchery Committees' consideration that will be consistent with Hatchery Committees'

discussions over the last several years as well as the recent Hatchery Scientific Review Group (HSRG) recommendations.

- The Hatchery Committees reviewed the YN's Memorandum of Agreement (MOA) project list for opportunities for coordination of HCP and MOA activities.
- The Hatchery Committees discussed developing a plan to install PIT-tag arrays to support determining sockeye escapement in the White and Little Wenatchee Rivers.
- The Hatchery Committees discussed the steelhead reproductive success study plan in light of the HSRG recommendations and timing of the study plan. WDFW will be coordinating a Joint Fisheries Parties (JFP) response to issues raised by Chelan PUD.

III Chelan PUD (Steve Hemstrom)

A. Spill Update

Steve Hemstrom provided an update on Rock Island summer spill and the spill studies thus far this year, including information on index counts (as of August 23, the total index count since June 1 is 30,830 Chinook year-0 smolts). Hemstrom will send a final spill summary from Rock Island to the Coordinating Committees for their information, and will send one for Rocky Reach as it becomes available.

Spill is ongoing at Rocky Reach. The index count from May 27 to August 25 was 11,534 smolts. The modeling program RealTime is estimating 95 percent passage at this time. Barring some unanticipated increase in numbers of outmigrants, Hemstrom indicated that Chelan PUD planned to spill through the end of the week at Rocky Reach, and the Committees agreed to an August 31 shutdown date. Hemstrom also noted that Chelan PUD would probably run the bypass an additional week, through the first week of September.

B. Pikeminnow Trapping

Steve Hemstrom updated the group that trapping on the fish ladders is going well, and approximately 4,200 pikeminnow have been trapped in the ladders at Rocky Reach and Rock Island. This is in addition to over 60,000 removed by other methods (e.g., long line fishery).

IV Douglas PUD (Rick Klinge and Tom Kahler)

A. Spill Update

Rick Klinge updated the group that bypass operations have been completed for the year, and that today is the last day of bypass spill. Responding to a question from Jerry Marco, Klinge will provide an update to the Coordinating Committees on the analyses Douglas PUD uses to predict 95 percent passage and spill termination on August 26 of each year. Klinge also said that he will provide a complete bypass summary at the September meeting.

B. East Fish Ladder Sockeye and Attraction Water Grates

Rick Klinge updated the group on the situation that occurred several weeks ago in which sockeye were trapped on the wrong side of the attraction water grates in the collection gallery of the Wells east fishway. The problem initially was thought to be the result of a failure of the attachment points on the water grates; however, this did not prove to be the case. With this possibility ruled out, it was thought that fish were leaping into the collection gallery from the fishway. Accordingly, a net/PVC barrier was added to prevent this for the remainder of this year, and Douglas PUD will check the grates again next winter during service to ensure that the bolts are secure. Responding to a question from Bryan Nordlund, Klinge will check with Douglas PUD engineering staff to assess whether fish could be falling back through the supply channel intake or trash racks.

C. Pikeminnow Summary for 2008

Tom Kahler updated the group that pikeminnow removal is complete for this year, and final counts are forthcoming. Approximately 20,000 pikeminnow have been captured.

D. Planning for Future Project Survival Studies

Rick Klinge updated the group that Douglas PUD is scheduled for a survival study “check-in” for yearling Chinook and steelhead in 2010, and has requested hatchery broodstock to support this study. Planning currently includes discussions of rearing strategies, tag types, and release locations. Douglas PUD will be discussing a study plan next spring with the Coordinating Committees.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- September 23 from 9:30 am to 3:00 pm in SeaTac
- October 28 from 9:30 am to 3:00 pm in SeaTac
- November 18 from 9:30 am to 3:00 pm in SeaTac
- December 16 from 1:00 pm to 4:30 pm (tentatively scheduled for Wenatchee)

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Steve Hemstrom *	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Bill Tweit *	WDFW

* Denotes Coordinating Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick, Steve Hemstrom

Date: October 21, 2008

Re: Final Minutes of September 23, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel in SeaTac, Washington on Tuesday, September 23, 2008, from 9:30 am to 11:30 am. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final August 26 Meeting Minutes to the Coordinating Committees (Item I).
- Ali Wick will re-circulate the previous Statement of Agreement (SOA) approval of the Rock Island 10% spill study as review material to assist with the October meeting discussions addressing Remedial Investigation (RI) 2009 study design (Item IV-B).

DECISION SUMMARY

There were no decision items at this meeting.

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

The August 26 Meeting Minutes were approved with revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees did not meet in September, but are on track to make funding decisions this fall consistent with the Tributary Fund schedule, which matches the Salmon Recovery Funding Board schedule.

At the last Hatchery Committees meeting, the group focused on the following items:

- The Hatchery Committees addressed the Non-target Taxa of Concern (NTTOC) analysis, primarily discussing the species that would be analyzed.
- Chelan PUD has developed a plan to estimate sockeye observer error and redd residence time, and will be implementing the study in the next year.
- Chelan PUD presented results of the pilot water re-use study, and the Hatchery Committees approved an additional year of study. Density will be increased from 126,000 to 200,000 fish in the re-use ponds next year.
- Chelan PUD is continuing to work with the U.S. Forest Service (USFS) and local landowners regarding the new Chiwawa steelhead rearing ponds.
- Chelan PUD presented an SOA for a bacterial kidney disease (BKD) strategy for the Committees' review. This SOA will soon be up for Committee approval.
- Chelan and Douglas PUD (along with Grant PUD) have sent a joint comment letter to the Hatchery Scientific Review Group (HSRG) regarding their draft recommendations for hatchery reform.
- Chelan PUD is working to get Passive Integrated Transponder tag (PIT-tag) data from Peshastin and Entiat into the PTAGIS database.
- Douglas PUD presented results from bird predation studies of recent years at the Wells Hatchery and other rearing areas.
- Douglas PUD updated the group on some minor maintenance issues at Twisp weir.
- Douglas PUD is requesting additional Wells summer/fall Chinook broodstock to produce smolts for potential survival studies in 2010.
- The Colville Tribes are moving forward on developing a groundwater supply at Bonaparte Pond.
- The Committees are discussing a steelhead reproductive success study, which is currently under review by the Joint Fisheries Parties (JFPs); the JFPs are preparing a response memorandum to concerns raised by Chelan PUD.

- The Yakama Nation (YN) initiated a discussion on balancing brood collection and harvest, and on the use of ultrasound for gender identification of broodstock and its effect on timing of broodstock collection and determining whether there are surplus adults available for distribution to the tribes.
- A summer Chinook management workshop is planned for the spring of 2009.
- The YN updated the group that Columbia River Intertribal Fish Commission (CRITFC) has recently received some funding that the YN would potentially like to use for PIT-tagging of Skaha Lake sockeye.
- The YN is evaluating opportunities for expanded acclimation of spring Chinook and steelhead in the Wenatchee and Methow Basins.
- The YN is working on the proposal for kelt reconditioning and plan to submit it for Independent Scientific Review Panel (ISRP) review.
- The YN is working with National Marine Fisheries Service (NMFS) on Section 10 coverage for the pilot study of summer Chinook reintroduction in the Yakima River.
- A NMFS kickoff meeting will occur October 2, 2008, to discuss the process described in the recent NMFS letter regarding reinitiation of consultation on HCP hatchery programs.

III Douglas PUD (Rick Klinge)

A. Summary of 2008 Bypass Operations

Rick Klinge provided a summary of 2008 bypass operations and a memorandum documenting the actions, which will be forwarded to the Committees.

B. Schedule for Debris Boom Construction

Rick Klinge updated the group that the bid has been awarded for the Wells Dam debris boom construction contract. In-water work is anticipated between November of this year and January of 2009, to be completed in January. In November, the pool will be lowered for approximately 5 days in order to install a concrete pad; Douglas PUD will keep the Committees updated on this work.

IV Chelan PUD (Keith Truscott and Steve Hemstrom)

A. Bypass Spill Update

Keith Truscott and Steve Hemstrom reviewed the spill actions for 2008, including test dates, 95 percent passage dates, and spill percentages. They provided a handout with details for the Committees' information.

Hemstrom provided total fish captures during pikeminnow trapping at Rocky Reach and Rock Island, which included approximately 5,000 pikeminnow, approximately 1,000 sockeye, and 460 mini-jack Chinook. He said that the total pikeminnow counts are 40,000 at Rock Island and about 15,000 at Rocky Reach.

B. Update on Study Results

Keith Truscott provided a handout with some preliminary acoustic tag survival study results for Rocky Reach and Rock Island. This included sockeye studies at Rocky Reach, and sockeye, steelhead, and yearling Chinook at Rock Island. Chelan PUD will be working with their consultants to refine these estimates based on tag life information. The PUD will also be looking carefully for an explanation of the preliminary yearling Chinook results; estimated survival this year was 89.72 percent in contrast to 97.25 percent in 2007. Truscott said that Chelan PUD would likely ask John Skalski and Tracey Steig to attend the November meeting to present and discuss the final results. This will include route-specific passage and survival information. Ali Wick will re-circulate the previous SOA approval of the Rock Island 10% spill study as review material to assist with the October meeting discussions addressing RI 2009 study design.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- October 21 from 9:30 am to 3:00 pm in SeaTac (moved a week earlier of normal schedule to accommodate HCP CC member conflicts)
- November 18 from 9:30 am to 3:00 pm in SeaTac
- December 16 from 1:00 pm to 4:30 pm in Wenatchee

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Steve Hemstrom *	Chelan PUD
Keith Truscott *	Chelan PUD
Jerry Marco * (by conference call)	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Bill Tweit *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick

Date: November 18, 2008

Re: Final Minutes of October 21, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel in SeaTac, Washington on Tuesday, October 21, 2008, from 9:30 to 11:30 am. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final September 23 Meeting Minutes to the Coordinating Committees (Item I).
- Keith Truscott will send out draft reports and Statements of Agreement (SOAs) for the Rock Island 10 percent spill study and the 2009 Rocky Reach sockeye studies (Item IV-A).

DECISION SUMMARY

There were no decision items at this meeting.

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

The September 23 Meeting Minutes were approved with revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees received presentations on seven General Salmon Habitat Program projects at the last meeting. There are approximately nine proposals under consideration, and the Tributary Committees will make final funding decisions in December. For the Small Projects Program, the Tributary Committees are considering the *Sleepy Hollow Reserve Protection Feasibility Assessment* and will make a funding decision after they receive signed landowner agreement forms from the sponsor (Chelan County Natural Resources).

The Tributary Committees had a discussion with the Chelan-Douglas Land Trust, Methow Salmon Recovery Foundation, and the Methow Conservancy regarding the escalating cost of conservation easements. The sponsors assured the Tributary Committees that they are doing everything they can to keep the cost down and that they are seeking multiple sources of funding.

Tributary Committees members attended post-implementation project tours with the Upper Columbia Regional Technical Team (RTT).

At the last Hatchery Committees meeting, the group focused on the following items:

- Rob Jones of National Marine Fisheries Service (NMFS) attended the Hatchery Committees meeting to discuss and answer questions about the hatchery program review and to summarize specific information that will inform the review. The Hatchery Committees discussed sequencing of the reviews, the appropriate permit-holder(s), and the process for completing the Hatchery Genetic Management Plans (HGMPs).
- The Hatchery Evaluation Technical Team (HETT) is continuing to work on identifying control groups (also known as reference populations) and is researching the origin of the 1981 and 1982 spring Chinook spawning data in the Chewuch and Twisp rivers.
- The Hatchery Committees approved the 2007 Douglas PUD Monitoring and Evaluation (M&E) Report and are currently reviewing the 2009 M&E Implementation Work Plan.
- Douglas PUD recently provided $41,000 to the Yakama Nation as the final installment pursuant to Douglas PUD's coho mitigation agreement.
- Douglas PUD is about to begin a turbine rewind project at Wells Dam that will affect access to the east fish ladder (See Item III-D below).

- The Hatchery Committees tentatively agreed on a final list of species to consider in the Non-target Taxa of Concern (NTTOC) expert panel exercise. The Committees agreed to convene the expert panel next spring or early summer.
- Pamela Nelle of the Integrated Status and Effectiveness Monitoring Project (ISEMP) attended the last Hatchery Committees meeting to give an update on incorporating Peshastin and Entiat Passive Integrated Transponder (PIT)-tag data into the PTAGIS database.
- The Hatchery Committees have conditionally approved an SOA regarding an additional year of study for the Chelan PUD Partial Water Re-Use Study.
- The Hatchery Committees will soon be considering the Sockeye Enumeration Study Plan for approval.
- Chelan PUD is at 30 percent design for both the Chelan Falls (conversion of the Turtle Rock summer Chinook program) and the Chiwawa steelhead facilities, and will wait for HGMPs to be completed before moving forward on design.
- The Chelan PUD 2009 M&E Work Plan has been finalized and was approved by conference call on October 1.
- The Committees are continuing to consider options for steelhead reproductive success studies.
- The Committees formally approved the Blackbird Island Pond project.
- The Colville Tribes and the Yakama Nation will soon be discussing the use of Columbia River Intertribal Fish Commission (CRITFC) funds for enhancing sockeye salmon PIT-tagging in the Upper Columbia.
- The Coho Master Plan will be completed soon and available for Hatchery Committees review.

III Douglas PUD (Rick Klinge)

A. Update on Debris Boom Construction

Rick Klinge updated the group that the debris boom project is underway, and the pool will be dropped 8.5 feet at the end of October for approximately 2 weeks in order to pour concrete for the debris ramp. Following this work, the floats will be installed. The project is expected to be completed by the end of January.

B. Update on Lamprey Passage

Rick Klinge said that it appears that lamprey are able to pass through the ladder grates below the fish counting window at Wells Dam and are not being counted at the window. No lamprey have been counted since October 6. Klinge indicated that he could not rule out that this might be a function of temperature as well. Douglas PUD is investigating this and will have an update at the November meeting.

C. Update on Coho Mitigation Requirement

Tom Kahler said that Douglas PUD recently completed its 10-year coho mitigation agreement by transfer of $41,000 to the Yakama Nation.

D. Rewind Project at Wells Dam

Rick Klinge informed the group that Douglas PUD is about to begin a turbine rewind project at Wells Dam. The project will require work space on the deck that could obstruct direct access to the east fish ladder. Klinge assured the group that Douglas PUD is working through this internally and will keep the Hatchery and Coordinating Committees updated on the solutions.

IV Chelan PUD (Keith Truscott)

A. Rock Island 10 Percent Spill Study and Survival Studies Discussion – SOA and Path Forward

Keith Truscott reviewed the preliminary 10 percent spill study results from this year (2008) and summarized Chelan PUD's initial plans for additional studies in 2009. The 2008 survival estimate for yearling Chinook was 89.7 percent, which is lower than the 97.3 percent estimate from 2007, and lower than the 3-year average of 94.3 percent at 20 percent spill. The 2008 steelhead survival estimate was 97.0 percent, which is higher than the 3-year average of 94.1 percent at 20 percent spill; sockeye survival in 2008 was 93.25 percent, which was lower than the 3-year average of 96.6 percent at 20 percent. John Skalski and Tracy Steig will attend the next meeting to go over these data, as well as the results from Rocky Reach sockeye testing. Truscott anticipates that Chelan PUD will have draft reports from both Rocky Reach and Rock Island studies as well as an SOA for Rock Island 2009 studies distributed in advance of the meeting.

B. Implications of a Decreased Bond Market

Keith Truscott updated the group that in light of the current economic climate, Chelan PUD is developing separate budget plans for 2009 for two scenarios: 1) in the case of "business-as-usual" and 2) in the case of a depressed bond market. If the second scenario occurs, funding would be restricted in some fashion, but so far, this situation is for discussion only.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- November 18 from 9:30 am to 3:00 pm in SeaTac
- December 16 from 1:00 to 4:30 pm at Chelan PUD in Wenatchee
- January 27 from 9:30 am to 3:00 pm in SeaTac

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Keith Truscott *	Chelan PUD
Jerry Marco * (by conference call)	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Bill Tweit *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick and Steve Hemstrom

Date: December 16, 2008

Re: Final Minutes of November 18, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel in SeaTac, Washington on Tuesday, November 18, 2008, from 9:30 am to 2:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final October 21 Meeting Minutes to the Coordinating Committees (Item I).
- Keith Truscott will follow up with Bill Tweit to discuss possible causes of the interannual variability between Chinook salmon survival estimates in 2007 and 2008 at Rock Island Dam under 10 percent spill. They will also discuss developing additional language for the Rock Island 10% Statement of Agreement (SOA; Item II-B) addressing unexpected high interannual variability for the current and potential future survival estimates. Chelan PUD will provide a revised draft SOA that reflects the discussions to the Committees by e-mail by December 5 as the means to finalize the Rock Island 2008 10% SOA.
- Mike Schiewe will update the group on the status of Washington State Department of Ecology's (Ecology's) water right discussions about Blackbird Island Pond following tomorrow's Hatchery Committees meeting (Item IV).

DECISION SUMMARY

- There were no decisions made at this month's meeting.

I Approval of Meeting Minutes and Agenda (Ali Wick)

The October 21 Meeting Minutes were approved with minor revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Chelan PUD (Keith Truscott)

A. Survival Study Presentations

John Skalski reviewed the results of the survival studies for 2008. His presentation and the others' presentations from today's meeting were sent out to the Coordinating Committees prior to the meeting. At Rocky Reach Dam, Skalski indicated that the treatment operation did not increase sockeye salmon survival when compared with the "Waterview" or conventional powerhouse operation in 2008. Overall, project passage survival of sockeye in 2008 was 0.9202 and standard error was 0.0212. This compares to historical survival estimates of 0.8351 (0.0213) in 2004, 0.8920 (0.0165) in 2005, 0.9331 (0.0121) in 2006, and 0.8381 (0.0188) in 2007 (standard error in parentheses). At Rock Island Dam in 2008, project survival estimates were 0.8972 (0.0157) for yearling Chinook salmon, 0.9335 (0.0163) for sockeye salmon, and 0.9699 (0.0103) for steelhead. The Chinook salmon estimate of 0.8972 (0.0157) compared with the 0.9725 (0.019) estimate in 2007. Both 2007 and 2008 Rock Island studies were completed under a 10 percent spill.

Tracey Steig summarized results of the 2008 juvenile sockeye salmon acoustic tag studies at Rocky Reach Dam. These studies focused on route-specific passage. The study showed that fewer sockeye went through the surface collector during the treatment operation than during the Waterview operation. Further, more sockeye passed through Units 3 through 11 during the treatment operation than during the Waterview operation; slightly fewer sockeye passed via Units 1 and 2 and the spillway during the treatment versus Waterview operation. Steig indicated that during time periods when fewer sockeye passed via the surface collector, higher numbers of sockeye smolts were approaching the dam from a mid-river trajectory. In contrast, during periods when a higher proportion of sockeye smolts were using the surface collector, more smolts tended to approach the dam along the west bank. Steig said that he was not sure why this would be the case, and Chelan PUD will continue to look at these data to see if there is some condition that could be used that would increase surface collector passage for sockeye.

Next, Steig presented the results of the Chinook salmon acoustic tag studies evaluating route-specific passage at Rock Island Dam. In 2008, more Chinook smolts approached the dam along the east shore than in 2005 and 2007, when a large percentage of Chinook migrated down the west shore. In 2008, 54 percent of Chinook passed via Powerhouse 2, and 37 percent passed via Powerhouse 1. During the period from 2005 to 2008, the proportion of Chinook smolts annually passing via Powerhouse 2 and Spillway 2 declined, while the proportions increased through Spillway 1 and Powerhouse 1. There was not any major week-to-week variability with regard to passage route.

In 2008, most sockeye smolts approaching Rock Island migrated down the west bank (51 percent) and mid-river (38 percent), with a majority passing through Powerhouse 2. For steelhead, passage has decreased via Powerhouse 2 during the period of 2004 through 2008; passage has increased through Powerhouse 1 in latter years, and has increased through Spillways 1 and 2, except in 2008, when it dropped slightly due to different spill conditions. In 2008, most steelhead approached the dam mid-river (50 percent) and along the west bank (32 percent), and most passed through Powerhouse 2. Steig mentioned that the report for all of these data will be coming out soon, and more details will be discussed there.

B. SOA for Rock Island 10 Percent Spill Study

Keith Truscott updated the group that Chelan PUD has distributed a draft SOA for a Rock Island 10 percent spill study for 2009 that was essentially the same as that conducted in 2008—same species, same test protocols. Committees members raised several questions about the differences between Chinook salmon survival estimates in 2007 and 2008, and asked whether there were additional investigations that might be helpful to sort this out. Truscott indicated that Chelan PUD was open to suggestion, but at this time, he felt obtaining a third year's estimate was the appropriate next step. Bob Rose asked about the availability of a hydraulic model for the Rock Island Tailrace. Truscott indicated that hydraulic modeling was being discussed for Rocky Reach, but that one was not currently planned for Rock Island. Rose suggested that such a model might be useful to explain fish behavior in the forebay in different years. The Committees requested that Chelan PUD provide additional detail in the SOA on how 2009 studies might further the understanding of the differences between the 2007 and 2008 survival estimates. Truscott said that Chelan PUD would like the SOA to memorialize the Committees' decision to go forward with the study as proposed, and that Chelan PUD would be open to continuing discussion on what further information might be developed to resolve the question regarding interannual variability. Steve Hemstrom noted that Chelan PUD tagging technicians had indicated that the 2008 Chinook smolts did not appear to be in as good a condition as in past years. Jim Craig indicated that he could go back and check fish condition from the Methow Hatchery and the Entiat screw traps to see if poor fish condition was observed higher in the watersheds.

Keith Truscott will follow up with Bill Tweit and Bob Rose to discuss possible causes of the interannual variability between Chinook salmon survival estimates in 2007 and 2008 at Rock Island Dam under 10 percent spill. They will also discuss additional language for the Rock Island 10% Statement of Agreement (SOA; Item II-B) addressing unexpected high interannual variability for the current and potential future survival estimates. Chelan PUD will provide a revised draft SOA that reflects the discussions to the Committees by e-mail by December 5 as the means to finalize the Rock Island 2008 10% SOA.

C. Revised Scope of Work for Rocky Reach Fishway Maintenance Schedule

Keith Truscott provided a revised scope and schedule for reconditioning the third attraction water pump at Rocky Reach. Due to some cracks in pump B, a new shaft will be needed and has been ordered. Pump C was also found to have cracks, but there is no replacement shaft at this time. The new shaft for Pump B will arrive in mid-January. Pump C will be operated without overhaul this year, and the replacement shaft for Pump B will be installed during the 2009/2010 overhaul period. The Pump C shaft would then be replaced during the 2010/2011 overhaul period. Additional items to be addressed during this year's outage include the following:

- Automating the upper fishway picket barriers
- Removing the antiquated fish counting platforms and infrastructure
- Changing out the middle spillway entrance gate operators from pneumatic to electric
- Installing the de-watering pump in the spillway entrance pool and cleaning the floor diffusers
- Removing the antiquated stilling wells and replacing them with look-down transducers

D. Annual, 3-year, and 6-year Rocky Reach Surface Collector Underwater Inspection Schedule

Keith Truscott explained that the 6th year is coming up on the preventative maintenance underwater inspection schedule for the Rocky Reach surface collector. He provided a list of inspection items and the frequency. The 6th year's items include all of the items on the annual and 3-year list as well. The total time needed for the maintenance inspection will be 6 weeks.

III Douglas PUD (Rick Klinge)

E. Update on Debris Boom Construction

Rick Klinge reminded the group that the debris boom project required dropping the pool 8.5 feet from November 1 through 13 in order to pour concrete for the debris ramp. This was completed and the pool is back up now. During this period, some coho were found in a dried-out pond behind a 12-inch culvert through a berm along the Columbia River about 3.5 miles downriver from the confluence of the Methow River. Douglas PUD inspected the area and could find nothing that would have attracted the fish to the pond where they were subsequently stranded. Douglas PUD also looked around for others at other known ponds and did not find any Plan Species in these other ponds.

The construction of the debris boom should be completed by the end of February.

F. Winter Ladder Maintenance Schedule

Rick Klinge said that Douglas PUD is preparing for winter maintenance and will be servicing both fish ladders as typical. The west ladder will be serviced in December, and the east ladder will be serviced sometime in January 2009. Klinge reminded Committees members that they were welcome to visit the dam during this period to view the de-watered ladders.

IV Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe said that the Tributary Committees did not meet in November and that the November Hatchery Committees meeting will be occurring tomorrow. Mike Schiewe will update the group on the status of Ecology's water right discussions about Blackbird Island Pond following tomorrow's Hatchery Committees meeting. Schiewe said that the key item that the Hatchery Committees are dealing with is the Hatchery Scientific Review Group updates.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- December 16 from 1:00 to 4:30 pm at Chelan PUD in Wenatchee
- January 27 from 9:30 am to 3:00 pm in SeaTac
- February 24 from 9:30 am to 3:00 pm in SeaTac

VI List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Keith Truscott *	Chelan PUD
Steve Hemstrom	Chelan PUD
Lance Keller	Chelan PUD intern
Jerry Marco *	Colville Confederated Tribes
Rick Klinge *	Douglas PUD
Tracy Steig (morning)	Hydroacoustic Technology, Inc.
Bryan Nordlund * (by conference call – morning only)	NMFS
John Skalski (morning)	University of Washington
Rich Townsend (morning)	University of Washington
Jim Craig *	USFWS
Bill Tweit *	WDFW
Bob Rose * (by conference call)	Yakama Nation

* Denotes Coordinating Committees member or alternate

ATTACHMENT B

ROCK ISLAND HCP COORDINATING COMMITTEE STATEMENT OF AGREEMENT CHELAN COUNTY PUD, 2009 CONTINUED EVALUATION OF ROCK ISLAND PROJECT SURVIVAL FOR YEARLING CHINOOK, STEELHEAD, AND SOCKEYE DURING A 10% SPILL OPERATION

Rock Island HCP Coordinating Committee
Statement of Agreement
Chelan County PUD
2009 Continued Evaluation of Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation

December 16, 2008

Statement

The Rock Island HCP Coordinating Committee has reviewed the draft results of Chelan County PUD's 2008 Rock Island Survival Study with 10% spill operations and has agreed as outlined in the original Statement of Agreement approved on December 8, 2006 that the results warrant continued project survival evaluation of yearling Chinook, steelhead, and sockeye in 2009 under a 10% spill operation. Study protocol and logistics detail will be implemented as outlined in the RI 2008 "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation*". It was noted by the Committee that unexpectedly high variability exists between the 2007 and 2008 estimates of yearling Chinook survival. Continued detailed analysis comparing results of 2007 and 2008 (plant operations, tag/tagger effect, environmental conditions, fish health) is recommended as a means to explain the unusual variability. Should an element or combination of elements arise as likely contributors to the variance then efforts to improve study design and/or protocol to implement corrective action (if possible) will be considered.

If 2009 results continue to contribute to this unexplained extreme variability (unexplained high or low survival estimate) from previous years' study then the Committee will consider discussion regarding the need for additional information, including the option of an additional year of survival study .

Background

On December 8, 2006, the Committees approved a Statement of Agreement for testing a 10% spill operation (10% SOA) in 2007 at Rock Island Dam to assess yearling Chinook survival. The 10% SOA outlined an agreed project survival testing plan for 2007 and 2008 and beyond) based on results of the 2007 and 2008 tests. Although the 2-year average (2007 & 2008) of Project Survival for yearling Chinook is 93.5% and sets in motion as outlined in the 10% SOA a third year of yearling Chinook testing in 2009 at 10% spill operation, the Committee expressed some concern with the high level of variability between 2007 and 2008 results and will pursue additional data analysis in attempts to describe elements contributing to the variance. The first-year steelhead and sockeye results (97% & 93.3%; paired-release model) met the pre-determined survival metrics of the 10% SOA to continue survival testing in 2009. For reference, the December 2006 10% SOA and the "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation*" have been attached (Attachment A.1, 2).

Deleted: SOA 2009 CPUD RI 10% Survival Study V2 12_02_08 bt .doc¶

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair, HCP Coordinating Committees

CC: Ali Wick

Date: January 27, 2009

Re: Final Minutes of December 16, 2008 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Chelan PUD Headquarters Building in Wenatchee, Washington on Tuesday, December 16, 2008, from 1:00 pm to 3:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute the final November 18 Meeting Minutes to the Coordinating Committees (Item I).
- Bryan Nordlund will be meeting with Richie Graves at National Marine Fisheries Service (NMFS; Chief of the Federal Columbia River Power System Branch [FCRPS] Branch) to discuss further the appropriate path forward regarding potential modification of non-lethal take of non-listed Plan Species (Item III-B), and Nordlund will update Mike Schiewe on these discussions.

DECISION SUMMARY

- The Committees approved the Statement of Agreement (SOA) for the 2009 Rock Island 10% spill study (Item III-A).

I Approval of Meeting Minutes and Agenda (Mike Schiewe)

The November 18 Meeting Minutes were approved with minor revisions. Ali Wick will distribute the final minutes to the Coordinating Committees.

II Update: Tributary and Hatchery Committees (Mike Schiewe)

Mike Schiewe updated the group that the Tributary Committees have not met since the last Coordinating Committees meeting. The Tributary Committees will be meeting this Friday, December 19 to finalize the list of habitat projects to be funded in 2008.

Schiewe gave an update on the issues under discussion by the Hatchery Committees during the November meeting:

- Chelan PUD has been working toward Committees agreement on a second year of a partial water re-use study with summer/fall Chinook.
- The Committees have agreed to move up to 50,000 steelhead for acclimation at Blackbird Island Pond. The Committees have also agreed to support the water right application to Ecology.
- Since 2005, Chelan PUD has been supporting the Okanagan Nation Alliance's (ONA's) Skaha sockeye program as part of its mitigation obligation. Recently, Chelan PUD has been seeking an extension of this commitment beyond 2013 in order to finance an ONA hatchery facility and increase fry production. The goal of this action is to ultimately increase smolt numbers to meet the Rocky Reach and Rock Island HCP's mitigation obligation.
- Under the 2008 FCRPS Biological Opinion, NMFS is requiring the preparation of new Hatchery Genetic Management Plans (HGMPs) for all federally funded hatcheries in the Columbia River basin. Coincident with this review, NMFS has requested that the Hatchery Committees update HGMPs for the PUD-funded programs that rear Endangered Species Act-listed species. The first programs to be considered will be Wenatchee steelhead and Wenatchee spring Chinook. There are a number of policy issues associated with the management of these populations that are under discussion outside the Hatchery Committees, primarily between Washington Department of Fish and Wildlife (WDFW) and the Yakama Nation as co-managers of these programs. WDFW and Chelan PUD will be involved in the writing of the Wenatchee steelhead HGMP, and WDFW, Chelan PUD, and the Yakama Nation will be involved in the Wenatchee spring Chinook HGMP. The other members of the Hatchery Committees have elected to review the draft HGMPs rather than work directly on drafting the documents. The management discussions between WDFW and Yakama Nation are expected to be complete around the time that the HGMPs are due. Consequently, the

timing and schedule of submitting these HGMPs are still under discussion. The current timing being discussed is April or May for Chinook and March for steelhead.

- The Hatchery Committees are continuing their discussion of steelhead reproductive success studies as required by the HCPs. Chelan PUD is currently considering a study plan/proposal prepared by WDFW.
- Chelan PUD is working out the details of a sockeye enumeration study to collect population-specific information for area-under-the-curve method estimates of spawner abundance.
- The Wells Hatchery Compliance Report is out for review.
- The Wells HC approved the Douglas PUD 2009 Monitoring and Evaluation (M&E) Implementation Plan.
- The Committees discussed the Wells "drawdown" for debris boom installation in November and implications for steelhead and coho migration behavior.
- The Yakama Nation and the Colville Tribes are discussing potentially using Columbia River Intertribal Fish Commission (CRITFC) funding for M&E of production of Upper Columbia sockeye (Osoyoos Lake and Skaha Lake, primarily).
- The Committees are discussing broodstock collection at Wells Dam. The Joint Fisheries Parties are planning to hold a summer Chinook broodstock workshop this spring.
- The Yakama Nation expects to have steelhead kelts on station at the Entiat Hatchery for spawning this spring.
- NMFS has sent a proposal regarding male precocity to the Hatchery Committees for potential funding. The PUDs will be organizing some questions to send back to NMFS.
- The Hatchery Evaluation Technical Team (HETT) is working to identify control groups in the Methow basin. The HETT is also working to assemble Passive Integrated Transponder (PIT)-tag data from the Entiat River and Peshastin Creek.

III Chelan PUD (Keith Truscott)

A. DECISION ITEM: SOA Rock Island 10% Spill Study

Keith Truscott introduced this item, noting that discussions with Bill Tweit and Bob Rose had taken place post-November CC meeting to develop language in the SOA that would offer the Committee guidance should results of future RI 10% survival studies vary significantly beyond what has normally been experienced to date. Chelan PUD has agreed to further analyze these data to identify possible reasons for the differences between years.

The Committees approved the SOA previously sent, dated December 5 (now re-dated, see Attachment B). Bryan Nordlund noted that he was interested in seeing some additional investigation of individual turbine survival at Powerhouse 1 in future years, particularly at the higher end of unit flow range. Truscott said that this would be considered as their planning for out-years progresses.

In response to a question from last meeting regarding whether fish condition may have contributed to a decrease in survival in 2008, Jim Craig said that smolt trap data indicated that condition of smolts downstream of Entiat Hatchery in 2007 was significantly better than in 2008. He is still awaiting information on smolts released from Winthrop Hatchery. Keith Truscott expressed gratitude to Committees members for providing this type of information because it helps Chelan PUD and the Committees better understand these results.

B. Bi-catch during 2008 Pikeminnow Ladder Trapping at Rocky Reach and Rock Island

Keith Truscott summarized information on bi-catch of sockeye observed during ladder trapping of pikeminnow at Rocky Reach and Rock Island. He said that he wanted to bring this up for the Committees' information and to ensure that they were informed of this. There was a record return of sockeye this year. Chelan PUD intends to complete similar trapping in 2009 and wants to make sure there are not any Committees' concerns before moving forward with this.

Bryan Nordlund asked how many adult sockeye were caught in the NPM traps at the dams, and Steve Hemstrom responded that all six traps caught a total of 1,031 sockeye, and all were released with no injuries or mortalities documented. With a combined passage of 355,082 adult sockeye this year (combined Rock Island / Rocky Reach), the 1,031 incidental captures accounted for 0.29% of the run. Nordlund said that he asked this because he noted that he believed that the number exceeds the non-lethal take for non-listed HCP Plan Species under the provision for predator control in the Biological Opinion. He suggested that the Committees might want to formally address this issue. He indicated that he will be meeting with Richie Graves at NMFS (Chief of the FCRPS Branch) to discuss further the appropriate path forward regarding potential modification of limits for non-lethal take of non-listed Plan Species. Following these discussions, Nordlund will update Mike Schiewe with the path forward.

C. Rocky Reach Sockeye Study Planning for 2009

Keith Truscott asked for input from the Committees on sockeye study planning for 2009 at Rocky Reach. He asked Steve Hemstrom to provide an overview of what Chelan PUD is likely to propose for 2009. Hemstrom reviewed the test conditions and results since 2005 and said that the highest proportional use of the juvenile bypass was documented in 2008, and that Chelan PUD would like to maximize its use again in 2009. In continuing this discussion, Hemstrom noted that survival test release timing at Wells has traditionally been around noon on the day of release, and that this likely places the fish at the forebay of Rocky Reach during the daytime the next day when predators tend to be more active. To determine if this affects the results of survival testing, Chelan PUD is planning to compare results from both day/night releases, and potentially refine future sockeye release strategies to reflect natural arrival timing at the dam. The powerhouse would be operated according to the "Waterview" condition with no spill. To support this expanded release strategy, Chelan PUD is currently putting together a schedule for releases and staffing and is also looking into hydroacoustic monitoring of fish behavior at the surface collector entrance.

Steve Hemstrom asked if anyone on the Committees knew what the sockeye passage was like in the 1990s before the ONA program, and he questioned whether Skaha sockeye releases and passage timing might affect the overall timing of juvenile sockeye passage timing at Rocky Reach Dam. Rick Klinge suggested that the early records could be consulted to identify deep echoes (sockeye) and shallow echoes (steelhead) to help understand this. He said that historical behavior timing is likely similar to current timing.

Bryan Nordlund recommended that the study plan also include collection of information on survival through the powerhouse turbine units, especially when unit flow is high. He also suggested that spill, even with potential egress issues in the tailrace could prove to be a better option for increasing overall juvenile survival, as opposed to running turbine units at the higher flow rates. Lastly, he questioned whether the proposed test is addressing operating conditions that would benefit survival for all juvenile fish or whether it is more a test of study methods particular to sockeye. He asked this question as a reminder to the Committee that the final year of testing yearling Chinook survival had been deferred and sockeye survival studies initiated, based on the assumption that passage improvements would benefit both species. He stated that he could not see how the current study plan could result in any benefit to yearling Chinook passage and survival. Steve Hemstrom replied that Chelan PUD recognizes that it would be testing study methods for sockeye, but that it was critical to ensure that the study fish behaved in the same way as run-of-the-river fish.

IV Douglas PUD (Rick Klinge)

D. Update on Debris Boom Construction

Rick Klinge updated the group that the project is going well and the contractor is ahead of schedule. The anchoring cables are in place. The project should be completed in February, and Klinge invited the Committees to visit and see it once it is complete.

E. Update on East Fish Ladder Annual Maintenance at Wells Dam

Rick Klinge said that Douglas PUD conducted a dewatering of the east ladder earlier in December. Klinge has sent a memorandum to the Committees summarizing the number of fish that were removed from the ladder. Dewatering of the Collection Chamber took approximately 1 week to complete because of a leaking bulkhead that required additional attention. Only one fish mortality occurred (one whitefish). Klinge invited the Committees to tour the ladder while it is out of service.

V HCP Committees Administration (Mike Schiewe)

A. Meeting Schedule

The upcoming meetings are set as follows:

- January 27 from 9:30 am to 3:00 pm in SeaTac
- February 24 from 9:30 am to 3:00 pm in SeaTac
- March 24 from 9:30 am to 3:00 pm in SeaTac

VI List of Attachments

Attachment A – List of Attendees

Attachment B – Rock Island HCP Coordinating Committee Statement of Agreement Chelan County PUD, 2009 Continued Evaluation of Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Keith Truscott *	Chelan PUD
Steve Hemstrom	Chelan PUD
Jerry Marco * (by conference call)	Colville Confederated Tribes
Rick Klinge *	Douglas PUD
Tom Kahler *	Douglas PUD
Bryan Nordlund * (by conference call)	NMFS
Jim Craig *	USFWS
Bob Rose * (by conference call)	Yakama Nation

* Denotes Coordinating Committees member or alternate

ATTACHMENT B

ROCK ISLAND HCP COORDINATING COMMITTEE STATEMENT OF AGREEMENT CHELAN COUNTY PUD, 2009 CONTINUED EVALUATION OF ROCK ISLAND PROJECT SURVIVAL FOR YEARLING CHINOOK, STEELHEAD, AND SOCKEYE DURING A 10% SPILL OPERATION

Rock Island HCP Coordinating Committee
Statement of Agreement
Chelan County PUD
2009 Continued Evaluation of Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation

December 16, 2008

Statement

The Rock Island HCP Coordinating Committee has reviewed the draft results of Chelan County PUD's 2008 Rock Island Survival Study with 10% spill operations and has agreed as outlined in the original Statement of Agreement approved on December 8, 2006 that the results warrant continued project survival evaluation of yearling Chinook, steelhead, and sockeye in 2009 under a 10% spill operation. Study protocol and logistics detail will be implemented as outlined in the RI 2008 "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation*". It was noted by the Committee that unexpectedly high variability exists between the 2007 and 2008 estimates of yearling Chinook survival. Continued detailed analysis comparing results of 2007 and 2008 (plant operations, tag/tagger effect, environmental conditions, fish health) is recommended as a means to explain the unusual variability. Should an element or combination of elements arise as likely contributors to the variance then efforts to improve study design and/or protocol to implement corrective action (if possible) will be considered.

If 2009 results continue to contribute to this unexplained extreme variability (unexplained high or low survival estimate) from previous years' study then the Committee will consider discussion regarding the need for additional information, including the option of an additional year of survival study .

Background

On December 8, 2006, the Committees approved a Statement of Agreement for testing a 10% spill operation (10% SOA) in 2007 at Rock Island Dam to assess yearling Chinook survival. The 10% SOA outlined an agreed project survival testing plan for 2007 and 2008 and beyond) based on results of the 2007 and 2008 tests. Although the 2-year average (2007 & 2008) of Project Survival for yearling Chinook is 93.5% and sets in motion as outlined in the 10% SOA a third year of yearling Chinook testing in 2009 at 10% spill operation, the Committee expressed some concern with the high level of variability between 2007 and 2008 results and will pursue additional data analysis in attempts to describe elements contributing to the variance. The first-year steelhead and sockeye results (97% & 93.3%; paired-release model) met the pre-determined survival metrics of the 10% SOA to continue survival testing in 2009. For reference, the December 2006 10% SOA and the "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation*" have been attached (Attachment A.1, 2).

APPENDIX B

HABITAT CONSERVATION PLAN HATCHERY COMMITTEES MEETING MINUTES AND CONFERENCE CALL MINUTES

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Chuck Peven, Julie Pyper, and Tom Kahler

Date: February 21, 2008

Re: Final Minutes of January 16, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the SeaTac Radisson, on Wednesday, January 16, 2008, from 9:30 am to 4:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will send out the final December 12, 2007 Meeting Minutes (as revised) to the Hatchery Committees (Item I).
- Shaun Seaman will provide a revised Statement of Agreement (SOA) and study plan for the partial water re-use study to Ali Wick for distribution to the Committees (Item II-A).
- Julie Pyper will send out the Chiwawa Steelhead Acclimation Ponds Feasibility Report and a draft SOA in the next week or so for Committees' review and discussion (Item II-B).
- Julie Pyper will provide the monthly Chelan PUD engineering report to Ali Wick for distribution to the Committees (Item II-C).
- Chuck Peven and Ali Wick will work together to draft a letter to the Upper Columbia Salmon Recovery Board (UCSRB) summarizing the process and status of reference stream selection; the draft letter will include a list of recipients that will be copied on the letter (Item II-D).
- Shaun Seaman will coordinate with Trout Unlimited to request a presentation at the next Hatchery Committees meeting on plans for Blackbird Pond (Item II-E).
- Kris Petersen will discuss the steelhead reproductive success study internally within National Marine Fisheries Service (NMFS) and will provide a brief topic paper for the next meeting on defining potential reproductive success endpoints (Item III-C).

- Kirk Truscott will develop a draft Request for Concurrence letter for NMFS regarding an interim strategy for bacterial kidney disease (BKD) management at Methow Hatchery for the Committees' review by the next meeting (Item III-D).
- Kirk Truscott will provide a summary of the rearing study for 2005 Broodyear Turtle Rock summer Chinook rearing at Chelan Falls net pens to Ali Wick for distribution to the Committees for their review (Item IV-A).
- Tom Scribner will provide to Ali Wick for distribution a recent Yakama Nation (YN) poster discussing the proposed restoration of sockeye in the Yakima Basin (Item V-B).
- Julie Pyper will meet with Tom Scribner on the status of improvements to address leaf litter that impedes fish ladder use at Dryden (Item V-C).
- Tom Scribner will provide the YN's kelt reconditioning proposal to the Committees for their information and discussion as soon as it is available (Item V-D).
- Tom Scribner will provide the handouts on the YN's smolt acclimation proposal to Ali Wick for distribution to the Committees for discussion and review (Item V-E).
- Kirk Truscott will discuss with the Methow Hatchery manager whether the hatchery is a workable location for the BKD study (Item VI-A).
- Tom Scribner will discuss with the Cle Elum Hatchery manager whether this location is a workable location for the BKD study, and if so, then Mike Schiewe will discuss with Dave Fast (YN) a potential presentation to the YN, WDFW, and U.S. Fish and Wildlife Service (USFWS; Item VI-A).
- The Committees will re-review the Non-Target Taxa of Concern (NTTOC) process and be ready to make a decision on path forward at the next meeting (Item VI-B).

DECISION ITEM SUMMARY

There were no formal decision items approved at this meeting.

I Meeting Minutes Approval

The Committees approved the December 12, 2007 Meeting Minutes pending revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II Chelan PUD

A. Partial Water Re-use Pilot Study

Shaun Seaman distributed a revised study plan and draft SOA for a Partial Water Re-use Pilot Study to rear 100,000 Wells summer Chinook from the PUD's hatchery compensation program on a partial water re-use system. The new study plan reflects an agreement between Chelan PUD and WDFW staff that the initial testing will be conducted at a rearing density of 0.12 pounds per cubic foot-inch (lbs/cf-in); this is the same rearing density that is currently used in traditional raceways for HCP production. Under the proposal, Chelan PUD would implement the study as described in a first year "proof of concept" test, and then would review results with WDFW fish health staff and the Hatchery Committees before a potential second year of study would be proposed. The proposal includes the provision that each additional year would require Committees' approval. Seaman indicated today that he would like to further alter the draft SOA distributed today to add the condition that if a second year is agreed to, the PUD can test a 0.2 density index; he said that this item was inadvertently omitted when he was preparing the draft SOA for today.

Kirk Truscott discussed the various issues that had been discussed with WDFW fish health and Chelan PUD prior to today's meeting, and indicated that these issues had been worked out to the satisfaction of WDFW.

Shaun Seaman indicated that Chelan PUD had recently requested that John Skalski review the statistical power of the proposed study to compare differences in smolt to adult returns (SARs) between the testing groups; the SARs would be estimated based on Passive Integrated Transponder (PIT) tag detections. Kris Petersen mentioned that it would be valuable from a fisheries perspective to compare the return rates of test versus conventionally-reared fish that return to the area of Chelan Falls. (For context, this is based on an assumption that final acclimation for the test and control fish will occcur in the Chelan River).

Russell Langshaw confirmed that Grant PUD intends to provide some funding to this study because of Grant PUD's interest in the partial water re-use technology.

Tom Scribner asked whether Chelan PUD's expectation was that if the partial water re-use system works, then this system would be applied to other stocks, particularly spring Chinook. Shaun Seaman responded that Chelan PUD faces certain challenges, including water, in all hatchery programs, and the PUD's intention is to have a set of practical tools to use where they make sense in order to meet these challenges. If this system is a tool that makes sense, then the PUD would consider using it with an agreement by the Committees that it meets resource needs. He said that it was not possible to know at this time whether this tool would be considered for spring Chinook in particular.

Shaun Seaman agreed to provide a revised SOA and study plan for Committees' approval before the next meeting.

B. Chiwawa Feasibility Study

Julie Pyper introduced the current status of the Chiwawa feasibility study. Pyper intends to send this and an SOA out in the next week or so for Committees' email discussion. Pyper confirmed that the design will be consistent with the discussions the Committees have had over the last few months. At the last meeting, the PUD had agreed to investigate whether the design would include production level plus 10 percent because the permit allows 110 percent production if needed. Shaun Seaman commented today that the past Committee agreement to raise 450,000 fish was based on a conservative estimate of fish needed in order to meet permit needs. Thus, the design intent is for 450,000 fish. Kris Petersen noted that the 110 percent criteria is part of Grant PUD's obligation and that the different criteria may have led to this initial request by the Hatchery Committees. The Committees agreed that this criteria did not apply to the sizing of the new steelhead ponds.

C. Engineering Report

Julie Pyper and Sam Dilly provided the Engineering Report to the Committees for review. Pyper will provide the engineering report to Ali Wick for distribution to the Committees.

D. Potential Letter to the Entiat Planning Unit on use of the Entiat River as Potential Reference Stream

Chuck Peven indicated that at a recent UCSRB meeting, a group of Entiat Watershed residents expressed an interested in the status of the Entiat River as a reference stream. The Committees agreed that there was a need for communication with these groups and discussed how best to make the connection. The Committees agreed to send a letter to the UCSRB discussing the process for selecting reference streams, data being collected, and the expected schedule, but the letter will not discuss fisheries implications, which the Committees agree is outside the purview of these Committees. Chuck Peven and Ali Wick will draft a letter for Committees' review. The draft letter will be directed to the UCSRB, but copies will be distributed to several additional interested parties

E. Blackbird Island Pond Improvements for Steelhead Rearing

Shaun Seaman provided an update on recent Chelan PUD discussions with the Trout Unlimited group that is developing Blackbird Island Pond as a potential steelhead acclimation site. Seaman updated the group that Mike Kaputa of Chelan County Natural Resources Department (NRD) has committed to pursue grant funding to partially fund these improvements along with Chelan PUD. Seaman confirmed that because of the timing of proposal development, the pond would likely be ready for first use in 2009 at the earliest. The pond would not be used for overwintering due to winter conditions at the site. Seaman agreed to discuss with Trout Unlimited representatives the need to coordinate their efforts with the Hatchery Committees, as the final authority to move steelhead to this site will require the Committees' approval. Seaman agreed to coordinate with Trout Unlimited to have them provide a presentation about plans for the pond at the next meeting.

III Douglas PUD

A. 2008 Action Plan

Rick Klinge updated the group that the 2008 Action Plan for Douglas PUD had been distributed last meeting. The Committees approved the Plan for 2008.

B. Request by Grant PUD for Access to 2008 Brood Fish

Rick Klinge updated the group that Grant PUD has sent its annual request to Douglas PUD for access to the Wells and Methow hatchery facility to raise Upper Columbia River (UCR) steelhead, UCR spring-run Chinook salmon, survival study fish, and summer Chinook. The Committees were provided this request letter for their information. Douglas PUD intends to approve this request, as they did last year. Klinge said that the reply to Grant PUD will note that the current Grant PUD request does not conflict with the current programs at either facility, but if the programs change, the request will need to be re-evaluated. The Committees acknowledged that the rearing capacity at the Methow Hatchery for spring Chinook depends on the prevalence of BKD in the broodstock, with the capacity being reduced as the prevalence of BKD increases. This is due to the WDFW policy of rearing progeny of high BKD antigen females at reduced density. The Committees accept that if production falls below the 550,000 smolt level, then the shortfall will be divided proportionately among the three PUDs utilizing this facility for production.

C. Status of a Steelhead Reproductive Success Study

Tom Kahler discussed that studies comparing the natural reproductive success of hatchery reared and wild steelhead are required by all three HCPs. Kahler further stated that based on an earlier request by Douglas PUD staff, WDFW had included with the 2008 Douglas PUD Monitoring and Evaluation (M&E) Implementation Plan, a draft proposal utilizing the Wells Spawning Channel for such a study. Subsequently, Douglas PUD separated the reproductive success proposal from the M&E Implementation Plan to expedite approval of the M&E Plan. Kahler indicated that based on a more careful review of the proposed steelhead study by Douglas staff, they were reluctant to pursue it as proposed because it did not adequately address the objective identified in the HCP.

The discussion of the WDFW proposal to Douglas PUD served to open a broader discussion of how the Committees should proceed to develop and coordinate plans for reproductive success studies required by all three HCPs. Mike Schiewe suggested that perhaps Hatchery Evaluation Technical Team (HETT) could develop a list of reproductive success endpoints that might be considered, and review the various approaches that have been previously used to measure reproductive success in these types of studies. He further suggested that HETT might develop a matrix of the pros and cons for various endpoints and experimental approaches. Chuck Peven suggested that the work being done by the *ad hoc* supplementation workgroup should be included in this review. Kris Petersen requested the opportunity to discuss this subject internally within NMFS and agreed to provide for the next meeting a brief topic paper on defining potential reproductive success endpoints.

D. Interim BKD Management Strategy for Methow Spring Chinook Supplementation Program

Mike Schiewe introduced this topic by reviewing the brief document summarizing a proposed interim management strategy for BKD in the Methow spring Chinook program that he prepared in collaboration with Douglas PUD and WDFW staff. He explained that the strategy was a much abbreviated version of the July 2, 2007 memo summarizing discussion between WDFW and

Douglas PUD staff that was prepared by Kirk Truscott for the Committees. Schiewe noted that the purpose of his summary document was to document Committees' approval of the interim strategy and initiate NMFS permit review as necessary.

Kris Petersen commented that one of NMFS' ongoing concerns is that too few natural origin fish are currently being incorporated in the broodstock than should be for a true supplementation program. Accordingly, she would like to see some evaluation of the potential of culling to exacerbate this concern. Kirk Truscott indicated that the interim strategy does not contemplate the culling of wild fish. Petersen indicated that it was her first impression that the proposed interim strategy would require modification or amendment of permit 1196.

The Committees discussed that the interim BKD program will need to reflect the intention of producing a positive effect on the program. Petersen recommended that one of the permit holders send a "Request for Concurrence" to NMFS describing this proposal (disposition of culled fish; incorporation of natural origin fish into the program) and how the proposal would increase information about BKD and program effects over the long term. The letter would need to describe any new take that would occur in the program relative to what was originally considered in the permit. Tom Scribner stated that being clear and forthright about the proposed culling (e.g., sacrificing versus early release of the progeny of BKD antigen females) should simplify the permit process. Stating that the high BKD antigen progeny would be removed from the program rather than being reared and released early would eliminate the ecological concern associated with the early release practice. Kirk Truscott agreed to draft a Request for Concurrence letter for Committees' review by the next meeting.

E. *Update on Construction Projects*

a. *Twisp Weir*

Tom Kahler updated the group that contractor submittals are being reviewed by Douglas PUD for Twisp Weir.

b. *Wells Hatchery Water Intake Screen*

Tom Kahler updated the group that the contractor has mobilized the construction/ installation barge and deployed the containment boom for installation of the new screen.

IV WDFW

A. Broodyear 2005 Turtle Rock Summer Chinook Rearing at Chelan Falls

Kirk Truscott provided an update on the outcome of rearing broodyear (BY) 2005 summer Chinook at net pens at Chelan Falls versus those reared under standard rearing protocols at Turtle Rock Island. This year, fish were reared at 16 fish per pound, and 99,660 fish were released. In comparing lengths and weights, results show that fish reared in the Chelan Falls net pens were closer to program targets than those reared at Turtle Rock Island. WDFW believes that fishes homing fidelity will improve and updated the Committees that WDFW will likely request a second year of study. Truscott will provide a study summary to Ali Wick for distribution to the Committees for their review. This will be on the agenda for approval at the next meeting; the Committees decided that a formal SOA is not needed for this year because last year's SOA sufficiently captures the detail needed to agree to a second year of study.

B. Colville Tribes Request for Release of Steelhead Smolts into Salmon Creek

Kirk Truscott updated the group that the Colville Tribes have made their annual request to WDFW to release 25,000 steelhead smolts in Salmon Creek this spring. Truscott brings this up today for the Committees' information.

V Yakama Nation

A. Mid-November Ending Dates for Mainstem Dam Counts as Relates to Coho Salmon

Tom Scribner updated the group that mainstem index dam counts for coho salmon at several Mid-Columbia dams are inconsistent (e.g., Rock Island and Priest Rapids). Scribner believes these counts are the result of counter misidentifying the species and wants to discuss with PUDs ways to refine these. For example, this year's coho counts were approximately 5,000 greater at Rock Island than at Priest Rapids. Chuck Peven surmised that it could be that coho are being counted as Chinook jacks at Priest Rapids, as their jack count is typically out of sync with other dams. Russell Langshaw discussed that smaller fish have historically escaped the camera's view at Priest Rapids Dam, and fish size is distorted due to viewing window/camera position. He indicated that Grant PUD will be moving the camera this year in order to capture these fish better on film. Russell suggested that Keely Murdoch talk to Eric Lauver at Priest Rapids Dam to discuss these counts.

In addition, Scribner noted that counts typically extend to mid-November. He would like to request extending the counting season at least for 1 or 2 years in order to potentially capture more of the run. He indicated that at the time counting ended last year, there were still about 10 coho per day passing the dam, according to dam counts. Scribner will be discussing with the PUDs the options to review existing data or extend the counting season.

B. Sockeye Reintroduction into Lake Cle Elum

Tom Scribner introduced this topic by summarizing that sockeye had been extirpated from Lake Cle Elum, and there is currently an interest by the Yakama Nation Council to look into reintroducing sockeye. The YN is investigating possibilities for obtaining about 200 pairs of sockeye from the Okanagan Basin as an opportunity to reintroduce sockeye. At this time, these discussions are mostly at the conceptual level. The YN has contacted Howie Wright of the Okanagan Nation Alliance to discuss this. At the end of February, the YN will be attending the Bilateral Okanagan Basin Technical Working Group (BOBTWG) meeting in order to further discuss opportunities and arrangements. Scribner will provide to Ali Wick for distribution a recent YN poster discussing restoration of sockeye in the Yakima Basin.

C. Dryden Dam Upgrades

Tom Scribner asked Chelan PUD to update the group on recent work at Dryden Dam to address leaf litter that impedes fish ladder use on the right bank. Julie Pyper will get back to Scribner on the status of improvements at Dryden.

D. Kelt Reconditioning

Tom Scribner provided an update on YN discussions with the Action Agencies as part of the Federal Columbia River Power System Biological Opinion (FCRPS BiOp) remand process. He indicated that the YN is developing an implementation proposal for steelhead kelt reconditioning. Scribner will provide this proposal to the Committees for their information and discussion as soon as it is available.

E. Follow-up on Yakama Nation Smolt Acclimation Presentation from December 2007 Meeting

Tom Scribner updated the group that YN staff are further developing the Wenatchee basin steelhead smolt acclimation proposal by identifying and evaluating potential sites. Scribner will provide this information to Ali Wick for distribution to the Committees for discussion and review. The next step for the YN staff is to develop some conceptual drawings depicting how these sites might be developed.

VI HETT Updates

A. Progress on Draft BKD Study Plan

Mike Schiewe reminded the group that HETT is working on developing a list of potential facilities where the draft BKD study plan could be implemented. Schiewe reported that after some discussion, it was determined that the USFWS is not interested in performing this study at any USFWS hatcheries. Another potential location is the Methow Hatchery, and Kirk Truscott is discussing with the Methow Hatchery manager whether this location is workable with regard to overall production capacity. Truscott will update the group on these discussions at the next meeting.

Tom Scribner commented that he had discussed the potential to conduct the study at Cle Elum Hatchery, and the preliminary response was a qualified 'yes,' depending on study details. Scribner would likely need a technical presentation to help the hatchery managers and the YN understand the study proposal and capacity needs. Scribner will further discuss with the Cle Elum Hatchery manager whether this location is workable, and if so, then Mike Schiewe will discuss a potential presentation with Dave Fast (YN).

B. NTTOC

Mike Schiewe reminded the group that the NTTOC process has been on hold since last summer pending Hatchery Committees' review of the process described by Todd Pearson at the July Committees meeting. The Committees agreed to review the NTTOC material and be ready develop a path forward at the next meeting.

VII HCP Administration

A. Meeting Agreements

The following are informal Committee agreements that were made at the meeting:

- The Committees agreed that the 2008 Douglas PUD Action Plan is satisfactory (Item III-A).

B. Next Meetings

The next scheduled meetings are as follows: February 20, March 19, and April 16, all at Chelan PUD in Wenatchee.

VIII List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Chuck Peven	Chelan PUD
Shaun Seaman *	Chelan PUD
Julie Pyper	Chelan PUD
Sam Dilly (morning only)	Chelan PUD
Jerry Marco *	Colville Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Russell Langshaw	Grant PUD
Curt Dodson	Grant PUD
Kris Petersen *	NMFS
Dave Carie * (by conference call)	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer	WDFW
Tom Scribner *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Chuck Peven, Julie Pyper, and Tom Kahler

Date: March 20, 2008

Re: Final Minutes of February 20, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, February 20, 2008, from 9:30 am to 4:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Julie Pyper will meet with Tom Scribner on the status of improvements to address leaf litter that impedes fish ladder use at Dryden (January Meeting).
- Ali Wick will send out the final January 16, 2008 Meeting Minutes (as revised) to the Hatchery Committees (Item I).
- Lynn Hatcher will ask Kris Petersen to check with National Oceanic and Atmospheric Administration (NOAA) general counsel regarding the legality of a directed take of listed steelhead that residualize and pose a predation risk on other listed species (Item II).
- George Velasquez will send the Chiwawa Concept Plan/Feasibility Study to Ali Wick by February 29 for Hatchery Committees' review and comment submission by March 19 (Item III-C).
- Shaun Seaman will check with Chuck Peven regarding the 2007 Wenatchee spawning ground reports (Item III-D).
- Shaun Seaman will provide the 2008 Rocky Reach and Rock Island Action Plan to Ali Wick for distribution to the Policy Committees (Item III-F).
- Shaun Seaman will send the January Engineering Report to Ali Wick for distribution to the Hatchery Committees (Item III-H).

- Lynn Hatcher will check with Kris Petersen to determine whether taking blood samples from listed spring Chinook populations is covered by the existing Endangered Species Act (ESA) permit (Item IV-C).
- Kirk Truscott will meet with the Wells Hatchery staff to discuss potential space constraints and manpower issues regarding potential summer Chinook egg collection at Wells Hatchery for subsequent transfer to Prosser Dam (Item V-B).
- Jerry Marco will report back to the Hatchery Committees on any policy issues that the Colville Tribes may have with the Yakama Nation's proposed summer Chinook egg take at Wells for transfer to Prosser Dam (Item V-B).
- Douglas PUD will discuss internally the potential need for new holding facilities for the bacterial kidney disease (BKD) study at the Methow Hatchery and will provide an update at the next meeting (Item VI-D).
- Tom Scribner will discuss with Dave Fast and Cle Elum Hatchery staff the facility requirements for a potential BKD rearing density study (Item VI-D).
- Kirk Truscott will forward to Ali Wick Washington Department of Fish and Wildlife's (WDFW's) proposal to conduct trapping efficiency trials for spring Chinook in the Methow basin, for distribution to the Hatchery Committees and for Committees' email concurrence (Item VI-E).
- Mike Schiewe will discuss with Kris Petersen the potential endpoints for a steelhead reproductive success study for each of the various HCPs (Item VII-A).
- Mike Schiewe will discuss with Ali Wick and Keely Murdoch the development of a Hatchery Evaluation Technical Team (HETT) task order and schedule for the Non-Target Taxa of Concern (NTTOC) process (Objective 10 of the Monitoring and Evaluation [M&E] Plan; Item IX-B).

DECISION ITEM SUMMARY

- The Hatchery Committees approved the Pilot Partial Water Reuse Study Statement of Agreement (SOA) and plans for the study for 2008, with the provision that a decision on whether to mark 10,000 or 20,000 fish per group will be based on further review of the impacts of tagging these groups and the likelihood of increasing the detection of a significant difference between treatment and control (Item III-A).

I Meeting Minutes Approval

The Hatchery Committees approved the January 16, 2008 Meeting Minutes pending revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II Presentation: Blackbird Island Pond

Rollie Schmitten of the Icicle Chapter of Trout Unlimited introduced today's presentation, which was an update on the group's ongoing efforts to develop Blackbird Island Ponds for steelhead acclimation. Bob Stroup of Trout Unlimited provided an overview of the work to date. In the late 1990s, a children's fishing pond and back-channel area were created on the Wenatchee River. He then discussed the history of the support group's participating in the current efforts. Bruce Heiner of WDFW described the proposed installation and operation of a pump during the period of mid-February through April to provide adequate water to support the fish and facilitate their exit to the river. His current design idea for the outlet pipe consisted of a vertical half-round culvert with stop logs and screens at the top, connected to a buried ~18-inch pipe out to the river. Dan Davies said that the capacity of the pond was likely to be 35,000 to 50,000 fish, depending on the water right approved. Tom Scribner noted that one of the key issues will be providing an adequate water supply; Heiner verified that the current design will provide enough head to get water to the pond.

Kirk Truscott requested that Trout Unlimited work with WDFW to develop plans for power outages, security and access, and predator control. Schmitten confirmed that he would provide this information to the Committees. Dan Davies pointed out that the demand for children's fishing ponds is very high in the area. Rollie Schmitten and Kirk Truscott discussed that the strategy for post-release management of steelhead that failed to migrate would need to be considered. Keely Murdoch asked about plans for staffing at the ponds, noting that staff presence during pond operation has a big influence on the magnitude of bird and otter predation. Joe Miller indicated that WDFW would look forward to working with Trout Unlimited on this project and how to address residual steelhead and stocking the pond for kids fishing. Lynn Hatcher asked about the predicted frequency of overtopping; Heiner replied that overtopping might typically be a 10-year event. Mike Schiewe confirmed with the Trout Unlimited group that plans for the facility would continue to be vetted and worked on with WDFW; Rollie Schmitten agreed.

Rollie Schmitten said that the earliest this facility would likely be ready for use would be in the spring of 2009. Shaun Seaman agreed to determine the availability of Chelan PUD permitting staff to advise Trout Unlimited on permitting issues. During this discussion, Lynn Hatcher reported that Kris Petersen had indicated that the project would likely be covered under the existing Permit 1395. Following a discussion of how to manage steelhead that fail to leave the pond, Hatcher indicated he would ask Kris Petersen to contact NOAA General Counsel about potential management options that were legal under the ESA.

III Chelan PUD

A. *Partial Water Reuse Pilot Study*

Shaun Seaman introduced this topic and the supporting documents that had previously been provided to the Committees, including the SOA for the 2008 pilot study. The SOA discusses that this will be a 1-year study based on the criteria set forth in the supporting documents, including the study's rearing criteria and the study's M&E plans. Sam Dilly discussed that Chelan PUD has been investigating the numbers of fish that could be PIT-tagged, and how different numbers would affect the statistical power of the test. Steve Hays indicated that Chelan PUD had contracted with statistician Dr. John Skalski at the University of Washington for these analyses. Hays noted that Skalski's analyses indicated that the low detection rates of juvenile fish at McNary Dam would make it highly unlikely that a small (10 percent) difference in survival between treatment groups ($\alpha = 0.5$, one-tailed) would be statistically significant. However, the analyses did show that there was a relatively high likelihood of detecting a 50 or 100 percent difference in survival as statistically significant. Under all circumstances, it was demonstrated that increasing the numbers of tagged fish from 10,000 to 20,000 per treatment would increase the likelihood of detecting a significant difference. It was acknowledged, however, that tagging twice the number of fish posed logistical problems and could potentially compromise the experiment. This lead to considerable discussion on whether or not the increase in confidence was worth the additional tagging and the related impacts to the fish. Sam Dilly agreed to ask their consultants about the use of a pie-shaped crowder in the circular tanks as a way to separate tagged from untagged fish during the tagging process. There was also a discussion of how long the fish might be off-feed during the tagging process. The Committees agreed that 20,000 fish per treatment would be marked, unless it was determined that this number was logistically not possible or that marking this number would compromise fish health and thus add another unrelated variable to the study. It was further discussed that these fish might be tagged just prior to acclimation and moved to an alternate vessel after tagging. With these provisions, the Committees approved the SOA and plans for the study for 2008.

B. Chiwawa Water Warming Manifold Operation Memorandum

Shaun Seaman updated the group on the Chiwawa water warming manifold operation; this information had been previously sent to the Hatchery Committees.

C. Chiwawa Concept Plan / Feasibility Study Report

George Velasquez introduced this topic and discussed that he will soon be sending out the updated Chiwawa Steelhead Acclimation Ponds Feasibility Study report for Hatchery Committees' review and comment. Velasquez will send the document to Ali Wick by February 29 for distribution to the Committees. The Committees agreed to provide comments by the date of the next meeting, March 19. If Committees members identify any major design issues in the document while reviewing it, they will notify Velasquez as soon as feasible so that these issues can be resolved.

Velasquez also noted that CH2M Hill is concurrently working on the 30 percent design for the Chelan Falls Rearing Ponds. Permitting for the Chelan Falls and the Chiwawa facilities will likely proceed on similar timelines.

D. 2007 Wenatchee Spawning Ground Reports

Shaun Seaman will check with Chuck Peven regarding this item.

E. WDFW/Yakama Nation Wenatchee Spring Chinook Management White Paper

Kirk Truscott updated the group that WDFW and the Yakama Nation (YN) are collaborating on a draft white paper describing a Joint Fisheries Parties (JFP) management plan for spring Chinook in the Wenatchee basin. Truscott and Bob Pfeifer will keep the Hatchery Committees updated as this document develops.

F. 2008 Rocky Reach and Rock Island HCP Action Plan

Shaun Seaman distributed the 2008 Rocky Reach and Rock Island Action Plan. This plan is provided as an FYI to the Committees. Seaman will provide this document to Ali Wick for distribution to the Policy Committees.

G. Update on Tumwater PIT-tag Coil Installation

Shaun Seaman updated the group that the Tumwater Passive Integrated Transponder tag (PIT-tag) coil has been installed and is either working now or will be shortly.

H. Engineering Report

Shaun Seaman will send the January Engineering Report to Ali Wick for distribution to the Committees.

I. Tumwater Dam

Shaun Seaman updated the group that Chelan PUD may not be able to operate Tumwater Dam on a year-round basis, and will be working with WDFW on this issue.

IV Douglas PUD

A. Update on Construction Projects

a. Twisp Weir

Tom Kahler updated the group that construction is underway in building the cofferdam for the Twisp weir project.

b. Wells Hatchery Water Intake Screen

Tom Kahler updated the group that the Wells Hatchery Screen project is now complete.

c. PIT-Tag Detector Location at West Ladder Trap

Tom Kahler updated the group that Douglas PUD is working with Biomark to upgrade and reconfigure the PIT-tag detector associated the west ladder trap; as it is currently positioned, it is subject to vibration and electromagnetic interference. Douglas PUD anticipates 100 percent detection following this upgrade, and the construction is anticipated to begin in March.

B. Water Rights Certificates

Rick Klinge discussed that Douglas PUD is considering converting from individual water certificates for each well to one certificate that applies to an entire wellfield at the Methow Hatchery. The intent of this action is for Douglas PUD to remain within the gallons per minute (gpm) criteria stipulated in the water right, but eliminate the need to manage each well individually. Douglas PUD may request letters of support from individual Committees members to Washington State Department of Ecology (Ecology) for this conversion.

C. Request by NMFS for Blood Samples for Hatchery Fish

Rick Klinge introduced this topic and Russell Langshaw provided additional information. Based on recent work in the Yakima basin, National Marine Fisheries Service (NMFS) researchers had found that a high percentage of male Chinook salmon were maturing as mini-jacks, and that those fish maturing precociously could be identified prior to release based on hormone concentrations in their blood. The NMFS researchers want to expand their study into other basins in the Upper Columbia River, and are now requesting 300 pre-smolt (yearling or subyearling) Chinook per hatchery program for this study. The researchers have not identified which stock(s) they want to sample, but indicated that they would like to sample in March or April. Langshaw confirmed that the researchers cannot get useful samples from dead fish and want to test as many independent spring Chinook populations as possible. The Committees agreed that, subject to NMFS review, making these fish available for this study would be acceptable, given that these fish are not PIT-tagged individuals. Lynn Hatcher will discuss the ESA issues with Kris Petersen to confirm whether this action is within the existing permit.

V Yakama Nation

A. Kelt Reconditioning

Tom Scribner updated the group that the YN are still working on a proposal for kelt reconditioning; this activity will eventually involve trapping kelts at Chelan and Douglas PUD dams. The YN is not anticipating collections this year, but collections would occur within the April to May timeframe, potentially a year from now.

B. Summer Chinook Egg Request from Wells Hatchery for Feasibility Work in Yakima River

Tom Scribner referenced the previously distributed summary of the YN's proposal requesting summer Chinook eggs from Wells Hatchery for rearing and release at Prosser Dam in the Yakima basin. The purpose of this action is to support the reintroduction of summer Chinook in the Yakima Basin. The YN is currently working on fish health issues with WDFW and U.S. Fish and Wildlife Service (USFWS) associated with this proposal. Scribner indicated that he was discussing this proposal with the Hatchery Committees in order to provide an opportunity for members to express any early concerns. Rick Klinge noted that Wells Hatchery may have some space issues with holding excess adults, and would like the opportunity to review this proposal in further detail. Scribner noted that the facility manager had indicated that space would likely not be an issue, but he will continue to work with the PUD to ensure that this action would not negatively impact the summer Chinook production program broodstock currently held at the Wells Hatchery. Kirk Truscott will meet with the hatchery staff to discuss potential space constraints and manpower issues. Several Committees members indicated the need to further explore some of the ramifications (e.g., hatchery use, policy), but the Committees agreed that this proposal is acceptable in concept. Jerry Marco will report back to the Committees on any policy issues that the Colville Tribes may have with this action.

C. Tribal/Action Agency FCRPS Memorandum of Agreement

Tom Scribner updated the group that a 10-year Memorandum of Agreement (MOA) between the Federal Columbia River Power System (FCRPS) Action Agencies (Bureau of Reclamation [BOR], U.S. Army Corps of Engineers [USACE], and Bonneville Power Administration [BPA]) and the Treaty Tribes was close to being agreed upon. Today, the Yakama Nation Tribal Council is meeting to decide whether they will accept this MOA [In review of these minutes, Tom Scribner later noted that this was incorrect - the council was meeting that day to get an initial briefing on the MOA with a decision to come at a later date].

VI WDFW

A. Update on Ultrasound Machines

Kirk Truscott and Shaun Seaman reported that they would review last year's efficiency of the ultrasound equipment in order to finalize the decision to purchase additional units. Since last year's utilization was late in the season, additional information gained from early use this year will help validate the purchase. They will report back to the Hatchery Committees at the next meeting.

B. Concurrence Letter to NMFS on Interim BKD Management Plan

This item is on hold while the Hatchery Committees moves forward on potential sites for the BKD study.

C. Summary of Broodyear 2005 Turtle Rock Summer Chinook Net Pen Rearing at Chelan Falls

Kirk Truscott informed the Hatchery Committees that WDFW would like to continue net-pen rearing of Turtle Rock Summer Chinook in 2008, employing the same protocols and schedule as was used in 2007. The Committees agreed that continuing this rearing is acceptable for 2008.

D. Update on Potential for BKD Study at HCP Hatcheries

Mike Schiewe updated the group that Kirk Truscott had provided a memorandum regarding the use of the Methow Hatchery for a BKD rearing-density study. Truscott indicated that, after taking into account that two brood years would be on station at the same time, the current study design would require use of all of the existing rearing space at the hatchery. Truscott indicated that one way to move forward would be to consider constructing additional rearing facilities at the hatchery, and that any new rearing capacity (after the test) might be used by Grant PUD to meet their production needs in the future. Douglas PUD agreed to discuss this internally and will provide an update at the next meeting.

Reporting back as requested from the last meeting, Mike Schiewe reported that he had spoken to Trevor Evelyn regarding the role of disease in the upcoming Hatchery Scientific Review Group (HSRG) analysis; Evelyn reported that fish disease would factor into the HSRG analysis, but disease would likely not be a substantial driver in the analysis. The HSRG will primarily be looking at genetic management of brood stock. This means that the HSRG analysis will not be a large impetus for the BKD study, and a study (if conducted) will not likely be an important factor in HSRG conclusions.

Tom Scribner will further discuss with Dave Fast and the Cle Elum Hatchery staff the potential to conduct a BKD rearing-density study at the Cle Elum facility.

E. Proposal for Spring Chinook Methow Trapping Efficiency Trials

Kirk Truscott will forward to Ali Wick WDFW's proposal to conduct trapping efficiency trials for spring Chinook in the Methow basin; Wick will distribute the proposal to the Hatchery Committees for review and email concurrence. These trials would need to begin in early March in order to cover a range of discharge levels.

VII NMFS

A. Steelhead Reproductive Success Endpoints

Lynn Hatcher provided a handout on NMFS suggestions for steelhead studies about hatchery supplementation programs in the upper Columbia River Basin. Mike Schiewe will further discuss with Kris Petersen the necessary first step of determining what would be the most appropriate endpoint(s) for determining reproductive success of hatchery-origin recruits spawning naturally. Seaman asked for clarification regarding the action item from the last meeting on how this list meets the intent of that item. Also, Seaman asked whether this list was consistent with the M&E program.

VIII HETT Updates

A. Update on Reference Streams (a.k.a Reference Populations) for Spring Chinook

Keely Murdoch provided an update on the HETT's work on reference stream (reference populations) analysis for Chiwawa River spring Chinook. The HETT looked at correlation coefficients for effect sizes, and also at productivity and abundance. The results were fairly consistent with one another. Populations that are likely to be recommended include Marsh Creek, Entiat River, Secesh River, and the Little Wenatchee River. The Naches River population has a certain set of early datapoints that may be outliers, and Andrew Murdoch is following up for information on these points. The next step is to run the analyses for fish spawning in the Methow and Chewuch Rivers, and for Nason Creek and the White River to be completed as time allows. Russell Langshaw is completing a physical parameter comparison among these streams that will inform the results once data are collected.

IX HCP Administration

A. Upper Columbia River Salmon Recovery Board (UCSRB) Letter

Mike Schiewe reviewed with the Hatchery Committees that Chuck Peven had suggested at the last meeting that the Hatchery Committees might want to send a letter to the Entiat Watershed Planning Group (EWPG) describing progress in identifying hatchery supplementation reference streams. The Committees agreed to consider drafting such a letter. However, after discussion today, the Committees felt it would be more useful for selected Committees members to attend the next meeting of the EWPG to provide a verbal update. Further, the Committees agreed that it would be useful for Mike Schiewe to contact Julie Morgan (Executive Director) of the UCSRB to arrange for a briefing on HCP programs and progress over the last several years.

B. NTTOC Path Forward

Mike Schiewe introduced this topic and emphasized the importance of agreeing to a plan for implementing Objective 10 of the M&E Plan, determining the effect(s) of supplementation on NTTOC in HCP streams. This objective is a regional issue, and funding should be discussed at some point. The Committees discussed that the species list and containment levels should be chosen in the Hatchery Committees with HETT input. Mike Schiewe will discuss with Ali Wick and Keely Murdoch the development of a HETT task order and schedule for this activity.

C. Informal Meeting Agreements

The following are informal Committee agreements that were made at the meeting:

- Several Committees members indicated the need to further explore some of the ramifications (e.g., hatchery use, policy) of collecting extra summer Chinook eggs at the Wells Hatchery for transfer to the Yakima basin for rearing and release, but the Committees agreed that this proposal is generally acceptable in concept at this time (Item V-B).
- The Committees agreed to continue Turtle Rock summer Chinook net pen rearing in 2008 at Chelan Falls (Item VI-C).

D. Next Meetings

The next scheduled meetings are as follows: March 19, April 16, and May 21, all at Chelan PUD in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Steve Hays	Chelan PUD
Shaun Seaman *	Chelan PUD
Sam Dilly (morning only)	Chelan PUD
George Velasquez (afternoon only)	Chelan PUD
Jerry Marco *	Colville Tribes
Tom Kahler *	Douglas PUD
Rick Klinge*	Douglas PUD
Lynn Hatcher *	NMFS
Rollie Schmitten (morning only)	Trout Unlimited
Bob Stroup (morning only)	Trout Unlimited
Dan Davies (morning only)	Trout Unlimited
Dave Graybill (morning only)	Trout Unlimited
Dave Rayfield (morning only)	Trout Unlimited
Dave Carie *	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Joe Miller (morning only)	WDFW
Bruce Heiner (morning only)	WDFW
Keely Murdoch *	Yakama Nation
Tom Scribner * (by conference call)	Yakama Nation

* Denotes Hatchery Committees member or alternate

ATTACHMENT B

ROCKY REACH AND ROCK ISLAND HCP HATCHERY COMMITTEES STATEMENT OF AGREEMENT REGARDING PILOT STUDY FOR PARTIAL WATER REUSE

Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding Pilot Study for Partial Water Reuse
February 20, 2008

Statement

The Rocky Reach and Rock Island HCP Hatchery Committees (hereafter "Committees") agree that Chelan County PUD (hereafter "District) can perform a partial water reuse pilot study. Approximately 100,000 Wells Summer Chinook from the District's hatchery compensation program will be reared on partial water reuse water utilizing circular ponds. The Committees agree to allow the District to perform the study as outlined in the attached *Pilot Water Reuse Fish Rearing Criteria* and the *Partial Water Reuse Pilot Study Monitoring and Evaluation*. The study will be for one (1) year and the Committees will decide whether to pursue additional years of study based on the results of the first year of the pilot study.

The study will continue as long as the health of the fish remains comparable to the control group reared under protocols as detailed in the *Hatchery Facility Evaluation Suggested Guidelines for Anadromous Fish Hatchery Programs.* The pilot study will be discontinued if fish health criteria and mortality limits agreed to by the Committees prior to the start of the study are not met or if limits are exceeded.

A subset of the study (those in the circular ponds) and control fish will be PIT tagged to allow for evaluation of the study. All study fish will be differentially marked with coded wire tags. The number of study and control fish to be PIT tagged will be determined by the Committees.

Background

Background

Water and space are major limiting factors in hatchery facilities. The District would like to investigate alternative methods for using water, and potentially space, when revising either existing facilities or constructing new ones. One such method for conserving water during rearing is partial water re-use. Successful application of water re-use technology has been previously demonstrated with Atlantic Chinook using 75 % reuse water. Twenty-five percent of the water is instantaneously added and the 75% reused water is oxygenated and CO_2 stripped before reentering the pond. The effluent (at the bottom of the pond) contains practically all of the waste products and unused fish food.

The District proposes to test this configuration at a rearing density (0.12 lbs./cu.ft.-in). Based on case studies from existing applications, this reuse technology may be practical and feasibility for application to Upper Columbia hatchery sites at this density.

Objective

Determine if circular ponds with 75% reuse can be used to rear Chinook from ponding to yearling size at Eastbank, while producing fish with growth, health and vigor desired for the supplementation programs.

ATTACHMENT 1

PILOT STUDY REARING CRITERIA

P I L O T   W A T E R   R E U S E

F I S H   R E A R I N G   C R I T E R I A

DATE: February 2, 2009

TO: Hatchery Committee

FROM: Sam Dilly

RE: Pilot Study Rearing Criteria

This draft Pilot Water Reuse Fish Rearing Criteria was developed in collaboration with WDFW staff and Chelan PUD representatives January 23, 2008. WDFW staff reviewed the criteria and provided recommendations that were accepted by the District and are included in the pilot program. These final criteria will be part of the pilot study covered in the Statement of Agreement February 2008.

Pilot study disease and rearing criteria

1. Juvenile summer Chinook disease identification and treatment requires consideration of multiple variables and conditions. The pilot water reuse study will track water quality and study conditions per the attached monitoring and evaluation paper. The Fish Health Monitoring and Evaluation is structured adequately, contains the correct magnitude of testing and observation and will be followed. However, rearing conditions, test duration, and further discussion among WDFW staff and Chris Good, fish veterinarian with Freshwater Institute, may lead to additional testing or other testing to improve the pilot test data. The data will create the basis for disease identification and treatment.

2. Observed fish disease and sickness among pilot study fish will be treated. Upon observation of abnormal fish behavior or physical condition, the Complex Manager, John Penny, will contact Bob Rogers (WDFW Fish Pathologist) and the District. In coordination, Bob Rogers, John Penny, and Chris Good will develop:

a. Possible cause of the fish health condition

b. Recommended changes to pilot conditions

c. Recommended treatments and

d. Record of observations and actions to resolve the conditions

3. An acute fish health event (epizootic) could be defined as 0.08 percent mortality for three consecutive days (0.0008 X 50,000 fish = 40 fish). The District and WDFW recognize waiting to observe continued fish health deterioration to this point is not recommended or practical. Upon observing as few as five daily mortalities, WDFW and the District will begin discussions. Upon documenting sickness, disease, or causative conditions, and group consultation, WDFW will prepare treatment recommendations and may take action. Anticipated actions include:

    a. Changing the reuse water proportion

    b. Changing water quality

    c. Treatment with medications (water treatment or feed)

4. WDFW and the District will inspect pilot study fish, compile data, and create recommendations for final fish rearing and release. At the September 2008 HC meeting there will be a data review and recommendation for final rearing conditions. Location, cohort co-mingling, and possible continued cohort biological analysis will be decided at that time.

5. Fish mortality among pilot study fish will be compared to survival standards per Table 1. Mortality will be compared to cohorts in a standard raceway as well. Wenatchee Summer Chinook have been reared in Eastbank raceways for over 17 years. Historical survival rates will provide a general basis for comparison at the study's end.

6. If mortality exceeds life stage standards the study will be terminated unless extenuating circumstances exist. Standards are contained in Table 1.

Table 1
Pilot Study Survival Standard

Standard	Ponding To 30-days	Ponding To 100-days	Ponding To Release	Transport To Release
Percent Survival	97	93	90	95

Temporary equipment failures, acute treatable fish illness, and unforeseen conditions that affect fish will not give cause to stop the study. Conditions that can not be changed or remedied will give cause to stop the study. Chronic illness, with mortality (approaching survival standards), and poor performance compared to cohorts in raceways will give cause to stop the study. If necessary either a flow through system in the circular ponds or transfer to annex raceways will occur.

ATTACHMENT 2

PARTIAL WATER REUSE PILOT STUDY
MONITORING AND EVALUATION

Partial Water Reuse Pilot Study
Monitoring and Evaluation

The District will investigate a partial reuse aquaculture system incorporating circular culture tanks with dual drains. Such technologies have been successfully applied elsewhere to improve rearing volume use, reduce site footprint, improve control over culture conditions, and reduce water consumption and energy costs.

The pilot project at the Eastbank Hatchery will use Chelan River (A.K.A. TRI Yearling) Summer Chinook. The following piloting parameters have been defined but may be subject to change:

Table 1:
Pilot Project Parameters[1]

Parameter	Criteria
Per tank volume	3884.6 ft3
Total tank volume	7769.2 ft3
Density index	0.125 lb/cf-in
Max rearing density	9.2 kg/m3 (1.24 lb/gal)
Minimum Flow Index	0.75 lb/gpm-in
Tank exchange rate	calculated
Condition factor	0.0121 g/cm3
Release length	4.6 in (11.7 cm)
Release weight	23.5 fish/lb (19.4 g)
Total number of fish	104,500
Total fish biomass	4,467 lb (9848.7 kg)
Maximum temperature	59 °F (15 °C)
Reuse rate	75%
Total flow rate (2 tanks, flow index based)[2]	1295 gpm (4902 lpm)
Influent flow rate (2 tanks)	323 gpm (1222 lpm)

1 Based upon moving fish in November to acclimation facility
2 Single pass water use provisions will be provided

To facilitate an effective piloting process, the District will use a hatchery consultant to design an aquaculture systems, supply and support equipment, perform training, and assist with data analysis during the pilot.

Design Concept

Based on design parameters, the estimated equipment requirements are:

1. **30 ft Diameter Circular Culture Tank System (Qty = 2)**
    a. 30 ft diameter x 6 ft wall height circular culture tank, FRP walls and floor, sectional
    b. Bottom drain sump and screen
    c. Side drain (Cornell style) and screen
    d. Bottom drain standpipe
    e. Spraybar assembly
2. **Partial Reuse Aquaculture System**
    a. Drum filter (Qty = 1)
    b. 89 micron screens

c. Pump sump (Qty = 1)
d. Reuse pumps (Qty = 2 or 3)
e. Oxytower Gas Transfer System (Qty = 2)
   i. CO2 stripper and Low Head Oxygenator (LHO)
   ii. Gas transfer media

3. **Motor Control Panel (Qty = 1)**
   a. Alarm relays
4. **Water Quality Monitoring System**
   a. Analyzers (4-DO, 1-Temperature, 1-pH)
   b. Flow meter (1 for influent 1 for reuse)
   c. Multi-channel transmitter unit with local display and alarm relays
   d. Data logging capabilities
   e. Software package for PC
5. **Effluent Treatment**
   a. Radial Flow Settlers (Qty = 2)
6. **Ancillary Equipment**
7. **Culture tank jump screens or covers**
8. **Feeding systems will be manual (to make a consistent comparison)**
9. **Spare parts and materials as needed or related tools.**

<u>Scope of Work</u>

The pilot study work is organized into the following tasks:

1. **Scoping and concept design**
   a. Site review and layout analysis.
   b. Identify design constraints and preferences.
   c. Production parameters.
   d. Rearing parameters.
   e. Water quality parameters.
   f. Calculate mass balance and verify flow and treatment requirements.
   g. Develop process and layout drawings.
   h. Check equipment list and performance criteria.
   i. Calculate influent and effluent water quality.
   j. Prepare water quality report template.
2. **Detailed system design and design coordination**
   a. Aquaculture system process design.
   b. Layout of aquaculture systems.
   c. Detailed design analysis and design calculations
   d. Prepare detailed list of electrical loads, mechanical loads, and other service requirements.
   e. Integrate aquaculture system to site.
   f. Develop construction drawing
3. **Equipment supply**
4. **Construction**
5. **Commissioning**
6. **Training**
   a. Prepare and provide Operation and Maintenance Manual for System and for Components.
   b. Prepare training program for O&M personnel.
   c. Coordinate and conduct O&M personnel training.

7. **Operational support**
    a. Provide qualified personnel for operational advice and water quality troubleshooting.
8. **Monitoring Parameters**
    a. The following parameters will be monitored continuously with analyzers and meters:
        i. Dissolved Oxygen (DO) in each of the tank side drains (2 places).
        ii. Dissolved Oxygen (DO) in the header tank.
        iii. Dissolved Oxygen (DO) in the pump sump.
        iv. Water temperature in the header tank.
        v. Water pH in the header tank.
        vi. Water flow rate on influent water supply (make-up water).
        vii. Water flow rate on the reuse flow directly downstream of the pumps.
    b. The following parameters are to be monitored using a colorimetric test kit or laboratory methods (frequency to be determined):
        i. Dissolved carbon dioxide at the pump sump and the header tank.
        ii. Dissolved total ammonia nitrogen (TAN) at the pump sump.
        iii. Alkalinity (as calcium carbonate) at the pump sump.
        iv. Biological Oxygen Demand (BOD) in the culture tanks and in the effluent.
        v. Total Suspended Solids (TSS) in the culture tanks and in the effluent.
    c. The following additional parameters are examples of additional parameters that will be read and/or recorded manually (frequency to be determined):
        i. Pressure as measured with gauges upstream and downstream of pumps.
        ii. Flow split between bottom and side drain of tank (using portable flow meter)
        iii. Rotational period at perimeter of the culture tanks (using a float)
        iv. Oxygen use rate (at oxygen flow meter on LHO inlet)
        v. Daily feed usage and feeding time of day
9. **Data analysis and reporting**
    a. Provide analysis and trend development for water quality data. Track dissolved oxygen, dissolved CO_2, ph, temperature, Total Ammonia Nitrogen, BOD, and TSS. Analysis will be performed monthly but may be more frequent if so required for troubleshooting purposes.
    b. Prepare a monthly summary report of system performance and water quality.

The following schedule of milestones is estimated:

Table 2:
Pilot Project Parameters

Milestone	Estimated Completion Date
Scoping and concept design	2008-01-31
Detailed design documents	2008-02-29
Equipment delivery	2008-03-31
Pilot equipment installation	2008-04-30
Commissioning	2008-05-15
O&M training	2008-05-30
Piloting period	2008-06-01 (start) to 2009-05-31 (end)
Decommissioning or contract renewal	2009-06-01

Note: All dates assume initiation of contract by December 20, 2007.

Partial Water Reuse Fish Health Monitoring and Evaluation

Background

Modern partial reuse aquaculture systems have the capacity to reuse up to 85% while maintaining water quality parameters (e.g. DO, CO_2, ammonia) within safe limits. The capacity to reuse water makes the technology applicable to those who are investigating methods to reduce source water usage. One of the most important concerns for using any different technology is how fish health might be affected.

The pilot study purpose is to investigate and document fish health differences among fish raised in traditional raceways compared to fish raised in a partial reuse system.

A partial water reuse system will be constructed at the Eastbank Hatchery to rear approximately 100,000 Summer Chinook salmon for a 5-month period (June 2008–November 2008) while the remainder of this population will be raised for the same period at Eastbank Hatchery in traditional flow-through raceway units. Both groups will be differentially marked and transferred to the acclimation pond prior to release. In addition, 10,000 fish of the test and the same number of control fish will be PIT tagged for evaluation of survival and travel time comparison to McNary dam (see attached correspondence). Fish health and welfare will be evaluated according to the below plan.

Proposed Study Details

Start date: June, 2008
End date: November, 2008

(For a complete time-line of the proposed study, see Appendix A)

Hypothesis – Fish growth and health$_{\text{partial reuse}}$ $\geq$ Fish growth and health$_{\text{traditional raceway}}$

Study design – This study follows a prospective cohort epidemiological design, and will assess specific health and welfare indicators between two cohorts of fish of the same background (genetic strain, early rearing environment, etc.) exposed to two different rearing systems, with other exposures (water source, management, feeding rates, etc.) being equal.

Methodology

1. **Performance –** Fish will be sampled from both cohorts at regular monthly intervals for length and weight, from which growth curves and (with feeding data) feed conversion ratios will be generated. These data will be analyzed for statistically significant differences over time between the two cohorts.

2. **Fish Health –** There will be multiple assessments:
    a. Mortality data will be collected throughout the study period, and a proportional hazards survival analysis will be carried out at the end of the study to determine differences in overall survival between the two cohorts.
    b. Samples of 60 fish from each cohort (120 fish total per sampling event) will be collected at the start, middle, and end of the rearing period. These fish will be euthanized, packed in ice and shipped overnight to an accredited fish disease

diagnostic laboratory for screening of listed viral, bacterial, and parasitic pathogens, following Blue Book protocols (see Appendix B). This testing will reveal the presence or absence of subclinical infections, and will be used to assess changes in subclinical infection over time between the two cohorts.

c. In the event of clinical disease outbreaks during the study period, WDFW fish pathologist will diagnose and treat the study populations with support from a fish pathologist. Diagnostic and treatment records for each cohort will be summarized at the end of the study, and compared statistically.
d. At the end of the study, 50 fish from each cohort will be euthanized, and samples of multiple tissues (gill, heart, liver, spleen, pyloric cecae, intestine, swim bladder, anterior and posterior kidney, skin, and fillet) will be sent to a fish pathologist for histopathological assessment to determine the extent of organ pathology within each cohort.
e. At the end of the study, 50 fish from each cohort will be bled, and frozen plasma samples will be sent to a diagnostic laboratory for biochemistry profiles as agreed upon with WDFW for further comparison of pathological processes, as well as indictors of long-term stress (see Appendix C).
f.

3. **Fish Welfare –** At the end of the study, 50 fish from each cohort will have their fin condition assessed. This will be carried out for all rayed fins, with measurements by digital calipers to calculate the overall fin indices (i.e. length of longest ray of each fin standardized to fork length) for each fish. Differences in fin indices between the two cohorts will be assessed statistically. This work will be coordinated with WDFW to insure proper techniques and methods are used.

Table 1:
Estimated Effort and Time

Task	Effort
Field Work	
Site Visits and Field Work (Principal Investigator)	15 days
Site Visits and Field Work (Technician)	5 days
Field Work TOTAL	**20 days**
Laboratory Analyses – Allowances	
Pathogen Screening: 6 samples	
Diagnostic pathology (blood chemistry)	
Sample Shipment, Field Work Equipment, etc.	
Laboratory Analyses TOTAL	
Data Analysis and Report Preparation	
Monthly Data Collection and Study Coordination	5 days
Analysis and Report Writing	15 days
Data Analysis TOTAL	**20 days**
PROJECT TOTAL[1]	**40 Days**

[1] Diagnostic veterinary services to address clinical disease are not included in this estimate. These services are assumed to be part of the normal hatchery program.

Appendix A:
Detailed Project Time-Line

Date	Activity

June 2008	• Chris Good to travel to Eastbank Hatchery
	• First sampling of 60 fish per system for **pathogen screening** (see Appendix B) as cohorts begin early rearing at Eastbank
	Details:
	  • Sampling for pathogen screening requires MS-222 for euthanasia, and hard-sided coolers packed with ice for shipment
	  • Purposive sampling is employed (as opposed to random sampling), in that smaller, unthrifty fish or those exhibiting clinical signs will be targeted

August 2008	• Chris Good to travel to Eastbank Hatchery • Second sampling of 60 fish per system for **pathogen screening**

November 2008	• Chris Good plus technician final visit to Eastbank Hatchery
	• Final sampling of 60 fish per system for **pathogen screening**
	• Blood sample collection from 50 fish per system for **biochemistry profile analysis**
	Details:
	  • Blood collection will require 3ml syringes with 22-guage needles, blood collection tubes and freezer space to freeze samples prior to shipment (hard-sided cooler plus ice).
	• **Tissue collection** from 50 fish per system for histological assessment
	Details:
	  • Tissue collection requires dissection kits, histological grade formalin, and plastic jars for specimen fixation
	  • Once fixation is complete (48 hours), tissues are removed, placed in Whirlpak bags with small amounts of formalin, and shipped to the pathologist in a hard-sided cooler
	• **Fin data collection** for 50 fish per system for fin health assessment, and this requires use of a digital microcaliper

Throughout study period	• Routine mortality data collection following established facility protocols • Routine feeding data collection • Routine performance (length, weight, etc.) data collection • As needed veterinary sampling and diagnoses for clinical disease conditions as they arise

Appendix B   Listed Pathogen Screening

The following fish pathogens will be screened in samples of 60 fish from each system according to Blue Book guidelines. The sample size of 60 fish in populations greater than 100,000 provides a 95% confidence of pathogen detection when pathogen apparent prevalence is at least 5%.

Pathogen	Disease	Detection Method
Bacteria		
Aeromonas salmonicida	Furunculosis	Culture
Yersinia ruckeri	Enteric redmouth disease	Culture
Renibacterium salmoninarum	Bacterial kidney disease	ELISA
Viruses		
IHNV	Infectious hematopoietic necrosis	Cell culture on CHSE, EPC
IPNV	Infectious pancreatic necrosis	Same
VHSV	Viral hemorrhagic septicemia	Same
Parasites		
Myxobolus cerebralis	Whirling disease	Tissue digestion / light microscopy
Additional Screening		**As determined by WDFW**

Appendix C Plasma Chemistry Analysis

The following plasma chemistry parameters are typical of a small animal panel as performed by a veterinary diagnostic laboratory. Specific parameters, such as the electrolytes, glucose, and liver enzymes, provide useful data for interpreting fish stress and underlying pathological processes.

Sodium	Albumin	Cholesterol
Potassium	Globulin	Creatine kinase
Chloride	Glucose	Iron
Bicarbonate	ALT	Total iron binding capacity
Anion gap	AST	Saturation
Urea nitrogen	Alkaline Phosphatase	Lipemia
Creatinine	GGT	Hemolysis
Calcium	Total bilirubin	Icterus
Phosphate	Direct bilirubin	Plasma Protien
Magnesium	Indirect bilirubin	hematocrits
Total protein	Amylase	Blood Osmolatity
Cortisol	Lactate	

REPRINTED E-MAIL FROM STEVE HAYS

OK - here we have it for adults.

These statistical powers are based on PIT tag recoveries at Columbia River fishways, assuming about a 0.5% SAR for Turtle Rock adults escaping ocean harvest and making it to Bonneville Dam, and using all PIT recoveries (3, 4, 5, and 6 year old returns).

With PIT tag releases of 10,000 fish each for reuse and control, a 2x1 survival difference beween control and test fish has a high power of being detected, a 1.5x1 survival difference has a power of .70 (not bad) if you are willing to use a .10 alpha level of significance, and only a 1-in-5 chance of detecting a 10% (1.08x1) SAR reduction from reuse rearing conditions with a .10 alpha level

To put this into perspective, if your PIT tag returns actually do equal 0.00499 for the controls, then the table below gives an idea of how many fewer fish could return from the reuse group before you would fail to reject the null hypothesis when, in fact, there was a difference in SAR. So, from a conservative viewpoint of do no harm and we detected 50 PIT tagged controls, then if we detected fewer than 33 adults we could conclude that the SAR was reduced because of rearing on reuse water (with a 1 in 10 chance of having convicted an innocent rearing technology). With control returns greater than 50, the likelihood of rejecting the null hypothesis (no difference in SAR) gets progressively closer to the Test .91 column.

Control	Test .91	Test .67	Test .50
100	91	67	50
90	82	60	45
80	73	53	40
70	64	47	35
60	55	40	30
50	45	33	25
40	36	27	20
30	27	20	15
20	18	13	10
10	9	7	5

Steven Hays
Fish and Wildlife Senior Advisor
Chelan County Public Utility District
PO Box 1231
Wenatchee, Washington 98807
(509) 661-4181

-----Original Message-----
From: John Skalski [mailto:skalski@u.washington.edu]
Sent: Monday, February 04, 2008 10:52 AM
To: Hays, Steve
Subject: Re: Statistical power

Steve,

Here is the updated table with the SAR values you suggested.

Power calculations for estimates of $SAR_C = 0.00499$, tested against $SAR_T = 0.00454$ and 0.00333, and 0.00250.

Release Size		% S_C greater than	α-level	Power
R_C	R_T	S_T	1-tailed	(1-β)
10,000	10,000	10%	0.05	0.1184
10,000	10,000	50%	0.05	0.5710
10,000	10,000	100%	0.05	0.8922
10,000	10,000	10%	0.10	0.2063
10,000	10,000	50%	0.10	0.7062
10,000	10,000	100%	0.10	0.9454
20,000	20,000	10%	0.05	0.1607
20,000	20,000	50%	0.05	0.8250
20,000	20,000	100%	0.05	0.9925
20,000	20,000	10%	0.10	0.2650
20,000	20,000	50%	0.10	0.9028
20,000	20,000	100%	0.10	0.9974

John

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Chuck Peven, Julie Pyper, and Tom Kahler

Date: April 17, 2008

Re: Final Minutes of March 19, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, March 19, 2008, from 9:30 am to 3:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Rick Klinge will send the Hatchery Committees' revised well field letter to Mike Schiewe for submittal to Ecology (Item II-A).
- Tom Kahler will email photos, and possibly video, of the Twisp Weir construction project to Ali Wick for distribution to the Hatchery Committees (Item II-B).
- Kirk Truscott will provide comments to the Chiwawa Feasibility Report to George Velasquez by March 28 (Item III-A).
- Ali Wick will email the Hatchery Committees with Washington Department of Fish and Wildlife's (WDFW's) comments on the Chiwawa Feasibility Report, and schedule a conference call if necessary to resolve any issues (Item III-A).
- Julie Pyper will send the Engineering Report to Ali Wick for distribution to the Hatchery Committees when it is ready (Item III-D).
- Chuck Peven will check with Derek Van Marter of the Upper Columbia Salmon Recovery Board (UCSRB) regarding progress on obtaining hatchery data that the Hatchery Scientific Review Group (HSRG) is compiling, and will send an email to the Hatchery Committees updating them on this (Item III-E).
- Kirk Truscott will re-evaluate future Methow Hatchery spring Chinook salmon production capacity for the period spanning a potential bacterial kidney disease (BKD)

study, assuming that the BKD study fish would be held in the same raceways as production fish; Truscott will brief the Hatchery Committees in the next few weeks (Item IV-A).

- Kirk Truscott will ask Andrew Murdoch to provide additional information for the proposed sockeye trap efficiency tests for distribution to the Hatchery Committees for discussion (Item VI-B).
- The Hatchery Committees will provide comments on the sockeye trap efficiency test protocols to Kirk Truscott by April 1 for consideration (Item VI-B).
- Kris Petersen and Kirk Truscott will talk with their respective staff to determine when the National Marine Fisheries Service's (NMFS') potential steelhead reproductive success study plan may be available for Hatchery Committees review (Item VII-A).
- Mike Schiewe will draft a request from the Hatchery Committees to the Hatchery Evaluation Technical Team (HETT) to develop a study plan for assessing steelhead reproductive success (Item VII-A).
- Kirk Truscott and Kris Petersen will discuss Endangered Species Act (ESA) permit concerns regarding potential steelhead residualization at Blackbird Island Pond (Item VII-B).
- Bob Pfeifer and Kirk Truscott will coordinate a Joint Fisheries Parties (JFP) discussion regarding marking of Chiwawa Hatchery fish (Item VIII).

DECISION ITEM SUMMARY

- The Hatchery Committees provisionally approved the Chiwawa Feasibility Report contingent on WDFW's review of the document; if WDFW has significant unresolved issues with the report or preliminary design, the Committees will convene by conference call for additional discussion (Item III-A). [Update on April 30, 2008: SOA is still in progress for this item].

I Meeting Minutes Approval

The Hatchery Committees approved the February 27, 2008 Meeting Minutes pending revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II Douglas PUD

A. Letter of Support for Douglas PUD Request to Convert Individual Hatchery Well Water Certificates to Well Field Certificates at the Methow and Well hatcheries

Rick Klinge briefed the Hatchery Committees that Douglas PUD had requested that Mike Schiewe send a letter to Washington State Department of Ecology (Ecology) on behalf of the Committees regarding switching from individual groundwater certificates to a single certificate for each hatchery's well field. Klinge provided a draft of this letter for Committees review. The Committees reviewed the letter and, after minor changes, agreed that Klinge should send the draft to Schiewe to transmit to Ecology. [Rick Klinge will coordinate with Ecology to provide additional information on the implications of changing from individual hatchery well water certificates to well field certificates at the Methow and Wells Hatcheries (this comment added during meeting minutes finalization)].

B. Update on Twisp Weir Construction Project

Tom Kahler updated the group that the picket panels and hydraulic system at the left bank were being installed and tested at Twisp Weir this week. Douglas PUD is anticipating that the project will be completed in the next few weeks. Tom Kahler will email some photos and possibly some video of the construction to Ali Wick to send to the Hatchery Committees.

III Chelan PUD

A. DECISION ITEM: Chiwawa Feasibility Report

Julie Pyper briefed the Hatchery Committees that she had received no comments on the draft Chiwawa Feasibility report. George Velasquez joined the meeting in order to address questions about the project engineering. Tom Scribner posed a question regarding the proximity of the water intake location relative to the water discharge because of a concern that there could be co-mingling of the two. Velasquez acknowledged the issue and agreed to work with the engineers to make sure that this would not be a significant issue. Velasquez also verified that he would confirm with Chelan PUD staff that they had a complete list of permits needed and that those have been accounted for in the current schedule. Kirk Truscott informed the group that he needed some additional time to review this report. Notwithstanding the need for additional time, Truscott raised a question regarding whether Chelan PUD had a permit for sufficient volume and flow of Wenatchee River water in the event that Chiwawa spring Chinook would need to be switched over to an alternate water supply. Truscott also indicated he wanted to review the smolt trap diagrams in greater detail. Truscott agreed to provide comments by March 28.

Jerry Marco, Dave Carie, and Kris Petersen had no comments or issues concerning the feasibility report. The Committees provisionally approved the report and preliminary design contingent on WDFW's approval. If WDFW raises any significant issues with the report or preliminary design, it will come back to the Committees for reconsideration. Ali Wick will email the Hatchery Committees with Washington Department of Fish and Wildlife's (WDFW's) comments on the Chiwawa Feasibility Report, and schedule a conference call if necessary to resolve any issues. [Update on April 30, 2008: SOA is still in progress for this item].

B. Update on 2007 Annual M&E Report Schedule

Julie Pyper updated the group that the 2007 Annual Monitoring and Evaluation (M&E) Report was posted to the ftp site on March 1 and that comments are due to Tracy Hillman by the end of day on Friday, May 2. Chelan PUD anticipates that any changes will be made by the end of May, and the document will be up for approval at the June Hatchery Committees meeting.

C. Update on Discussion with Yakama Nation regarding Dryden Operation

Julie Pyper updated the group that Chelan PUD and Yakama Nation (YN) have agreed on a plan for this year regarding the management of leaf litter at the Dryden Fish Trap. Chelan PUD and the YN will be re-evaluating this year's approach at the end of the trapping season and will make modifications as necessary.

D. Engineering Report

Julie Pyper updated the group that the Engineering Report will be forthcoming. She will send it to Ali Wick for distribution to the Hatchery Committees.

E. Hatchery Scientific Review Group Review

Chuck Peven updated the group that the Upper Columbia Implementation Team (a technical working group of the UCSRB) met last week and discussed the upcoming visit of the HSRG to review Upper Columbia hatchery programs. Peven noted that the UCSRB was hopeful that the Hatchery Committees members would verify that the HSRG has the correct information for the Upper Columbia. Peven indicated that he would check with Derek Van Marter of the UCSRB regarding progress on obtaining the HSRG data set on Upper Columbia hatcheries, and then forward the response to Committees members. It was agreed that reviewing these data was not strictly an HCP Hatchery Committees responsibility, but that it would be in the best interest of individual members to validate the accuracy of the information on their programs.

F. Ad Hoc Technical Working Group

Chuck Peven reported that an ad hoc Technical Working Group (TWG) had been convened to consider the effectiveness of supplementation in the Upper Columbia. The TWG was preparing a draft study plan to make this assessment; the plan will likely be released in June 2008.

IV Committee Business

A. Update on Potential BKD Rearing Density Study

Tom Scribner updated the group that he has discussed the potential to conduct the BKD Rearing Density Study at Cle Elum Hatchery with hatchery managers. He noted that one way to pursue this would be for the Hatchery Committees to send a study proposal to the Yakima Basin Technical Work Group under the Yakama/Klickitat Fisheries Project (YKFP). However, his understanding after talking to the fish health staff and hatchery managers at Cle Elum was that their ELISA values have been decreasing in recent years. Thus, they were concerned that the returning spring Chinook at the hatchery would not have high enough antigen levels to conduct the study in a manner that effectively answers the research questions. Rick Klinge also updated the Hatchery Committees that Douglas PUD has met internally regarding the potential scenario for the study at Methow Hatchery in terms of juvenile early rearing space. Douglas and Grant PUDs are now discussing these issues together. They have not talked with WDFW yet regarding the types of vessels that might be needed for the study. Rick Klinge cautioned that there was concern on the part of Douglas PUD management that any expansion at the Methow Hatchery would be a concern to landowners in the vicinity of the hatchery.

Tom Scribner brought up the issue of how the hatchery would handle the number of fish produced under the potential study and how many of these fish would go toward HCP mitigation. Kirk Truscott verified that the HCP amount would be approximately 211,000 fish, with 120,000 of these fish used for the study. Scribner asked what the roadblocks would be to hypothetically raising a larger number of fish there (up to 550,000 fish total). Rick Klinge responded that more water would be needed and an additional water right would need to be procured. One additional complicating factor noted by Kirk Truscott was that if broodstock were reduced in order to raise only 211,000 fish, then sufficiently high ELISA levels may not even be present in the collected broodstock. The Hatchery Committees then proceeded to discuss alternative study designs in which fish could be reared using existing hatchery infrastructures, as well as scenarios that would require additional raceways and acclimation ponds. The conclusion of this discussion was that the study would potentially not be feasible without new infrastructures specific to the study fish group. In agreement with this, Tom Scribner noted that he did not believe that the YN would agree to even a temporary production of 211,000; he indicated that the YN goal was to maintain production at the agreed-to level of 550,000 smolts.

The Hatchery Committees discussed what other ideas might work for the study. Tom Kahler suggested considering a design in which study fish were reared in the same raceways with production fish (at the appropriate densities and BKD condition), thus embedding the test within the production environment. The Committees noted that this might be a workable solution. Mike Schiewe suggested that Truscott re-evaluate hatchery production capacity under this alternative and brief the Committees on his evaluation in the next few weeks.

B. Objective 10: Non-Target Taxa of Concern

Mike Schiewe briefed the group that he had worked with Keely Murdoch and Ali Wick to draft a proposal and schedule for implementing Objective 10 of the M&E Plan. The implementation would begin with HETT reviewing a list of potential non-target taxa of concern (NTTOC), suggesting biologically-appropriate containment objectives for each NTTOC, and assembling a list of potential local experts to complete the analysis. The Hatchery Committees would then review these recommendations, and if approved, the HETT would oversee the analysis process. The Committees' review would occur at the May Hatchery Committees meeting. The Committees agreed that the HETT should proceed with the proposed actions.

V Yakama Nation

A. YN / ONA Discussions Regarding Egg Take of Okanagan sockeye

Tom Scribner updated the group that the Yakama Nation fisheries staff has initiated discussions with the Okanagan Nation Alliance (ONA) to partner with ONA on egg take operations for Okanagan sockeye at Shuswap Hatchery. Eggs from the Okanagan sockeye broodstock would be used in a YN program to re-establish sockeye in the Yakima River Basin. Preliminary discussions with the YN and ONA surfaced concerns that transporting eggs across the U.S./Canada border could be a problem. The YN is developing a proposal for a potential process by which this operation, as well as egg incubation, could occur in Canada. The YN selected this stock because they believe that the Okanagan stock has a better chance of surviving the warmer water in the Yakima River than the Lake Wenatchee stock, which had been used in a previous Yakima Basin study.

B. Update on Kelt Reconditioning

Tom Scribner updated the group that he is continuing to work with Chelan PUD on the potential collection of kelt at Rocky Reach and Rock Island Dams. Scribner said that discussions with Douglas PUD indicated that fish could not be captured at Wells Dam. Ideally, collection would occur in April and May of 2009, with holding and reconditioning at the Entiat Hatchery. Scribner indicated that his understanding of the study plan was that it specified long- and short-term reconditioning.

VI WDFW

A. Update on Yakama Nation Request for Summer Chinook Eggs

Kirk Truscott reminded the Hatchery Committees that the YN has requested 250,000 summer Chinook eggs from Wells Hatchery, and updated the group that this request has been worked out by both agencies. Jerry Marco commented that his action item from the last Hatchery Committees meeting was to check that the Colville policy staff was in agreement with this proposal. Marco updated the group that the next step is for Joe Peone (Colvilles) to meet with Steve Parker (YN) to discuss any policy issues.

B. Lake Wenatchee Sockeye Production Estimates and Smolt Trap Efficiency Trials

Kirk Truscott indicated that WDFW plans to trap sockeye smolts in Lake Wenatchee and release them at the Monitor trap in order to estimate trap efficiency. The trap efficiency estimates would be used in estimating the numbers of outmigrants passing the trap. Additionally, the Hatchery Committees discussed that WDFW might want to consider continuing trapping at the lake in order to compare the two trap efficiencies. Truscott will ask Andrew Murdoch to provide additional information on the proposed tests for distribution to the Committees for discussion. The Committees will provide any comments to the tests to Truscott by April 1 for incorporation into the trials.

VII NMFS

A. Steelhead Reproductive Success Endpoints

Kris Petersen updated the group that she has been discussing with the Northwest Fisheries Science Center (NWFSC) a steelhead reproductive success study that Science Center staff are working on with WDFW. Petersen noted that the study was not being designed for the Hatchery Committees *per se*, but that the Committees might want to consider the design as appropriate to meeting the requirement for such a study under the HCPs. Petersen is hoping to have the Hatchery Committees review this study so that the Hatchery Committees could use the NMFS input on endpoints to inform the HCP study. Kris Petersen and Kirk Truscott will talk with their respective staff to find out when the study plan may be available. Mike Schiewe will begin developing a request for the HETT to eventually use in crafting a study plan for steelhead reproductive success.

B. Management of Blackbird Island Pond Steelhead that Residualize

An action item for Kris Petersen from the last meeting was to explore internally within NMFS whether there would be a legal constraint on how to manage ESA listed steelhead acclimated at Blackbird Island pond that failed to migrate. She indicated that, in general, NMFS had no formal legal or biological opinion on how to manage residualized listed species, and that a proposed management plan would be evaluated on a case-by-case basis. She also noted that NMFS would likely want the Hatchery Committees to investigate the reasons that fish residualized in the first place. The next step is for WDFW to discuss internally what type of management scenario they might propose, and to discuss this with NMFS. Kirk Truscott and Kris Petersen will discuss Endangered Species Act (ESA) permit concerns regarding potential steelhead residualization at Blackbird Island Pond.

C. Request by NMFS for Blood Samples for Hatchery Fish

Kris Petersen provided an update to the last meeting's discussion about a proposed NMFS study on early maturation that would require lethal sampling for hormone concentrations in blood.

Petersen updated the group that after some internal discussion, she has identified that this "take" of ESA-listed fish would not be covered under the existing ESA permit and that this sampling should not be occurring on ESA-listed fish. The Hatchery Committees discussed that if the Committees agreed in the future that this study were a part of the 2009 M&E Implementation Plan, then the activity might be covered under the existing Section 10 permit for the Hatchery M&E program.

VIII USFWS

Dave Carie asked for clarification of why Chiwawa spring Chinook (a listed stock) were being marked with an ad-clip, as this external mark is typically used to identify hatchery fish that are available for harvest. The USFWS views the use of this mark as a potential limit on harvest potential for spring Chinook from the Leavenworth Hatchery. Carie asked whether there might be another external mark for Chiwawa fish that could be used for this same purpose. Kirk Truscott stated that one reason for the ad-clip is that it is used to distinguish Chiwawa hatchery from wild fish for the reproductive success study. The JFP members agreed to further discuss this issue. Bob Pfeifer and Truscott will coordinate this discussion.

IX HETT Updates

Ali Wick updated the group that the HETT is currently working on reference streams for spring Chinook, and will soon begin the analysis for steelhead and sockeye.

X HCP Administration

A. ONA Program Review

Mike Schiewe will check with the ONA regarding a presentation at a future meeting (June or July) to discuss the year's progress on the Skaha sockeye program. [This was subsequently scheduled for July.]

B. Updates to UCSRB

At the request of the HCP Policy members and based on discussions with the Coordinating Committees, Mike Schiewe will be meeting with the UCSRB next month on April 24 to discuss HCP progress.

C. Informal Meeting Agreements

The following agreements were reached at this meeting:

- The Committees agreed that the HETT could proceed with the proposed actions for NTTOC.

D. Next Meetings

The next scheduled meetings are as follows: April 16 in SeaTac (location TBA); May 21 and June 18 at Chelan PUD in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Julie Pyper *	Chelan PUD
Chuck Peven	Chelan PUD
George Velasquez (morning only)	Chelan PUD
Jerry Marco *	Colville Tribes
Tom Kahler *	Douglas PUD
Rick Klinge*	Douglas PUD
Russell Langshaw	Grant PUD
Kris Petersen * (by conference call)	NMFS
Dave Carie *	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Keely Murdoch *	Yakama Nation
Tom Scribner *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, and Tom Kahler

Date: May 22, 2008

Re: Final Minutes of April 16, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Radisson Hotel at SeaTac on Wednesday, April 16, 2008, from 9:30 am to 3:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Rick Klinge will coordinate with Washington State Department of Ecology (Ecology) to provide additional information on the implications of changing from individual hatchery well water certificates to well field certificates at the Methow and Wells Hatcheries (Item I).
- Following resolution of the Washington Department of Fish and Wildlife (WDFW) comments on the Chiwawa Steelhead Ponds Feasibility Study, Kirk Truscott will provide an email documenting concurrence with the study document and Statement of Agreement (SOA) that were provisionally approved at the last (March 2008) Hatchery Committees meeting (Item II-A).
- Julie Pyper will provide Chelan PUD's response to WDFW comments on the Chiwawa Feasibility Report to Ali Wick for distribution to the Hatchery Committees (Item II-A).
- Julie Pyper will provide preliminary design drawings of the Chelan Falls rearing facility to the Hatchery Committees (Item II-B).
- Shaun Seaman will provide the Hatchery Committees with an update on installation of the Integrated Status and Effectiveness Monitoring Project (ISEMP) Passive Integrated Transponder tag (PIT-tag) detection arrays (Item II-D).

- The Hatchery Committees will provide comments to Kirk Truscott on WDFW's broodstock collection protocols by Thursday, April 24; Ali Wick will distribute copies of all comments to Committees members (Item III-C).
- Tom Scribner will send Kirk Truscott a template that identifies the information on smolt releases that Scribner requested be made available in advance of the releases; Truscott will review the list and work with the Hatchery Committees in developing a response (Item IV-A).
- Tom Scribner will send out the proposal for kelt reconditioning at the Entiat Hatchery for Hatchery Committees' comment. The Committees will provide comments by the next meeting. (Item IV-B).
- Ali Wick will coordinate with Tracy Hillman to invite him to attend the next Hatchery Committees meeting to discuss the Hatchery Monitoring and Evaluation (M&E) Plan control group recommendations and the technical basis behind them (Item VI-A).
- Kris Petersen will provide a document on steelhead reproductive success study endpoints to the Hatchery Committees by Friday, April 25 (Item VII-A).

DECISION ITEM SUMMARY

There were no decision items at this meeting.

I Meeting Minutes Approval

The Hatchery Committees approved the March 19, 2008 Meeting Minutes pending revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees. Kirk Truscott asked to add an additional action item for Rick Klinge from the last meeting that was overlooked in the meeting minutes. The action item is for Klinge to coordinate with Ecology to provide additional information on the implications of changing from individual hatchery well water certificates to well field certificates at the Methow and Wells Hatcheries.

II Chelan PUD

A. Update on Chiwawa Feasibility Report

Julie Pyper discussed that Chelan PUD has been working toward resolving and responding to WDFW comments on the Chiwawa Feasibility Report. Pyper indicated that one of the issues remained unresolved: whether the proposed water right was adequate to serve capacity and flow density at the hatchery under all possible circumstances. Shaun Seaman said that this issue is still being worked out with Chelan PUD's consulting engineers. Pending resolution of the water right comment, Kirk Truscott will provide an email that he concurs with the SOA provisionally approved at the last (March 2008) Hatchery Committees meeting. Julie Pyper also noted that Chelan PUD is committed to ensuring that the volitional release infrastructure functions properly, and will be working with the engineers during design to make this release strategy possible. Pyper will provide Chelan PUD's response to WDFW comments to Ali Wick for distribution to the Committees.

B. Engineering Report

Julie Pyper provided an overview of the Engineering Report for March, and addressed several Hatchery Committees questions on this report. The Committees requested that Pyper provide preliminary design drawings for the Chelan Falls rearing facility for Committees' review. The Committees also had several questions about the purpose of the Eastbank Aquifer conceptual model that was developed under contract by the U.S. Geological Survey (USGS). Pyper confirmed that the purpose of the model is to better understand the relationship between water use at the Eastbank Hatchery and the aquifer water temperature. Pyper explained that the purpose of aquifer modeling and the ongoing evaluation of test wells at the Chelan Falls Hatchery is to develop data for use in planning for future operations at the Chelan Falls and Eastbank Hatcheries. She further explained that Chelan PUD was using a "bioprogramming" approach to plan the implementation of Alternative 3 of the Hatchery Facilities Evaluation completed in 2005.

Pyper also provided an update on the water reuse pilot study, which is on schedule. Chelan PUD is in the construction phase, and the ponds and water treatment towers are now installed. The next steps are to evaluate the function of the facility with no fish present and then to begin testing with fish in June.

C. Hatchery Scientific Review Group

Julie Pyper reminded the group that the Hatchery Scientific Review Group (HSRG) will be conducting visits to the Mid-Columbia next week. On May 12 through 15, the HSRG will be convening a summary meeting to review recommendations for the entire Columbia River basin; the meeting location is uncertain at this time, but it will likely be held either in the Tri-Cities or in

Wenatchee. Douglas PUD, Chelan PUD, and WDFW all confirmed that they had provided comment and updates to the HSRG's data.

D. PIT-Tag Detection at Tumwater Dam

Shaun Seaman updated the group that the Tumwater Dam PIT-tag detector is up and running and is sending data to the PTAGIS database. In the course of discussing PIT-tag detection at Tumwater Dam, a question was asked about the status of the ISEMP PIT-tag detection arrays. Seaman agreed to provide the Hatchery Committees with an update on implementation and operation of the ISEMP PIT-tag detection arrays at the next Hatchery Committees meeting.

E. Sockeye Spawning Counter Efficiency Study

Shaun Seaman reminded the group that a new draft of this document has just been sent out for review, and that this will be a discussion item at the next meeting.

III WDFW

A. Sockeye Trap Efficiency Tests

Kirk Truscott reviewed WDFW's plans to use sockeye trapped in Lake Wenatchee to test trap efficiency for this species at the Monitor Trap.

B. Ad-Clipping of Chiwawa Fish

Kirk Truscott reviewed recent discussions with U.S. Fish and Wildlife Service (USFWS) staff regarding the purpose of ad-clipping Chiwawa hatchery fish. The purpose is to distinguish hatchery fish from wild fish on the spawning grounds through visual observations for use in the Wenatchee spring Chinook reproductive success study. The discussion resulted in agreement between the USFWS and WDFW that if the USFWS were to need an alternative mark for the Leavenworth hatchery fish in the future, that the USFWS would develop and implement this additional mark. Tom Scribner noted that he would like the Hatchery Committees to be involved in any marking decisions that affect HCP species, and the Committees agreed that this is a good practice to continue.

C. Broodstock Collection Protocols

Kirk Truscott reminded the group that broodstock collection protocols had been sent out. So far, WDFW has received comments from Douglas PUD and Yakama Nation (YN). Julie Pyper confirmed that Chelan PUD has comments as well. Truscott noted that the most important issues from his perspective are the Methow rearing capacity and production estimates, and associated with that, the culling of eggs of females with high bacterial kidney disease (BKD) antigen levels as described in the document. Following review of the protocols with the Hatchery Committees, Truscott will discuss these protocols with WDFW policy-level staff before forwarding them to National Marine Fisheries Service (NMFS). The Committees discussed that one important element is that monitoring will be conducted to better understand the potential effect of culling eggs from high BKD females on the prevalence of BKD in returning adult fish.

Tom Kahler asked questions regarding the nature and scope of the proposed culling and monitoring and the implications of those proposed actions on the planned BKD study. The details of the monitoring are under development and would not be included in the broodstock collection protocols, but would include, at a minimum, differential CWT marking of progeny of high-ELISA wild fish, and a comparison of SARs from the marked groups. The Committees briefly discussed the possible inclusion of PIT tagging some fraction of the comparison groups to provide more immediate performance data. The initial implication of the culling and monitoring on the BKD study is that no study would be conducted on the 2008 brood.

On the general topic of broodstock collection, Tom Scribner noted that he would like to have more input into in-season adjustments to the protocols to ensure that the Committees have the best opportunity to meet program goals at the hatcheries. Truscott would like any comments by end of day on Thursday, April 24. Ali Wick will distribute copies of all comments to Committees members.

IV Yakama Nation

A. Release Information as It Affects Trapping

Tom Scribner indicated that YN biologists continue to have problems managing work load and sampling efforts at riverine traps because they do not receive up-to-date hatchery release information (tags, release date, release location, etc.) from hatchery operators prior to release. Kirk Truscott agreed to develop a protocol for smolt release coordination, including asking the hatchery operators to provide information within a week of release. Tom Scribner will send Truscott a template of information that he suggested would meet YN needs; Truscott will review this template and provide a recommendation to the Hatchery Committees for consideration.

B. Kelt Reconditioning Paper

Tom Scribner updated the group that the YN has been in communication with USFWS regarding potential kelt reconditioning, and current thinking is for this activity to occur at the Entiat Hatchery. Scribner will send out an update soon with the proposed implementation plan for Hatchery Committees' comment. The Committees will provide comments by the next meeting.

V Douglas PUD

A. Update on Twisp Weir Construction Project

Tom Kahler updated the group that the Twisp Weir construction project has been completed. One item of note is that the existing trap box was installed unmodified, so when the trap is removed in August, it will be modified at that time. The foundation for the new trap will be also modified in August, as there are currently small gaps between the trap and a pair of aluminum rests on the trap foundation. . These gaps were to be closed with aluminum shims during project implementation, but the contractor failed to install the shims. In the meantime, some wood shims have been installed in the gaps until the work can take place. Finally, triangular plates will be installed to keep fish from jumping through a gap between the picket panels and the aluminum structure that guides fish into the trap. The dimensions of the gap vary according to the angle of the picket panels and the amount of flow through the gaps varies with discharge. Fish response will be monitored by WDFW personnel to inform the design of the triangular plates. The hope is that fish will not be attracted to the gaps under typical operating configurations.

VI HETT Updates

A. Reference Streams (Control Groups) Recommendation for Chiwawa Spring Chinook

Tom Kahler introduced this topic and the one-page summary that was sent out to the Hatchery Committees to document the Hatchery Evaluation Technical Team's (HETT's) recent work to identify control groups for the M&E program. These recommendations were based on analyses using primarily adult data. The Hatchery Committees will discuss what might be done using juvenile data. Ali Wick will coordinate with Tracy Hillman to invite him to attend the next meeting to discuss the recommendations and the technical basis supporting them. Agreeing to control groups for Chiwawa spring Chinook will be up for decision at the next meeting.

B. NTTOC Recommendation

Tom Kahler introduced the HETT's recommendations for non-target taxa of concern (NTTOC; relative to target species), containment objectives for those NTTOC, and a panel of experts to assess program impacts to NTTOC. This is the HETT's biological recommendation, from which the Hatchery Committees will prepare their recommendation that includes policy considerations. This item will be up for decision at the next meeting.

VII NMFS

A. Steelhead Reproductive Success Study Endpoints

Kris Petersen updated the group that she is working on a document summarizing experimental strategies for reproductive success studies, including potential endpoints. She will have this to the Hatchery Committees by Friday, April 25.

VIII Committee Business

A. Update on Task List for HETT for Steelhead Reproductive Success Study Plan

This item is on hold while Kris Petersen prepares documentation for the next meeting (See Item VII-A).

B. Update on BKD Rearing Density Study Siting

This topic was covered under the discussion on the broodstock collection protocols (III C, above). As an action item from the Hatchery Committees meeting on 19 March 2008, Kirk Truscott was to re-evaluate the production capacity for spring Chinook at the Methow Hatchery under the scenario of a BKD study where instead of limiting each raceway to 10,000 study fish, the study fish would be a sub-sample of the production fish held in each raceway at the prescribed study densities. The study design would include the rearing of progeny of high-ELISA parents at normal 0.12 rearing densities; previous experience by WDFW has indicated that rearing high-ELISA fish at that density results in heavy fish losses from BKD. Because WDFW was unwilling to jeopardize additional production fish beyond those necessary for the study, such a study design is not workable. Additionally, Tom Scribner reiterated that the YN would not be satisfied with the 211,000-fish production capacity estimated for the Methow Hatchery under the original study proposal of 10,000-fish study groups, and other parties agreed. The Committees anticipate that the proposed culling of eggs of hatchery origin high-ELISA parents would, at least temporarily, alleviate the capacity constraints associated with the current WDFW BKD rearing strategy, thereby forestalling the urgent need for the BKD study. No further alternatives for a BKD study were proposed, and no timeline was proposed for future discussion on the topic.

C. Update on Blackbird Island Pond Letter and Potential Steelhead Residualization

Mike Schiewe updated the group that the letter from the Hatchery Committees members had been sent to Ecology asking that the water right request be expedited. Rollie Schmitten from Trout Unlimited is currently working with Ecology on this issue.

Kris Petersen and Kirk Truscott have met to discuss management of the steelhead acclimation at the Blackbird Island Pond, including how best to minimize the proportion of fish that residualize and how to manage those that do residualize.

IX HCP Administration

A. Next Meetings

The next scheduled meetings are as follows: May 21, June 18, and July 16, all at Chelan PUD in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Shaun Seaman *	Chelan PUD
Julie Pyper *	Chelan PUD
Steve Hays	Chelan PUD
Jerry Marco *	Colville Tribes
Tom Kahler *	Douglas PUD
Russell Langshaw	Grant PUD
Curt Dodson	Grant PUD
Kris Petersen * (afternoon)	NMFS
Dave Carie * (by conference call: morning)	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Tom Scribner *	Yakama Nation

* Denotes Hatchery Committees member or alternate

ANCHOR ENVIRONMENTAL, L.L.C.

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, and Tom Kahler

Date: June 19, 2008

Re: Final Minutes of May 21, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects' Habitat Conservation Plans' (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, May 21, 2008, from 9:30 am to 3:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Julie Pyper will send the final design criteria for Chiwawa to Ali Wick for attachment to the previously provided Statement of Agreement (SOA), for the Hatchery Committees' agreement by email. (Item IV-A).
- Julie Pyper will provide Chelan PUD responses to Washington Department of Fish and Wildlife's (WDFW's) comments on the Chiwawa Feasibility Study for the Hatchery Committees' information (Item IV-A).
- Julie Pyper will send the link to the U.S. Geological Survey (USGS) Eastbank Aquifer report on May 27 for the Hatchery Committees' information, if available (Item IV-B).
- Julie Pyper will forward the Chelan PUD Engineering Report when it is available (Item IV-D).
- Shaun Seaman will give an update at the next meeting on the sockeye counter efficiency study plan (Item IV-F).
- Kirk Truscott has received comments on this year's broodstock collection protocols from the Yakama Nation (YN) and from Douglas PUD. He will revise and send out the finalized protocols (Item V-B).

- Shaun Seaman will work with Keely Murdoch to review the list of Bonneville Power Administration (BPA)/YN Memorandum of Agreement (MOA) projects to identify those that may have a nexus with the Hatchery Committees (VI-A).
- The Hatchery Committees will submit any additional comments to the YN on the kelt reconditioning proposal by May 30 (Item VI-B).
- Jerry Marco will send out a proposal on the use of Bonaparte Ponds for rearing Chinook for Hatchery Committees' review before the next meeting (Item VII-A).
- Hatchery Committees' members will discuss how to proceed with implementing Monitoring and Evaluation (M&E) Objective 10 (NTTOC) with their respective agencies with the goal of making a decision at the July meeting (Item IX-A).
- Dave Carie will identify additional experts within the U.S. Fish and Wildlife Service (USFWS) that can address bull trout in the non-target taxa of concern (NTTOC) process (Item IX-A).
- Hatchery Committees' members will discuss the preliminary Hatchery Scientific Review Group (HSRG) recommendations within their agencies in anticipation of future discussion among Committees members when the recommendations are finalized in December (Item IX-B).

DECISION ITEM SUMMARY

There were no decision items at this meeting.

I Meeting Minutes Approval

The Hatchery Committees approved the April 16, 2008 Meeting Minutes pending revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II HETT Presentation on Control Groups

Tracy Hillman provided a presentation on the Hatchery Evaluation Technical Team's (HETT's) work on selecting control groups for use in the monitoring and evaluation of HCP hatchery programs. He began by discussing the difference between reference and control groups and the fact that the HETT is evaluating control groups, not reference groups. He then described the various methods for comparing pre- and post-treatment values and the HETT's rationale for using one method over the other. He described the meaning of the various trend patterns that may occur in treatment effects and that the Hatchery Committees likely will want to use several of the comparisons to give a more complete picture of the treatment effects. He also noted it was important to retain several control groups in order to increase certainty in inferences made.

Hillman reviewed results of comparisons of natural log-normalized spawner abundance and productivity of control groups for Chiwawa spring Chinook. Productivity was analyzed using recruits per spawner. He confirmed that next steps in the process of identifying control groups would be to focus on those useful for comparisons with the spring Chinook populations in the Twisp, Methow, and Chewuch Rivers, with White River and Nason Creek to follow (the latter under contract from Grant PUD and not affiliated with the HCPs). After spring Chinook, steelhead will be analyzed, followed by sockeye. The Hatchery Committees agreed with this priority going forward and accepted the recommendations from the HETT provided today, which included the use of multiple analyses and statistics to test for the effect of the supplementation programs (Attachment B).

III Douglas PUD

A. Status on Wells Dam PIT-tag Detector

Tom Kahler updated the group that the Passive Integrated Transponder tag (PIT-tag) detector project on the west ladder trap at Wells Dam was completed on May 12 and the system is now functional. BioMark is now remotely monitoring the detections, and WDFW personnel are also hand-wanding captured fish providing opportunity to ground-truth the efficiency of the detection array.

B. Status of Hatchery Well-field Certificates for Wells and Methow Hatcheries

Rick Klinge updated the group that it was his understanding that, based on discussions with the Washington State Department of Ecology (Ecology), combining the water-right certificates for the Wells Hatchery and for the Methow Hatchery well-fields would not jeopardize the existing well water rights or options for the future. Klinge agreed to update the Hatchery Committees as he obtained new information. In order to facilitate the process, Ecology has recommended that the Chelan County Water Conservancy Board be contracted to review the application as Ecology’s workload is too high to complete it. Douglas PUD is currently contemplating this arrangement and will be making a decision on this soon, as the PUD’s General Manager needs to approve the process.

IV Chelan PUD

A. Finalization of Chiwawa Feasibility Study

Julie Pyper updated the group that Chelan PUD had calculated that a new water right of 21.4 cubic feet per second (cfs) would be applied for by the District for the new steelhead ponds. Such right would be from the Wenatchee River and separate from the existing spring Chinook water right from the Wenatchee River. This would be consistent with the proposed production level of 450,000 steelhead smolts at 6 fish per pound. Chelan PUD will be meeting soon with WDFW to discuss the operations relevant to design for this pond. Pyper will send the final design criteria to Ali Wick for attachment to the previously provided SOA, for the Hatchery Committees' agreement by email. She will also provide Chelan PUD responses to WDFW's previous comments for the Committees information.

B. USGS Report on Eastbank Aquifer Expected out May 27

Julie Pyper updated the group that the report on Eastbank Aquifer Model from USGS is expected on May 27. On May 28, from 8:30 am to 12:00 pm, Chelan PUD is hosting a meeting to debrief about the report, held at Chelan PUD. Julie Pyper will send the link to the document on May 27 for the Hatchery Committees' information, as this is the earliest date that the information will be released.

C. Meeting with Washington State Department of Transportation regarding Tumwater Dam

Shaun Seaman updated the group that Chelan PUD will be meeting with Washington State Department of Transportation (WSDOT) about future road and bank stabilization work adjacent to Tumwater Dam. Tumwater Dam is currently used for broodstock collection and other fish collection and monitoring activities. Currently, WSDOT would like to make some adjustments to the base of the dam, but questions remain regarding fish passage, and so this meeting is being held to try to work out some of these issues. The Hatchery Committees indicated that they would be willing to write a letter in support of maintaining the dam for fish monitoring activities, if necessary.

D. Engineering Report

Julie Pyper will forward the engineering report when it is available.

E. 2007 Monitoring and Evaluation Annual Report

Julie Pyper updated the group that the comment period for the 2007 M&E Annual Report has ended, and that Chelan PUD had received comments only from WDFW; the final report will be out on June 2.

F. Committees' Review of Sockeye Spawner Counter Efficiency Study

Shaun Seaman indicated he would like to table discussion of the sockeye counter efficiency study plan until June while Chelan PUD reviews staffing for implementing this study; Seaman will give an update at the next meeting.

V WDFW

A. Disposition of High ELISA Broodyear 2007 Spring Chinook at Eastbank Annex

Kirk Truscott reported that there were a small number of high-ELISA Chiwawa spring Chinook females incorporated in the 2007 broodstock, which have produced a relatively small group of juveniles (about 800). Truscott indicated that these fish have been adipose-clipped, and that WDFW intends to release them as subyearlings at the confluence of the Chiwawa River at Meadow Creek. The Hatchery Committees indicated that they did not object to this proposal and WDFW will proceed with this action.

B. Broodstock Collection Protocols

Kirk Truscott has received written comments on this year's broodstock collection protocols from the YN and from Douglas PUD and verbal comments from Chelan PUD. He will revise and send out the finalized protocols shortly.

VI Yakama Nation

A. Memorandum of Agreement with Bonneville Power Administration

Keely Murdoch discussed the MOA that has recently been signed by BPA and the YN. Murdoch indicated that she was raising this subject and the YN was open to input from the Hatchery Committees on how best to implement the actions identified in the MOA. Shaun Seaman agreed to work with Murdoch to review the list of projects to identify those that may have a nexus with the Hatchery Committees. This will then be shared with the Hatchery Committees to begin coordination on this work.

B. Kelt Reconditioning Proposal

Keely Murdoch updated the group that the YN had previously distributed a draft proposal to the Hatchery Committees describing a YN approach for kelt reconditioning in the Yakima Basin. The YN would like to develop the plan further, and she stated that, if there are additional comments expected, she would appreciate having those by May 30. Comments have been received thus far from Chelan PUD (Chuck Peven) and from USFWS (Ray Brunson).

VII Colville Tribes

A. Update on Bonaparte Ponds

Jerry Marco updated the group that the Colville Tribes are developing a proposal to rear Chinook smolts in Bonaparte Ponds this fall, and are currently developing a budget for this activity. He will be sending out a proposal before the next meeting for Hatchery Committees' review.

VIII USFWS

C. Two-Year Steelhead Rearing Program

Dave Carie briefly updated the group that the USFWS has begun a 2-year hatchery rearing program for steelhead at Winthrop Hatchery (different from the typical 1-year rearing program). Fourteen females were spawned and the USFWS has observed 98 percent eye-up of these progeny.

IX Committee Business

A. Committees Agreement on HETT Recommendations for Non-Target Taxa of Concern, Containment Objectives, and Panel of Experts

Mike Schiewe introduced this topic, reminding the group that HETT had previously provided recommendations for NTTOC, the NTTOC containment objectives, and a panel of experts to participate in a potential analysis. The Hatchery Committees had an extended discussion on the implications of having containment objectives of 0-percent allowable impact for listed species. Also, Shaun Seaman suggested that the spirit of Objective 10 of the M&E Plan on NTTOC was to analyze risk of impact to non-listed species that are not currently addressed in the HCP (e.g., species such as leopard dace and lamprey). Kirk Truscott brought up the point that it would be infeasible and potentially unacceptable to WDFW to support a 0-percent containment objective. Kris Petersen agreed with this comment.

Mike Schiewe reminded the group that today's discussion is about a modeling exercise that would help the Hatchery Committees evaluate where new data are needed, and not about an automatic decision to begin new field programs.

Keely Murdoch commented that the YN suggests reducing the containment objective percentage for Wenatchee and Okanogan sockeye to less than or equal to 5 percent, due to the importance of sockeye to the tribe, as well as the reduced size of sockeye populations in the Mid-Columbia system relative to pre-development conditions.

Several of the Hatchery Committees' members requested more time to evaluate this recommendation and the Committees will continue discussion of this item in July. Committees' members will discuss how to proceed with implementing M&E Objective 10 with their respective agencies with the goal of making a decision at the July meeting. Mike Schiewe summarized that the issues that need to be resolved include: 1) whether the analysis would include species already being monitored under the HCP; 2) whether a 0-percent containment is realistic and acceptable for any of the species; and 3) who will facilitate the NTTOC process. Also, Dave Carie agreed to discuss internally whether the USFWS would identify a list of experts that can address bull trout as a potential NTTOC.

B. Summary of Hatchery Scientific Review Group Preliminary Recommendations

Mike Schiewe briefed the group on the recent meeting that was held to discuss the HSRG's preliminary recommendations. Several of the metrics discussed included proportion of natural influence (PNI), proportion of natural origin in the broodstock (pNOB), and proportion of hatchery-origin spawners (pHOS). Schiewe noted that several of the recommendations called for aggressively limiting the numbers of hatchery origin fish on the spawning grounds, and the development of localized broodstocks. He also noted that the recommendations included the idea of culling high-ELISA fish when programs are not broodstock-limited. The HSRG intends to finalize these recommendations by December.

Schiewe said that it would be important for the Hatchery Committees to discuss these and any potential implications for the HCPs. The Committees agreed that the path forward would be for individual Committees members to work these recommendations through their respective organizations, and be prepared to discuss those that may affect the HCP process. No timeline was set for further discussions, other than it was noted the HSRG recommendations will not be finalized until December 2008.

C. Reproductive Success Study Endpoints

Kris Petersen recently sent out a document summarizing experimental strategies for reproductive success studies, including potential endpoints for these studies. The Hatchery Committees discussed how the National Marine Fisheries Service (NMFS)/Columbia River Intertibal Fish Commission (CRITFC) hatchery supplementation workshop scheduled for June 3 and 4, 2008, in Seattle would be useful in the development of these studies. Kirk Truscott noted that WDFW will use Petersen's document as well as information from the upcoming workshop to formulate a study plan that the Committees could use as a starting point to develop a study plan; the Committees agreed with this approach.

X HCP Administration

A. Next Meetings

The next scheduled meetings are as follows: June 18, July 16, and August 20, all at Chelan PUD in Wenatchee.

B. Meeting Agreements

The following informal agreements were made at today's meeting:

- The Hatchery Committees agreed with the HETT's proposed Wenatchee spring Chinook control groups and accepted the recommendations from the HETT to use multiple analyses and statistics to test the effects of the supplementation programs on unsupplemented populations (Item II).
- The Hatchery Committees agreed with WDFW's planned early release of adipose-clipped progeny of 2007 high-ELISA broodstock spring Chinook at the confluence of the Chiwawa River at Meadow Creek (Item V-A).
- The Hatchery Committees agreed that WDFW, using Kris Petersen's recent guidance document on steelhead reproductive success studies, as well as information from the upcoming workshop, would formulate a steelhead reproductive success study plan that the Committees could use as a starting

point for planning a Wenatchee steelhead reproductive success study (Item IX-C).

List of Attachments

Attachment A – List of Attendees

Attachment B – Chiwawa Spring Chinook Control Groups Handout

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Tracy Hillman	BioAnalysts, Inc.
Shaun Seaman *	Chelan PUD
Julie Pyper *	Chelan PUD
Steve Hays	Chelan PUD
Jerry Marco *	Colville Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
George Thompson	Grant PUD
Curt Dotson	Grant PUD
Kris Petersen * (by conference call)	NMFS
Dave Carie *	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

ATTACHMENT B

CHIWAWA SPRING CHINOOK CONTROL GROUPS HANDOUT

Chiwawa Spring Chinook Control Groups

Initial Candidate Groups:

(1) Naches
(2) Entiat
(3) Lemhi
(4) Marsh
(5) Sesech
(6) Little Wenatchee

Final Groups for Spawner Abundance:

Comparison of LN spawner abundance of control groups with Chiwawa spring Chinook before the Chiwawa group was supplemented (1981-1991). The correlation coefficient reflects the relationship between the control groups and the Chiwawa group before supplementation; differences in trends determines if the change in the time series of control groups differed significantly from the Chiwawa group; and the effect size represents the minimum detectable difference between the Chiwawa group (T) and the control groups (C) in five-years post-supplementation.

Control Group	Correlation Coefficient	Differences in trends	Effect size (T-C) in 5 years
Naches	0.22	P = 0.06	1.36
Entiat	0.58	P = 0.21	1.82
Lemhi	-0.03	P = 0.52	1.45
Marsh	0.28	P = 0.17	1.88
Sesech	0.37	P = 0.33	0.97
Little Wenatchee	0.70	P = 0.25	0.97
Mean (N, E, M, S, LW)	***0.58***	***P = 0.28***	***1.12***
Mean (E, M, S, LW)	***0.73***	***P = 0.97***	***1.03***
Mean (E, S, LW)	***0.70***	***P = 0.56***	***0.99***

Final Groups for Productivity (Returns/Spawner):

Comparison of LN productivity (R/S) of control groups with Chiwawa spring Chinook before the Chiwawa group was supplemented (1981-1991). The correlation coefficient reflects the relationship between the control groups and the Chiwawa group before supplementation; differences in trends determines if the change in the time series of control groups differed significantly from the Chiwawa group; and the effect size represents the minimum detectable difference between the Chiwawa group (T) and the control groups (C) in five-years post-supplementation.

Control Group	Correlation Coefficient	Differences in trends	Effect size (T-C) in 5 years
Naches	0.63	P = 0.71	1.79
Entiat	0.64	P = 0.03	1.50
Lemhi	0.43	P = 0.99	2.11
Marsh	0.79	P = 0.30	1.30
Sesech	0.84	P = 0.11	1.31
Little Wenatchee	0.85	P = 0.21	1.33
Median (N,E,M,S,LW)	***0.91***	***P = 0.09***	***1.32***
Median (E,M,S,LW)	***0.90***	***P = 0.17***	***1.18***
Median (M,S,LW)	***0.86***	***P = 0.47***	***1.04***

MetChew Spring Chinook Control Groups

Initial Candidate Groups:

(1) Naches
(2) Entiat
(3) Lemhi
(4) Marsh
(5) Sesech
(6) Little Wenatchee

Final Groups for Spawner Abundance:

Comparison of LN spawner abundance of control groups with MetChew spring Chinook before the MetChew group was supplemented (1981-1994). The correlation coefficient reflects the relationship between the control groups and the MetChew group before supplementation; differences in trends determines if the change in the time series of control groups differed significantly from the MetChew group; and the effect size represents the minimum detectable difference between the MetChew group (T) and the control groups (C) in five-years post-supplementation.

Control Group	Correlation Coefficient	Differences in trends	Effect size (T-C) in 5 years
Naches	0.51	P = 0.79	3.12
Entiat	0.22	P = 0.00	3.80
Lemhi	0.36	P = 0.03	3.21
Marsh	0.83	P = 0.57	4.48
Sesech	0.66	P = 0.43	3.26
Little Wenatchee	0.55	P = 0.00	3.48
Mean			
Mean			
Mean			

Final Groups for Productivity (Returns/Spawner):

Comparison of LN productivity (R/S) of control groups with MetChew spring Chinook before the MetChew group was supplemented (1981-1994). The correlation coefficient reflects the relationship between the control groups and the MetChew group before supplementation; differences in trends determines if the change in the time series of control groups differed significantly from the MetChew group; and the effect size represents the minimum detectable difference between the MetChew group (T) and the control groups (C) in five-years post-supplementation.

Control Group	**Correlation Coefficient**	**Differences in trends**	**Effect size (T-C) in 5 years**
Naches	0.32	P = 0.09	1.76
Entiat	0.66	P = 0.01	1.89
Lemhi	0.13	P = 0.03	1.30
Marsh	0.70	P = 0.47	1.41
Sesech	0.68	P = 0.01	0.70
Little Wenatchee	0.80	P = 0.06	1.10
Median			
Median			
Median			

Twisp Spring Chinook Control Groups

Initial Candidate Groups:

(1) Naches
(2) Entiat
(3) Lemhi
(4) Marsh
(5) Sesech
(6) Little Wenatchee

Final Groups for Spawner Abundance:

Comparison of LN spawner abundance of control groups with Twisp spring Chinook before the Twisp group was supplemented (1981-1994). The correlation coefficient reflects the relationship between the control groups and the Twisp group before supplementation; differences in trends determines if the change in the time series of control groups differed significantly from the Twisp group; and the effect size represents the minimum detectable difference between the Twisp group (T) and the control groups (C) in five-years post-supplementation.

Control Group	Correlation Coefficient	Differences in trends	Effect size (T-C) in 5 years
Naches	0.26	P = 0.83	2.44
Entiat	-0.09	P = 0.00	2.41
Lemhi	0.01	P = 0.01	2.55
Marsh	0.65	P = 0.21	4.05
Sesech	0.48	P = 0.09	2.43
Little Wenatchee	0.16	P = 0.00	2.79
Mean			
Mean			
Mean			

Final Groups for Productivity (Returns/Spawner):

Comparison of LN productivity (R/S) of control groups with Twisp spring Chinook before the Twisp group was supplemented (1981-1994). The correlation coefficient reflects the relationship between the control groups and the Twisp group before supplementation; differences in trends determines if the change in the time series of control groups differed significantly from the Twisp group; and the effect size represents the minimum detectable difference between the Twisp group (T) and the control groups (C) in five-years post-supplementation.

Control Group	Correlation Coefficient	Differences in trends	Effect size (T-C) in 5 years
Naches	0.37	P = 0.05	1.92
Entiat	0.61	P = 0.00	1.53
Lemhi	0.11	P = 0.01	1.86
Marsh	0.62	P = 0.22	1.68
Sesech	0.62	P = 0.00	0.79
Little Wenatchee	0.79	P = 0.01	0.97
Median			
Median			
Median			

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, Tom Kahler, Keely Murdoch, and Bob Pfeifer

Date: July 22, 2008

Re: Final Minutes of June 18, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, June 18, 2008, from 9:30 am to 1:30 pm. Following the meeting, the Committees proceeded on a site visit of the water reuse pilot study at Eastbank Hatchery. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Kirk Truscott and Jerry Marco will meet with Eastbank Hatchery staff to discuss whether 50,000, instead of 100,000 of the 576,000 summer Chinook programmed for rearing and release in the Similkameen River could be reared and released from Bonaparte Ponds. This would be conditioned on resolving the water quality and icing problems previously encountered at Bonaparte Ponds (Item III).
- Kirk Truscott will update the Hatchery Committees this week about whether Washington Department of Fish and Wildlife (WDFW) can implement additional consecutive trapping days at Wells Dam to minimize adult passage delays at the trapping weirs (Item IV-A).
- WDFW and Douglas PUD will meet to discuss potential structural and operational ways of minimizing adult fish delay at the Wells Dam ladders during trapping (Item IV-A).
- Kirk Truscott will be distributing the revised broodstock protocols soon (Item V-B).
- Shaun Seaman will check on the availability of motion-sensing radio tags for use in the sockeye salmon spawning studies this year, and will also ask Chelan PUD staff to estimate the number of tags that would be needed, both practically and statistically (Item VI-A).

- Joe Miller will work with John Skalski and Tracy Hillman on a statistical power analysis to determine the numbers of radio tags that would be necessary to estimate sockeye salmon spawning ground residency time and observation error—both are parameters needed for area-under-the-curve estimates of spawner abundance (Item VI-A).

DECISION ITEM SUMMARY

There were no decision items at this meeting.

I Meeting Minutes Approval

The Hatchery Committees approved the May 21, 2008 Meeting Minutes pending revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II HETT Update

The Hatchery Evaluation Technical Team (HETT) is currently compiling data and conducting analyses to determine the suitability of potential control groups to be used in the Hatchery Monitoring and Evaluation (M&E) of Methow Basin spring Chinook. Tracy Hillman is separating and analyzing Methow and Chewuch populations independently for these analyses. Following these analyses, the HETT will consider control groups for steelhead and sockeye. The Hatchery Committees requested a matrix showing the control groups and populations for each of the objectives, to be prepared at the conclusion of the work.

III Colville Tribes

Jerry Marco updated the group that he had sent a proposal out for discussion regarding reinitiating use of Bonaparte Ponds to rear up to 100,000 summer Chinook smolts from the Similkameen program. The proposal outlines the problems with the current system and discusses how modified operations would address these issues. The Colville Tribes have secured funding and plan to drill a well to develop a groundwater source for the ponds that would be isolated from the Okanogan River. Marco noted that the Colville Tribes would not go forward with the proposed rearing in Bonaparte Pond if a groundwater source is not found. The Hatchery Committees will review the proposal this month and will decide on it at the next meeting. Kirk Truscott and Jerry Marco will meet with Eastbank Hatchery staff to discuss whether 50,000, instead of 100,000 of the 576,000 summer Chinook programmed for rearing and release in the Similkameen River could instead be reared and released from Bonaparte Ponds. This would be conditioned on resolving the water quality and icing problems previously encountered at Bonaparte Ponds.

IV Yakama Nation

A. Wells Dam Trapping of Methow Spring Chinook Broodstock

Tom Scribner expressed concern that adult spring Chinook migration was being delayed at Wells Dam because fish were not immediately passing the trapping weir when the diversion screens were in the water. He asked if WDFW was considering the potential negative impact that this delay might be having on spawning fish. Kirk Truscott acknowledged this delay, and indicated that WDFW would like to analyze the existing facility to evaluate trapping configuration to minimize fish delay. Currently, Truscott believes that the issue may be that the attraction flow to the trapping weir occurs at a right angle to the flow exiting the fish ladder; a remedy to this might include installing a diagonal picket weir or some other flow modification. Scribner suggested that some modification in trapping schedule might also, at least in the short term, minimize fish delay. Truscott said that he will discuss with his trapping staff the possibility that increasing the period the screens are in the water might reduce the delay. The specific request was to increase to two consecutive 24-hour days of trapping on the west ladder and 16-hour days (dawn to dusk) of trapping on the east ladder. Truscott will update the Hatchery Committees this week as to whether this might be a workable solution. WDFW and Douglas PUD agreed to meet to discuss what changes might be possible in the future to remedy this situation.

V WDFW

A. Reproductive Success Proposal

Kirk Truscott reminded the Hatchery Committees that WDFW and National Marine Fisheries Service (NMFS) have provided a proposal for a potential reproductive success study to the Committees to use in the development of a Committees-approved study plan. Committees' comments are requested by the end of July to Andrew Murdoch. The development of a study plan will be discussed in August.

B. Broodstock Protocols

Kirk Truscott has received comments from the Yakama Nation, Douglas PUD, and Chelan PUD on the broodstock protocols. Kirk Truscott will work with Tom Scribner on these and said that he will be sending out the final protocols soon.

C. Wenatchee Spring Chinook Management Plan White Paper

Bob Pfeifer updated the Committees that WDFW has been preparing a white paper for Wenatchee Spring Chinook Management. This paper will discuss such topics as escapement goals and managing hatchery-wild proportions on spawning grounds. One outstanding issue that WDFW is still working on is the capability of using genetic stock identification in broodstock collections. The next JFP meeting will be on July 22, and the draft paper will be sent out for Committees review following a full JFP review.

VI Chelan PUD

A. Sockeye Spawner and Counter Efficiency Study Update

Steve Hays said that after reviewing the sockeye spawner and counter efficiency study plan again, he is concerned the seining approach that was proposed might be too stressful or otherwise damaging to fish nearing their spawning time. He suggested the possibility of using Passive Integrated Transponder tags (PIT-tags) for this work to track spawner escapement. Keely Murdoch commented that early on in the study development in the HETT, external tags plus radio tags with motion sensors were discussed but dismissed due to cost. Tom Scribner noted that the HETT had taken considerable time to refine this study plan, and was concerned about the timing of Hays input. The Hatchery Committees discussed the merits of going forward with a study that might damage spawners versus delaying and going with a plan that might provide higher quality data. In order to more fully consider the possible use of radio tags, Shaun Seaman will check on the availability of motion-sensing radio tags for study this year, and also committed Chelan PUD (Joe Miller) to work with John Skalski and Tracy Hillman on a statistical power analysis to determine sample sizes. Seaman also indicated that Chelan PUD would further explore the potential to use PIT-tags, and a 2008 study plan would follow. Kirk Truscott suggested that even if radio tags were not available, it might be possible to use Peterson tags to estimate counter efficiency for this year.

B. Blackbird Pond

Shaun Seaman updated the group that Chelan PUD will be supporting the Blackbird Pond project with Trout Unlimited. The project is progressing forward to have fish in the pond next year.

C. Okanagan Nation Alliance Sockeye Program

Shaun Seaman reviewed with the Hatchery Committees that the Statement of Agreement (SOA) on Skaha sockeye from 2005 confirms that Chelan PUD fulfills its mitigation obligation for Okanogan River sockeye by funding the Okanagan Nation Alliance's (ONA) Skaha sockeye program through 2013. Seaman reaffirmed with the Committees that, according to this agreement, after 4 years (2009 data), Chelan PUD will conduct a check-in on the program. He wanted to confirm this again with the Committees because next month's Hatchery Committees meeting will include an update from the ONA on survival for the third year (2008 data) and previous years. This program is funded jointly with Grant PUD.

D. Tumwater Dam

Shaun Seaman updated the group that Washington State Department of Transportation (WSDOT) and Chelan PUD had met to discuss bank stabilization at Tumwater Dam. At that meeting, the U.S. Fish and Wildlife Service (USFWS) raised the question about potential removal of the dam. Seaman said that Chelan PUD believes that the facility has a value toward recovery, and asked whether the Hatchery Committees would want to send a letter that confirms this. The Committees discussed that they would like to think about this further. Chelan PUD will consider this issue and will come back at a later date to discuss.

E. Engineering Report

Chelan PUD intends to prepare a status report for the July meeting. Julie Pyper commented that there are no "red flags" to date on any of the ongoing projects.

VII Douglas PUD

A. Status of Hatchery Well-field Certificates for Wells and Methow Hatcheries

Rick Klinge updated the group that Douglas PUD has been in touch with the Chelan Water Conservancy Board regarding these certificates and the PUD has been working to understand the cost involved. The Hatchery Committees have previously recommended that any change in these certificates should not affect the water right. Klinge will update the group on any new movement on this item.

B. Chewuch Trap

Tom Scribner asked for an update on this item. Rick Klinge said that Douglas PUD has not discussed this recently due to other workload issues; the most recent discussions several years ago were that Chewuch Dam was likely the most workable location.

VIII HCP Administration

A. Reminders

Ali Wick reminded the group that the Hatchery Committees agreed at the last meeting that they would discuss within their agencies the Non-target Taxa of Concern (NTTOC) process and the Hatchery Scientific Review Group (HSRG) recommendations, for discussion at the July meeting. Further discussions regarding HSRG recommendations indicated that there were different opinions as to how the HSRG recommendations would be addressed. Kirk Truscott and Tom Scribner stated that the HSRG recommendations were simply that and it would be up to the Hatchery Committees to decide how to apply the recommendations. Seaman asked that the Hatchery Committees members be ready to discuss how their respective agencies plan on addressing the recommendations. For the HSRG discussions, this includes bringing to the meeting an understanding of the policy-level approach and responses to the HSRG recommendations.

B. Next Meetings

The next scheduled meetings are as follows: July 16 in SeaTac at Grant PUD's offices; and August 20 and September 17 at Chelan PUD in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Ali Wick	Anchor Environmental, L.L.C.
Shaun Seaman *	Chelan PUD
Julie Pyper *	Chelan PUD
Steve Hays (morning only)	Chelan PUD
Jerry Marco * (by conference call)	Colville Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Kris Petersen * (by conference call)	NMFS
Dave Carie *	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Tom Scribner *	Yakama Nation
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, Bob Pfeifer, and Tom Kahler

Date: August 20, 2008

Re: Final Minutes of July 16, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Grant PUD offices in SeaTac, Washington, on Wednesday, July 16, 2008, from 9:30 am to 4:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Chelan PUD will provide a schedule for developing a proposal using Passive Integrated Transponder tags (PIT-tags) to estimate observer error and redd residence time for use in Area-Under-the-Curve (AUC) estimates of spawner counts for Lake Wenatchee sockeye (Item VI-A).
- Tom Scribner and Russell Langshaw will look into a temporary loan of Grant PUD's ultrasound equipment to Washington Department of Fish and Wildlife (WDFW) for use in the Wells Hatchery summer Chinook program; Kirk Truscott will verify that the current fish holding arrangement at Wells Hatchery will allow the use of this equipment (Item VII-A).
- Kirk Truscott will distribute a brief summary on broodstock collection for the Hatchery Committees' information (Item VII-C).
- Mike Schiewe will be requesting that Hatchery Committees members document their recommendations for (a) species of concern, (b) risk containment levels, and (c) panel members, as a way to move forward on implementing Objective 10 of the Hatchery Monitoring and Evaluation (M&E) Program (Non-target Taxa of Concern [NTTOC] analysis; Item VIII-A).

- Mike Schiewe will call Michael Newsom regarding Bureau of Reclamation's (BOR's) plans for reproductive success studies (Item VII-D).

DECISION ITEM SUMMARY

There were no decision items at this meeting.

I Meeting Minutes Approval

The Hatchery Committees approved the June 18, 2008 Meeting Minutes subject to revisions from Douglas PUD; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II Colville Tribes

Jerry Marco informed the group that the Colville Tribes have a proposal out for review and discussion regarding the use of Bonaparte Ponds to rear up to 100,000 summer Chinook smolts from the Similkameen program. The Hatchery Committees discussed the proposal and concluded that it would likely be approved when a source of warmer water was available to prevent icing over of the pond during the winter. Eastbank Hatchery staff will be uniquely marking these fish in anticipation of this program going forward this year. Marco will prepare a Statement of Agreement (SOA) for the Committees' consideration after the water supply issue has been resolved.

III Yakama Nation

A. Surplus Summer Chinook Eggs from Wells Hatchery

Tom Scribner discussed with the group that the Yakama Nation request for summer Chinook eggs from "excess" broodstock at Wells Hatchery had not yet been resolved with the Colville Tribes; he noted that this issue was separate from, but tied to, the allocation of "excess" broodstock that had in past years been distributed to the tribes. Mike Schiewe reminded the Hatchery Committees that under the HCP the responsibility of the Committees was to determine whether a surplus existed, but that any issue related to allocation or use (for any purpose) was a fishery co-manager issue. Kris Petersen also noted that any proposed transfer of eggs or live fish to the Yakima River would be subject to Endangered Species Act (ESA) consultation. Steve Parker joined the meeting by phone and, after being briefed on the discussion, agreed to look into the ESA issue and work with WDFW on the allocation and use issue. Chelan PUD requested to have it reflected in the meeting minutes that it is abstaining from this discussion.

IV Okanogan Nation Alliance and Fish-Water Management Tool Presentation

A. Skaha Sockeye Program

Howie Wright of the Okanagan Nation Alliance (ONA) presented an overview of the Skaha Lake sockeye program, including information from the 2007 egg take and releases. The ONA has documented that adult sockeye from earlier releases are returning to the Okanagan and have been observed on the spawning grounds. Based on 2007 returns, Skaha smolt-to-adult return rates (SARs) are lower than Osoyoos SARs, but within the range of SARs in other British Columbia sockeye populations. Wright also noted that there is no evidence that kokanee survival and growth have been affected by the presence of sockeye in the system. The ONA has recently participated in a 4-year review of the program with the Canadian Okanagan Basin Technical Working Group (COBTWG) to confirm that the ONA is meeting the requirements of the program. For the 2008 broodyear, the ONA expects to easily meet their broodstock goal.

B. Okanagan Fish-Water Management Tool

Kim Hyatt introduced the Okanagan Fish-Water Management Tool (FWMT) and presented a summary for 2007–2008. The Tool is a simulation model and rule set that informs how water is managed in the Okanagan River Basin in British Columbia. The model takes into account event timing and natural variations to maximize fish survival as it relates to water availability. Sockeye fry emergence is verified with direct field observation to confirm that the FWMT is managing actual conditions. The tool was used successfully this season and the development team recently received an award for its work.

V Douglas PUD

A. Update on Operation of Twisp Weir

Rick Klinge updated the group that the Twisp weir has been operating smoothly and successfully this summer, even under fairly high flows. Kirk Truscott noted that WDFW is retaining one out of every three fish collected, and so far, there are approximately 40 adults on station. Truscott indicated that this number is higher than last year, and this should translate to the full program of 550,000 spring Chinook smolts at the Methow Hatchery. Klinge also noted that spring Chinook jacks and bull trout have been observed at the weir.

B. HSRG Draft Recommendations

Mike Schiewe updated the group that he had attended a meeting with NMFS and PUD representatives to gain insight into how NMFS plans to deal with the Hatchery Scientific Review Group (HSRG) recommendations. NMFS expressed that any possible changes to any of the HCP hatchery programs would have to meet these two ESA criteria: changes would have to be 1) based on the best available science, and 2) reasonably certain to occur. NMFS will also consider trust responsibilities with regard to treaty rights. Kris Petersen noted that she has been tasked with evaluating which programs might warrant re-initiation of consultation as a result of the HSRG recommendations. She will provide additional information as it evolves. The PUDs emphasized to NMFS staff that early notification of any proposed changes would be critically important from a facilities perspective.

VI Chelan PUD

A. Sockeye AUC Study Update

Joe Miller introduced this subject and summarized the discussions on the sockeye spawner efficiency study (also known as the AUC study) to date. At the last meeting, Chelan PUD agreed to check on the cost of radio tags and the required number of fish that would need to be tagged. Miller reported that the tags cost approximately $212 each, and that an optimal sample size would be approximately 5-10% percent of the run. This estimate would translate to a cost of anywhere from $150,000 to $600,000 for tags alone. This estimate would translate to a cost of anywhere from $150,000 to $600,000 for tags alone, depending on percentage of fish tagged and the run size (which could exceed 30k in 2008). He also checked on the availability of antennae and signal decoders to detect radio tags and indicated that Chelan does not have any of this equipment available for this year. The PUD's entire inventory is deployed and committed through 2009 for ongoing studies. To purchase new units, the cost per decoder is $9-12,000 and likely several would be needed to cover the White and Little Wenatchee Rivers. Given that (1) a radio-tag study would be extremely expensive and difficult to implement in 2008 because of the short-time frame, (2) the expectations of a very large run , and (3) the need to develop a long-term solution to measuring escapement , Chelan PUD would like to move ahead with a proposal to install

PIT-tag arrays on the White River and Little Wenatchee Rivers to enumerate Wenatchee sockeye escapement in the future. The Hatchery Committees took advantage of attendance of the ONA and Department of Fisheries and Oceans – Canada (DFO) staff at the meeting, and asked for their input on the best methods for defining AUC parameters. Kim Hyatt noted that for the most part DFO had relied on mark-recapture studies. Julie Pyper indicated that, in August, Chelan PUD would provide a schedule for developing a proposal for using PIT-tags and in-stream detection arrays to estimate redd residency times and observer error. The Committees agreed with this path forward.

B. USGS Report Follow-Up

Julie Pyper updated the group that the U.S. Geological Survey (USGS) report on the Eastbank Aquifer has been finalized and is available to the general public. In response to the report, Chelan PUD intends to increase monitoring of the aquifer, and begin developing an aquifer management plan.

C. MOA with Bonneville

This discussion was deferred to the next meeting, when Shaun Seaman and Keely Murdoch will be present, as they were reviewing the Memorandum of Agreement (MOA) project list for opportunities for coordination of HCP and MOA activities.

D. Tumwater Dam meeting with WSDOT

Julie Pyper said that there is no activity on this item, but as this process unfolds, the Hatchery Committees will be kept informed.

E. CRITFC Sampling at Tumwater

Julie Pyper updated the group that the Columbia River Intertribal Fish Commission (CRITFC) had requested permission for access to Tumwater Dam to continue their annual sockeye salmon sampling. It was noted that this will require anesthetizing fish with MS-222. Kirk Truscott indicated that he was interested in learning more details about this sampling, so that WDFW can evaluate what, if any, measures need to be taken to prevent anglers from consuming fish that had been exposed to MS-222 within 21 days of capture. Because this is not an HCP issue, the fisheries co-managers will discuss this offline.

F. Engineering Report

Julie Pyper provided and discussed key points in the Engineering Report for July. Regarding the Chiwawa acclimation ponds, Pyper noted that Chelan PUD is currently working on the water right permit, and will be evaluating what components of the facility could be constructed in 2009, before the water rights are finalized.

VII WDFW

A. Broodstock Gender ID

The Hatchery Committees discussed the status of WDFW's evaluation of ultrasound as a way to determine fish gender at an early stage of maturation. Tom Scribner asked whether ultrasound was being used for summer Chinook at Wells Hatchery. Kirk Truscott said it was not currently being tested there, and that the only equipment was Chelan PUD's and was being used elsewhere. Scribner noted that the use of ultrasound at Wells Hatchery could help make sure adequate broodstock were available to meet program objectives, and could also help determine if there were fish in excess of broodstock needs at a time when the fish are in better shape and might be available for harvest. Scribner indicated that he would like to see additional units purchased. Julie Pyper communicated that the District had funding to purchase additional units in 2008 if use during the current year brood stock collection proved that the units were useful and warranted. Truscott reminded the group that WDFW was still evaluating the technology and planned to continue the evaluation this year before committing to further purchases. He indicated that if another unit was available he could look into whether WDFW could also test the technology at Wells Hatchery. Tom Scribner and Russell Langshaw will look into borrowing Grant PUD's ultrasound unit for use by WDFW; Truscott will verify whether the holding pond at Wells Hatchery is set up in such a way that it is possible to use it for the summer Chinook program (Item VI-F).

B. Proposal to PIT-Tag Steelhead

Kirk Truscott updated the group that he is seeking the Hatchery Committees' concurrence on a WDFW proposal to body-tag female steelhead at Tumwater Dam. The purpose of the pilot study would be to evaluate whether the shedding of PIT-tags as steelhead spawn can be used to identify spawning location and relate the location to individual females. Joe Miller said that without a study design and plan, that there are too many unknowns to evaluate the proposal. He indicated that Chelan PUD would need a study plan before approving any study. Joe Miller indicated that examining tag retention in the hatchery environment would be a beneficial step in determining the efficacy of the body cavity approach. Chelan PUD would support the examination of PIT-tag retention in brood stock, but would not support the use of the protocol in the field until it is vetted. Mike Schiewe noted that such a study might be appropriate as part of the 2009 M&E Implementation Plan. Julie Pyper confirmed that this plan is slated for Committees review in the next few weeks. The Committees agreed that, as a first step, WDFW could begin evaluating PIT-tag shedding by double-tagging steelhead broodstock at Eastbank Hatchery. Truscott agreed with this approach and will work with hatchery staff to develop a brief study protocol.

C. Broodstock Collection Update

Kirk Truscott updated the group that WDFW has counted about 3,900 spring Chinook at Tumwater, of which approximately 500 are wild. The proportion of wild fish is lower than pre-season predictions. At Chiwawa, WDFW has halted collection of hatchery origin fish until more wild fish are collected. The goal under the permit for both programs is 33 percent wild fish in the brood. Truscott will soon send out a brief summary on these numbers for the Hatchery Committees.

D. Steelhead Reproductive Success Study Plan

The Hatchery Committees discussed the path forward for developing the steelhead reproductive success studies that are described in the three HCPs. WDFW had previously distributed a study proposal for the Wenatchee that might serve as either a starting point for planning or as a possible study that could be implemented if funded. Joe Miller indicated that Chelan PUD was anticipating this discussion at the August meeting but had strong reservations about moving forward with the study given the HSRG recommendations that appear to have already decided the fate of hatchery steelhead on the Wenatchee. There would be some question about the relevance of the study if all the hatchery fish were removed. Chelan PUD anticipates conducting a reproductive success study in accordance with the HCPs, but will continue to question how a study proposal can be evaluated before the Committees have (1) determined the goal and objectives of the study itself, or (2) decided how the study results would influence on-the-ground program changes. At this point, the WDFW, Yakama Nation, National Marine Fisheries Service (NMFS), and the Colville Tribes indicated that they are in agreement in principle with the WDFW study proposal. Julie Pyper reminded the Committees that comments on the WDFW study proposal were due to Andrew Murdoch by the end of July, and that consideration of the proposal would be more appropriate after any comments were addressed. Mike Schiewe indicated that he wanted the Committees to be prepared to discuss the proposal and agree on a path forward in August. Mike Schiewe will call Michael Newsom regarding Bureau of Reclamation's (BOR's) plans for reproductive success studies.

VIII HETT

A. NTTOC Discussion

Mike Schiewe introduced this topic by summarizing that the Hatchery Evaluation Technical Team (HETT) had previously provided its recommendations for species of concern, risk containment criteria, and area biologists who were knowledgeable of these species and might be asked to serve in the study group. Joe Miller indicated that Chelan PUD had refocused on the language in the HCPs, M&E plan and other documents to prioritize the consideration of NTTOC species. The result of this effort was a much smaller list of species that reflected high risk and priority interactions. These included the four high risk interactions with NTT Chinook in Table 3 of the M&E plan. Chelan felt that this "refocusing" effort was important because the HCP was designed to address Plan Species - as opposed to all species present, and that many of the interactions were addressed by other regulatory efforts or as the result of the current M&E plan. Chelan also indicated that objective 10 (NTTOC) in the M&E plan explicitly states that monitoring all species is impractical, prioritization must be focused on the species of highest risk, and "Investigating these effects will rely primarily on efforts outlined in objectives 1-8". Miller also noted that Chelan PUD believes that most of the NTTOC interactions involving the HCP species are (1) already considered in the incidental take permits and associated Biological Opinions that cover Chelan PUD's hatchery programs or will be in the context of future consultations, and (2) other resident species and those species not included in the HCPs and Biological Opinions should be addressed in Relicensing Settlement Agreements where plans (e.g., resident species, bull trout, pikeminnow) have been established and approved by many of the same parties as are present on the Hatchery Committees. Kris Petersen noted that not all species interactions are considered under the ESA consultations. Miller also stated that the listed containment objectives of "zero," for some interactions among Plan Species, did not comport with existing incidental take permits that authorize take and presumably would exceed the zero containment level. Miller also stated that Chelan PUD was concerned that the entire NTTOC objective was originally a regional objective with expected contributions by other parties but was now apparently the sole responsibility of the Chelan PUD. In conclusion, Chelan PUD indicated a desire to consider the NTTOC interactions in the context of the existing M&E objectives 1-8, focusing on the four high priority Chinook species, as opposed to convening the panel of regional experts to consider the broader range of interactions. The Hatchery Committees then engaged in an extended discussion on whether and how the NTTOC process should be implemented. To move the discussion forward, Mike Schiewe will be sending an email to each of the Committees members asking for them to document their recommendations for which species to focus on, what the appropriate risk containment levels are, and any changes to the list of biologists who might participate in the study group. He reiterated that the NTTOC objective is part of the approved Hatchery M&E Program and will need to be either addressed or modified.

IX HCP Administration

A. Meeting Agreements

The following informal agreements were made at the meeting:

- The Hatchery Committees agreed that the path forward for the AUC study is that in August, Chelan PUD will provide a schedule for developing a proposal for using PIT-tags as the evaluation tool for calculating AUC (Item VI-A).
- The Hatchery Committees agreed that Kirk Truscott can instruct his staff to double-tag the steelhead broodstock in the hatchery to determine tag shedding rates; the use of these data will be described further in the study plan (Item VII-B).

B. Next Meetings

The next scheduled meetings are as follows: August 20, September 17, and October 15, all at Chelan PUD in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment B – Okanagan Nation Alliance Presentation

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Julie Pyper *	Chelan PUD
Joe Miller	Chelan PUD
Steve Hays	Chelan PUD
Jerry Marco *	Colville Tribes
Barry Rosenberger (ONA presentation and AUC discussion)	DFO-Canada
Kim Hyatt (ONA presentation and AUC discussion)	DFO-Canada
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Todd Pearsons	Grant PUD
David Duvall (ONA presentation and AUC discussion)	Grant PUD
Debbie Williams (ONA presentation and AUC discussion)	Grant PUD
Chris Carlson (ONA presentation and AUC discussion)	Grant PUD
Russell Langshaw	Grant PUD
Kris Petersen *	NMFS
Howie Wright (ONA presentation and AUC discussion)	ONA
Denny Rohr (ONA presentation and AUC discussion)	Rohr and Associates
Dave Carie * (by conference call)	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Bob Rose	Yakama Nation
Tom Scribner *	Yakama Nation

* Denotes Hatchery Committees member or alternate

ATTACHMENT B

OKANAGAN NATION ALLIANCE PRESENTATION

Reintroduction of Sockeye Salmon into Skaha Lake

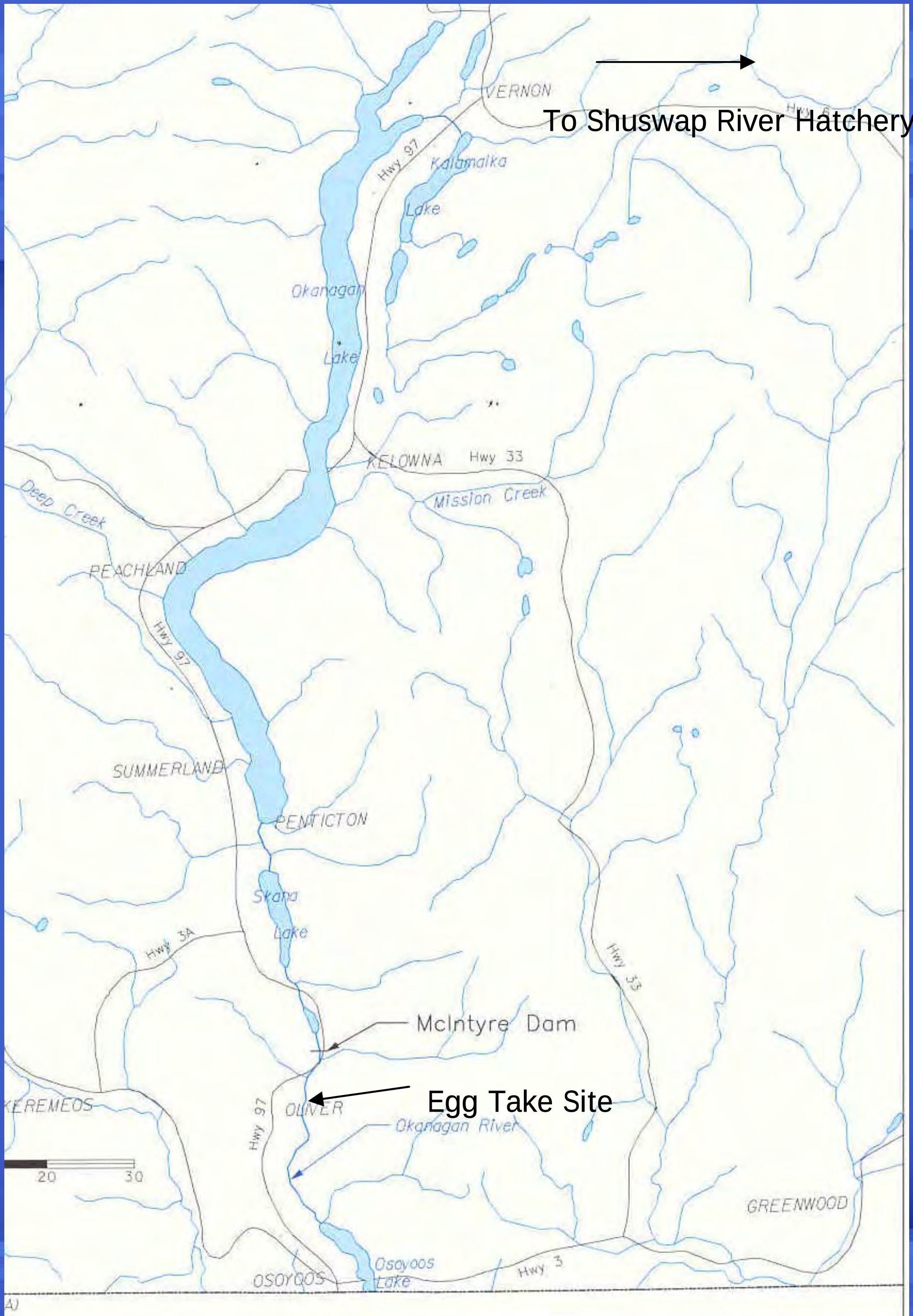
Okanagan Nation Alliance
3255 C Shannon Lake Road
Westbank, BC V4T 1V4
250.707.0095

Background

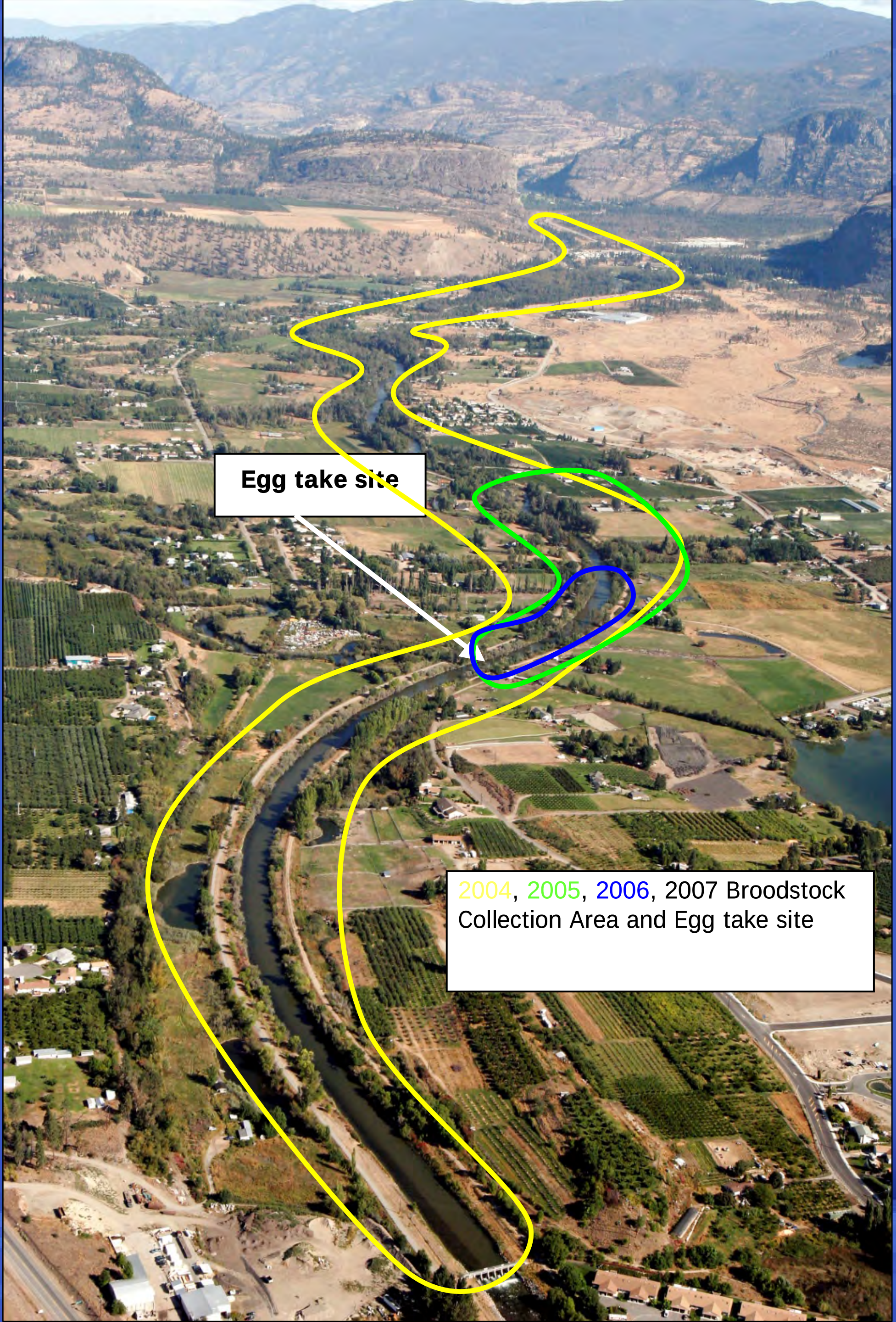
- Initiated by the Okanagan Nation in 1997
- Multi-agency workshop
- Proposed Reintroduction into Okanagan L. - Skaha Lake selected as the experimental control
- *"Evaluation of an Experimental Reintroduction into Skaha Lake"* funded by BPA (2000-2003)
- Pilot Reintroduction in 2003
- 12-year Sockeye Reintroduction Program implemented in 2004

Summary of Broodstock Collections and Fry Releases

Brood years 2004 - 2007



To Shuswap River Hatchery
VERNON
Hwy 97
Kalamalka Lake
Okanagan Lake
KELOWNA
Hwy 33
Mission Creek
Deep Creek
PEACHLAND
SUMMERLAND
PENTICTON
Skaha Lake
Hwy 3A
McIntyre Dam
Egg Take Site
KEREMEOS
OLIVER
Okanagan River
20
30
GREENWOOD
OSOYOOS
Osoyoos Lake
Hwy 3


Egg take site
2004, 2005, 2006, 2007 Broodstock Collection Area and Egg take site

Collection, Transportation and Holding

Egg Take

Evening Release

Ceremonial Release

Summary of Broodyears 2004-2007

	2004	2005	2006	2007
Spawning escapement est.	21,423	24,279	18,686	13,504
No. females / males retained	642 / 700	680 / 720	656 / 690	395/450
Final inventory of green eggs	1,574,600	1,702,400	1,742,800	1,053,800
Number of fry ponded	1,372,400	1,462,800	1,504,700	926,680
Number of fry externally marked	363,300	150,000	--	-
Number marked released	349,000	134,300	--	-
Total number released (fry/ha)	1,205,500 (603)	1,384,000 (692)	1,479,000 (740)	885,500 (443)
% survival (green eggs to fry)	76.5 %	81.3 %	85.5 %	84.03%
Average weight at release	1.16 g	1.01 g	1.24 g	1.27 g

All fry receive thermal otolith marking. Mortalities associates with calcein application deemed too high to continue with external marking in 2005 - 2007.

- In-Lake Monitoring
- Smolt migration monitoring
- Adults returning (habitat/migration studies)

1. Kokanee variables
2. Sockeye variables
3. Four year review (2004-2007)
4. 2008 BY
5. Hatchery Update

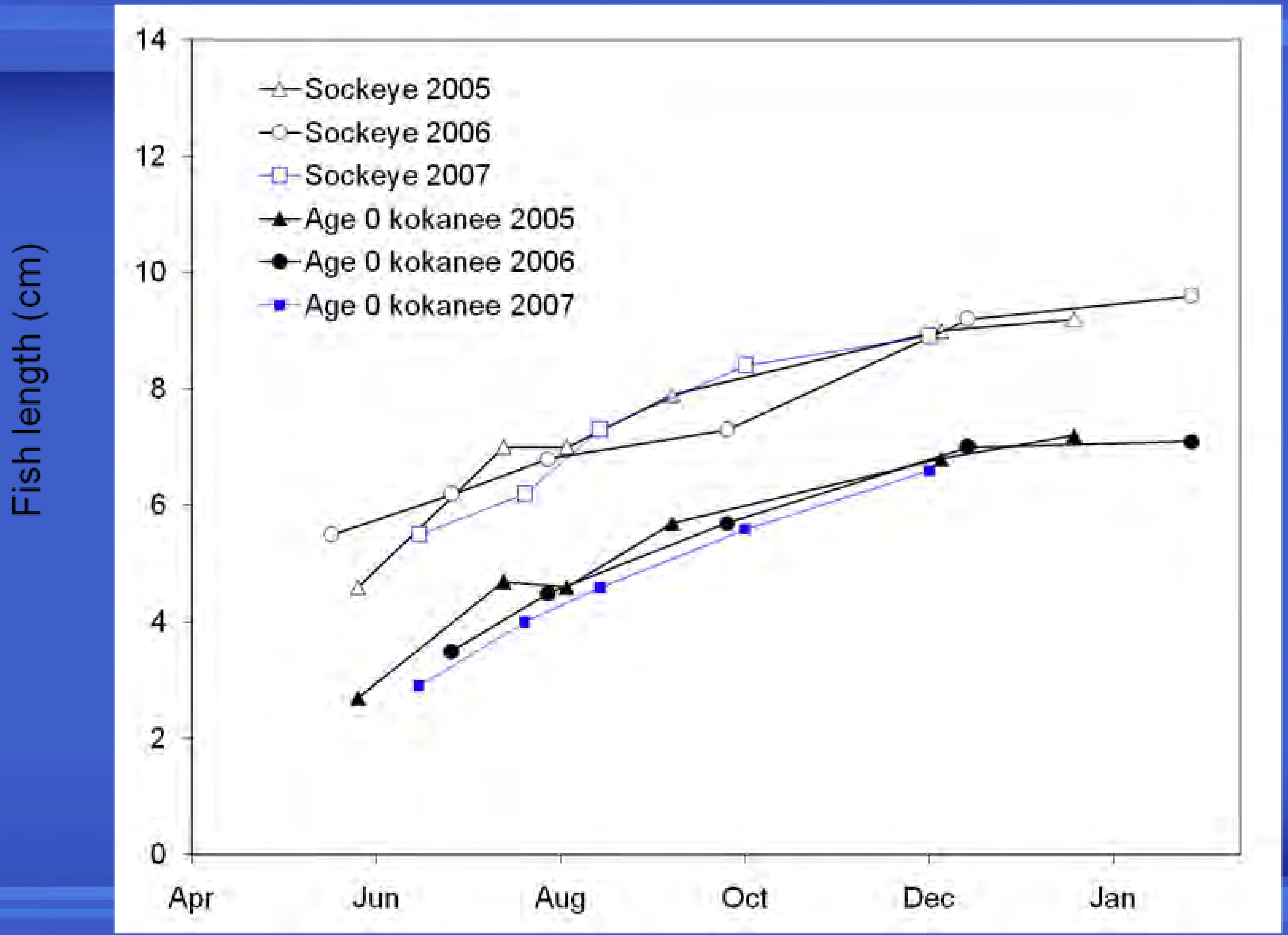
Kokanee Variables

Are kokanee numbers declining in presence of sockeye?

Age 0 kokanee survival not changing

	2005	Stocked 26 May	Sampled 13 Jul 2005	Sampled 18 Jan 2006
Age 0 sockeye	Density per ha	602	241	72
			% surviving since July	**30**
Age 0 kokanee	Density per ha		241	186
			% surviving since July	**77**
	2006	Stocked 19 May	Sampled 29 Jul 2006	Sampled 27 Feb 2007
Age 0 sockeye	Density per ha	692	194	66
			% surviving since July	**34**
Age 0 kokanee	Density per ha		210	109
			% surviving since July	**52**
	2007	Stocked 17 May	Sampled 17 Jul 2007	Sampled 18 Mar 2008
Age 0 sockeye	Density per ha	735	223	99
			% surviving since July	**44**
Age 0 kokanee	Density per ha		145	116
			% surviving since July	**80**

Age 0 kokanee growth not changing



Are Skaha sockeye being produced in sufficient numbers?

Objective: no more than 10% of Spawners

Effects on Osoyoos Lake sockeye?

Year	AUCriver	Number spawners taken	Percent spawners taken
2003	18,896	458	2
2004	40,908	1400	3
2005	31,536	1464	5
2006	20,819	1421	7
2007	13,504	955	7

Skaha egg-to-winter fry survival is higher

	egg number	Late summer fry number	**% egg to late summer fry survival**		Pre-Smolt numbers	**% egg to winter fry (Pre-smolt) survival**
Osoyoos Lake						
2005	70,901,746	4,000,000	**6**		1,800,000	**3**
2006	44,064,433	2,500,000	**6**		1,600,000	**4**
2007	33,439,894	2,500,000	**7**		2,202,930	**7**
Skaha Lake						
2005	1,574,600	400,000	**25**		144,000	**10**
2006	1,702,400	300,000	**18**		132,000	**9**
2007	1,742,800	220,000	**13**		198,000	**11**
2008	1,053,800	440,000	42			

sockeye smolts produced in Skaha Lake

2005	Stocked 26 May		13-Jul-05	3-Aug-05	7-Sep-05	25 Nov - 13 Dec.		18-Jan-06	Juvenile sockeye production
Density per ha	602		241	198	301	85		72	144,000

2006	Stocked 16-19 May	26-Jun-06	24 July - 03 Aug.		20-27 Sept 06	23-Nov-06		26-27 Feb 07	
Density per ha	692	103	194		100	117		66	132,000

2007	Stocked 16-17 May	11-Jun-07	17-Jul-07	14-Aug-08	2-Oct-07	13-20 Nov 07	20-Dec-07	18-Mar-08	
Density per ha	735	nd	223	110	154	78	56	99	198,000

Skaha production remains at about 10% of Osoyoos production

Production per Lake

Osoyoos		Skaha	
18-Jan-06	1,812,890	18-Jan-06	144,000
14-Mar-07	1,480,560	26-27 Feb 07	132,000
15-Jan-08	2,202,930	18-Mar-08	198,000

Are Sockeye Adults Returning? 2007 Spawners (2003 pilot year)

BY	SEX	THERMAL MARKS	NO THERMAL MARKS	Total fish	% of hatchery fish
2003 OR OLDER	Male	4	89	93	4
	Female	17	175	192	9
2004	Male	10	52	62	16
	Female	17	36	53	32
				400	

Adults are returning

Age Structure/Proportion of Skaha Sockeye

	Brood Year			
	2003		2004	
AUC (River)	%	number	%	number
13,504	71	9,622	29	2,766

		Skaha Adults		Osoyoos Adult	
BY	AUC River	%	number	%	number
2003	9,622	7	709	93	8,913
2004	2,766	23	649	77	2,117

Smolt/Adult Ratio

	Smolts	Adults	Ratio
Skaha	176,500	709	0.40
Osoyoos	850,000	8,913	1.05

SK survival compared to other watersheds

- Comparison to sk hatchery supplementation in other watersheds
- Taltahn
- Tatsenmine

Four year review – COBTWG Skaha Sub-Committee

- ONA mtg requirements of program
- Continue with same monitoring program and fry supplementation
- Want to push limits of Skaha Lake (require hatchery)
- May have to evaluate potential ‘hatchery effect” which would involve releasing into Osoyoos Lake (2010 or 2011)
- Conduct spawning habitat assessments (spawn habitat most likely limiting)
- Provide long term program on trap and transport of adults
- Learning for Okanagan Lake

2008 Broodyear Plans

Workplan for ESSA Technologies for support in:

1. Data management
2. Evaluation/Synthesis
3. Model options

2008 Broodyear

- 2008 **estimates** for Sockeye returns
  - July 9, 2008 about 80,000 at Wells Dam
  - Therefore maximize collection of females for broodstock to hatchery capacity

Shuswap River Hatchery

- Priority on Adams Lake (Fraser) sockeye egg take
- Maximum capacity is 1.7-million eggs (due to biomass / water flow constraints of rearing ponds)
- Will investigate varying release strategy similar to 2007 BY

Hatchery Study Design

Penticton Indian Band Lands

2007 Objectives

- Identify aquifer depth, thickness and extent at the selected site
- Determine well and aquifer hydraulic properties
- Develop an initial conceptual hydrogeologic model
- Evaluate potential for development of a 2,000 gpm well field
- Characterize groundwater physical and chemical properties and assess the suitability of the resource for use as the hatchery water supply

Deliverables

- Completed groundwater test wells
- Aquifer and water quality data
- Draft and Final Hydrogeologic Report

Update/next steps

- a suitable aquifer exists near the proposed hatchery site,
- characterize the aquifer properties and water quality to develop conceptual design of a hatchery wellfield,
- Identified additional groundwater-related studies needed to develop final design

Next Steps

- Develop to 75% final design to confirm programming, and provide supporting technical information, project definition and construction costs in more detail
- Refine capital and operational cost budgets
- Work with PUDs since plans for ONA owned/leased to sockeye program
- First Egg Take October 2010


Any Questions????

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Draft Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, Jeff Korth, Bob Pfeifer, Steve Hays, Joe Miller

Date: September 18, 2008

Re: Draft Minutes of August 20, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, August 20, 2008, from 9:30 am to 3:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Rick Klinge will send an email to the Hatchery Committees describing planned water releases from Okanagan Lake that are intended to minimize the temperature-oxygen squeeze in Osoyoos Lake (Item II-C).
- Tom Kahler will provide a field study plan for Passive Integrated Transponder tagging (PIT-tagging) additional spring Chinook parr in the Methow sub-basin (Item II-D).
- Hatchery Committees members will be prepared to discuss the path forward for Monitoring and Evaluation (M&E) Plan Objective 10 (Non-target Taxa of Concern [NTTOC]) at the next meeting (Item IV-A).
- Chelan PUD will present a draft bacterial kidney disease (BKD) management plan for discussion at the next meeting, with the goal of having a Hatchery Committees decision in October (Item IV-F).
- Joe Miller will send a preliminary proposal to install PIT-tag arrays and implement the sockeye enumeration study to Ali Wick for distribution to the Hatchery Committees (Item IV-H).
- Tom Kahler will provide for the Hatchery Committees' information the Scope of Work describing the Bureau of Reclamation's (BOR's) monitoring of habitat improvements in the Methow sub-basin (Item IV-I).

- Mike Schiewe will talk again with Michael Newsom (BOR) regarding the October 10, 2008, meeting to discuss BOR's habitat improvement program in the Methow Basin, and their proposed steelhead reproductive success study; Schiewe will forward this information to the Hatchery Committees (Item IV-I).
- Kirk Truscott will coordinate a Joint Fisheries Parties (JFP) response to Chelan PUD's memorandum discussing Washington Department of Fish and Wildlife's (WDFW's) steelhead reproductive success study plan (Item IV-I).
- Kirk Truscott will provide dated broodstock collection updates (Item VII-A).

DECISION ITEM SUMMARY

There were no decision items at this meeting.

I Meeting Minutes Approval

The Hatchery Committees approved the July 16, 2008 Meeting Minutes subject to revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II Douglas PUD

A. Response to HETT NTTOC Recommendations

Rick Klinge requested more time for Douglas PUD to consider the Hatchery Evaluation Technical Team (HETT) recommendations and formulate a Douglas PUD response.

B. Request for Additional Wells Summer Chinook Brood for Study Fish

Rick Klinge informed the Hatchery Committees that Douglas PUD is requesting that an additional 29 adult Wells summer Chinook be collected for broodstock so that approximately 50,000 smolts would be available for dam passage survival studies in the spring of 2010. Klinge said that by early winter of this year, Douglas PUD will have a preliminary study design available for review by the Coordinating Committees. In the event that the juveniles were not needed for a study, they would be released as part of the current program. Tom Kahler pointed out that these fish would need to be held separate from the regular production once they are marked. Mike Schiewe clarified that the role of the Hatchery Committees is to decide whether these fish are available, and the role of the Coordinating Committees will be to agree to a survival study design. Kirk Truscott stated that there is no shortfall in Wells summer Chinook broodstock, so this request will not affect the existing program. The Hatchery Committees agreed to the collection of these additional fish.

C. Update on FWMT Action to Prevent Osoyoos Lake Oxygen-Temperature Squeeze

Rick Klinge updated the group that the Fish-Water-Management Tool (FWMT) team has reported that the oxygen levels in Osoyoos Lake are dropping to levels that could affect the survival of juvenile sockeye currently residing in the lake. As a result, the FWMT team recommended a water flush (approximately 1,000 cubic feet per second [cfs]) from Okanagan Lake in late August and early September, with the goal of increasing oxygen levels in Osoyoos Lake. Jerry Marco asked whether anyone knew the location of fish holding in the lake; Klinge verified that there have not been any recent studies to evaluate this. Klinge also said that this information represents another benefit of this tool, as this was an unanticipated use of the FWMT. Typically, the information from the FWMT is used to reduce scour and dewatering in spawning areas. Klinge will send an email verifying the dates and specifics of this action.

D. Proposed Parr Tagging in the Methow Sub-basin

Tom Kahler introduced this topic stating that Douglas PUD is proposing to increase efforts to PIT-tag spring Chinook parr in the Methow Basin. Additional numbers of PIT-tagged parr are needed to enhance the collection of M&E information on juvenile fish production. Currently, WDFW M&E crews are having trouble meeting sample sizes as described in the Douglas PUD M&E Plan. Douglas PUD intends to work with WDFW crews to collect and tag as many as 10,000 fish per year, with beach seining the preferred collected method. In response to a question from Keely Murdoch, Tom Kahler clarified that protocols for collecting genetic material would follow the methods that are currently being used when fish are being PIT-tagged at the screw traps, as described in the Douglas PUD M&E Implementation Plan. Kris Petersen commented that Douglas PUD should continue to meet conditions of the permit, and Kahler verified that this would be the case. The Hatchery Committees concurred that this tagging can proceed this year, with re-evaluation next year, provisioned on Douglas PUD providing a copy of a field study plan to the Committees for their reference. Tom Kahler will provide this document.

E. Hatchery Space

Rick Klinge updated the group that Grant PUD submitted to Douglas PUD a request to rear 80,000 summer steelhead at the Wells Hatchery and 201,000 spring Chinook at the Methow Hatchery. The Hatchery Committees concurred with this request, as in past years. This action is consistent with previous years' requests and continues the Committees' support of Chelan and Douglas' NNI obligation under their respective HCPs for the Methow system.

F. Disposition of Wells Summer Chinook Juveniles

Rick Klinge asked about the status of summer Chinook broodstock being held at Wells Hatchery that are provisionally earmarked for use by the Yakama Nation (YN) for green eggs that would be used in a pilot summer Chinook program in the Yakima sub-basin. Kirk Truscott verified that eggs from these fish will leave the hatchery as green eggs; however, he was uncertain if any decision had been made by WDFW Olympia staff regarding their intended use. Keely Murdoch reported that Tom Scribner indicated that Heather Bartlett would be sending a letter to Joe Peone stating that WDFW approved the use, even though the Colville Tribes objected. Kris Petersen indicated that she was unsure if the transfer was covered by any existing Endangered Species Act (ESA) permit, and that this needed to be resolved before any transfer occurred.

III Presentation: Hatchery Induced Life-history Variability in Chinook Salmon

Drs. Don Larsen and Brian Beckman from National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center presented a summary of their research on precocity in Chinook salmon. Don Larsen gave the first half of the presentation, which included a summary of data showing that in some years up to 50 percent of the male spring Chinook from a given brood year return as precociously mature mini-jacks. Larsen noted that NMFS uses a biochemical marker to screen hatchery populations prior to release to estimate the proportion of fish that are likely to mature precociously. This work has been conducted on populations at other area hatcheries, with recent percentages ranging from approximately 10 to 50 percent, and generally trending upward. Recently, this work was extended to Chinook at Carlton, Dryden, and Similkameen Ponds, and mini-jack percentages were 37 percent, 17 percent, and 10 percent, respectively. Larsen's conclusions were that mini-jacks are ubiquitous; mini-jack percentages are variable from population to population and from year to year; supplementation programs with local broodstock may have a higher proportion of mini-jacks; and a high proportion of mini-jacks obviously affects production

Brian Beckman's half of the presentation focused on the effect of emergence timing on life-history decisions. Beckman noted that in brood years with a relatively low proportion of precocious parr, there appears to be a relationship to the timing of ponding the juveniles and the release size. In years in which juveniles are ponded during a compressed period in late spring, the fish are subsequently released at a smaller size, and they tend to exhibit lower proportions of mini-jacks. Conversely, early emerging fish that are released at a large size have a high propensity for early male maturation. These results suggest that the Cle Elum Hatchery strategy of late release contributes to a low rate of age-1 precocious parr. Beckman speculated that this schedule perhaps best mimics conditions found in headwater streams and is favorable for yearling releases.

IV Chelan PUD

A. NTTOC Discussion

Shaun Seaman agreed to support Douglas PUD's request to defer this discussion until next meeting so that the full Hatchery Committees can discuss. The Committees agreed to be prepared to discuss NTTOC at the next meeting.

B. Chelan PUD Engineering Report

Julie Pyper said that the Engineering Report will be discussed next meeting.

C. Lake Wenatchee Net Pens

Julie Pyper updated the Hatchery Committees that the Lake Wenatchee net pens had been damaged, probably by a recreational fishing lure caught in the net, and that an unknown number of juvenile sockeye had escaped and a large number of pikeminnow had entered the net pen. The net has been repaired, and the pikeminnow have been removed. Information has already been forwarded to Tracy Hillman (BioAnalysts, Inc.) for inclusion in the annual M&E report.

D. Chelan PUD M&E Work Plan Comments

The Hatchery Committees agreed to submit comments on the Chelan PUD M&E Work Plan by next meeting (September 17). This schedule will allow the PUD to move forward with contracting in a timely manner.

E. PIT-tag Array at Peshastin and Entiat

Shaun Seaman updated the group that Chelan PUD is working with ISEMP|WDFW and the PIT-tag Information System (PTAGIS) database manager to obtain PIT-tag detection data from the Peshastin Creek and Entiat River PIT-tag arrays in order to evaluate steelhead spawning ground composition. Joe Miller outlined that indications are that initial problems with database format and accessibility will be resolved by the end of the summer and data will be available for use.

F. BKD Strategy Draft SOA

Shaun Seaman indicated that Chelan PUD will be drafting a Statement of Agreement (SOA) on BKD management for HCP Plan Species based on recent discussions in the Hatchery Committees and the Hatchery Scientific Review Group (HSRG) recommendations. Chelan PUD will work with WDFW in the preparation of the draft SOA and will present a draft at the next meeting, with a goal of having a Committees decision in October.

G. Tribal MOA with Bonneville

Shaun Seaman and Keely Murdoch have been reviewing the 2008 Columbia Basin Fish Accords Memorandum of Agreement (MOA) project list for opportunities for coordination of HCP and MOA activities. Seaman provided a summary table with a list of hatchery projects for Upper Columbia Spring Chinook and steelhead ESUs, organized by river basin. Jerry Marco commented that the Colville Tribes do not have a similar table prepared at this time, but as the Chief Joseph Hatchery program develops, he will initiate a discussion like this in the Hatchery Committees.

H. Sockeye Enumeration Study Update

At the last meeting, the Hatchery Committees discussed developing a plan to install PIT-tag arrays to support determining sockeye escapement in the White and Little Wenatchee Rivers. Joe Miller provided a handout today with a preliminary proposal to install these arrays and implement this study. He will send it to Ali Wick for distribution to the Committees. Chelan PUD would like comments by the next meeting and will have an SOA prepared for decision on the proposed study approach at that meeting.

I. Steelhead Reproductive Success Study Proposal

Regarding the WDFW study plan for steelhead reproductive success studies in the Wenatchee sub-basin, the Committees engaged in a lengthy discussion about the obligation to implement a steelhead reproductive success study and the timing of such a study. The Committees discussed the fact that the HCP does describe the need for a reproductive success study but does not prescribe a study date or timeline. The Committees discussed that the draft HSRG recommendations included proposed changes that would affect the nature of the steelhead hatchery program in the Wenatchee, and also the likelihood that these recommendations would be adopted. After some discussion about this and the WDFW study plan that was provided last month, NMFS, WDFW, YN, and the Colville Tribes indicated that they supported the WDFW study plan; Marco indicated the Colville Tribes would approve deferring a start until after the HSRG recommendations were finalized and considered. Chelan PUD stated that it did not support going forward with the study plan at this time, indicating that the HSRG recommendations may influence the need for and design of a study plan once the recommendations were finalized and considered by the Committees. Specifically, Chelan PUD noted that the HSRG has recommended substantive changes including the removal of at least 80 percent of hatchery origin spawners. This recommendation for the Wenatchee and the HSRG's recommendation for all steelhead programs that "outplanting of hatchery steelhead be discontinued (or at least minimized) wherever facilities are not available to recapture returning adults that escape harvest," strongly suggests that enough evidence exists to conclude that hatchery fish are deleterious on the spawning grounds. If the Committees implement a study now, and then change the management of steelhead to reflect the HSRG's recommendations, any results would be confounded by a significant reduction or the absence of hatchery steelhead.

Moreover, if Chelan PUD opted to maintain the integrity of the study, Chelan PUD would have to maintain a significant number of hatchery origin spawners on the spawning grounds (e.g., not implement the HSRG recommendations). Either way, Chelan PUD is concerned that proceeding with a study, before the final recommendations are available would be premature. In addition, the PUD is concerned about starting the study when over-winter acclimation at the new Chiwawa Acclimation Facility will likely occur during the study. This too would greatly influence the relative abundance of hatchery fish on the spawning grounds and potentially affect the reproductive success of hatchery fish, which may be spatially segregated and subject to the density dependent efforts. This operational change is going to occur and, like implementation of the HSRG recommendations, would confound the study results. Kirk Truscott agreed to coordinate a JFP response to Chelan PUD's concerns as expressed in their recent memorandum to the Committees, including questions about the timing of the study, consistency with the language in the HCP, and how to make management decisions with the study results.

In addition, and not related to Chelan PUD's work per se, Mike Schiewe reported that he contacted Michael Newsom of the BOR about BOR plans for steelhead reproductive success studies in the Methow Basin. Newsom indicated that Bonneville Power Administration (BPA) will be funding the study, and that it is required by the Federal Columbia River Power System (FCRPS) Biological Opinion. Newsom indicated that a meeting was being planned for October 10, 2008, in Twisp to review the study design and discuss logistical issues; BOR's habitat monitoring will also be discussed. Tom Kahler indicated that he had only limited information on the BOR's steelhead relative reproductive success study, but would provide to the Hatchery Committees a Scope of Work describing BOR's monitoring of their habitat improvement program in the Methow sub-basin. Schiewe will talk again with Newsom regarding an agenda for the October 10 meeting, and will forward this information to the Committees.

V NMFS

A. NMFS Letters on Upper Columbia River FCRPS Consultation

Mike Schiewe brought up the topic that NMFS had recently sent out a draft letter discussing their plan for reviewing federally funded hatcheries in the Columbia River basin as required under the 2008 FCRPS Biological Opinion. The letter indicated that NMFS would be taking this opportunity to review HCP-funded hatchery programs as well. The letter also indicated that NMFS would be holding a meeting in September to discuss the schedule for this review, and that they would be requesting revised Hatchery Genetic Management Plans (HGMPs) for all the programs by November 1, 2008. Kris Petersen commented that NMFS recognizes that new consultations may not be necessary for every program, and there must be clear rationale for any new consultations. Shaun Seaman commented that Chelan PUD will be sending a response letter to NMFS on this topic; Douglas PUD will also provide comments on the draft letter. NMFS has requested that comments be submitted by COB on August 22.

VI WDFW

A. Wenatchee Spring Chinook White Paper

The Hatchery Committees requested an update on the Wenatchee spring Chinook white paper. Kirk Truscott updated the group that the white paper is still in progress and it will be provided to the Committees when it is available. The outstanding issues still being discussed by the co-managers are related to broodstock abundance versus diversity in the sub-basin and how they support recovery. Julie Pyper requested that as soon as any sections of the white paper were available for distribution, Chelan PUD would appreciate receiving a copy; she noted that Grant PUD requested the same at the previous day's PRCC HSC meeting.

VII Yakama Nation

A. Questions on Status of Summer Chinook Broodstock Collection

Keely Murdoch asked Kirk Truscott about the status of summer Chinook broodstock collection at Wells Dam. One of the questions related to whether the changes in collection protocol implemented to make up the shortfall in broodstock were for the Methow/Okanogan and Wenatchee programs. Truscott indicated that the actions currently being taken are intended to make up the shortfall for the Methow/Okanogan program, but there is no shortfall for the Wells program. Murdoch commented that if shortfalls in the Methow/Okanogan program continue, the YN would recommend suspending the summer Chinook fishery that targets fish above Priest Rapids. Kirk Truscott will be providing another broodstock collection update soon.

VIII HETT Update

Tom Kahler updated the group that the HETT has been reviewing information on potential reference populations for the Methow, Chewuch, and Twisp populations. The HETT has identified a problem with the Chewuch numbers in some years, and will be further looking into the issue. Early indications are that there are only two reference streams that may serve as reference populations.

IX HCP Administration

A. Meeting Agreements

The following informal agreements were made at the meeting:

- The Hatchery Committees agreed that Douglas PUD can authorize collection of an additional 29 adult summer Chinook to produce up to 50,000 smolts for use in dam passage survival studies in spring 2010 (Item II-B).
- The Hatchery Committees concurred that Douglas PUD could PIT-tag up to 10,000 spring Chinook parr in the Methow for use in their M&E Program, with re-evaluation next year, provisioned on Douglas PUD providing a copy of the field study plan to the Committees for their reference (Item II-D).
- The Hatchery Committees concurred with the Grant PUD request of Douglas PUD to rear 80,000 summer steelhead and 201,000 spring Chinook at Wells and Methow Hatcheries, respectively (Item II-E).

B. Next Meetings

The next scheduled meetings are as follows: September 17, October 15, and November 19, all at the Chelan PUD offices in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment B – Hatchery Induced Life-history Variability in Chinook Salmon (presentation handout)

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Julie Pyper *	Chelan PUD
Joe Miller	Chelan PUD
Shaun Seaman *	Chelan PUD
Steve Hays	Chelan PUD
Jerry Marco *	Colville Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Todd Pearsons	Grant PUD
Russell Langshaw	Grant PUD
Kris Petersen *	NMFS
Brian Beckman (presentation only)	NMFS
Don Larsen (presentation only)	NMFS
Dave Carie * (by conference call)	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Jeff Korth	WDFW
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

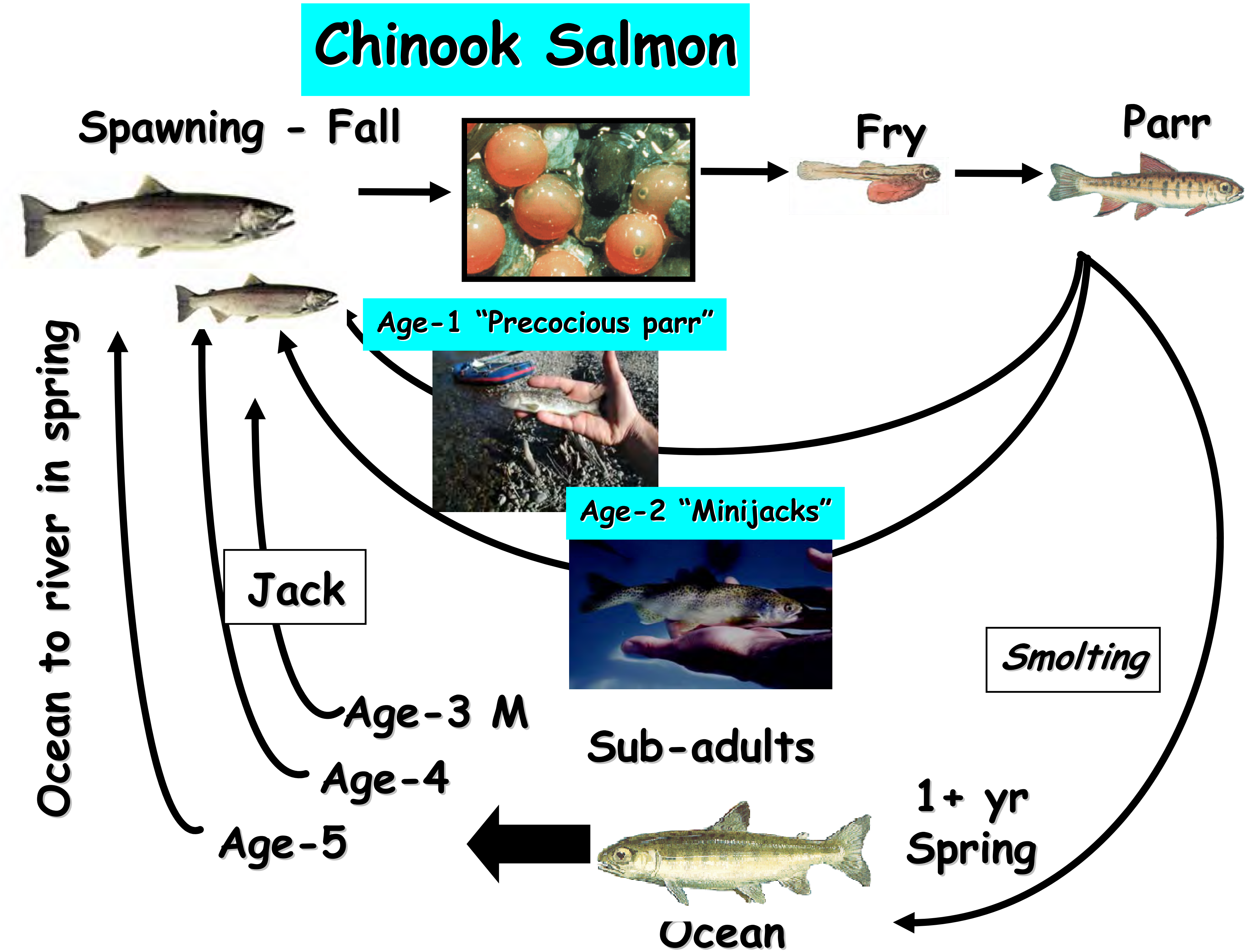
ATTACHMENT B

HATCHERY INDUCED LIFE-HISTORY VARIABILITY IN CHINOOK SALMON (PRESENTATION HANDOUT)

Hatchery induced life-history variability in Chinook Salmon

Don Larsen - part1
Brian Beckman - part 2

NOAA Fisheries, Northwest Fisheries Science Center
Seattle, Washington



Chinook Salmon
Spawning - Fall
Fry
Parr
Age-1 "Precocious parr"
Age-2 "Minijacks"
Jack
Smolting
Ocean to river in spring
Age-3 M
Age-4
Age-5
Sub-adults
1+ yr
Spring
Ocean

Variation in Age of Male Maturity

Mature male salmon

Factors Affecting Age of Maturation

- ✓ Genetics
- ✓ Environment
  - temperature
  - food availability
  - food quality

Growth
&
Body energy stores

The Hatchery environment can significantly influence age of maturation

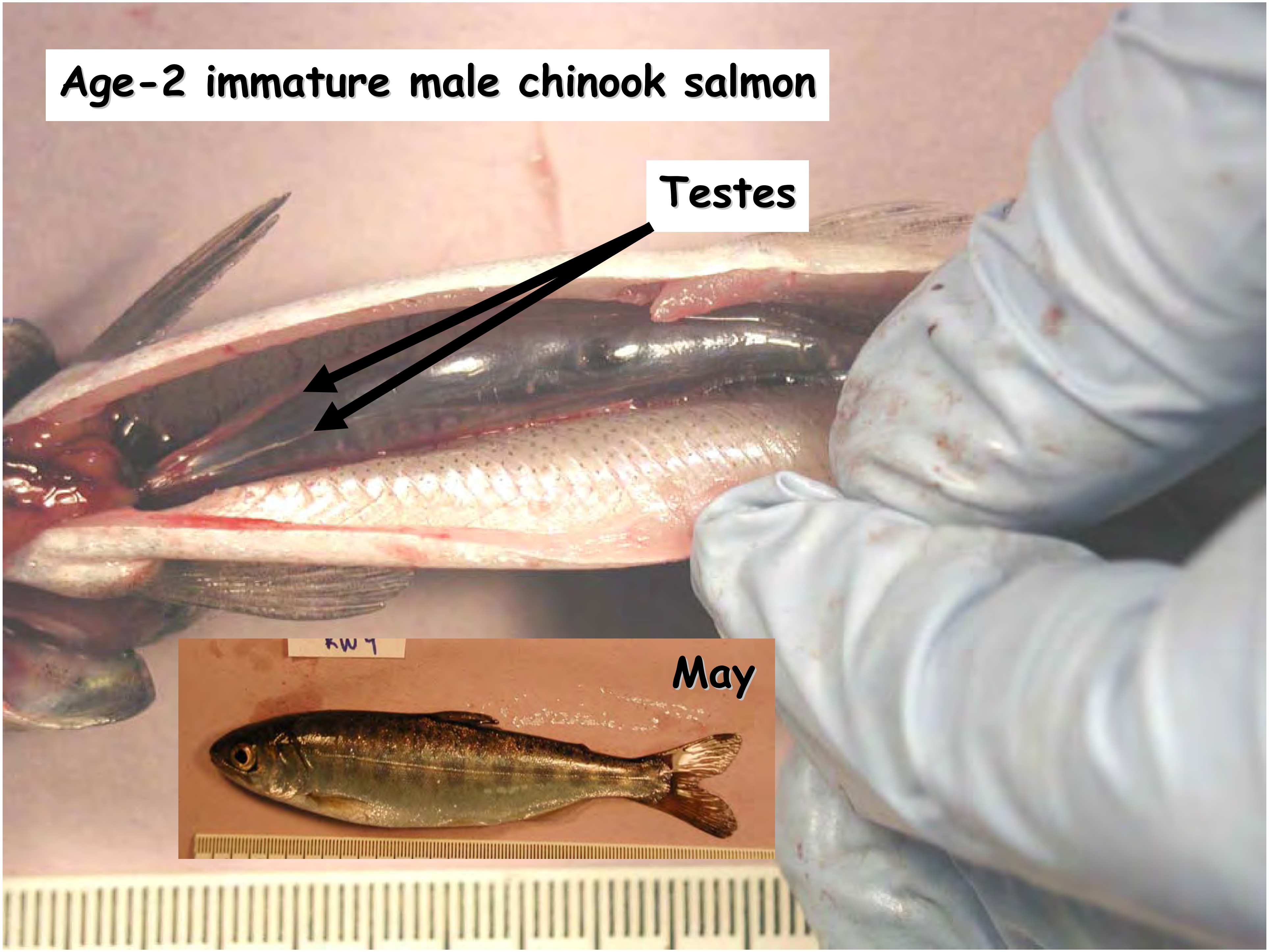
We've been monitoring the physiology of Cle Elum Supplementation Hatchery Spring Chinook since implementation in 1997

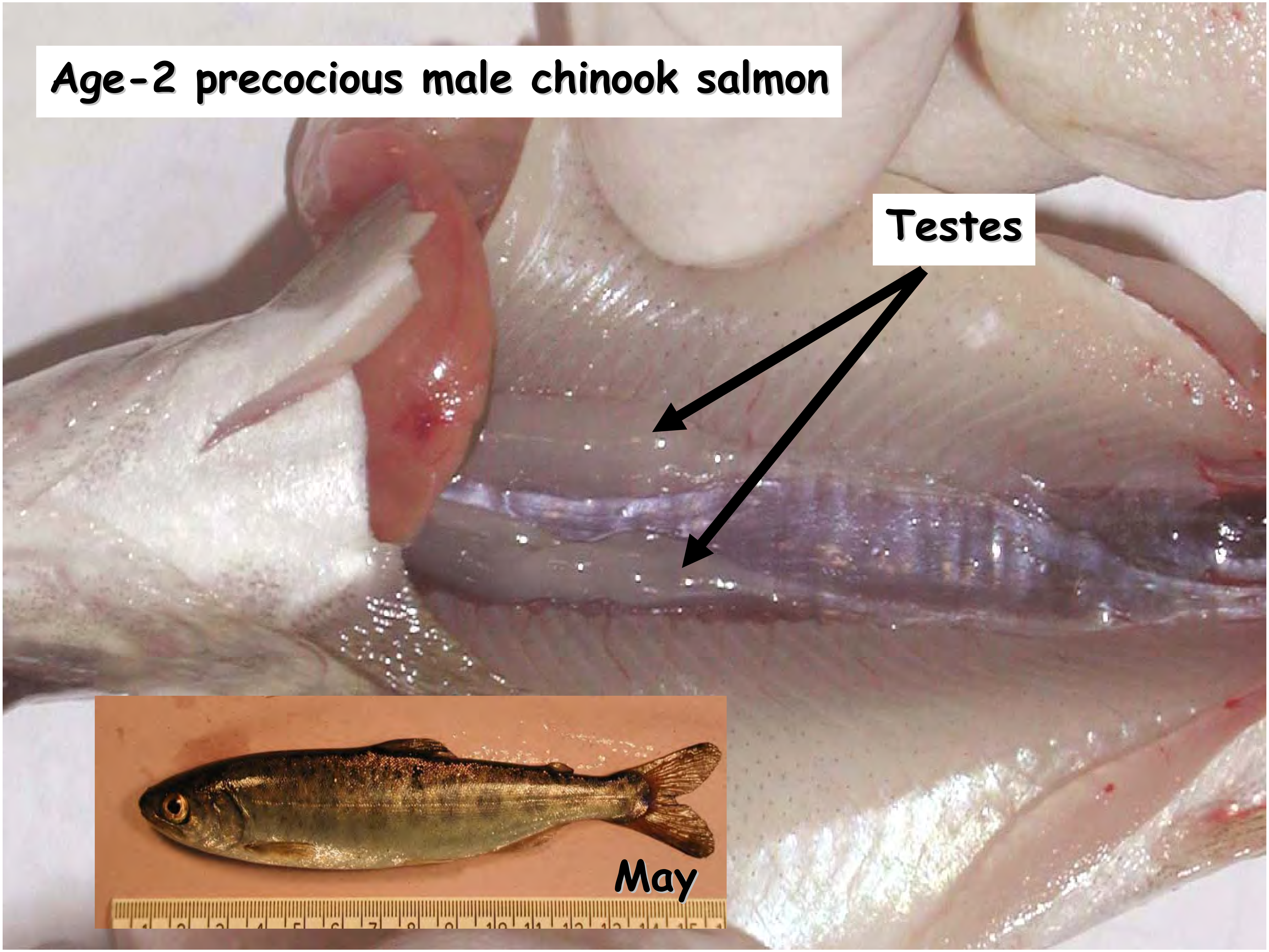
On average 50% of male Cle Elum hatchery spring Chinook precociously matured at age-2

BY	Release #	% of males	# Minijacks
1997	386,048	44%	84,931
1998	589,683	72%	211,107
1999	758,789	50%	189,697
2000	834,285	37%	153,508
2001	370,236	52%	95,520
		Avg. 50%	

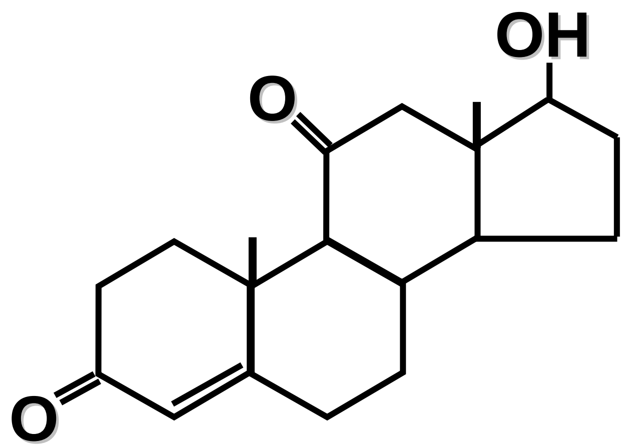
Larsen, D.A., Beckman, B.R., Cooper, K.A., Barrett, D., Johnston, M., Swanson, P., and Dickhoff, W.W. (2004). Assessment of high rates of precocious male maturation in a spring Chinook salmon supplementation hatchery program. Transactions of the American Fisheries Society. 133, 98-120.

How do we assess precocious male maturation?


Age-2 immature male chinook salmon
Testes
May

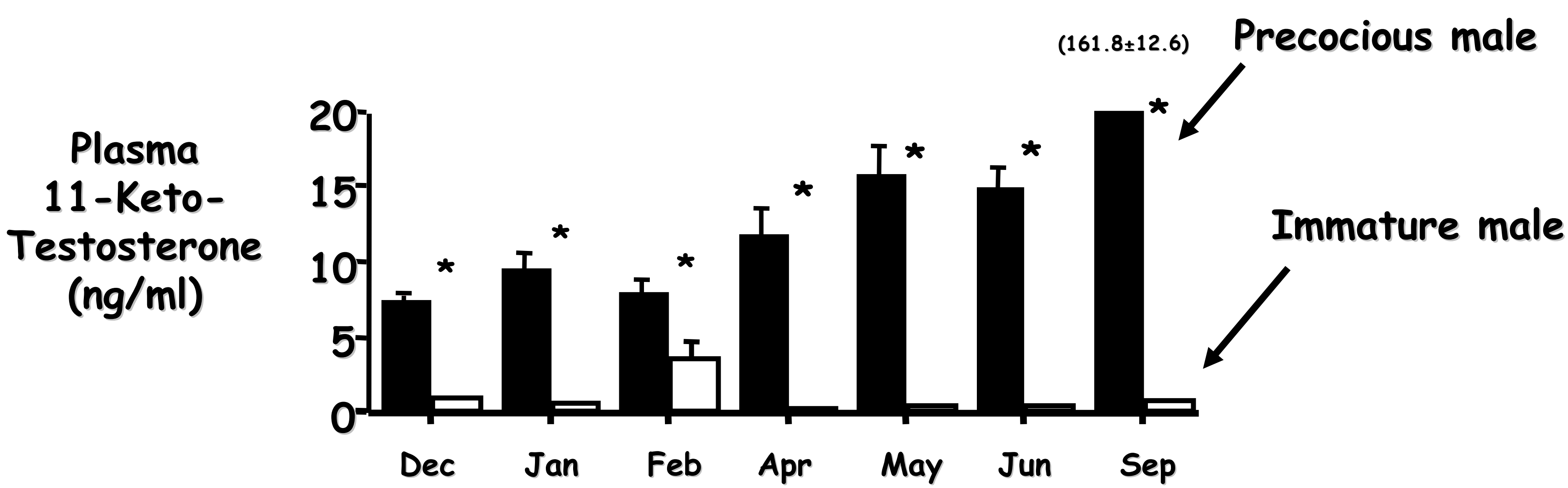

Age-2 precocious male chinook salmon
Testes
May

Plasma 11-ketotestosterone (11-KT)



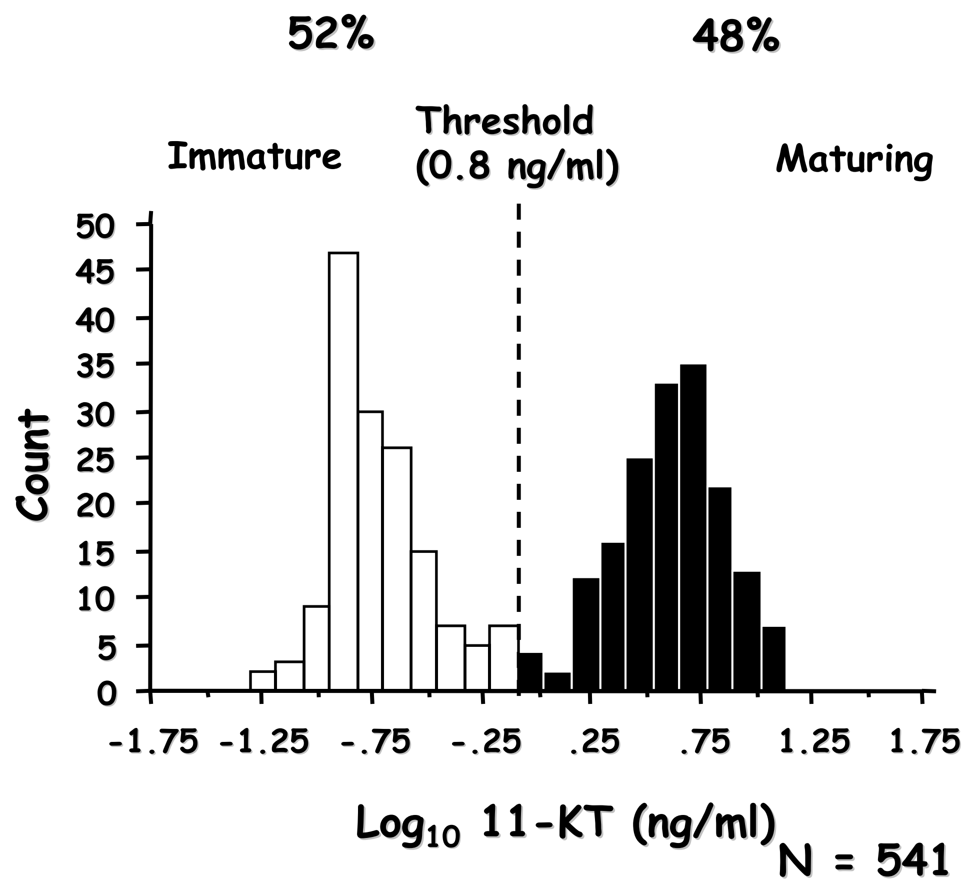
- Major androgen in teleost fish
- Instrumental in the regulation of spermatogenesis

Laboratory based studies have clearly established that 11-ketotestosterone (11-KT) is significantly elevated in precocious males as much as a year prior to mating



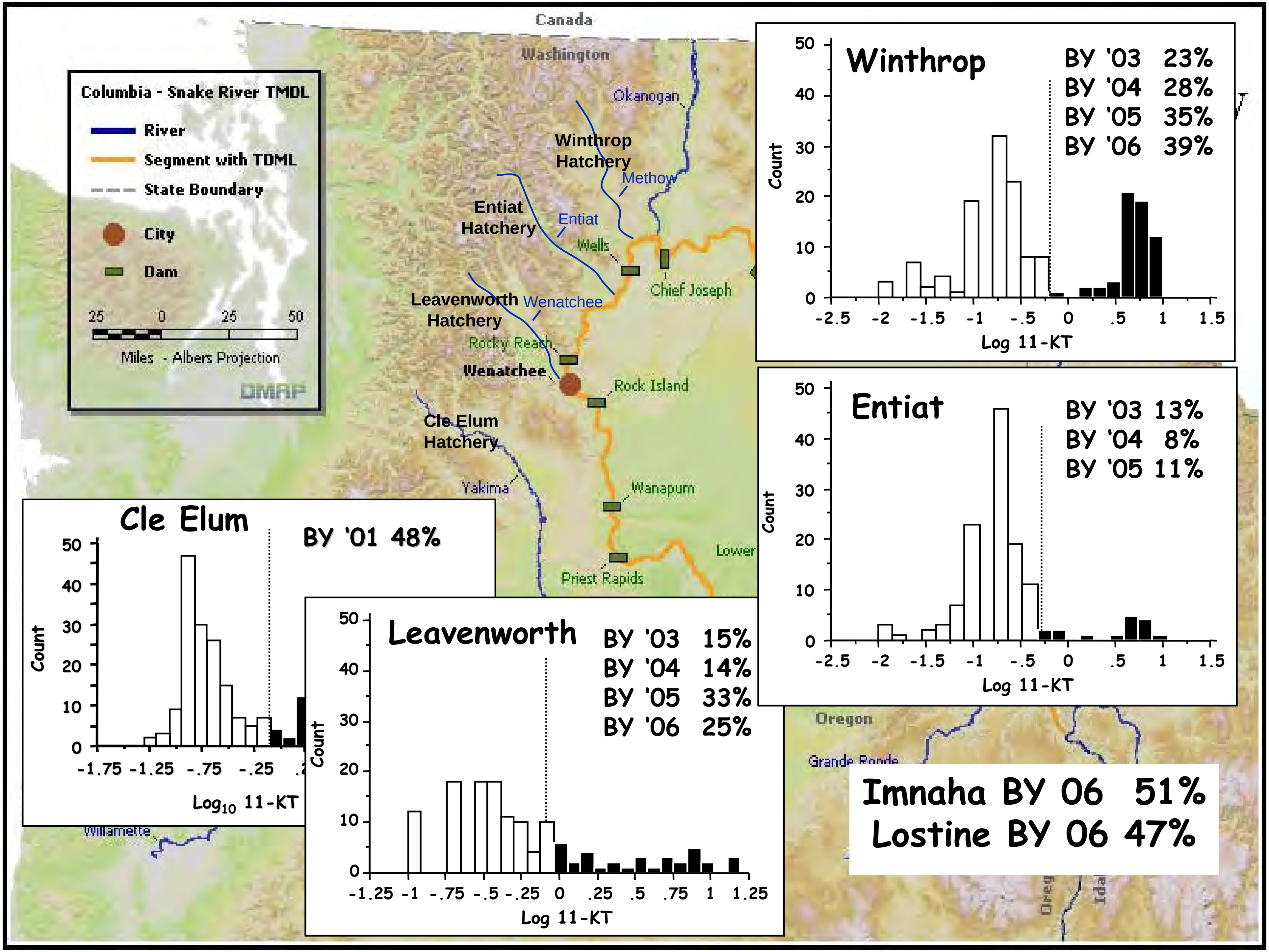
(Campbell et al. 2004)

Every March the Cle Elum Chinook are screened for pathology just prior to volitional release



Consequences of high levels of precocious maturation

- Ecological impacts
- Genetic impacts
- Increased straying
- Skewed gender ratio
- Loss of adult production
- Alter accuracy of SAR's



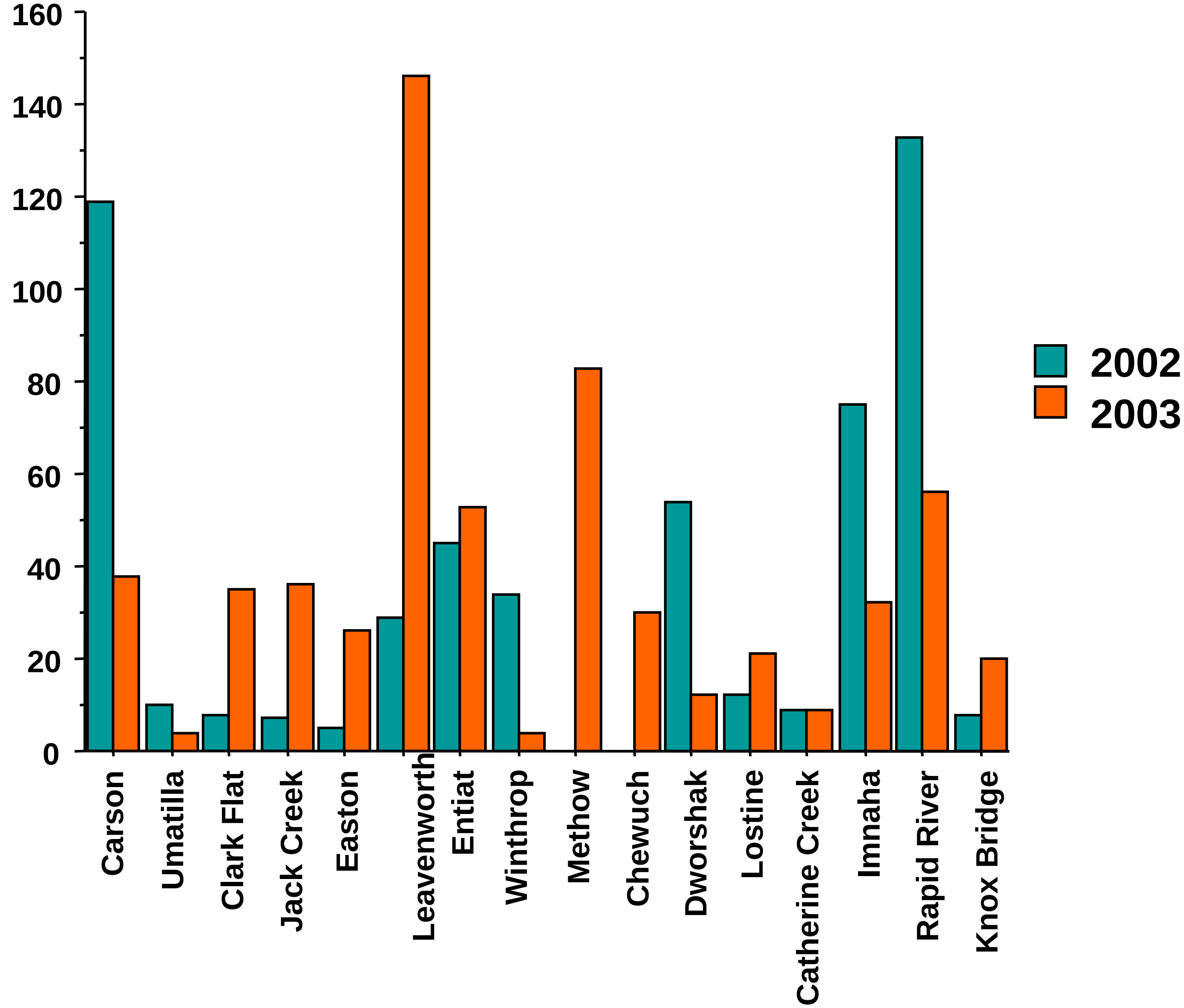
Canada
Washington
Columbia - Snake River TMDL
River
Segment with TDML
State Boundary
City
Dam
25 0 25 50
Miles - Albers Projection
Okanogan
Winthrop Hatchery
Methow
Entiat Hatchery
Entiat
Wells
Chief Joseph
Leavenworth Hatchery
Wenatchee
Rocky Reach
Wenatchee
Rock Island
Cle Elum Hatchery
Yakima
Wanapum
Priest Rapids
Lower
Winthrop
BY '03 23%
BY '04 28%
BY '05 35%
BY '06 39%
Count
Log 11-KT
Entiat
BY '03 13%
BY '04 8%
BY '05 11%
Count
Log 11-KT
Cle Elum
BY '01 48%
Count
Log_{10} 11-KT
Leavenworth
BY '03 15%
BY '04 14%
BY '05 33%
BY '06 25%
Count
Log 11-KT
Oregon
Grande Ronde
Imnaha BY 06 51%
Lostine BY 06 47%
Willamette

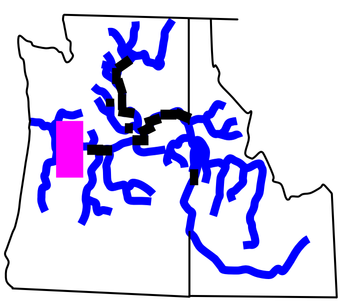
Minijacks are ubiquitous throughout the Columbia Basin

Beckman, B.R. and Larsen D.A. (2005). Up-stream migration of PIT-tagged Age 2 (minijack) Chinook salmon in the Columbia River: behavior, abundance, distribution, and origin. Transactions of the American Fisheries Society. 134, 1520-1541.

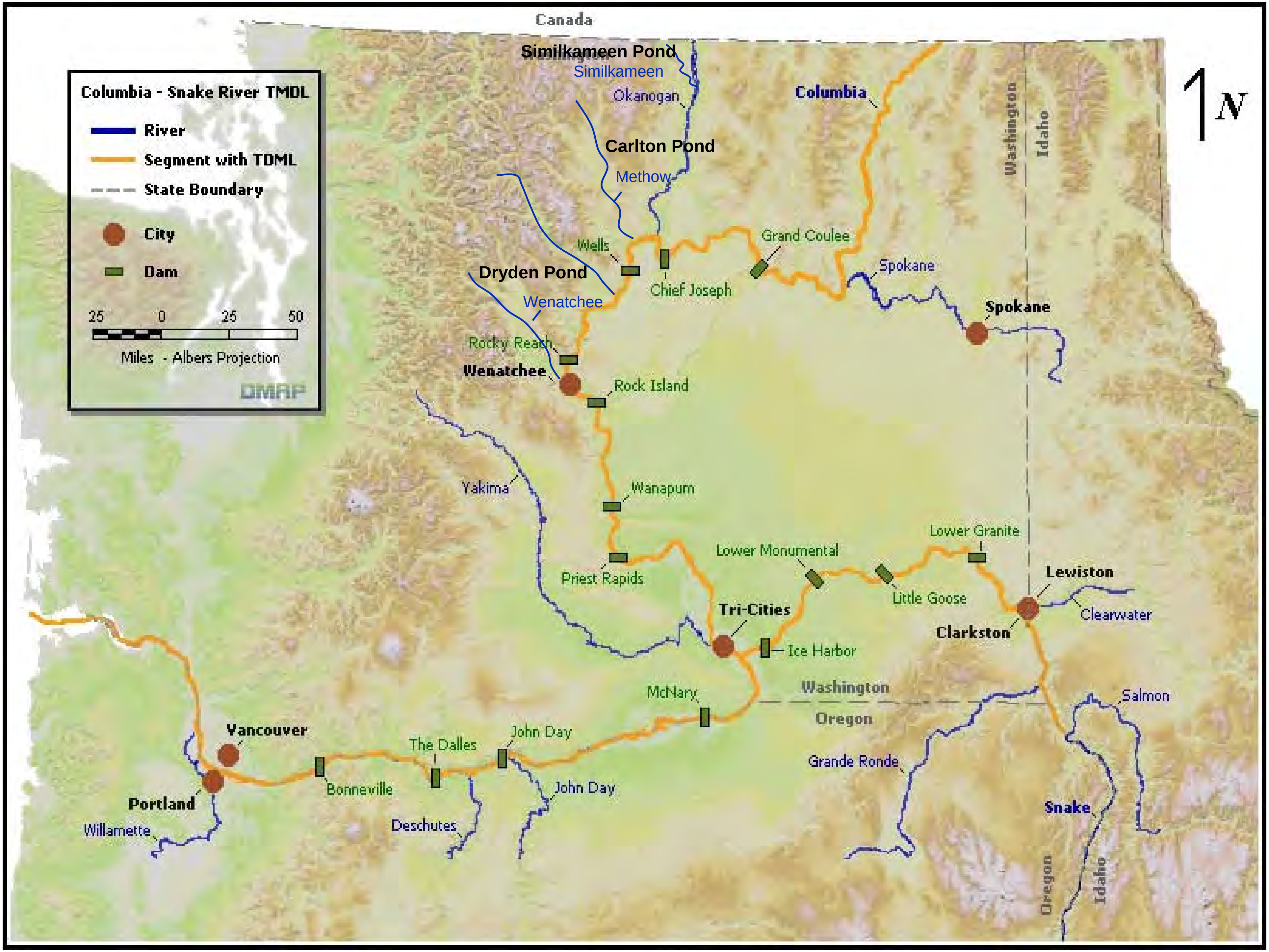
Minijacks were detected at Bonneville Dam from all releases

\# PIT-tags detected





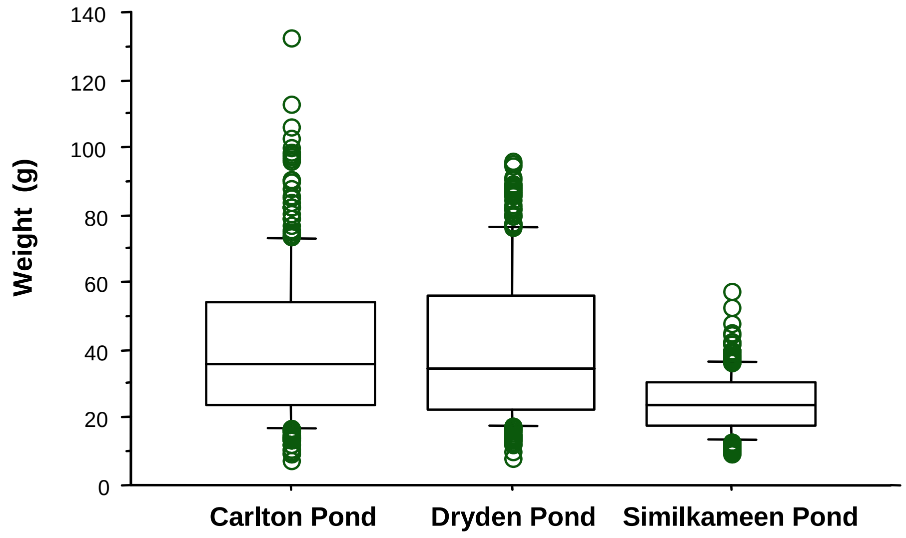
Mid/Upper Columbia
Summer Chinook Salmon

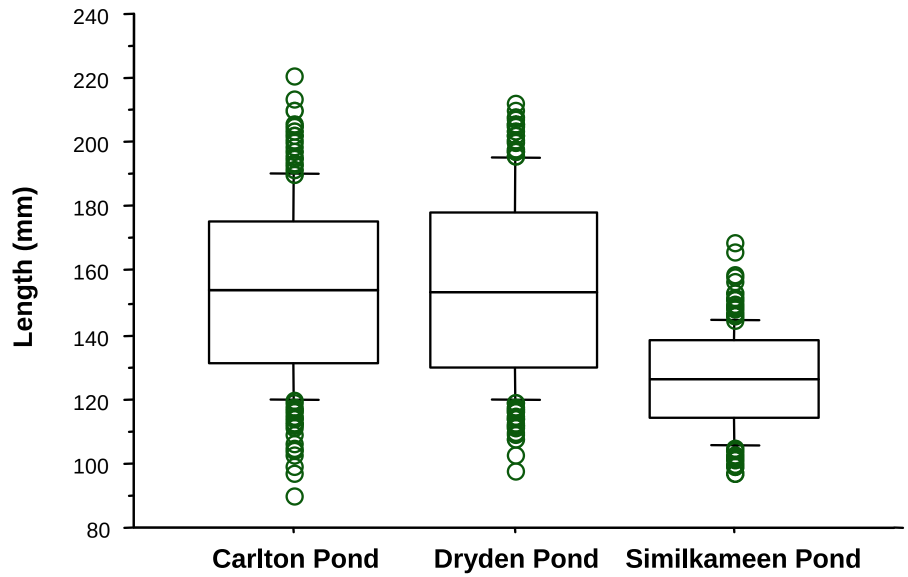

Canada
Similkameen Pond
Similkameen
Okanogan
Columbia
Carlton Pond
Methow
Wells
Chief Joseph
Grand Coulee
Spokane
Spokane
Dryden Pond
Wenatchee
Rocky Reach
Wenatchee
Rock Island
Washington
Idaho
Yakima
Wanapum
Priest Rapids
Lower Monumental
Lower Granite
Little Goose
Lewiston
Clearwater
Clarkston
Tri-Cities
Ice Harbor
Washington
Oregon
McNary
Salmon
Grande Ronde
Snake
Vancouver
Portland
Willamette
Bonneville
The Dalles
John Day
John Day
Deschutes
Oregon
Idaho
N
Columbia - Snake River TMDL
River
Segment with TDML
State Boundary
City
Dam
25 0 25 50
Miles - Albers Projection
DMAP

Methods

- April, 2008 collect random net grab samples of 300 fish from Carlton (Methow), Dryden (Wenatchee), and Similkameen Ponds prior to release.
- Measure fork length and weight, visually determined gender
- Collect blood and determine plasma 11-KT levels in all males via ELISA at NW Fish. Sci. Ctr., Seattle.
- Age-2 minijacks determined by 11-KT levels in excess of 1.5 ng/ml.

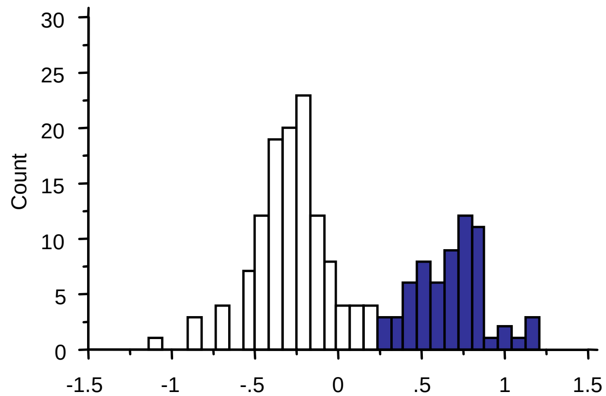
Mid-Columbia Summer Chinook - size comparison





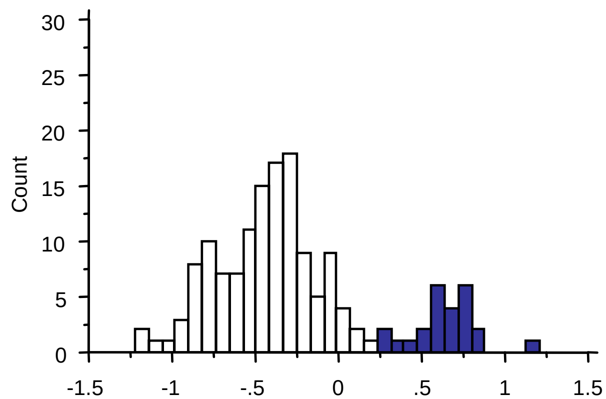
11-KT frequency distribution between stocks

Carlton Pond



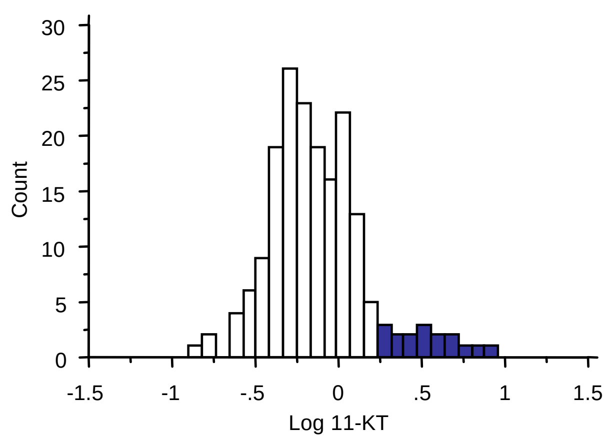
37% of males
Minijacks
74, 000 fish
(400,000 released)

Dryden Pond



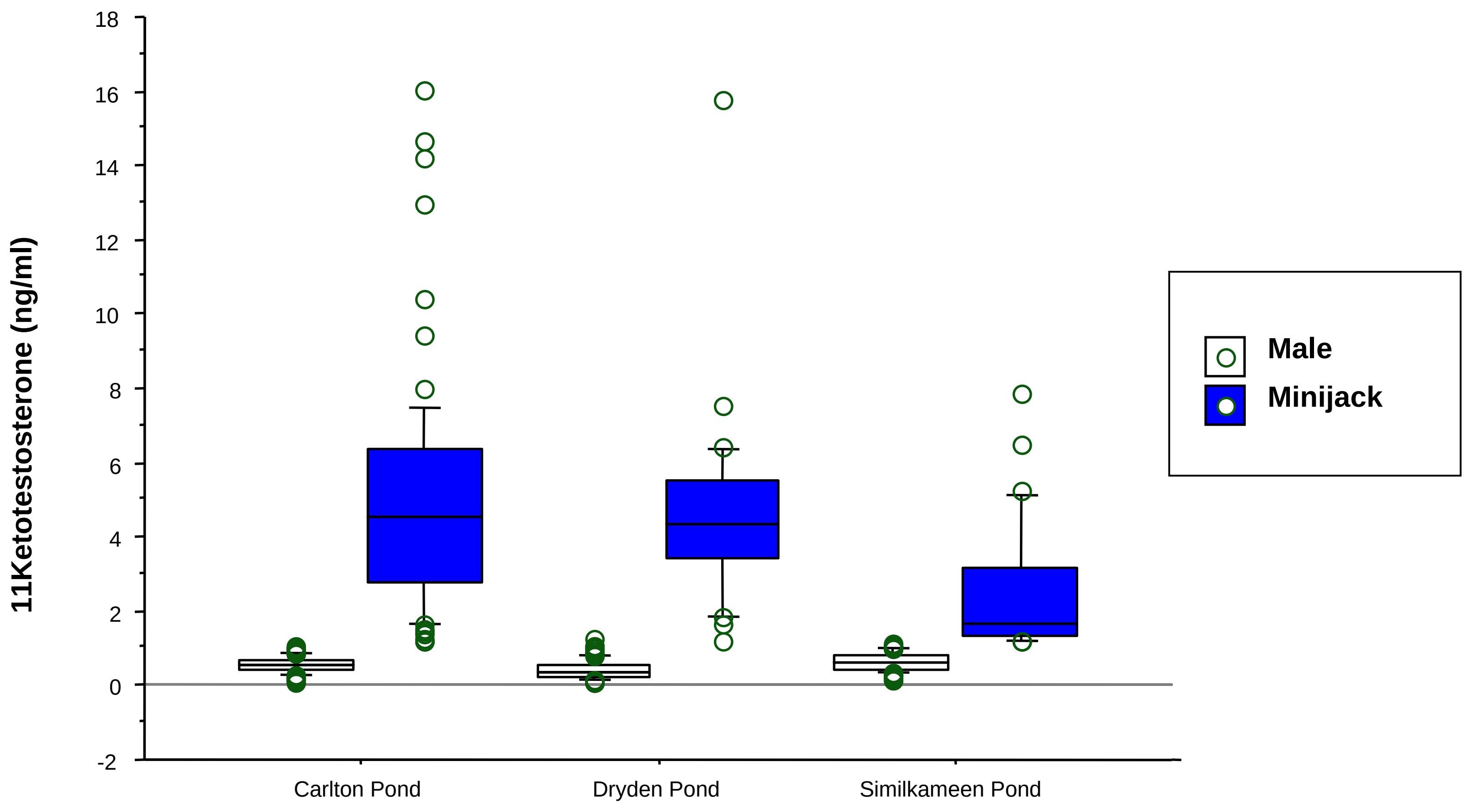
17% of males
Minijacks
73,440 fish
(864,000 released)

Similkameen Pond

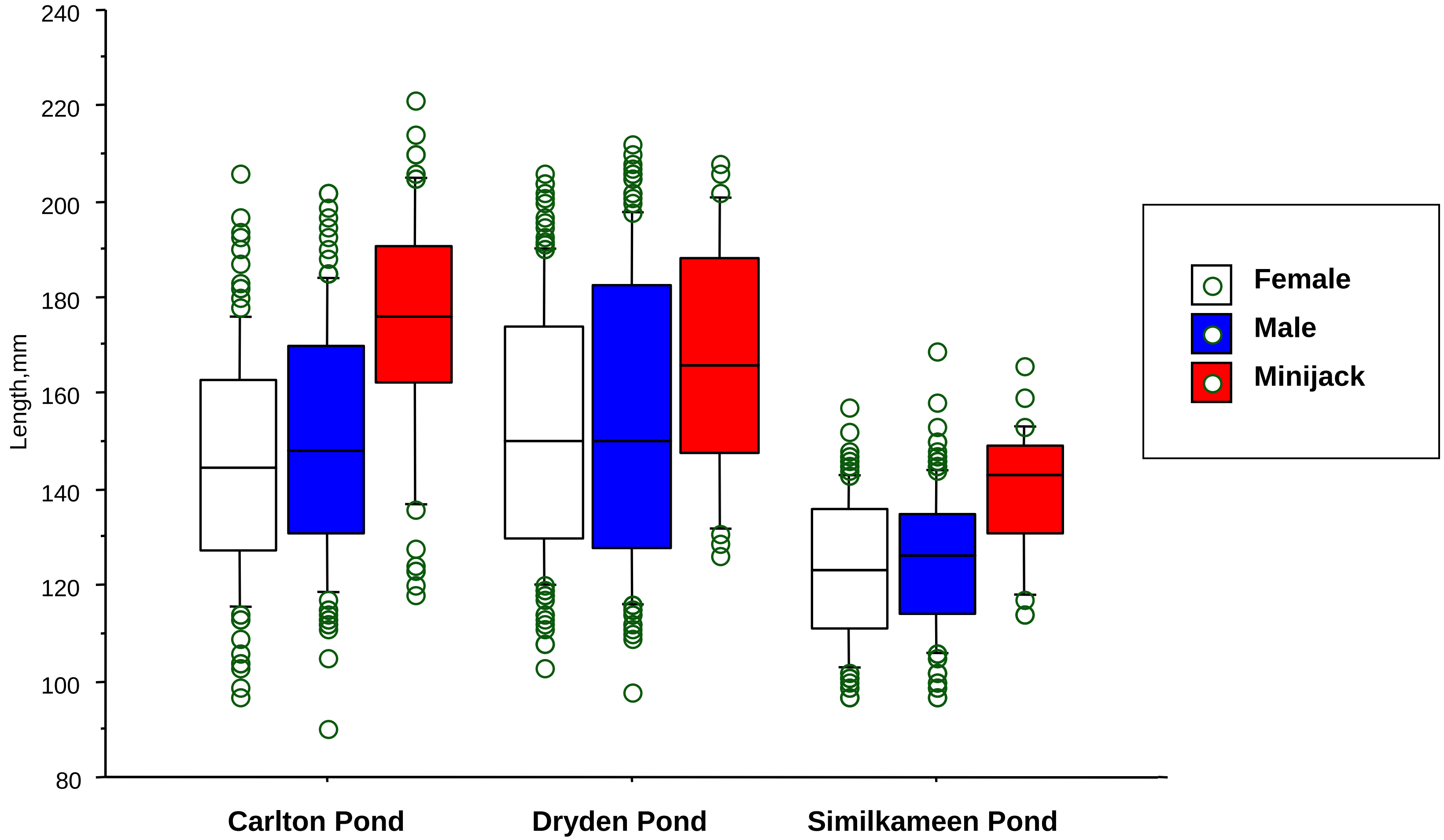


10% of males
Minijacks
28, 800 fish
(576,000 released)

11-KT levels in males and minijacks

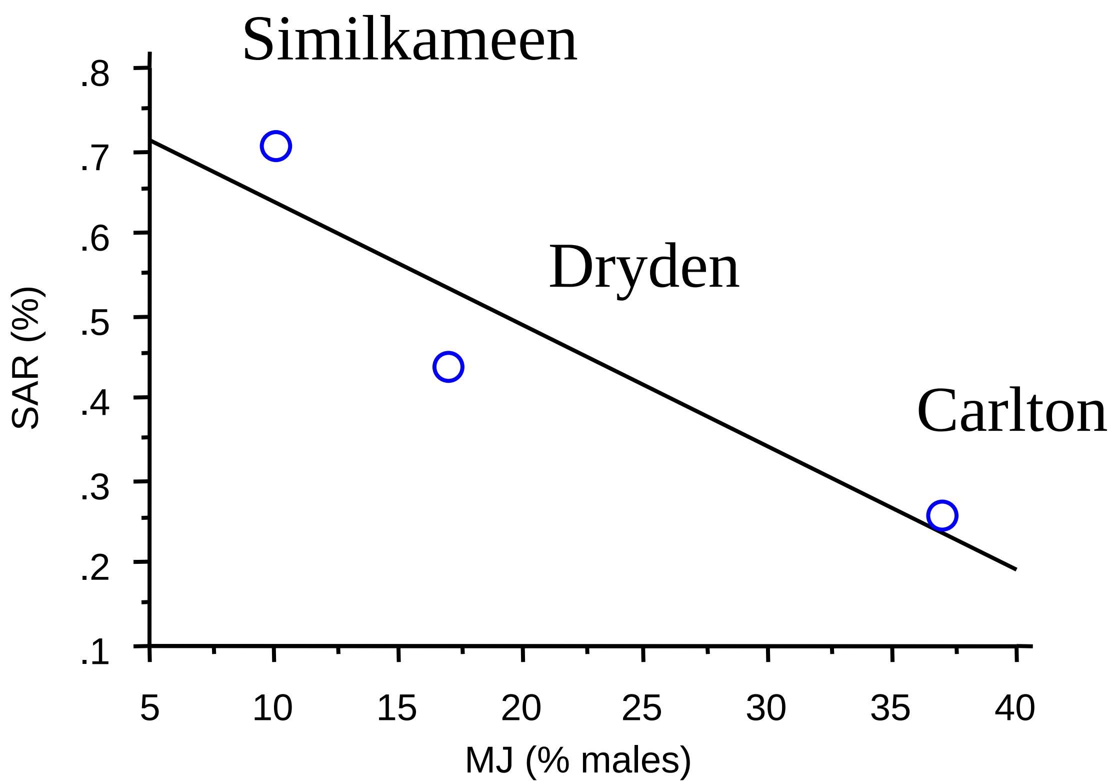


Size by phenotype



Regression relation between % Minijacks and SAR (avg. % over 11-13 years)

$R^2 = 0.86$

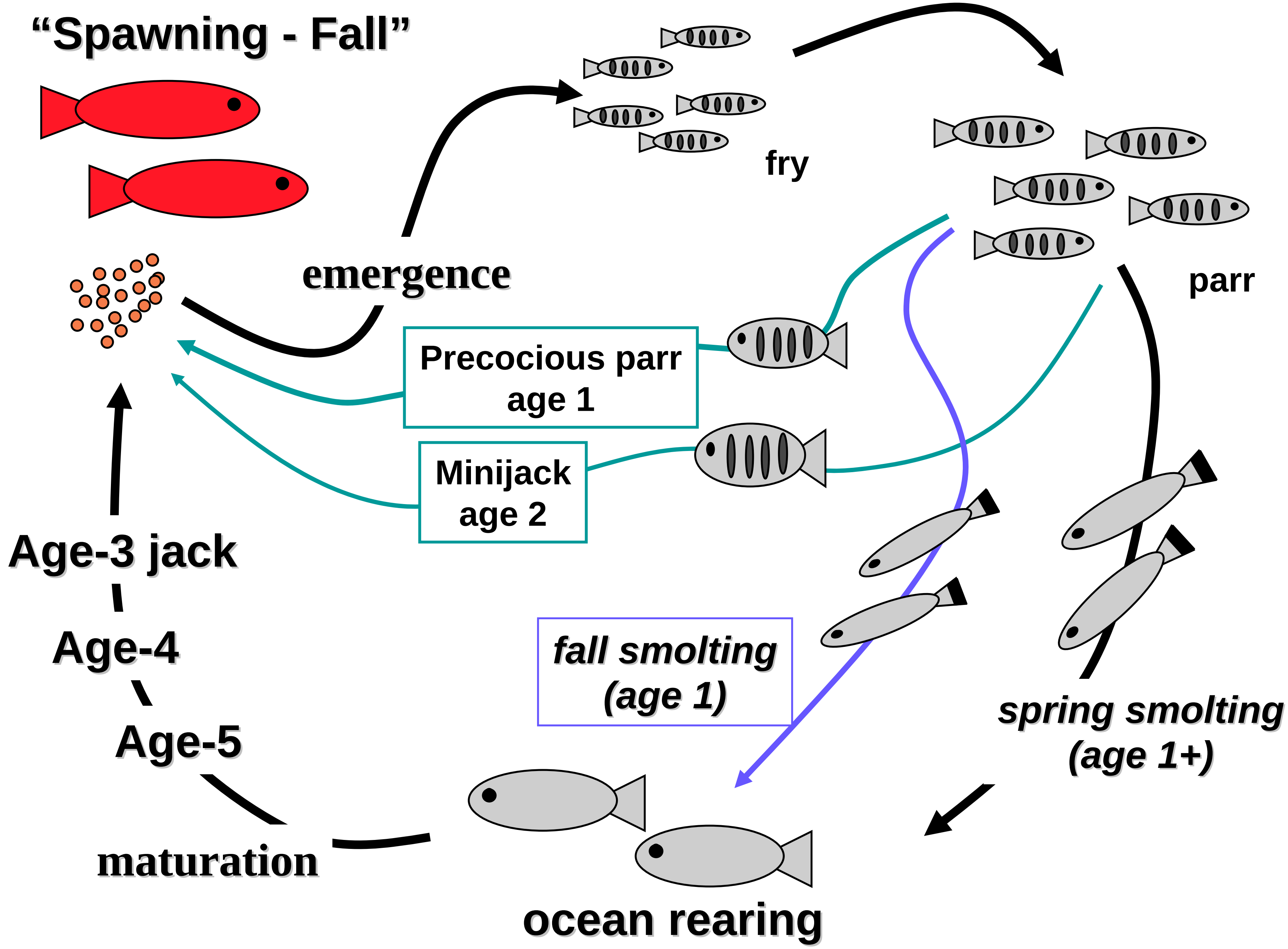


Columbia Basin Research
School of Aquatic and Fishery Science
University of Washington
Web@cbr.washington.edu
http://www.cbr.washington.edu/trends/index.php

Conclusions - part 1

- Minijacks are ubiquitous among all spring Chinook populations we've surveyed.
- Minijack rates among hatchery Summer Chinook populations are relatively variable (high and low).
- Supplementation programs using localized broodstocks may have increased susceptible to this life-history.
- The economic, ecological, and genetic impacts of this phenomenon may be significant
- Smolt quality monitoring is a useful tool for helping make informed decisions about hatchery uses and practices.

Brian -part 2


"Spawning - Fall"
emergence
fry
parr
Precocious parr
age 1
Minijack
age 2
Age-3 jack
Age-4
Age-5
maturation
fall smolting
(age 1)
spring smolting
(age 1+)
ocean rearing

10 years of sampling, >12,000 fish = 2 precocious parr (<0.02%)

1). this appears to be quite low

data from other hatchery and wild populations

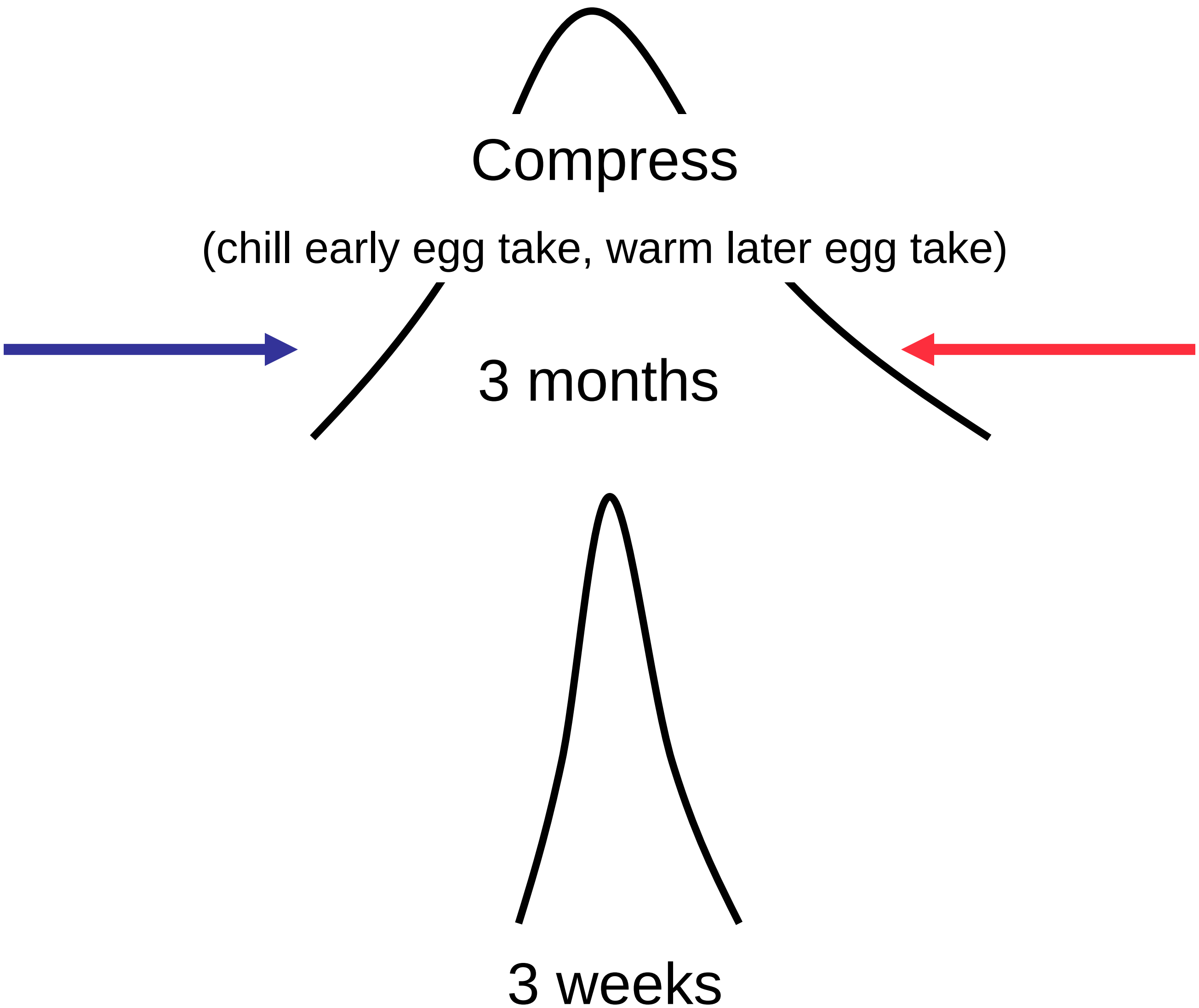
Why so few precocious parr?

One of the reasons CESRF is special:
(there are many)

Seasonal timing for ponding fry

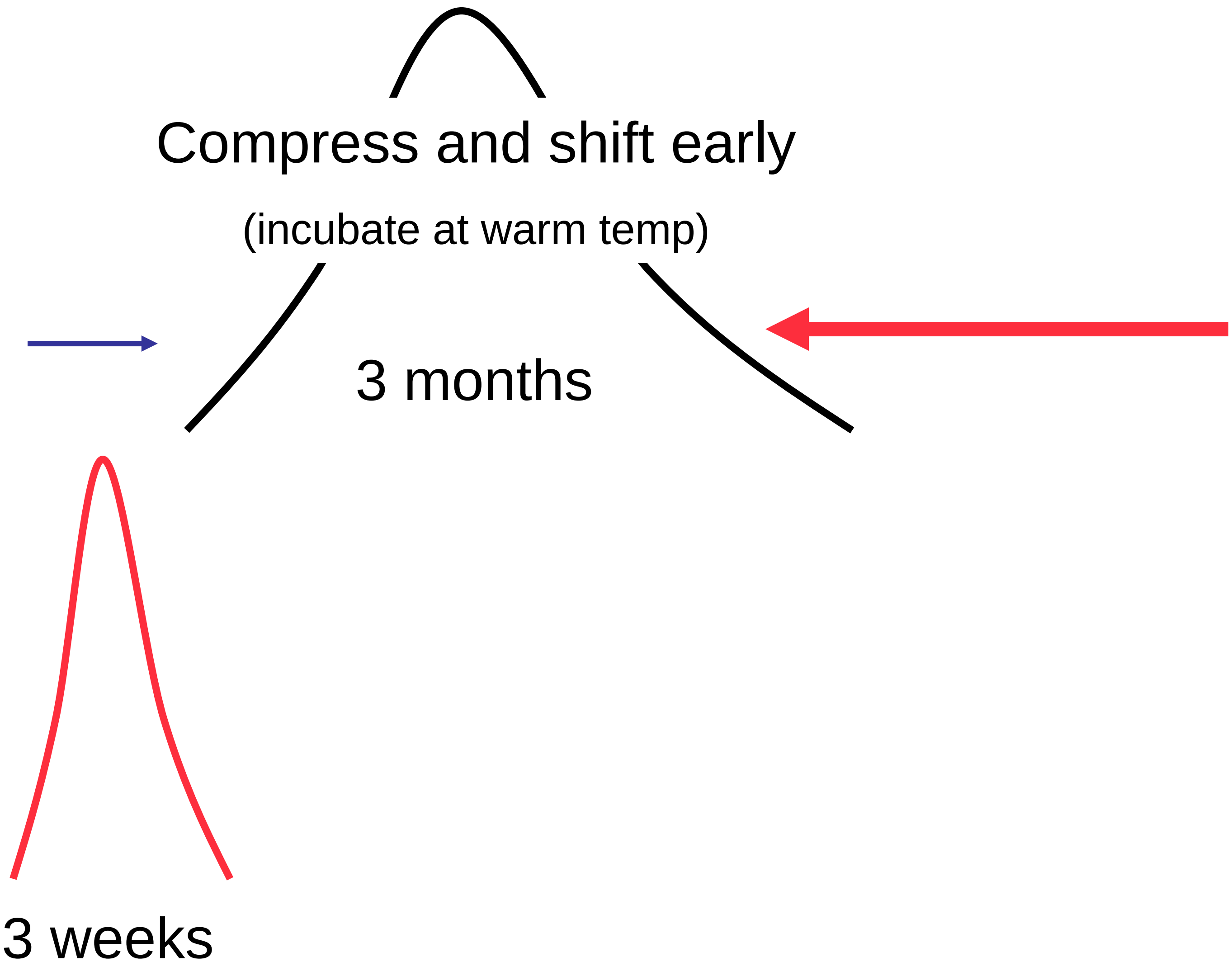
Many hatcheries alter emergence (ponding)

I). synchronize ponding



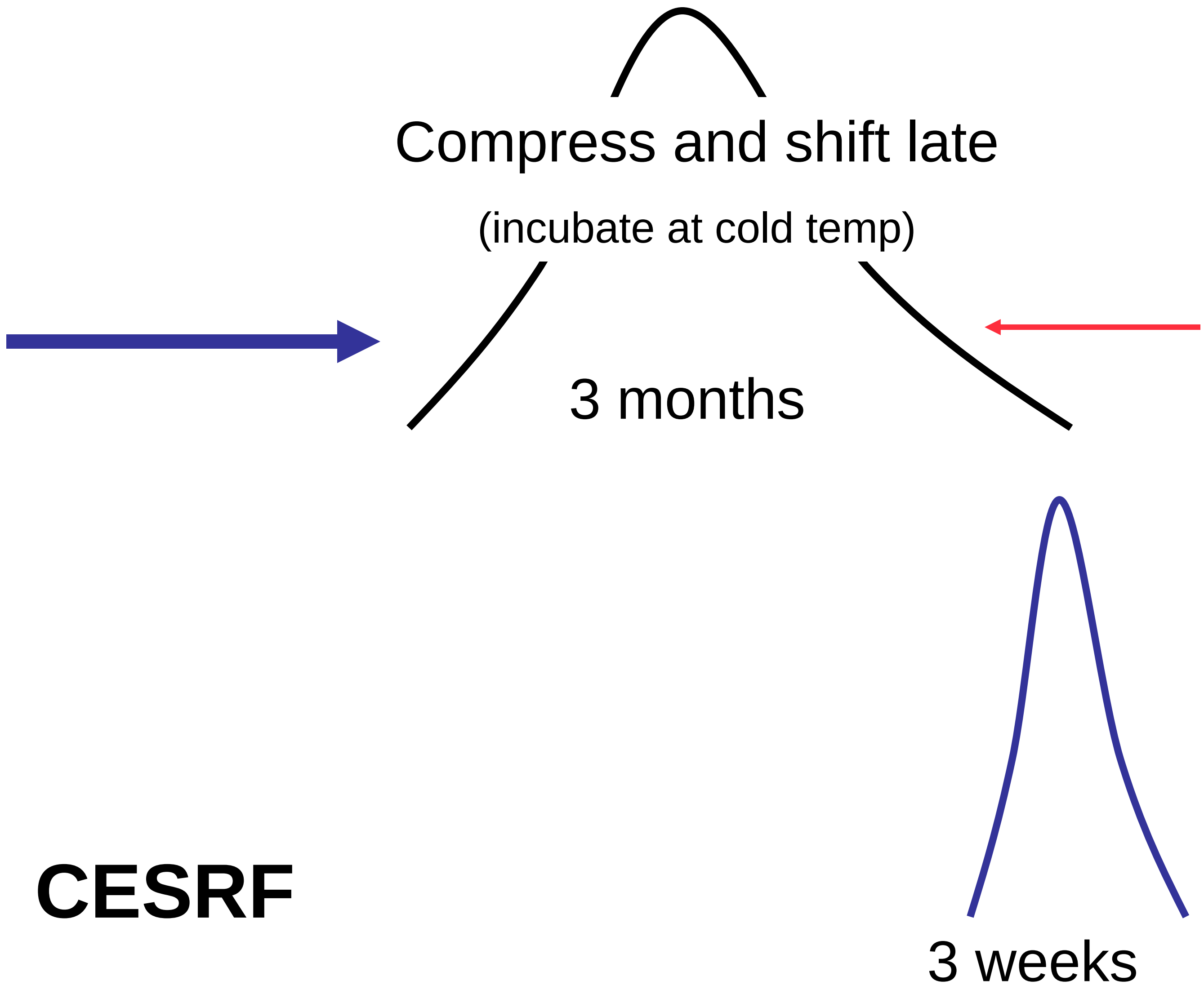
Many hatcheries alter emergence (ponding)

II). Pond “early” - longer growth period, clear egg stacks



Many hatcheries alter emergence (ponding)

III). Pond “late” - avoid silting of ponds, smaller size

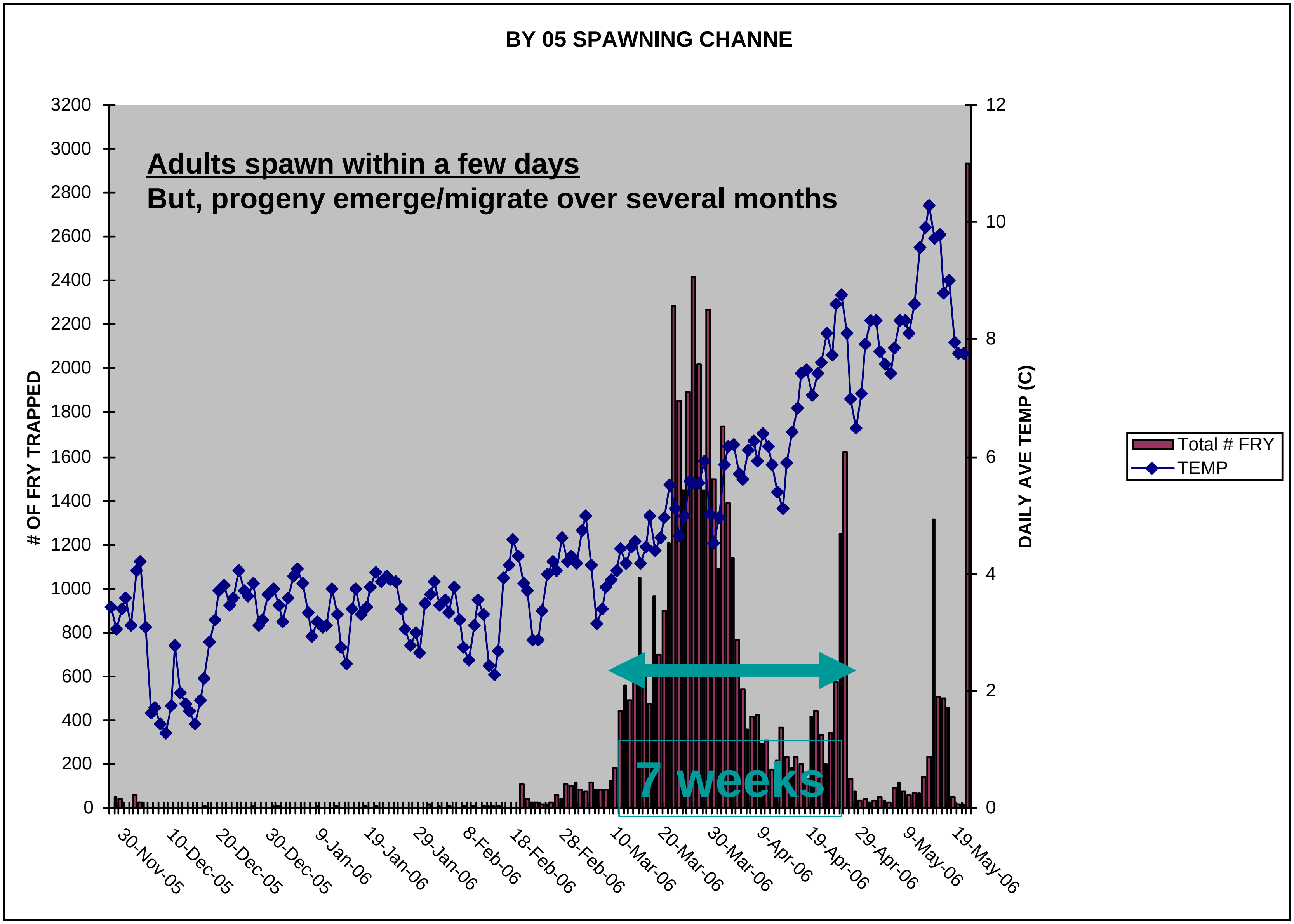


What is “Natural Emergence Timing”?

QuickTime™ and a
decompressor
are needed to see this picture.

QuickTime™ and a
decompressor
are needed to see this picture.

QuickTime™ and a
decompressor
are needed to see this picture.



Data kindly provided by Steve Schroder,Todd Pearsons, Anthony Fritts, Jen Scott, Jordan Vandal, Gene Sanborn (WDFW) and Curt Knudsen (Oncorh Consulting).

Experimental Question:

What is the effect of emergence timing on life-history decisions?

Experimental approach:

Pond fry at 3 different photoperiods

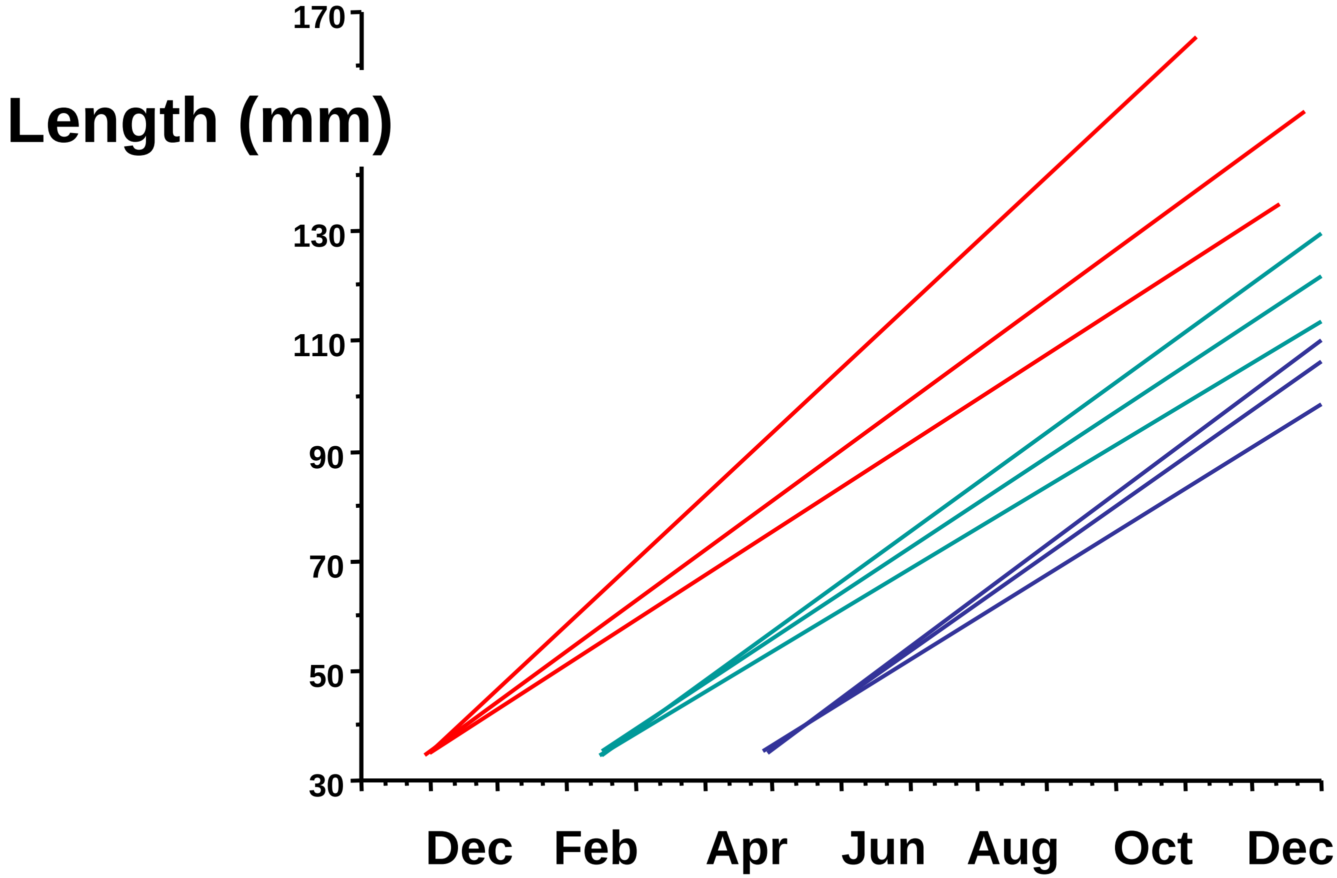
1 December (early)
15 February (middle)
1 May (late)

Experimental approach II:

feed fry at 3 different rates

- Low
- High
- Satiation

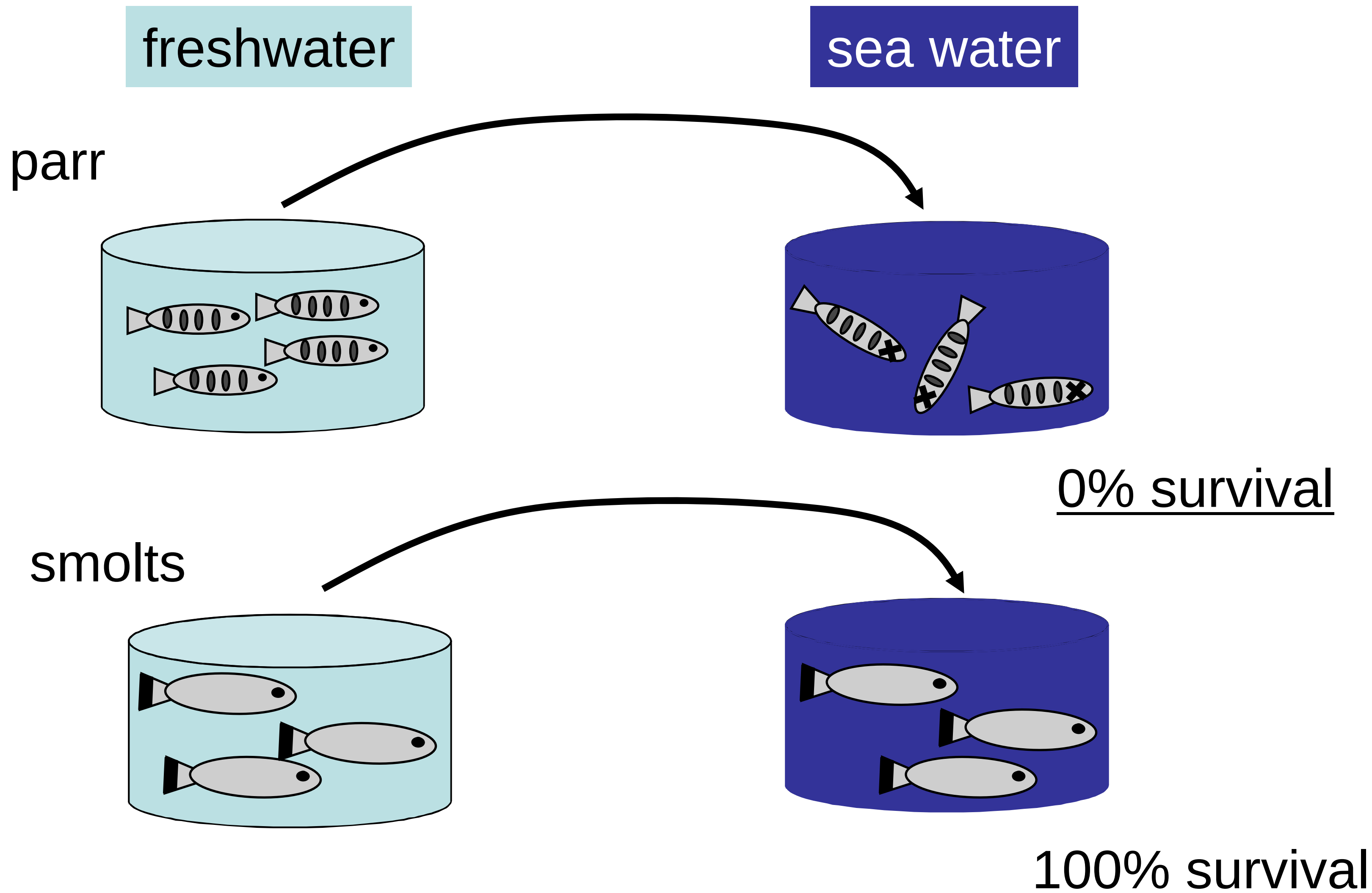
Emergence time, growth and size were varied experimentally



Fish grown in experimental tanks NOAA Montlake

Monitor Autumnal Smolting:

24 hour seawater challenge

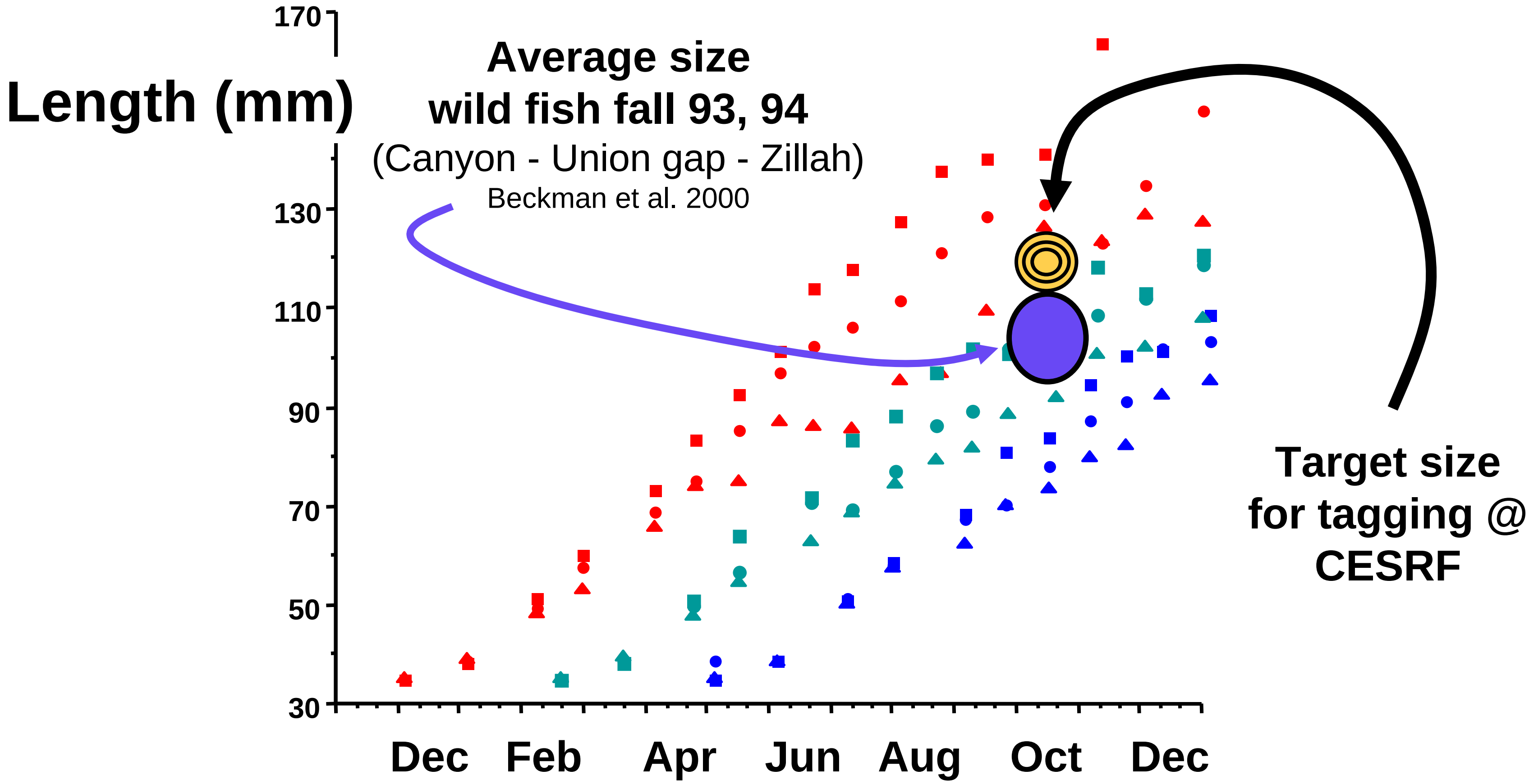


Monitor Age-1 (precocious parr) Maturation:

milt expression or simple dissection

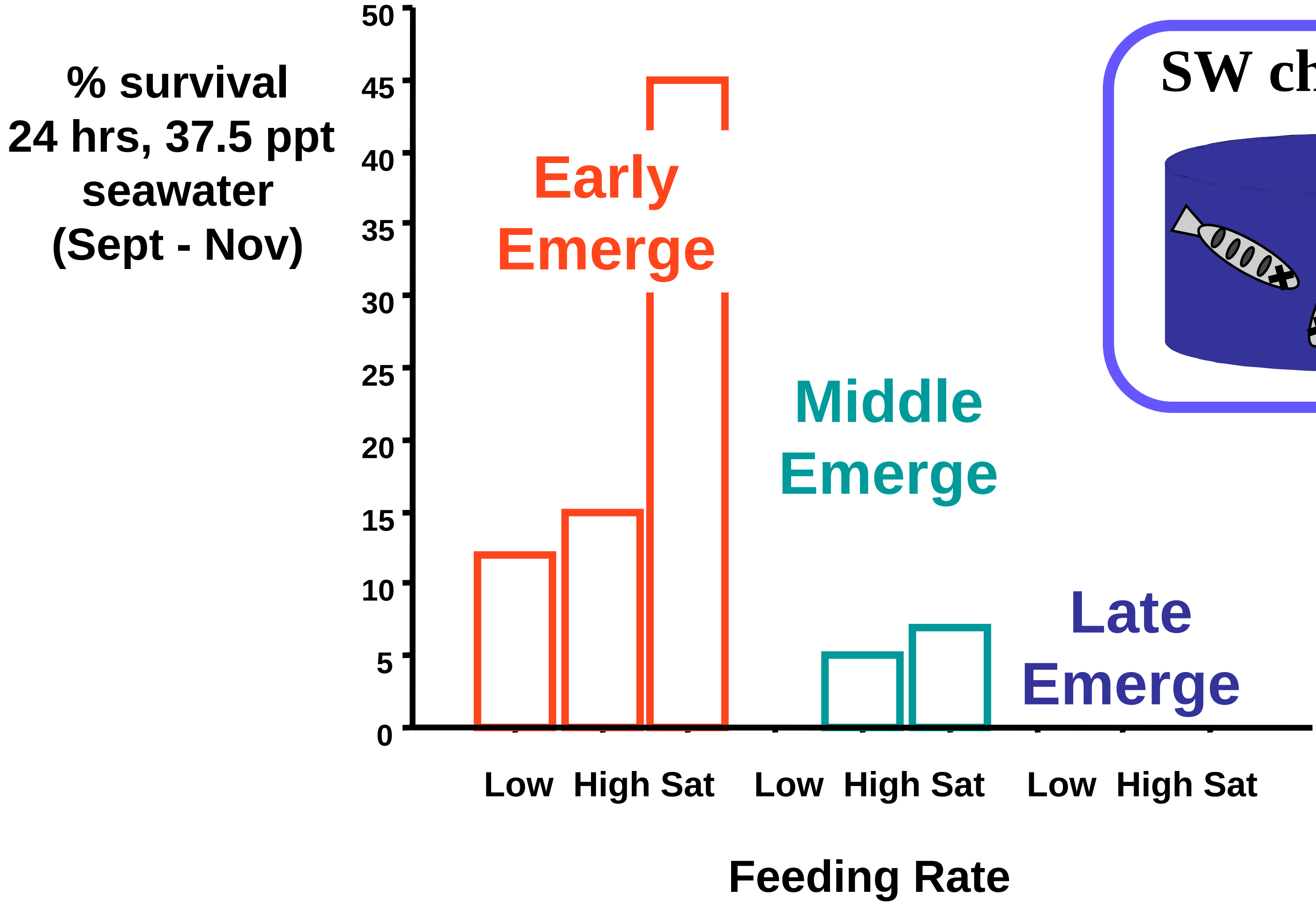
QuickTime™ and a
decompressor
are needed to see this picture.

Emergence and growth of fish did vary



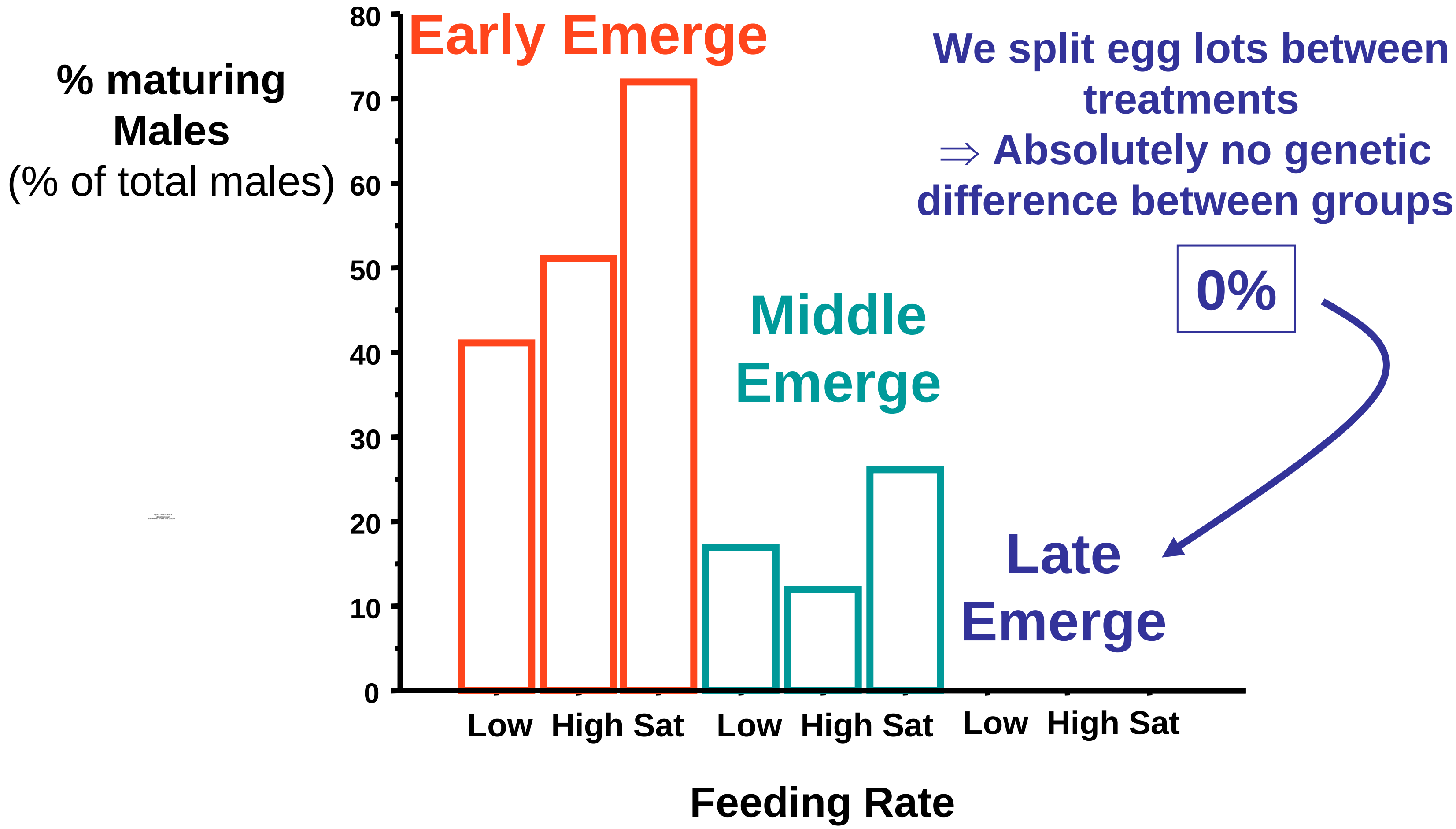
Thanks to Charlie Strom and CESRF staff for eggs

Early emerging fish smolt in the autumn
Later emerging fish do not

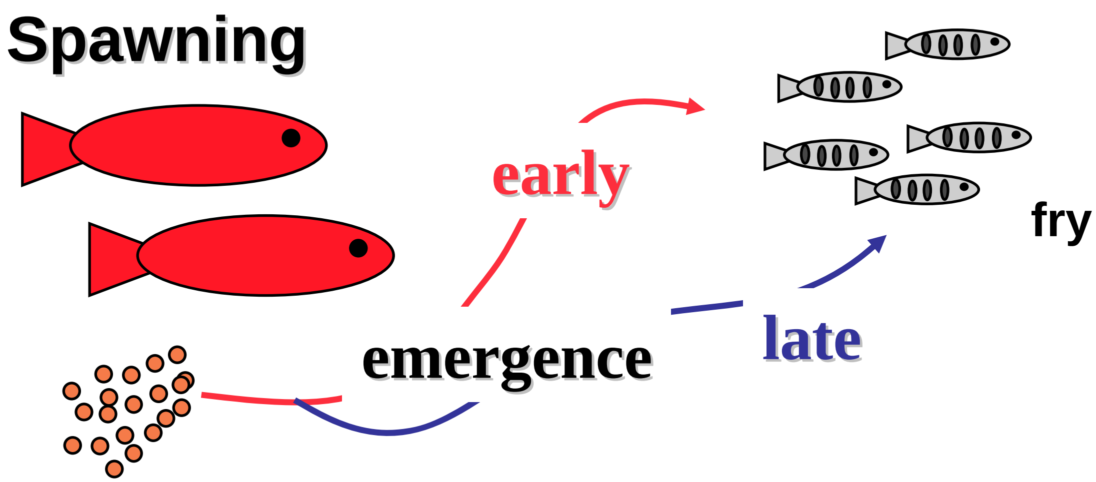


Early emerging fish have a high propensity for early male maturation (age 1)

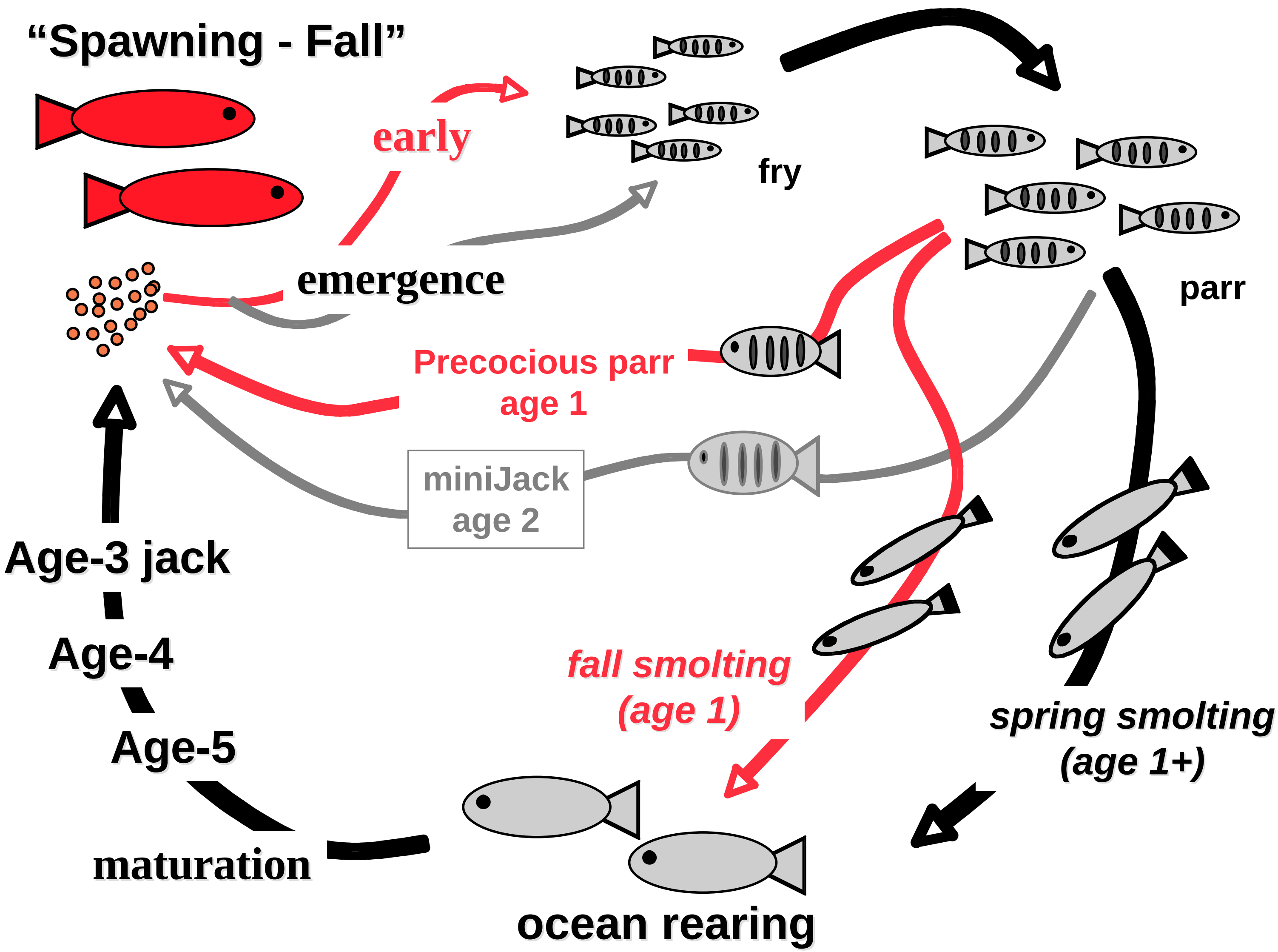
(precocious parr)



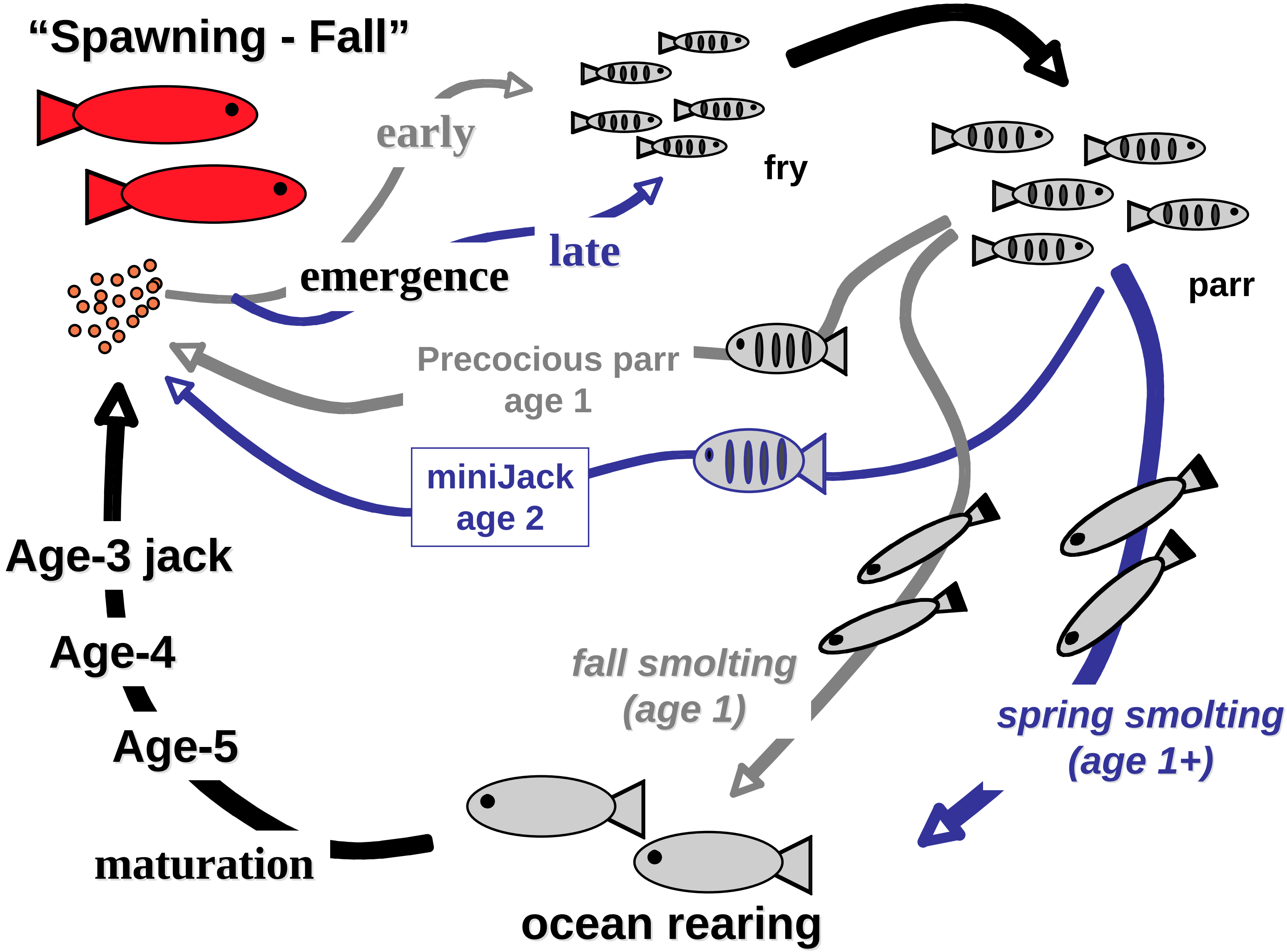
Conclusion -part 2: Emergence timing may provide another axis for life history variability



Early emergence accelerates life history

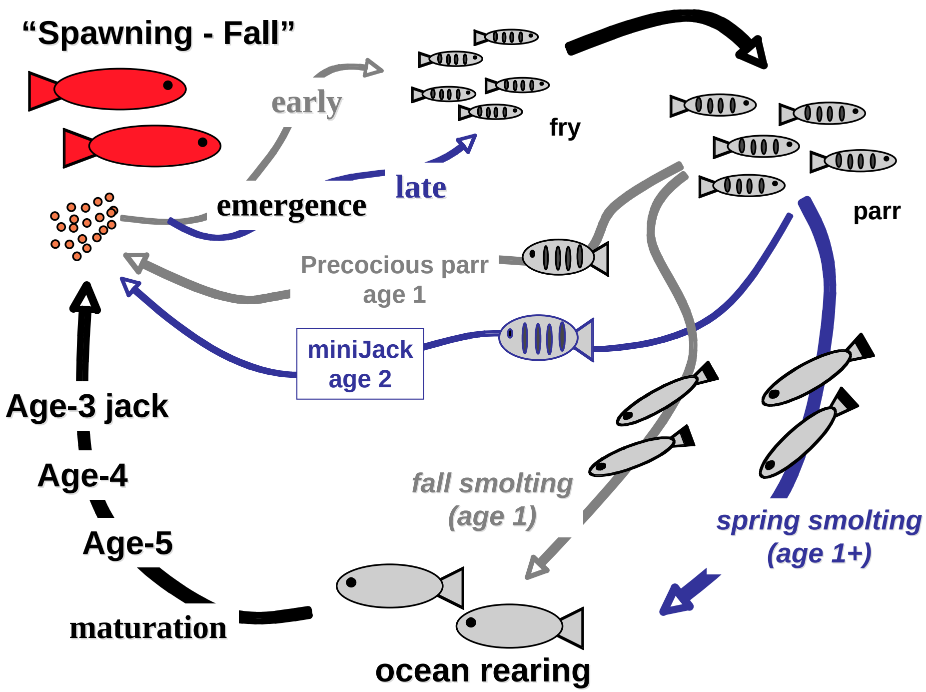


Late emergence delays life history



10 years of sampling, >12,000 fish = 2 precocious parr (<0.02%)

Late emergence delays life history



Implications

What happens in the hatchery <u>does not</u> stay in the hatchery, long-term life history implications for altering emergence (ponding) time exist.

No easy answers for “best” rearing program - a series of trade-offs between male maturation, size (tagging targets), smolting and SAR.

Current rearing program ((Yakima) late ponding) mimics conditions found in head water streams (high elevation, cold - late emergence) and is favorable for yearling releases.

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, Bob Pfeifer, Steve Hays, Joe Miller

Date: October 16, 2008

Re: Final Minutes of September 17, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, September 17, 2008, from 9:30 am to 3:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Mike Schiewe will summarize Committees member's preferences regarding a path forward for Non-target Taxa of Concern (NTTOC) in a table and will send it out for Hatchery Committees review (Item II-A).
- Each Committees member will provide to Mike Schiewe a list of recommended species to be analyzed in the initial NTTOC modeling exercise by September 24 (Item II-A).
- The Committees members will provide comments to Joe Miller on the sockeye enumeration study by October 1 (Item II-B).
- Chelan PUD will prepare a Statement of Agreement (SOA) for the Water Re-Use Study for the next meeting for continuing the study in 2009 (Item II-C).
- The Committees members will provide comments on the 2009 Chelan PUD Monitoring and Evaluation (M&E) Work Plan to Joe Miller by September 24 (Item II-F).
- Joe Miller will send the PUD's joint Hatchery Scientific Review Group (HSRG) comment letter and table to Ali Wick for distribution to the Committees (Item II-G).
- Shaun Seaman will ask for a memorandum from Pamela Nelle on the status of data archiving and will share this with the Committees (Item II-H).
- Jerry Marco will provide information from the Bonaparte Pond well water test as soon as it is available (Item IV-A).

- Kirk Truscott will finalize the Joint Fisheries Parties' (JFP's) response to Chelan PUD's concerns on Washington Department of Fish and Wildlife's (WDFW's) draft steelhead reproductive success study plan/proposal by the next meeting (Item V-A).
- Mike Schiewe will forward WDFW's Passive Integrated Transponder tagging (PIT-tagging) retention study protocol to Ali Wick for distribution to the Committees (Item V-B).
- Truscott and Shaun Seaman agreed to discuss options to protect the Lake Wenatchee net pens in the future from the net-snagging that caused the sockeye release last month (Item V-C).
- Scribner and Shaun Seaman will discuss cost sharing for PIT-tagging of Okanogan sockeye to clarify goals and potential objectives of having PIT-tag data (Item VI-B).
- Scribner and Kirk Truscott will discuss a date by which Section 10 coverage needs to be obtained in order to spawn the source fish for the Yakama Nation's (YN's) summer/fall Chinook reintroduction pilot study in the Yakima River (Item VI-E).

DECISION ITEM SUMMARY

There were no decision items at this meeting.

I Meeting Minutes Approval

The Hatchery Committees approved the August 20, 2008 Meeting Minutes subject to revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II Chelan PUD

A. NTTOC Discussion

Joe Miller opened this discussion by explaining that Chelan PUD recommends a focus on high-risk Plan Species as per the HCPs and Objective 10 in the M&E plan. Miller read excerpts form the HCPs and Objective 10 supporting the Chelan position. For the argument that HCPs explicitly do not address non-plan species, Miller read section 9.10 of the HCPs: "Non-Plan Species are not addressed in this agreement." For the argument that the M&E plan explicitly states that monitoring will be focused on high risk species, Miller read from page 37 of Objective 10 of the Plan: "Prioritization for monitoring will be given to those NTT, which are believed to be at the highest risk." Tom Scribner and Keely Murdoch disagreed, saying that the YN would like to 1) retain a broader range of species in the analysis, 2) include sockeye, and 3) support completing the analysis sooner rather than deferring until some future date. Kirk Truscott indicated that WDFW would support limiting the analyses to a specific list of Plan Species and other species but would recommend deferring the start of this effort until some future date. Truscott further noted that risk containment levels should be based on categories such as high, medium, and low, and not on precise (and uncertain) percentages. Jerry Marco commented that the Colville Tribes would be supportive of broader analyses that are not limited to Plan Species and would be supportive of completing the analysis now rather than waiting for regional action. Tom Kahler said that Douglas PUD would support analyzing a full range of Plan Species and was undecided as to whether the modeling exercise should be a current priority. Dave Carie noted that the U.S. Fish and Wildlife Service (USFWS) would support evaluating species other than Plan Species, but felt that he would need to consult further with his agency leadership before endorsing this as an agency priority. Kris Petersen stated that National Marine Fisheries Service (NMFS) would support a focus on a broad range of species, as well as involving other regional entities that should weigh in on completing this objective. She also said that NMFS would support going ahead now with the analysis. Mike Schiewe agreed to summarize these opinions in a table, and requested that each HCP entity provide a list of species to be analyzed in the NTTOC modeling exercise to him by September 24.

B. Comments on Sockeye Enumeration Study

Joe Miller opened this topic and asked whether there were any more comments on the sockeye enumeration study. Keely Murdoch asked for more time to review the study. The Committees agreed that Chelan PUD could move forward with planning, and that Committees members will provide any last comments to Joe Miller no later than October 1.

C. Water Re-Use Pilot Study Update

Sam Dilly reviewed the information in the recently distributed memorandum on the water re-use pilot study. He clarified an error in the memorandum: there were approximately 126,000 Turtle Rock summer Chinook in the circular re-use ponds and approximately 55,000 fish in the raceway. Further, he indicated that this year's results indicate that re-use pond fish are slightly longer and more narrow-bodied than the raceway fish. Dissolved oxygen levels have been high and carbon dioxide and ammonia have been low. Disease has not been a problem. Based on these results, Chelan PUD proposed an additional year of study with approximately 60 percent more fish in the re-use ponds to evaluate a higher rearing density. Kirk Truscott noted that two important points with this proposal are 1) that taking more fish into the re-use pond study would have the effect of reducing the subyearling program and 2) brings up the question of whether Endangered Species Act (ESA) permit coverage would still be adequate. Kris Petersen clarified that switching these subyearlings to yearlings would not be a permit issue. Taking this into account, Truscott said that the proposed action would be consistent with the goals of the study and program. The Committees said that they were comfortable with the study as stated, and Chelan PUD will prepare an SOA for the Water Re-Use Study for the next meeting for continuing the study in 2009. Chelan and NMFS will need to exchange letters relative to this issue to clarify any permit issues.

D. Chelan PUD Engineering Report

Mike Schiewe opened the floor for questions on the Chelan PUD Engineering Report. Tom Scribner asked for an update on the implementation of Chelan PUD's 5-year Capital Improvement Plan; Shaun Seaman verified that the Committees will have the opportunity to review this plan before implementation. Seaman also noted that, on the Chiwawa pond project, Chelan PUD has met with the U.S. Forest Service (USFS), and the USFS has been supportive of the Chiwawa project. In addition, Chelan PUD has had positive interactions with the nearby homeowners.

E. BKD Strategy Draft SOA

Shaun Seaman discussed the draft SOA for managing bacterial kidney disease (BKD) in Chelan PUD hatchery programs, which had been previously sent out to the Committees for review. Seaman indicated that the management strategy will be further developed (e.g., adding suggested management thresholds for prevalence of BKD in broodstock that would trigger culling of progeny), and that Chelan PUD would like this to be on the agenda for approval next month. Kirk Truscott provided some comments on the SOA, mentioning that WDFW will soon be developing a statewide policy on culling. He indicated that he did not know whether the upcoming WDFW policy would be consistent with this SOA, but Truscott did note that it was unlikely that WDFW would favor culling of natural-origin listed fish. Tom Scribner asked about some of the information currently missing from the SOA (noted as TBD), and Seaman confirmed that Chelan PUD would be working with Truscott on these items. Given the lack of numerical thresholds in the current SOA, Scribner and Kris Petersen indicated that they will likely want to have additional discussions within their agencies before approval.

F. Comments on M&E Work Plan

Joe Miller indicated that Kirk Truscott had provided comments on the 2009 Chelan PUD M&E Work Plan, and Miller would incorporate those. Shaun Seaman will send out Truscott's comments for the Committees information. The Committees will provide any outstanding comments by September 24, to Joe Miller for discussion and approval on a conference call at 9 am on Wednesday, October 1, if necessary.

G. Mid-Columbia PUD HSRG Comments

Joe Miller reported that Chelan PUD collaborated with Douglas and Grant PUDs to produce a joint comment letter and table outlining their collective concerns regarding the HSRG's draft recommendations for changes in HCP hatchery programs. Miller will send these to Ali Wick for distribution to the Committees.

H. PIT-Tag Data from Peshastin and Entiat

Shaun Seaman said that Chelan PUD is currently working with ISEMP on ways to compile and format PIT-tag data from the Peshastin and Entiat in-river detection sites, and that he hopes it will soon be available. Seaman said that Chelan PUD is working with ISEMP to see if information could be incorporated into PTAGIS. He will contact Pamela Nelle (Terraqua) regarding the status of Chelan PUD's efforts to have the ISEMP data available on PTAGIS.

III Douglas PUD

A. Presentation: USDA Report of Piscivorous Birds at the Wells Hatchery

Rick Klinge introduced Jim McGee of Douglas PUD, who provided a presentation on their evaluation of the effects of and alternatives to the existing bird and mammal control programs being used at Wells Hatchery (Attachment B). The study included identifying current and historic animals feeding on fish at the project hatcheries, looking at impacts of these animals, measures being used to control predation, and potential alternatives to these measures. The study also looked at the Methow Hatchery and the Chewuch and Twisp

Acclimation Ponds, although these were not the primary focus of the study. Approximately 2,200 bird occurrences were counted at the Wells Hatchery during the day, increasing to approximately 6,800 occurrences at night (an occurrence could represent the same bird multiple times). Frequently observed species included heron, merganser, and several duck species. During non-hazing periods, birds observed as most successful at capturing fish included cormorants and ospreys. Worst-case estimates of fish consumed in ponds included approximately 22,000 fish captured by herons, and approximately 5,000 fish captured by mergansers. Mammals observed at the hatchery included one family of raccoons and one otter.

Study results for the Wells Hatchery indicated that hazing is effective in altering the pattern of bird predation, but does not change the amount of predation. Also, the amount of fish lost in Pond 3 could not be attributed to bird predation only, while loss estimates in Pond 4 are likely all attributable to birds. Recommendations include modifying the hazing schedule to include evening/night times, fence and gull wire improvements, and improving fish enumeration throughout the rearing cycle. Results at Methow Hatchery showed that birds are only getting to the acclimation pond through open doors on covers. Mink were observed outside the hatchery but not inside it.

B. Douglas PUD 2009 M&E Implementation Work Plan

Rick Klinge updated the group that by the end of this week, Douglas PUD will be sending out its 2009 Implementation Work Plan, which will be out for a 30-day review.

C. Twisp Weir Update

Tom Kahler updated the group that a hydraulic hose on the Twisp Weir that had become disconnected near the end of the trapping season, had been reconnected in August, but incorrectly routed. Douglas PUD is uncertain how the quick-disconnect fitting became disconnected during trapping, but suspects that perhaps some debris could have jarred loose the collar on the female end of the fitting. Before the next Hatchery Committee meeting, Douglas PUD will be rerouting the hose and installing some devices on the quick-release collars so that they cannot accidentally come off again.

D. Summer Chinook Study Fish

Rick Klinge said that Douglas PUD is requesting Committees' approval for the collection of additional summer/fall Chinook broodstock from the Wells Hatchery program for potential use in 2010 survival studies. The new total is 44 study fish, up from 26 that had been previously approved. After some discussion as to whether this would be enough fish to meet HCP program needs, this study, and the YN request for green eggs for its Yakima River reintroduction pilot study, the Committees agreed to the increase in broodstock collection requested by Douglas PUD.

IV Colville Tribes

A. Groundwater Development at Bonaparte Pond

Jerry Marco updated the group that the Colville Tribes will soon have a test well drilled at the Bonaparte Pond site to determine the adequacy of groundwater as a potential source of water to prevent winter icing of the pond. This is a slight delay from the original schedule, as the Colville Tribes had hoped to have this completed by now. As such, Marco will forward information from this test as soon as it is available, and, if shown to be adequate, he will be looking for Committees concurrence as soon as possible following the test.

V WDFW

A. Steelhead Reproductive Success Response Memorandum

Kirk Truscott updated the group that he has sent a draft response memorandum on the steelhead reproductive success study plan out to the JFP for review. He will be finalizing this memorandum following the comment period, prior to the next meeting.

B. PIT-Tag Retention Study Protocols

Kirk Truscott said that all the fish in the PIT-tag retention study have now been tagged in the pelvic girdle. The study is intended to ultimately provide an indicator of PIT-tag shed rates. Mike Schiewe will forward the PIT-tag retention study protocol to Ali Wick for distribution to the Committees.

C. Results of Sockeye Fishery in Lake Wenatchee

In response to a question by Tom Scribner, Kirk Truscott reported that approximately 27,000 sockeye have been counted at Tumwater Dam, and that he would have information on harvest available shortly. Truscott and Shaun Seaman agreed to discuss options to protect the Lake Wenatchee net pens in the future from the net-snagging that caused the sockeye release last month.

D. Program Broodstock Collection

In response to a question by Tom Scribner, Kirk Truscott updated the group that the Methow spring Chinook broodstock collection should be adequate to meet the program's needs. David Carie said that whether there will be spring Chinook available above program needs at Winthrop Hatchery will depend on the BKD results for this brood. Truscott also reported that spring Chinook collection for the Chiwawa was approximately 80 percent of the program's needs.

VI Yakama Nation

A. Balancing Broodstock Collection and Harvest

Tom Scribner invited WDFW to initiate discussions about managing broodstock collections at Wells Dam and the associated hatchery programs. In particular, he indicated that the YN was interested in the use of ultrasound at the volunteer traps in order to finer tune broodstock sex ratios during brood collection. He also suggested that a more efficient collection of broodstock had the potential to allow the co-managers to make more timely decisions regarding the disposition of surplus fish. The Committees discussed that there will soon be an upper Columbia summer Chinook management workshop, which will be a good venue to discuss broodstock collection and these other issues.

B. Cost Sharing for PIT-Tagging of Okanogan Sockeye

Tom Scribner updated the group that Columbia River Intertribal Fish Commission (CRITFC) has recently received some funding that the YN would potentially like to use for PIT-tag arrays in the Skaha system. The YN's goal would be to use PIT-tag information to calculate a more precise assessment of smolt-to-adult survival in the Skaha system. Scribner and Shaun Seaman will discuss cost sharing for PIT-tagging of Okanogan sockeye to clarify goals and potential objectives of having PIT-tag data.

C. Expanded Acclimation in Wenatchee and Methow Basins

Tom Scribner said that the YN is evaluating expanded acclimation in the Wenatchee and Methow Basins and has hired Anchor Environmental, L.L.C., to help develop these ideas. Scribner verified that these acclimation sites would re-distribute existing production.

D. Update on Kelt Reconditioning

Tom Scribner said that the YN has received comments on their kelt reconditioning proposal, and he is working on submitting the proposal for Independent Scientific Review Panel (ISRP) review at this time. The YN is anticipating that reconditioning would begin May 2009 at the Entiat Hatchery. Seaman reminded Scribner on the limitations on using the Rocky Reach juvenile bypass system to collect kelts due to permit limitations and that fact that modifications to the system would be needed. Modifications have a long lead-time due to engineering and scheduling requirements.

E. Update on Section 10 for Summer Chinook Reintroduction

Tom Scribner is working with NMFS on Section 10 coverage for the YN's summer/fall Chinook reintroduction pilot study in the Yakima River. Scribner and Kirk Truscott will discuss a date by which Section 10 coverage needs to be obtained in order to spawn the source fish.

VII NMFS

A. NMFS Letter Regarding Hatchery Program

Kris Petersen confirmed that a kickoff meeting will occur October 2 to discuss the process described in the recent NMFS letter regarding a potential reinitiating of consultation on HCP hatchery programs. An agenda and other materials will be sent out this Friday, September 26, or next Monday, September 29. The tentative time and location are 10 am to 4:00 pm or 4:30 pm at the Ratepayer room at Bonneville Power Administration; RSVPs to Petersen are appreciated.

VIII HCP Administration

B. Next Meetings

The next scheduled meetings are as follows: October 15, November 19, and December 17, all at the Chelan PUD offices in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment B – An Evaluation of the Effects of and Alternatives to the Existing Bird and Mammal Control Program

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Joe Miller	Chelan PUD
Shaun Seaman *	Chelan PUD
Steve Hays (after 11 am)	Chelan PUD
Jerry Marco *	Colville Tribes
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Todd Pearsons	Grant PUD
Russell Langshaw	Grant PUD
Kris Petersen * (by conference call)	NMFS
Dave Carie *	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Tom Scribner *	Yakama Nation
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

ATTACHMENT B

AN EVALUATION OF THE EFFECTS OF AND ALTERNATIVES TO THE EXISTING BIRD AND MAMMAL CONTROL PROGRAM

AN EVALUATION OF THE EFFECTS OF AND ALTERNATIVES TO THE EXISTING BIRD AND MAMMAL CONTROL PROGRAMS

Study goal

- The goals of this study were to evaluate existing practices and alternatives, and inform future management decisions related to future piscivorous wildlife control measures at the Wells Project and associated hatchery rearing facilities.

Objectives

- Identify and count the current and historic numbers and species of birds and mammals feeding on fish at the Project hatcheries and in the Wells tailrace;
- Assess the potential impacts of mortality caused by piscivorous birds and mammals to ESA listed, sensitive and recreationally important species;
- Describe each of the existing piscivorous wildlife control measures, including species targeted, reasons for control, frequency of control and effectiveness of the control method;
- Evaluate alternatives, including the costs and benefits of each measure recommended. The study will provide alternative methods of preventing predation of fish at the Wells Project and in hatchery rearing ponds.

Wells Hatchery

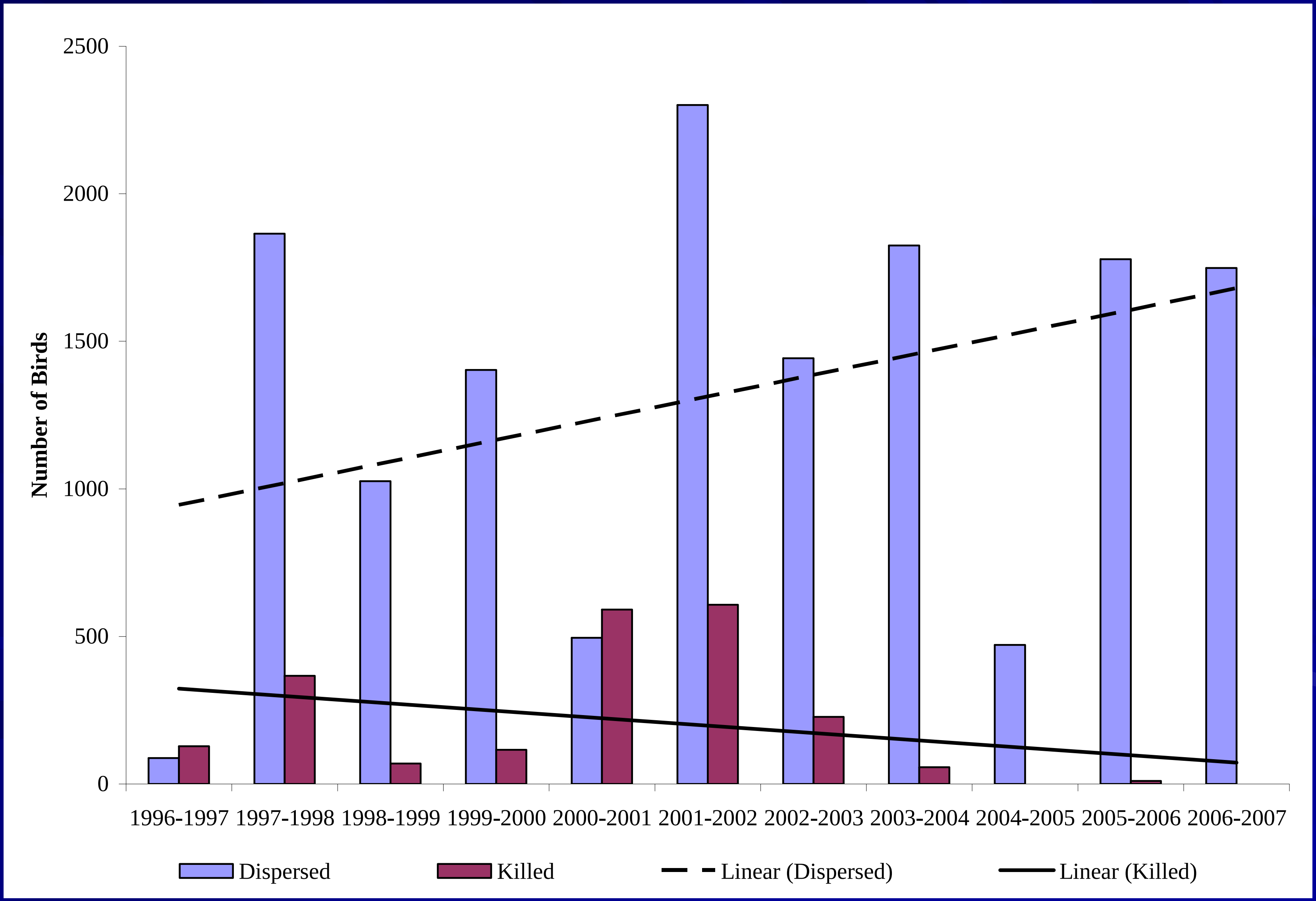

Methow Hatchery
Chewuch Acclimation Pond
Twisp Acclimation Pond

Observations

- Daytime Hazing
- Observed 2,288 birds attempting to use the Wells Hatchery.
- Dispersed 2,274 birds in 810 hazing events (324 vehicle and 486 pyrotechnics).

- Nighttime – no hazing
- Observed 6,839 birds using the Wells hatchery without hazing.

Numbers of birds dispersed and killed during management activities at Wells Hatchery October-May, 1996-2007.

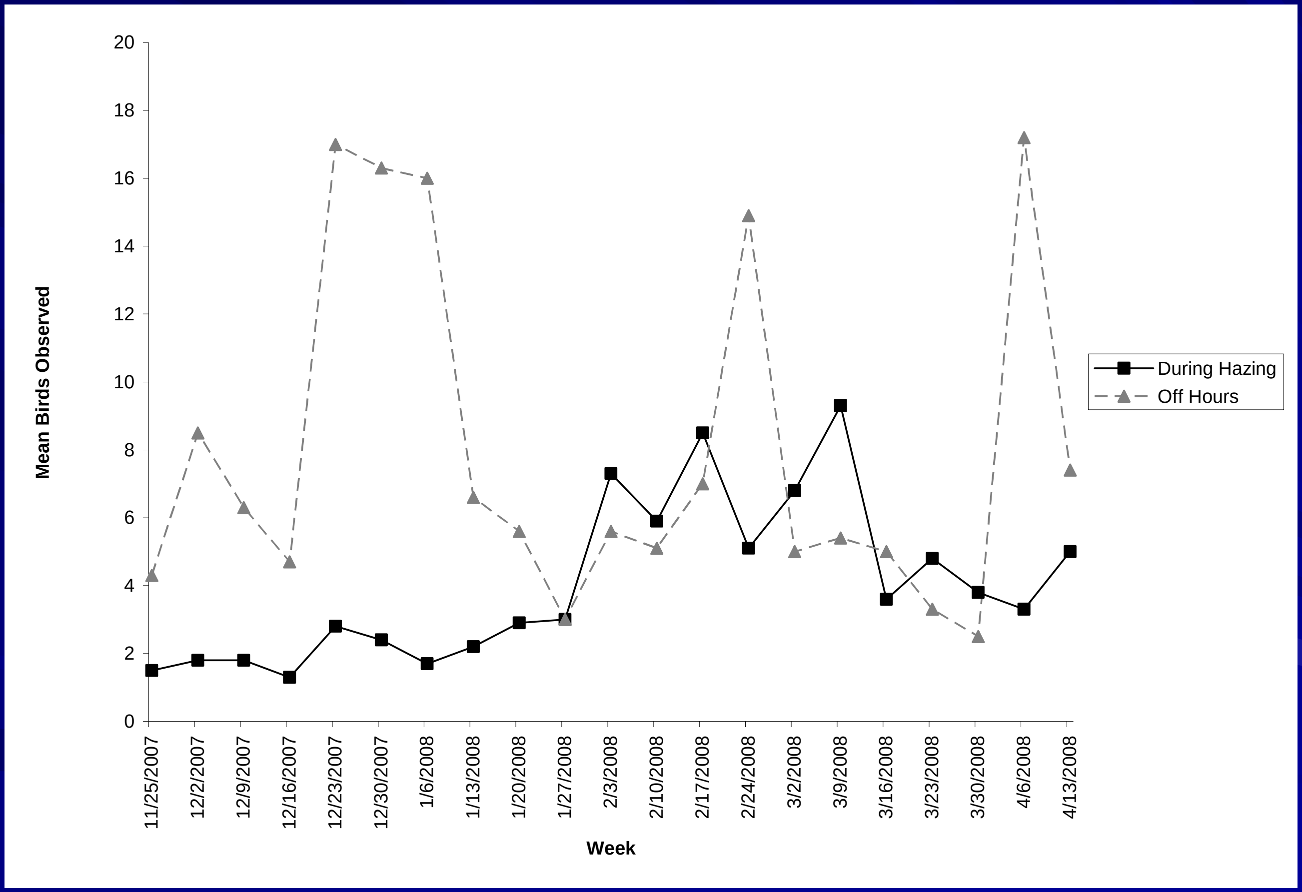


Three Most Frequently Observed Species

- Nighttime
- Great Blue Heron
- Mallard
- Common Goldeneye
- 23 species observed

- Daytime
- Common Merganser
- Bufflehead
- Great Blue Heron
- 15 species observed

Mean numbers of birds observed weekly at all Wells Hatchery locations during hazing and non-hazing periods, November 2007-April 2008



Observations of bird foraging behavior recorded during non-hazing periods at Wells Hatchery, Chelan County, Washington, November 2007-May 2008.

Species	Foraging attempts	Fish caught	Unknown caught
Great Blue Heron	522	16	329
Common Merganser	87	0	51
Hooded Merganser	53	0	27
Double-crested Cormorant	34	23	8
Osprey	27	26	0
Belted Kingfisher	26	1	14
Bufflehead	10	0	0
Pied-billed Grebe	9	0	2
Mallard	6	1	0
Common Loon	6	0	3
Common Goldeneye	2	0	2
Total	782	67	436

Worst case estimate of fish consumed in pond 1-4 during non-hazing periods at Wells Hatchery

Species	Pond 1	Pond 2	Pond 3	Pond 4	Total
Great Blue Heron	10,929	2,704	5,555	2,791	21,979
Double-crested Cormorant*	0	98	98	11	207
Belted Kingfisher	178	16	435	341	970
Common Merganser*	0	0	2,648	223	2,871
Hooded Merganser*	153	0	1,587	0	1,740
Total	11,260	2,818	10,323	3,366	27,767

* Estimated consumed 3 fish per hour

WDFW estimates of fish loss from Ponds 3 and 4 at Wells Hatchery, Chelan County, Washington, November 2007-May 2008.

Pond	**Fish in**	**Fish out**	**Fish missing**	**Loss rate**
Pond 3	333,908	294,908	39,000	11.7%
Pond 4	148,525	145,525	3,000	2.0%

Furbearer Observations

- 1 to 4 Raccoon observed 15 times
- 1 otter observed 4 times – caught 2 fish

What do we know?

- Local populations of birds altered their daily use of hatchery ponds to avoid hazing.
- The amount of loss in Pond 3 can not be attributed only to bird predation.
- Loss estimate in Pond 4 could be counting error.
- Otter predation was negligible.

Recommendations

- Modify the hazing schedule to also cover evening and nighttime hours.
- Replace the electric fence around ponds with woven fencing.
- Replace gull wires on ponds with 1 - 2 foot wire spacing.
- Improve the enumeration of fish through out the rearing cycle.

Methow Hatchery

- Only birds observes foraging in raceways entered through open doors on covers.
- Mink tracks were observed outside of the fence although not documented in ponds or raceways.

ANCHOR ENVIRONMENTAL, L.L.C.

Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Revised Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, Bob Pfeifer, Steve Hays, Joe Miller

Date: November 25, 2008

Re: Revised Final Minutes of October 15, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD auditorium in Wenatchee, Washington, on Wednesday, October 15, 2008, from 9:30 am to 4:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Shaun Seaman will email the Hatchery Committees the Chelan PUD response letter to National Marine Fisheries Service (NMFS) on the hatchery review process (Item IV).
- Rob Jones will finalize the draft NMFS handout on "Consultations for Upper Columbia River Hatchery Programs" and send it to Ali Wick for distribution to the Committees (Item IV).
- Mike Schiewe will contact the Colville Tribes regarding including westslope cutthroat, mountain whitefish, and resident rainbow trout in the Non-target Taxa of Concern (NTTOC) expert panel exercise (Item V-E).
- Pamela Nelle will send information on the November 13 Integrated Status and Effectiveness Monitoring Program (ISEMP) meeting to Ali Wick for distribution to the Hatchery Committees (Item VI-A).
- Julie Pyper will make edits to the Chelan PUD Statement of Agreement (SOA) for the Partial Water Re-use Study based on discussions with Washington Department of Fish and Wildlife (WDFW) on rearing issues. She will also check with John Skalski on Passive Integrated Transponder (PIT) tag sample sizes that are needed to calculate adult return rate, and will send out another SOA for consideration by October 31 (Item VI-B).

- Joe Miller will send the Final 2009 Chelan PUD Monitoring and Evaluation (M&E) Work Plan file to Ali Wick for distribution to the Committees; several Committees members had problems opening the previous version (Item VI-E).
- Kirk Truscott agreed to confirm whether WDFW would be collecting steelhead tissue samples at Tumwater Dam this year similar to last year (Item VI-H).
- Shaun Seaman will summarize Chelan PUD's procedural and technical concerns with the steelhead reproductive success study plan distributed by WDFW, and he will lead a discussion on this at the next meeting (Item VI-I).
- Shaun Seaman will provide for Committees approval an SOA for the Blackbird Island Pond project (Item VI-J).
- Tom Scribner will post the Yakama Nation's (YN's) coho Master Plan on an ftp site for Committees' review (Item VII-B).

DECISION SUMMARY

- The Committees approved the Blackbird Island Pond project and will document the decision with an SOA by email (Item VI-J).

I Meeting Minutes Approval

The Hatchery Committees approved the September 17, 2008 Meeting Minutes subject to revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees.

II HETT Update

Tom Kahler updated the group that Hatchery Evaluation Technical Team (HETT) is continuing to work on control groups (also known as reference populations) and is researching the origin of the 1981 and 1982 spring Chinook spawning data in the Chewuch River; these 2 years have exceptionally low spawner abundances and high recruits/spawner values compared to subsequent years.

III Recent Methow Basin Monitoring Meeting

Mike Schiewe noted that there was a meeting last week in Twisp convened by the U.S. Bureau of Reclamation (BOR) to review and coordinate habitat monitoring and evaluation in the Methow basin. Tom Kahler attended the meeting and indicated that most of the discussion was about current monitoring activities, but that the group also talked about a steelhead reproductive success study required by the Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp). Kahler indicated that BOR was waiting to see what the HCP entities were going to do to meet their steelhead reproductive success study requirement, and that BOR was looking to coordinate with them. Also discussed was the coordination between WDFW and U.S. Geological Survey M&E activities, including PIT-tagging juveniles and placement of PIT-tag detection arrays. Kahler noted that the BOR/USGS group was using the PTAGIS database to archive and retrieve their data.

IV NMFS Follow-up on Process for Hatchery Review

Mike Schiewe noted that NMFS convened a meeting in Portland on October 2 to formally kick off their comprehensive review of hatchery programs in the Upper Columbia. To follow up on several questions raised at that meeting, Rob Jones of NMFS had agreed to attend today's meeting to address questions about the review and to begin the discussion of the new information that NMFS considered important as to how hatchery programs might change in the Upper Columbia.

Jones began by noting that the time is ripe for considering the role of hatcheries in rebuilding Columbia River salmon populations. Several new documents are out regarding effects of hatcheries in light of recent recovery documents. These include the FCRPS BiOp's reasonable and prudent measures (RPAs), the Hatchery Scientific Review Group's (HSRG's) recommendations, the Interior Columbia Technical Recovery Team's (ICTRT) work, and several recently published scientific papers. The FCRPS BiOp lays out a schedule for reviewing hatchery programs in the Upper Columbia and requires the preparation of new Hatchery and Genetic Management Plans (HGMPs) for hatcheries in 2009. At the Portland meeting, NMFS described their expectation that these reviews would be completed within the current Mid-Columbia process, reviewed with the existing regulatory processes, and a new schedule would be set for the actions. Jones clarified that there could be four types of permit actions considered: 1) keeping the existing permit, 2) amending the existing permit 3)modifying the existing permit,, or 4) creating a new permit (given here in order of increasing change). Jones stated that it would not be until hatchery reviews were complete and new HGMPs were developed that NMFS would know which permit action would be required. He also said that NMFS is committed to the HCP process and will rely on the HCP Committees to develop the new HGMPs and work to achieve consensus among HCP signatories.

Jones provided a handout titled "Consultations for Upper Columbia River Hatchery Programs" that he would send to Ali Wick (Attachment B). The handout included a table that listed hatchery programs that are intended to supplement natural populations and hence may require reevaluation under the Endangered Species Act.

Jones said that it is NMFS' expectation that permit holders would take the lead on preparing the new HGMPs. Kris Petersen said that would help to focus the permits and set them up for future modifications if needed. She said that, typically, hatchery operators are the permit holders and that there can be multiple permit holders but that NOAA would leave this decision to the members of the Hatchery Committees. Cherise Oram said that her understanding was that the regulations contemplate that a permit holder is a single entity, that the entity is the party with the obligation to operate the hatchery program, and that the regulations specifically anticipate that agents are covered without being named in the permits. She said that this would suggest to her that Chelan and Douglas PUDs would be the permit holders. Tom Scribner indicated that the YN would like to be on the permits. Jones said that NMFS was flexible to discuss the specifics of how this would be set up. Kris Petersen reminded the group that how things had been done in the past was that there were multiple permit holders.

The Committees discussed concerns that the schedule for preparing new HGMPs may not be realistic. However, the Committees understood that if hatchery reviews were not complete by the deadlines, NMFS would not meet its deadline articulated in the FCRPS BiOp. Shaun Seaman expressed concern that Chelan PUD still may not have enough information to prepare the HGMPs. Jones confirmed that NMFS would not be dictating specific values such as percent natural influence (PNI), but NMFS would work iteratively with the PUDs to prepare acceptable HGMPs bases on available information. Oram asked Jones to clarify whether existing BiOps are still valid until the hatchery review is complete, and Jones confirmed this is the case.

Seaman indicated that Chelan PUD had sent a letter to NMFS expressing their concerns about the hatchery review process laid out at the October 2 meeting; he indicated that he would distribute the letter to the Committees. Oram summarized the Chelan PUD letter, which includes a recommendation to complete the comprehensive review at the ESU level, not at an individual basin level. Chelan PUD also recommended that individual BiOps and Individual Take Statements (ITS) be issued for individual programs. Petersen responded that the analyses would be done at the basin level and rolled up to the ESU level. Tom Scribner pointed out that the schedule is based on a basin level analysis, so this may have to be taken into account for future deadlines.

Petersen said that NMFS would further discuss internally the issue of sequencing the reviews. Oram suggested that if they are conducted sequentially, then the first programs to be consulted on would seem to limit the options for later programs. Jones agreed to modify today's handout to address some of these concerns and send it to Ali Wick for distribution to the Committees. Seaman indicated that Chelan PUD had additional questions that it would like NMFS to address and would follow up after today's meetings.

V Douglas PUD

A. Douglas PUD 2007 M&E Report

Tom Kahler updated the group that Douglas PUD received no comments on the Draft 2007 Douglas PUD M&E Report. The Hatchery Committees approved this report.

B. Douglas PUD 2009 M&E Implementation Plan

Tom Kahler reminded the group that the Douglas PUD Draft 2009 M&E Implementation Plan was sent out to the Committees for review and comments are due November 11.

C. Coho Obligation

Tom Kahler said that a final payment of $41,000 was transferred to the YN pursuant to Douglas PUD's coho mitigation agreement. This completes Douglas PUD's coho mitigation obligation through 2017.

D. Access to East Embankment and Trapping Facilities during Rewind Process at Wells Dam

Rick Klinge updated the group that Douglas PUD will be rewinding the turbine rotors at Wells Dam over the next 9 years. This work requires a flat surface near the turbines. Because of the configuration of Wells Dam, rewind will need to take place on the deck of the dam and there will be times when access to the east fish ladder will be restricted. Klinge is working with project engineers to resolve potential ladder access issues, and he will keep the Committees apprised of progress. Schiewe recommended that the affected parties (e.g., WDFW, YN) convene an onsite meeting with Douglas personnel to evaluate the potential for disruption of access to the east fishway and to discuss measures to minimize or avoid disruptions. Douglas will work with the affected parties to coordinate an onsite meeting.

E. NTTOC Discussion

The Committees reviewed the various HCP parties' positions listed on the recently compiled NTTOC table, and the group agreed on a final list of species to consider in the expert panel exercise. Because the Colville Tribes representative was unable to participate in today's meeting, Mike Schiewe will follow up with the Colville Tribes regarding their interest in including westslope cutthroat, mountain whitefish, and resident rainbow trout in the NTTOC review. The Committees agreed to convene the expert panel next spring or early summer.

VI Chelan PUD

A. ISEMP PIT-Tag Arrays

Pamela Nelle of ISEMP attended today's meeting to discuss incorporating Peshastin Creek and Entiat River PIT-tag data into the PTAGIS database. Because these arrays (as well as most ISEMP arrays) are not considered permanent detection locations, they are not currently archived in PTAGIS. Nelle indicated that ISEMP is setting up an ACCESS database to archive these data until an arrangement can be worked out with PSMFC, the organization that hosts the PTAGIS data system. The ACCESS database will be set up to allow HCP members to query these data. Nelle also mentioned that there will be an ISEMP coordination meeting on November 13, and that she would send Ali Wick information on the meeting for distribution to Committees members. The plan is to eventually get the data into PTAGIS.

B. Water Re-use Study Update

As discussed at the September Hatchery Committees meeting, Julie Pyper presented a draft SOA for consideration of a second year of study of water re-use for rearing summer Chinook. The Committees discussed several edits that Chelan PUD agreed to make. Chelan PUD indicated that it wanted to be very clear that if these pilot studies continued to show high survival, that eventually they would want to convert part of their mitigation fish to circular production. Committees members acknowledged this, but were equally clear that they had not expressly agreed to consider that path forward yet. Pyper worked through comments from the YN and WDFW regarding the SOA, and Chelan PUD and WDFW agreed to work out any outstanding issues before finalizing the SOA. Chelan PUD agreed to maximize the number of tags such that information on adult returns would be available in the future. Pyper will have these edits made and will send out another SOA for consideration by October 31.

C. Comments on Sockeye Enumeration Study

Joe Miller indicated that he had made edits to the study plan based on Committees comments. The Committees reviewed these edits. One issue that will still need additional work was how to evaluate the sampling efficiency of the instream PIT-tag detectors. Miller agreed to continue working on options for addressing this issue.

D. Revised HGMPs – Chelan Falls and Chiwawa

Julie Pyper updated the group that Chelan PUD is at 30 percent design for both the Chelan Falls (Turtle Rock conversion) and Chiwawa steelhead rearing facilities, but Chelan PUD does not have Section 10 permits for either of these programs/facilities. Chelan PUD wanted to make the Committees aware that it does not intend to move beyond the 30 percent design until Section 10 coverage is in place. Chelan PUD is committed to working with NMFS and the Committees to complete an HGMP and obtain the necessary permits.

E. Final 2009 Chelan PUD M&E Work Plan

Joe Miller indicated that all comments on the 2009 Chelan PUD M&E Work Plan have been addressed, and the version that the Committees conditionally approved by conference call on October 1 is now final. Joe Miller will send the file to Ali Wick for distribution to the Committees.

F. Chelan PUD Engineering Report

Julie Pyper said that the CPUD Engineering Report was distributed by email last week; there was no additional discussion on the report.

G. HSRG Coordination

Shaun Seaman indicated that Chelan PUD would be submitting additional comments to the HSRG during the formal comment period. Committee members indicated that as their individual agency comments were completed that they would share them with the other Committees members.

H. 2008/2009 NOAA/WDFW Steelhead Study

Julie Pyper asked WDFW whether they indicated to continue to collect steelhead tissue samples at Tumwater Dam this year. Kirk Truscott said that he thought that was the case, but he agreed to check with research staff to confirm.

I. Steelhead Reproductive Success Study

Mike Schiewe asked Committee members if there had been any progress toward resolving concerns raised by Chelan PUD on the draft steelhead reproductive success study plan circulated by WDFW. Tom Scribner asked if Chelan PUD was committed to doing a steelhead reproductive success study. Shaun Seaman confirmed this. Schiewe reminded the group that HCP explicitly required the Committees to plan a steelhead reproductive success study and Chelan PUD to implement the study. Schiewe also stated that he did not believe the Committees had vetted the technical issues of the study to all members' satisfaction. Seaman said that Chelan PUD wanted to consider further the policy and technical aspects of the study and will lead a discussion on this at the next meeting.

J. Blackbird Island Pond

Shaun Seaman indicated that although all the permits, agreements, and water rights applications were progressing through the approval process for the Blackbird Island Pond project, and the Committees had verbally agreed to this project, there had not been a formal SOA approved by the Committee. Today, the Committees stated their official agreement for the use of Blackbird Pond for acclimating up to 50,000 juvenile steelhead annually from 2009 to 2013. Seaman will provide a follow-up SOA for email approval.

VII Yakama Nation

A. Cost Sharing for PIT-Tagging of Okanogan Sockeye

Tom Scribner updated the Committees that any use of Columbia River Intertribal Fish Commission funds to enhance monitoring and evaluation of upper Columbia sockeye would require further coordination between the YN and the Colville Tribes.

B. Coho Master Plan

Tom Scribner updated the group that the YN has almost finished the final draft of the Coho Master Plan and would submit it to the Technical Working Group (TWG) soon. This submittal is part of the Northwest Power Planning and Conservation Council's (NPPCC) three-step process. Scribner will place the document on the ftp site for Committees' access and review. Comments will be due within 30 days from the date of Committee access.

VIII HCP Administration

A. Meeting Agreements

The Committees made the following agreements at this meeting that did not require a formal SOA:

- The Committees accepted the 2007 Douglas PUD M&E Report as final (Item V-A).
- The Committees agreed to proceed with the NTTOC expert panel exercise next spring or early summer (Item V-E).

B. Next Meetings

The next scheduled meetings are as follows: November 19, December 17, and January 21—all at the Chelan PUD offices in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment B – Consultations for Upper Columbia River Hatchery Programs (Draft NMFS handout) – TO BE REVISED

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Jeff Gislason (by conference call)	Bonneville Power Administration
Ron Eggers (by conference call)	Bureau of Reclamation
Joe Miller	Chelan PUD
Shaun Seaman *	Chelan PUD
Julie Pyper *	Chelan PUD
Cherise Oram	Stoel Rives
Tom Kahler *	Douglas PUD
Rick Klinge *	Douglas PUD
Todd Pearsons	Grant PUD
Russell Langshaw	Grant PUD
Kris Petersen *	NMFS
Rob Jones	NMFS
Bob Turner	NMFS
Dave Carie *	USFWS
Julie Collins	USFWS
Bill Gale	USFWS
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Tom Scribner *	Yakama Nation
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Attachment B
Consultations for Upper Columbia River Hatchery Programs (NMFS handout)
TO BE REVISED

CONSULTATIONS FOR UPPER COLUMBIA RIVER HATCHERY PROGRAMS

NOAA's National Marine Fisheries Service (NMFS) has announced a comprehensive review of hatchery programs starting in the Upper Columbia River Basin (UCR) (see the September 12, 2008 letter from Rob Walton). Federal programs and several Public Utility District funded programs in the UCR will be initiating consultations under the Federal Endangered Species Act (ESA) with NMFS and are working on new Hatchery and Genetic Management Plans (HGMPs). Hatchery programs funded by Chelan and Douglas PUDs were issued permits in 2003 and 2004 pursuant to section 10 of the ESA (permits 1196, 1395, and 1347). Issuance of these permits was based on NMFS Biological Opinions (BiOps) that considered public comments on hatchery operations as described in the permit applications submitted five and six years ago and on best available science at that time. Under the present circumstances, permit holders have been advised that reinitiation of consultation under the ESA is adviseable and to submit new HGMPs to NMFS for review.

As provided in 50 CFR §402.16 of the ESA, reinitiation of formal consultation is required if: (1) the amount or extent of annual take, either intentional take or incidental take, is exceeded or is expected to be exceeded; (2) new information reveals effects of the agency action that may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect to listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. Nine PUD funded hatchery programs fall into the first or second category; two funded by Grant PUD, five funded by Douglas PUD, and two funded by Chelan PUD (Table 1).

Hatchery actions may affect listed species in a way not previously considered based on substantial new information and analysis available since the issuance of permits 1196, 1395, and 1347. Technical analysis and options for operating hatchery programs consistent with ESA recovery objectives have been provided by the Interior Columbia Technical Recovery Team (ICTRT) and a recovery plan for UCR spring Chinook salmon and steelhead was adopted by NMFS in 2007. In May 2008, NMFS completed its analysis of the Federal Columbia River Power System (FCRPS) and issued a supplemental comprehensive analysis (SCA) with the BiOp on the FCRPS proposed action. The FCRPS BiOp and SCA considered new information in the form of scientific research published in both peer reviewed and technical report forms along with new life history models. Furthermore, the Federal Hatchery Review Team (HRT) and the Hatchery Scientific Review Group (HSRG) have conducted reviews of UCR hatchery programs in recent months. All of these sources of information and review have occurred since ESA permits 1196, 1395, and 1347 were issued.

Recent research on the fitness of hatchery-origin fish when they spawn in the natural environment comingled with natural-origin fish suggest that natural populations are susceptible to fitness loss in the hatchery most probably due to domestication selection. That is, salmon are inadvertently selected and thus adapt to the hatchery environment in either captive reared, traditional or supplementation hatcheries as contrasted with the natural environment (Araki et al. 2008; Naish et al. 2008; Ford 2002). In other words, the natural gene flow and adaption processes are interrupted and may adversely affect the natural-population. One of the major insights from past studies on documenting poorer relative fitness from hatchery origin fish compared to natural origin fish on the spawning grounds is the point that in most cases, the more generations that hatchery fish have been in culture the greater the fitness loss (Araki et al. 2008; Naish et al. 2008; Ford 2004).

The previous analysis and permit 1395 recognized that non-migratory hatchery-origin (residual) steelhead could pose a risk to natural-origin juvenile steelhead in the Wenatchee and other rivers in the UCR basin. The primary mechanism to address this risk was a term and condition in permit 1395 that states "*Measures shall be applied to ensure that artificially propagated UCR steelhead juveniles released will be ready to actively migrate to the ocean. To meet this condition, fish must be released at a uniform size and state of smoltification that ensures that the fish will migrate seaward without delay after release.*" The target size and coefficient of variation (CV) for the Wenatchee steelhead program is a fork length of 198 mm and a CV of 9.0 as established by the hatchery committee that oversees this program. The size variance target has been met for only two out of 27 release groups since 1999. This information in combination with observations and sampling of non-migratory steelhead in the UCR suggests that the risk posed to ESA-listed natural-origin fish by residualized steelhead in the form of competition and predation is greater than previously thought and that the amount or extent of annual take, either intentional take or incidental take, is exceeded or is expected to be exceeded.

New information reveals effects of the hatchery programs that may affect listed species in a way not previously considered. For example, sliding scale strategy for broodstock collection and sliding scale for the management of adult returns for specific programs was not considered in any of the previous BiOps. This shortcoming of permit 1196 was identified as far back as 2005 when the Washington Department of Fish and Wildlife (WDFW) with the Yakama Nation began work on a modification proposal for the Chiwawa Spring Chinook Salmon Program. Those agencies were concerned with broodstock collection constraints in permit 1196. Chelan PUD, as a co-permit holder with WDFW (and Douglas PUD), provided comments on the draft modification request in March of 2005 including providing additional text to support the request for permit modification "*this proposal is necessary because of various changes in anticipated adult returns from hatchery fish and potential changes in hatchery production levels.*" Since that time progress on a permit modification has been slow, but the need for the modification persists.

Programs that supplement natural spawning to reduce short-term extinction risk and accelerate recovery should include actions to reduce the dependence on the hatchery program as the status of the target population improves. Specific to the UCR Spring Chinook Salmon Programs (Permit 1196), the Biological Opinion on the issuance of permit 1196 (consultation 1999/00836) in addition to the aforementioned language quoting 50 CRF §402.16 of the ESA, states that "*the recent increased run sizes of hatchery origin UCR spring Chinook salmon might lead NMFS to reassess the potential adverse impacts on the natural spring Chinook populations, such as those of swamping and genetic introgression. Prior to the 2001 return year, the UCR spring Chinook returns were very low, since 2001 the adult returns have rebounded, primarily attributable to improved ocean conditions. If high returns continue, it is important to identify potential alternative uses for artificial propagated adult spring Chinook in order to promote the recovery of natural* *selection and protect natural origin spawners from being inundated by hatchery origin fish. Potential management actions include; the removal of excess artificially propagated spring Chinook salmon adults at traps and ladders in the Columbia River or at tributary locations; opening fish hatchery facility ladders for artificially propagated fish to enter voluntarily; allowing selective harvest using dip nets or traditional gear by tribes that historically fished in the UCR Basin; allowing selective harvest of artificially propagated salmon by recreational anglers. If new management actions are required, the potential impacts will need to be further evaluated under the ESA in a separate consultation process.*"

The need to develop strategies to manage hatchery adults on the spawning grounds has also been a draft recommendation of the HSRG. The parties to the Chelan PUD Habitat Conservation Plans (HCPs) were aware of this need as indicated by the text in the draft permit modification already mentioned. Adult management strategies were included in permit 1395 for UCR steelhead, but not in permit 1196 for UCR spring Chinook salmon. Since there was no analysis conducted on the effects on the listed species from adult management activities, a new consultation is necessary.

Table 1. Hatchery programs that warrant consultation under the Federal Endangered Species Act . The programs in this table engage in the direct "take" of salmon or steelhead listed as Endangered.

Program	Funding	Basin	Justification for Consultation
White River Spring Chinook	Grant PUD	Wenatchee	• Permit expires May 2010
Chewuch spring Chinook	Douglas PUD	Methow	• Adult hatchery fish management strategies not addressed in previous consultation • New information regarding fitness loss in natural population not addressed in previous consultation • "The ICTRT characterizes the diversity risk to all UCR spring Chinook populations as "high". The high risk is a result of reduced genetic diversity from homogenization of populations…In recent years, straying hatchery fish, compositing fish for broodstock, low proportion of natural-origin fish in some broodstocks and a high proportion of hatchery fish on the spawning grounds have contributed to high genetic diversity risk"0+ (SCA 8.6-6). • The Chiwawa program does not manage the HOF fraction of natural spawners and this poses a risk to population productivity (SCA Appendix D). • The Methow Chinook program composites Methow and Chewuch fish which breaks down genetic differentiation and "poses a risk to the fitness of the natural population" (SCA, 8.6-9). "Additional reforms would reduce threats to genetic diversity within the Methow population and to fitness reductions when a high proportion of the natural spawners are of hatchery –origin" (SCA 8.6-30).
Chiwawa spring Chinook	Chelan PUD	Wenatchee	
Methow Composite spring Chinook	Douglas PUD	Methow	
Twisp spring Chinook	Douglas PUD	Methow	

			• Broodstock practices reduce population diversity (few NOF are incorporated into the hatchery broodstock and the program composites Methow and Chewuch fish). Failure to manage the HOF fraction of natural spawners poses a risk to population productivity (SCA Appendix D).
Okanogan steelhead	Grant PUD	Okanogan	• Permit expires Oct 2008
Wells steelhead Methow Wells steelhead Okanogan	Douglas PUD Douglas PUD	Methow Okanogan	• The Wells Methow and Okanogan programs have been identified in the FCRPS as a top 5 limiting factor (SCA Appendix C). Pose risks to population diversity and productivity because of the broodstock program and because HOF >90% of all natural spawners (SCA Appendix D). • Non-migratory juveniles increase risk to naturally produced fish • New information regarding fitness loss in natural population not addressed in previous consultation • "The ICTRT has characterized the diversity risk to al UCR steelhead populations as "high". The Methow and Okanogan populations have particularly hig proportions of hatchery-origin spawners and recent monitoring data suggests that hatchery fish may be straying into non-target areas, likely contributing to the continued homogenization of the populations" (SCA 8.7-7). "The PUD funded program continues to be a composite of the Methow and Okanogan populations (not an optimum practice for a hatchery program intended to promote genetic diversity and improve natural survival" (SCA 8.7-11). • "In this analysis for the Wenatchee, Methow and Okanogan basins, assumptions in the CA that supplementation will be significantly reduced from recent averages and that the proportion of natural spawners composed of HOF will decline dramatically, depend on the increased abundance of natural-origin spawners in each basin and on future HGMPs that reduce the proportion of natural spawners composed of HOF as the abundance of NOF increases" (SCA 8.7-12). • "NOAA Fisheries expects that hatchery reform measures will include a plan for reducing the dependence on hatchery fish to spawn naturally as the abundance of NOF increases" (SCA 8.7-28). • "If the percentage of NOF on the spawning grounds increases, then it is likely that further increases in productivity, as reflected in the R/S estimates, would occur" (SCA 8.7-37). • The CA "demonstrated that if hatchery fractions were to be reduced sufficiently in the future, R/S estimates could be greater than 1.0 for three of the four populations. NOAA Fisheries acknowledges the potential that R/S could be greater than 1.0 for these populations when the natural-origin abundance increases and dependence on hatcheries can be reduced".(SCA 8.7-38). • "Additional reforms to increase the percentage of NOF on the spawning grounds and improved hatchery broodstock practices, are likely to reduce these residual effects and increase productivity" (SCA 8.7-38).

			• "Prospective actions to develop a local broodstock for the Methow and Okanogan are expected to improve the situation for the Wenatchee, Enitat, Methow and Okanogan populations. Substantial reduction in the homogenization of the Methow population will require reforms at Winthrop NFH and in the Wells Hatchery program (a hatchery program not funded by the Action Agencies)". (SCA 8.7-40). • "Hatchery programs in the Methow and Okanogan do not currently follow optimum broodstock practices for improving diversity for the Methow and Okanogan populations" (SCA 8.7.41).
Wenatchee steelhead	Chelan PUD	Wenatchee	• High adult stray rate to areas outside the Wenatchee basin (SCA Appendix D). • Non-migratory juveniles increase risk to naturally produced fish • New information regarding fitness loss in natural population not addressed in previous consultation

Anchor Environmental, L.L.C.
1423 Third Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, Bob Pfeifer, Steve Hays, and Joe Miller

Date: December 17, 2008

Re: Final Minutes of November 19, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, November 19, 2008, from 9:30 am to 4:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Shaun Seaman will add appendices to the Water Re-use Statement of Agreement (SOA) as attachments and will send the final SOA and attachments to Ali Wick for distribution to the Committees (Item II-A).
- Ali Wick will send out the final Blackbird Island Pond SOA (Item II-B).
- Keely Murdoch will work with Tom Scribner to develop additional text for the Okanogan Nation Alliance (ONA) SOA and will provide this to the Committees the first week of December (Item II-C).
- Mike Schiewe will develop a schedule of meetings and discussions for coming months that will be necessary to complete the revised/new Hatchery Genetic Management Plans (HGMPs; Item II-D).
- Joe Miller will work with Grant and Douglas PUDs to put together some key questions about the *Hatchery-Induced Life History Variability in Chinook Salmon* study (V-A).
- Kirk Truscott will work with Andrew Murdoch to develop a summary of steelhead Passive Integrated Transponder (PIT)-tag data for fish into the Entiat River and Peshastin Creek (Item VI).

DECISION SUMMARY

- There were no decisions made at this meeting.

I Welcome

The Hatchery Committees approved the October 15, 2008 Meeting Minutes subject to revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees. During the action item review, referring to an Action Item from last month, Kirk Truscott reported that Washington Department of Fish and Wildlife (WDFW) is collecting steelhead tissue samples at Tumwater Dam again this year.

II Chelan PUD

A. Water Re-use SOA

The Committees considered a revised SOA for a continuation of the Pilot Water Re-use Study. The SOA will be amended to include a statement clarifying that implementation is subject to National Marine Fisheries Service (NMFS) concurrence that the impacts to Endangered Species Act (ESA) species remain within those that were contemplated in the existing ESA authorizations. Kirk Truscott said that there would be substantive differences between 2008 and 2009 release dates. Keely Murdoch reminded the Committees that the Yakama Nation (YN) would be recommending that a high proportion of the fish are tagged in order to quantify adult returns. Shaun Seaman said that Chelan PUD agreed with PIT tagging and clarified that the full Committees have not yet agreed upon the method by which to quantify adult return rates. Seaman will add several appendices that are needed to the SOA as attachments and will send the final SOA to Ali Wick for distribution to the Committees.

B. Blackbird Island Pond SOA Edits

The Committees agreed to edits to the previously agreed to SOA for Blackbird Island Pond. Ali Wick will send out the final SOA as edited today.

C. Okanogan Nation Alliance SOA

Julie Pyper introduced a draft SOA that would commit Chelan PUD to funding the ONA Skaha Lake Sockeye Program through the broodyear starting in 2017, and concomitantly extend the Committee’s agreement that this funding meets the Chelan PUD HCP obligation for sockeye mitigation through 2018. Pyper indicated that Chelan PUD would like a Committees' decision on this SOA prior to the next meeting.

Keely Murdoch noted that the YN would like the SOA to include a requirement that adult returns will be used in the monitoring and evaluation of program progress. Murdoch will discuss some suggested text for the SOA with Tom Scribner and will provide this to the Committees the first week of December. Additional Committee discussions focused on the extension of the deadline to reevaluation of program progress; some members of the Committees indicated that they would prefer that the 2013 check-in date that was written into the original 2005 SOA should be retained. Several Joint Fisheries Parties (JFPs) members said that they would work collaboratively to draft some edits that address this timeline and will discuss these edits on a conference call set for 9:00 am on Thursday, December 4.

D. Preparation of HGMPs

Mike Schiewe introduced this topic. He noted that NMFS had requested that the Committees complete new HGMPs for Wenatchee spring Chinook and Wenatchee steelhead by February for 2009. Schiewe also noted that WDFW and YN staff have been working over the past several months to develop a joint management plan for Wenatchee spring Chinook. Steve Parker was attending today's meeting to brief the Committees on the status of their discussions and a recent agreement between WDFW and YN on management principles.

Steve Parker distributed to the Committees a document jointly prepared by WDFW and YN that articulated the co-managers' primary goals of ensuring that mitigation benefits are realized and that the programs do not impede recovery. The document included jointly agreed to principles and priorities, underlying assumptions, and next steps for the program. One of those priorities is to use proportion natural influence (PNI) thresholds in broodstock management to reduce risk of domestication in the Chiwawa River and Nason Creek populations. Parker noted that this may involve collection of broodstock at Tumwater Dam and assignment to a population (i.e., White River, Nason Creek, or Chiwawa River) based on results of genotyping of fish previously collected and tagged at Priest Rapids Dam. In response to a question from Shaun Seaman on whether weirs were then necessary upstream, Parker said that the intent of the co-managers' planning is that the need for weirs on the Chiwawa River and Nason Creek would for this purpose ultimately be eliminated.

Russell Langshaw had several questions. He asked what a suggested re-evaluation of population substructure would involve, and Parker replied that this had not been worked out yet. Langshaw also asked about the priority of genetic diversity over PNI as it applies to the White River. Parker said that the co-managers' goal is to keep the White River populations isolated from the lower basin populations in order to maintain its uniqueness within the Wenatchee basin. Langshaw also asked whether this approach would be applied for the Methow and Twisp populations. Parker replied that the approach could be used to consider management options not currently available, but that the co-managers have not discussed that yet.

Mike Schiewe asked Steve Parker whether there was any timeline for the YN and WDFW to complete their management plan. Parker said that the co-manager group will be meeting again on December 1, and he anticipates a decision and a product for external review within at least a month of the new year.

Mike Schiewe suggested that it would be important for the Committees to establish a schedule for developing the new HGMPs, and the members generally agreed, acknowledging that the Wenatchee spring Chinook management plan was due February 2009. Schiewe then posed several questions to the Committees:

1. Are there new or previously not identified data that the Committees should be considering in developing the HGMPs?
2. For each of the programs are there major policy or technical issues that need to be resolved before completing an HGMP (e.g., Tribal/WDFW agreement in Wenatchee spring Chinook HGMP)?
3. Who should or wants to be directly involved in crafting the HGMPs (as opposed to approving them once drafted)?

Schiewe said that once these issues were sorted out, a realistic schedule could be developed.

The Committees discussed in some detail what some of the bigger policy and technical issues are for revisions of the HGMPs:

- The time period or duration of the HGMPs (i.e., 10 years?)
- How to incorporate new information on reproductive success of hatchery versus wild fish
- Regarding adults
  - Balancing minimum escapement levels versus a liberal harvest policy
  - Incorporating a consideration of carrying capacity
- Regarding juveniles
  - Residualization of hatchery fish (particularly steelhead smolts)
  - Incorporating a consideration of carrying capacity

Regarding who should be involved in the writing the HGMP for the Chiwawa River spring Chinook program, Shaun Seaman said that he had been in contact with Jeff Korth of WDFW and that they had tentatively agreed that WDFW and Chelan PUD would jointly take leadership in drafting the HGMP, with Chelan PUD facilitating the process. He indicated that they would welcome the direct involvement of any other member of the Hatchery Committees as well. Kirk Truscott and Keely Murdoch (WDFW and YN, respectively) would definitely be involved in the writing. Jerry Marco, Bill Gale, and Dave Carie said that their agencies would not be directly involved in the writing but would appreciate some periodic check-ins as the documents are being prepared. Kris Petersen said that NMFS would like to be involved in the initial meetings and have the opportunity to review the draft documents as they come together.

Mike Schiewe asked about schedule; the Committees agreed that they could produce a final Wenatchee steelhead HGMP that could be reviewed by NMFS by the end of March. For Wenatchee spring Chinook, Steve Parker said that his expectation was that co-manager input would be available to craft a new HGMP by the end of January. Based on this timeline, the Committees agreed on a schedule for a final Chiwawa River HGMP by the end of May. Schiewe said that he would vet this schedule with Rob Jones (NMFS) and if acceptable, he would lay out a schedule of HGMP meetings and discussions for the coming months.

Kris Petersen asked Rick Klinge whether Douglas PUD wanted to be in on the Wenatchee discussions to prepare for developing a plan for drafting new HGMPs for the Methow Basin. He said that Douglas PUD would be ready to discuss their preferred approach at the December meeting.

E. Steelhead Reproductive Success Study Update

Shaun Seaman reported that he and Joe Miller had met with Andrew Murdoch (WDFW) and Mike Ford (NMFS) to review the technical aspects of the study. Miller said that the key topics discussed were 1) the statistical power of the study, 2) the importance of developing a draft decision structure for data interpretation and management strategies, and 3) development of a study budget. In December, Chelan PUD will invite Murdoch and Ford to come and share the discussions with the Committees.

F. Approval of Water Re-Use Rearing Criteria

Shaun Seaman reminded the Committees that at the beginning of the 2008 Pilot Water Re-use Study, Chelan PUD had agreed to review the rearing criteria with the Committees before proposing additional testing. Seaman noted that this information had been sent out to the Committees by email in order to close this loop.

G. Sockeye Enumeration Study – PIT-Tag arrays for Sockeye

Joe Miller said that Chelan PUD is making good progress on getting this study ready to implement. Chelan PUD has received a quantitative analysis of sample size from John Skalski. He also said that Chelan PUD has applied for a Hydraulic Project Approval (HPA) for the PIT-tag arrays. Miller said that Chelan PUD is on track to have this study ready for the 2009 sockeye spawning period.

H. Chelan PUD Engineering Report

Julie Pyper said that the Chelan PUD Engineering Report was distributed by email last week; there was no additional discussion on the report at this meeting, but members are encouraged to call her if any questions arise.

III Douglas PUD

A. Wells Hatchery Compliance Report

Rick Klinge said that this document is out for review and will be up for approval at the December meeting.

B. Douglas PUD 2009 M&E Implementation Plan

Rick Klinge said that there were no comments to the Douglas PUD Draft 2009 Monitoring and Evaluation (M&E) Implementation Plan; comments were due November 11. The Committees approved this plan.

IV Yakama Nation

A. Impacts to Coho Adults from Recent Wells "Drawdown"

Keely Murdoch reported that the YN was concerned that the recent Wells Project "drawdown" may have affected coho ability to migrate into and up the Methow River because only a few fish entered the Winthrop Hatchery during and immediately following the "drawdown." She requested that any future "drawdown" operations be scheduled to occur later in the year following the coho spawning migration. Rick Klinge agreed that doing the work in December would have reduced the potential for stranding coho. He said that the "drawdown" had been approved by the Wells Coordinating Committee. In the future, he would recommend to the PUD that a "drawdown" like this one would occur later in the coho migration period.

B. Sockeye Cost-Sharing in Okanogan Basin

Keely Murdoch updated the group that Jeff Fryer (Columbia River Intertribal Fish Commission) is continuing to discuss enhanced sockeye salmon monitoring and evaluating activities with the Colville Tribes and the Okanogan Nation Alliance.

C. Path Forward for Coordinating Protocols for Summer Brood Collection at Wells Dam

Keely Murdoch said that the YN was interested in better planning for managing broodstock collection of summer Chinook at Wells Dam. Jerry Marco said that the Colville Tribes will be holding a workshop this spring to discuss this.

D. Upper Columbia Kelt Re-Conditioning Program Funded under Yakama Nation MOA

Keely Murdoch said that the YN is hoping to have a test group this spring to begin testing kelt re-conditioning. Bill Gale noted that the U.S. Fish and Wildlife Service would like to be kept in the loop on this because of the proposed involvement of the Entiat Hatchery. Murdoch confirmed that the YN is coordinating with the staff at Entiat Hatchery.

V NMFS

A. Draft Proposal: "Hatchery-Induced Life History Variability in Chinook Salmon"

Kris Petersen said that she distributed this paper to the Committees on behalf of Don Larsen and Brian Beckman. She indicated that she was passing this on as an FYI. She said that the Hatchery Committees might think about whether the Committees would want to pursue something like this. Bill Gale wanted more information about how the authors would propose to link their findings about precocity and smolt-to-adult return rates (SARs) to rearing conditions. Shaun Seaman asked whether this study could fit within the existing M&E program. Joe Miller will work with Grant and Douglas PUDs to put together some additional questions about the study. If the Committees have additional comments, Petersen agreed to pass those on to the authors.

VI HETT Update

Keely Murdoch updated the group that Hatchery Evaluation Technical Team (HETT) is looking at ways to deal with density dependence when screening control groups. The HETT is also reviewing the recent ad hoc supplementation report to look for additional steelhead control groups since steelhead data are sparse. In addition, the HETT is investigating high adult productivity values for some early year data on Methow spring Chinook.

Shaun Seaman asked whether someone was going to analyze the steelhead PIT-tag data from the Entiat and Peshastin PIT-tag arrays from this year. Keely Murdoch responded that at the last ISEMP meeting, it was communicated to Chris Jordan that these data needed to be input into the PIT-tag Information System (PTAGIS) database. Kris Petersen asked WDFW to provide a summary of steelhead going into the Entiat River and Peshastin Creek. Kirk Truscott said that he would ask Andrew Murdoch about providing a summary of steelhead PIT-tag data for fish into the Entiat River and Peshastin Creek.

VII HCP Administration

A. Meeting Agreements

The Committees made the following agreements at this meeting that did not require a formal SOA:

- The Committees approved the Douglas PUD Draft 2009 M&E Implementation Plan.

B. Next Meetings

The next scheduled meetings are as follows: December 17, January 21, and February 18—all will be located at the Chelan PUD offices in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Joe Miller	Chelan PUD
Shaun Seaman *	Chelan PUD
Julie Pyper *	Chelan PUD
Steve Hays	Chelan PUD
Jerry Marco *	Colville Tribes
Rick Klinge *	Douglas PUD
Todd Pearsons	Grant PUD
Russell Langshaw	Grant PUD
Kris Petersen *	NMFS
Dave Carie *	USFWS
Bill Gale	USFWS
Pat Phillips	WDFW
Kirk Truscott *	WDFW
Bob Pfeifer *	WDFW
Steve Parker	Yakama Nation
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Anchor Environmental, L.L.C.
1423 Third Avenue, Suite 300
Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

Final Memorandum

To: Wells, Rocky Reach, and Rock Island HCP Hatchery Committees

From: Michael Schiewe, Chair, HCP Hatchery Committees

CC: Ali Wick, Julie Pyper, Bob Pfeifer, Steve Hays, and Joe Miller

Date: January 22, 2009

Re: Final Minutes of December 17, 2008 HCP Hatchery Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, December 17, 2008, from 9:30 am to 4:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Kirk Truscott will coordinate with Shaun Seaman to make sure that all tables were included in the Partial Water Re-Use Statement of Agreement (SOA) as necessary (Item I).
- Ali Wick will finalize and send out the final Okanogan Nation Alliance (ONA) SOA (Item II-A).
- Mike Schiewe will update the handout memorializing the Non-target Taxa of Concern (NTTOC) decision with today's discussion and will send it out prior to the January meeting (Item II-B).
- Ali Wick will send each of the HCP Committees' responses on Blackbird Island Pond to Shaun Seaman so that he can follow-up with Taylor Horne of Washington State Department of Ecology (Ecology; Item II-E).
- Joe Miller will email his comment letter on the life history variability study to the Committees to use as a starting point for their edits or additional questions (Item II-F).
- The Committees will provide additional comments by Friday, January 2 to Joe Miller regarding the comment letter for the life history variability study. Miller will transmit the comments to Kris Petersen, who will work with Don Larsen and Brian Beckman of

the National Marine Fisheries Service (NMFS) Science Center to address the questions (Item II-F).

- Ali Wick will recirculate the document prepared by Kris Petersen that summarized potential endpoints for the steelhead reproductive success study for Committees discussion in January (Item II-H).
- The Committees will produce by February an agreed-to set of objectives and goals for the steelhead reproductive success study (Item II-H).
- Shaun Seaman will compile and provide information to the Committees from the last 2 years' water use for the Chiwawa water warming operation (Item II-I).
- Rick Klinge will edit the Wells Hatchery Compliance Report and will forward the final document to Ali Wick for distribution (Item III-A).
- Kris Petersen will follow-up with Chris Jordan regarding integration of the Entiat River and Peshastin Passive Integrated Transponder tagging (PIT-tag) array data into the PIT-tag Information System (PTAGIS) database (Item IV-A).
- Mike Schiewe will send a letter to Rob Walton saying that the Committees can meet the dates of March 31 for steelhead and May 31 for Wenatchee spring Chinook (Item V-A).

DECISION SUMMARY

- The Committees approved the SOA extending Chelan PUD's funding of the ONA sockeye salmon re-introduction study that meets Chelan PUD's sockeye mitigation until 2017 (Item II-A).
- The Committees approved the Wells Hatchery Compliance Report with today's edits (Item III-A).
- The Committees concurred that Washington Department of Fish and Wildlife (WDFW) can cull the eggs of the very high enzyme-linked immunosorbent assay (ELISA) females from the 2008 Chiwawa spring Chinook brood (Item IV-B).

I Welcome

The Hatchery Committees approved the November 19, 2008 Meeting Minutes subject to revisions; Ali Wick will distribute the final Meeting Minutes to the Hatchery Committees. During the Action Item review, in response to a question about the last meeting, Kirk Truscott said that he would coordinate with Shaun Seaman to make sure that all relevant tables were included in the Partial Water Re-Use SOA.

II Chelan PUD

A. ONA SOA

The Committees discussed some edits to clarify a few last issues in the SOA documenting the agreement that Chelan PUD would contribute to funding an ONA sockeye salmon hatchery and would be a component of Chelan PUD's sockeye mitigation requirement until 2017. The Committees approved the SOA as edited. Ali Wick will finalize and send out the final SOA.

B. NTTOC: Memorializing October Decision in Minutes

The Committees agreed that the handout sent previously to the Committees characterizes the NTTOC decision made at the October meeting, with several edits, including removing bull trout and replacing it with westslope cutthroat, which was the species agreed on at the meeting. Mike Schiewe clarified that the potential list of panel members was preliminary, and a final list will be determined prior to convening the expert panel.

Kirk Truscott noted the need for consistency between future Section 7 consultations of the Hatchery Genetic Management Plan (HGMP) process and the expert panel analysis of impacts on listed NTTOC species. Kris Petersen agreed and was anticipating that these documents would be completed at about the same time. Mike Schiewe agreed that the timelines should match up such that the NTTOC expert panel exercise will occur prior to the completion of any future Biological Opinion(s) (BiOps).

Bill Gale brought up the point that bull trout have not been included in the NTTOC process, and he thought that perhaps the expert panel should review the bull trout consultation sections of the BiOp and comment or concur with it as it applies to NTTOC. Shaun Seaman said that the reason the Committees excluded bull trout was that the Biological Opinion process had already contemplated effects on bull trout. Mike Schiewe pointed out that the Committees had previously agreed not to include bull trout at the October meeting based on input from the U.S. Fish and Wildlife Service (USFWS), and he said that the draft handout will be updated to reflect this agreement. Bill Gale said that it seemed that if bull trout are covered under the BiOp, then the listed Plan Species should also be covered under the BiOps that may come from the HGMP process, and thus Plan Species should be excluded from the NTTOC process. Kris Petersen replied that she was not certain that the future BiOps would assess risk in the same way that the NTTOC expert panel discussion would and thus including Plan Species would be helpful. The Committees then discussed the usefulness of including bull trout and whether this decision should be re-opened. After some discussion, the various Committees members agreed that the BiOp provides the needed coverage and decided not to include bull trout in the expert panel exercise. Mike Schiewe will update the handout to reflect this and send it to the Committees prior to the January meeting.

C. Hatchery Program Summary (Engineering Report)

Julie Pyper handed out the Hatchery Program Summary (previously known as the Engineering Report) for November through December 2008. This was also sent out by email this morning.

D. PIT-Tag Array for the Sockeye Enumeration Study

Joe Miller updated the group that the Joint Aquatic Resources Permit Application (JARPA) for installing PIT-tag arrays has already been sent out and a contract would be submitted to WDFW. Miller said that Chelan PUD would be evaluating detection efficiency of this array in the coming year. He said that Chelan PUD would ultimately like to have two multiplexers, but the mechanisms cannot be placed closer than 1,000 feet because interference occurs. Chelan PUD's current plan is to install the first array with the current technology and to use the new multiplexing transcievers (MUX) in the future once technology is improved.

E. Blackbird Pond Ecology Responses

Shaun Seaman requested that Ali Wick send him each of the HCP Committees' responses so that he could follow-up with Taylor Horne of Ecology. Mike Schiewe confirmed that each of the HCP members had responded to Horne.

F. Follow-Up on Hatchery-Induced Life History Variability for Yearling Chinook Study

Joe Miller distributed a handout that outlines the joint PUD (Douglas, Chelan, and Grant PUDs) questions on the study proposal for hatchery-induced life history variability in Chinook salmon. The Committees gave Joe Miller some suggestions during today's meeting. The Committees will provide additional comments by Friday, January 2 to Joe Miller. He will email his comment letter on the life history variability study to the Committees to use as a starting point for their edits and additional questions. Miller will transmit the final summary to Kris Petersen, who will work with Don Larsen and Brian Beckman of the NMFS Science Center to address the questions.

G. Rocky Reach Bull Trout BiOp

Steve Hays informed the Committees that a BiOp has been released for impacts of the new Rocky Reach FERC License on bull trout. He reviewed several of the important points of the document. He said that he may be contacting WDFW and Yakama Nation soon because Federal Energy Regulatory Commission may require documentation of current measures that are being taken to minimize impacts to bull trout at Rocky Reach and several trapping locations associated with the project. Hays said that he does not anticipate any changes to current practices, but he will confirm this with the Committees when the license is provided.

H. Steelhead Reproductive Success Study

Shaun Seaman updated the Committees that he has received a draft study budget for the steelhead reproductive success study from WDFW, which was $2 million over 10 years. Seaman said that Chelan PUD is committed to a reproductive success study, but that the PUD needs more time to evaluate whether the current study design is the only approach. He also said that Chelan PUD is committed to continuing to collect tissue samples in 2009, similar to 2008, in order to have these samples for future use. Mike Schiewe suggested that the Committees might want to consider convening a small group that would review the technical aspects of the study plan, and include in this small group geneticists as well as persons who could help translate the science of the study results to potential management action(s). Several Committees members expressed frustration that implementing a study appears to be stalling. Shaun Seaman reiterated that Chelan PUD is committed to the study. The Committees discussed what might be done with regard to how to move the study process forward. Mike Schiewe said that it would help if the Committees members could formally agree to a set of objectives and goals for the study. To support this, Ali Wick will re-circulate the summary of potential and recommended endpoints for a reproductive success study that Kris Petersen had prepared and previously distributed. The Committees' agreed to use this as a starting point for an in-depth discussion in January. The Committees committed to producing by February an agreed-to set of objectives and goals for the study. This step will occur prior to convening of the small group noted earlier that would perform a technical review of a study plan.

I. Chiwawa Water Warming

Shaun Seaman updated the group that, at this time, the hatchery is running on one Wenatchee River pump (at a variable flow level, depending on what is required) and one Chiwawa pump. With the cold weather, the Wenatchee river temperature is continuing to drop, so more Wenatchee water may be required as the winter progresses. To help understand what water usage has been over the last several years of water warming at Chiwawa Hatchery, Shaun Seaman said that he would compile and provide information on Chiwawa Hatchery water use from the Chiwawa and Wenatchee Rivers over the past 2 years, and distribute to the Committees.

III Douglas PUD

A. Approval of the Wells Hatchery Compliance Report

Rick Klinge updated the group that Douglas PUD has sent out the Wells Hatchery Compliance Report for review and is looking for approval of this document at this time. The Committees approved this document with minor revisions, including adding a footnote regarding summer Chinook at Carlton Pond. Klinge will forward the final document to Ali Wick for distribution.

IV WDFW

A. Summary of PIT-Tag Array Data for Peshastin Creek and Entiat River Arrays

Kirk Truscott updated the group that he is working on a summary of PIT-tag data for the Peshastin Creek and Entiat River arrays. He is currently assigning origins to the PIT-tag hits from the arrays. He said that he would have this information soon.

This discussion prompted a question of whether there has been progress on adding these data into PTAGIS. Kris Petersen said that she had sent an email to Chris Jordan several weeks ago asking about this and said that she would follow-up with him.

B. ELISA Levels for 2008 Broodyear Spring Chinook Returning to Chiwawa River

Kirk Truscott reported to the group that the ELISA results are now available from broodyear 2008 Chiwawa spring Chinook. He distributed a memorandum that described that five of the wild females had extremely high optical densities (ODs) (average 1.6). Truscott requested Committees' concurrence for WDFW to cull the eggs of these females from the brood because of this highly elevated result, stating that WDFW is typically reticent to cull listed fish eggs. The Committees concurred that WDFW can cull these eggs.

V NMFS

A. HGMP Development Schedule and Plan

Mike Schiewe introduced this topic and said that he had talked to Rob Walton about the HGMP schedule that the Hatchery Committees had agreed to at the November Hatchery Committees meeting. Keely Murdoch updated the group that the YN and WDFW have been meeting weekly since the last Hatchery Committees meeting to develop a co-manager proposal for a joint management plan for Wenatchee spring Chinook. When finished, the intent is for this proposal to be evaluated by NMFS for ESA consistency. Murdoch said that she expects that the plan will be ready for review by the end of January, but additional writing may still be required. The Committees discussed dates that could be met for submitting draft HGMPs to NMFS, and agreed that Mike Schiewe will send a letter to Rob Walton saying that the Committees can meet the dates of March 31 for steelhead and May 31 for Wenatchee spring Chinook. To begin this process, Mike Schiewe scheduled a meeting for Wenatchee steelhead and Chiwawa spring Chinook HGMPs on Wednesday, January 7 in Wenatchee. Attendees will include Kris Petersen, Kirk Truscott, Bob Pfeifer, and several Chelan PUD representatives.

VI USFWS

A. Candidate Notice of Review

Bill Gale updated folks that the USFWS has just released a Candidate Notice of Review summarizing the status of removing or adding candidate species. He said that he did not see any species up for review in this region and invited Committees members to send any questions to him if necessary.

VII HCP Administration

A. Next Meetings

The next scheduled meetings are as follows: January 21, February 18, and March 18; all meetings will be held at the Chelan PUD offices in Wenatchee.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor Environmental, L.L.C.
Ali Wick	Anchor Environmental, L.L.C.
Joe Miller	Chelan PUD
Shaun Seaman *	Chelan PUD
Julie Pyper *	Chelan PUD
Steve Hays	Chelan PUD
Jerry Marco * (by conference call)	Colville Tribes
Rick Klinge *	Douglas PUD
Tom Kahler	Douglas PUD
Russell Langshaw	Grant PUD
Kris Petersen *	NMFS
Bill Gale	USFWS
Kirk Truscott *	WDFW
Tom Scribner * (by conference call)	Yakama Nation
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

APPENDIX C

HABITAT CONSERVATION PLAN TRIBUTARY COMMITTEES MEETING MINUTES

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 10 January 2008

Members Present: Dale Bambrick (NOAA-Fisheries)[1], Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Chris Parsons (WDFW), Chuck Peven (Chelan PUD), Bob Rose (Yakama Nation), and Tracy Hillman (Committee Chair).

Others Present: Becky Gallaher (HCP Project Coordinator).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Second-Floor Conference Room in Wenatchee, Washington, on Thursday, 10 January 2008 from 9:00 to 11:30 am.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following changes:

- Added update on Annual Reports.
- Included a discussion on the outcome of the Project Cost Workshop hosted by the Chelan County Lead Entity.
- Dropped the Chelan PUD 2008 Action Plans review.
- Added a Policy Update from Douglas PUD.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 13 December 2007 meeting notes with revisions suggested by Tom Kahler and Chuck Peven.

III. Update on Annual Reports

Tracy Hillman reported that he and Becky Gallaher were preparing the Tributary Committees Annual Reports for the Plan Species Accounts. Tracy noted that the report for the Wells Account was complete and that the other reports would be completed after receiving financial information from the bank. Tracy asked the Committees if they wanted to review the Tributary sections before seeing the entire draft annual report. The Committees elected not to review the Tributary section before receiving the entire draft report.

[1] Dale joined the meeting via conference call.

IV. Review of Project Cost Workshop

During the afternoon on 13 December 2007, some of the Tributary Committees members attended a Project Cost Workshop hosted by the Chelan County Lead Entity. The intent of the workshop was to provide funding entities with a better understanding of project costs and to identify potential cost-saving actions for habitat projects. The following thoughts were shared by members that attended the workshop.

- Although the workshop was initially proposed as being interactive (i.e., allow open dialog among groups), members felt like some of the presenters lectured rather than allowed for open dialog.
- Members were disappointed that Mike Kaputa, who initiated the workshop, was unable to participate in the workshop.
- Members indicated that some of the information presented during the workshop mischaracterized or misrepresented experiences and requirements. For example, some presenters lacked understanding of permitting and misrepresented the time needed for permitting. Members recommended that the sponsors engage with the permitting agencies well before the permit applications and project applications are submitted.
- Members noted that there was a lack of coordination and communication between Chelan County NRD, Cascadia Conservation District, and the Bureau of Reclamation.
- It was apparent from the presentation that the observed excessive costs of projects from the Lead Entity were the product of: (1) designs that were developed without the input of permitting agencies resulting in last-minute design changes in response to permit conditions, (2) rushing projects in an attempt to prematurely fit them into a funding round, (3) requesting bids on projects for which permits have not been issued, and (4) rushing projects to implementation so that requests for bids occurred too late in the year to obtain the most competitive bidding.
- The presentation revealed a lack of understanding by the Lead Entity of the sequencing and coordination with permitting agencies that would be necessary to align project development with funding-round cycles. Cost savings realized by such alignment would come from the elimination of the problems identified in the above bullet point.

Overall, members found the information presented at the workshop to be of limited use and that the County needs to improve project scheduling and implementation. Members of the Tributary Committees, having experience in stream restoration, project development, and contract management, believe that the County can and should provide more cost-effective estimates in their proposals. All “hidden costs” need to be fully disclosed in the proposed budgets.

Chris Parsons reported that the Salmon Recovery Funding Board will host a meeting on permitting on Tuesday, 22 January from 10:00 am to 2:00 pm. Chris will provide additional information to members as soon as it is available. This meeting should provide information that will help sponsors better understand the permitting process and timelines. Chris will update the Committees in February on the outcome of this meeting.

V. Payment Authorizations

The Wells Tributary Committee authorized the following payments:

- $18,180.71 to the Methow Salmon Recovery Foundation for the Heath Floodplain Restoration project (first payment request).

- $17,450.36 to the Methow Salmon Recovery Foundation for the Heath Floodplain Restoration project (second payment request).
- $559.11 to Chelan County PUD for fourth-quarter administrative work.

The Rock Island Tributary Committee authorized the following payments:

- $733.67 to Chelan County PUD for fourth-quarter administrative work.
- $30.00 to LeMaster and Daniels for Rock Island Administration.

The Rocky Reach Tributary Committee authorized the following payments:

- $12,341.75 to Okanogan Conservation District for the Clees Well and Pump project.[2]
- $838.53 to Chelan County PUD for fourth-quarter administrative work.
- $30.00 to LeMaster and Daniels for Rocky Reach Administration.

VI. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. Most are progressing well—or had no salient activity in the past month.

- Final reports have been submitted on the Clees Well and Pump, Alder Creek Culvert Replacement, and Nason Creek Off-Channel projects. These reports can be viewed at http://www.midcolumbiahcp.org/Tributary/GSF%20Projects.htm.
- Removal of the lower culvert and construction of the new bridge is complete on the Heath Floodplain Restoration project. Construction of the new fish passage channel is also complete. Bid proposals for the upper portion of the project exceeded the budget and therefore the sponsor will rebid the project in spring.

VII. 2008 Action Plan for the Wells HCP

Tom Kahler described the development of the 2008 Action Plan for the HCP Committees. The Plan outlined the timeline for both the Annual Report on the Plan Species Account Status and the 2008 Funding-Round Review and Funding Decisions. The Wells Tributary Committee accepted the 2008 Action Plan. Chuck Peven reported that he will present the 2008 Action Plans for the Rocky Reach and Rock Island HCPs to the Committees in February.

VIII. Douglas PUD Policy Update

Tom Kahler reported that Douglas County PUD updated their land-use policy regarding docks and piers along Wells Reservoir. Tom noted that development around the reservoir has increased exponentially over the last few years and this has resulted in increased dock development. The PUD hired Don Chapman to conduct an independent review on the effects of docks on Plan Species within the reservoir. The review indicated that docks can have a negative effect on the survival of Plan Species (especially juvenile summer Chinook). Therefore, the updated policy

[2] In December, the Rocky Reach Tributary Committee authorized the payment of $12,341.75 to Kooy's Irrigation for the Clees Well and Pump project. However, Kooy's Irrigation received payment for this amount from Okanogan Conservation District and therefore returned the check from the Rocky Reach Account. Okanogan Conservation District then submitted an invoice to cover the payment they made to Kooy's Irrigation.

will restrict further dock and pier development to areas only within the city limits of Brewster, Bridgeport, and Pateros. Tom stated that the PUD solicited public input and held two public meetings.

IX. Effectiveness Monitoring

Tracy Hillman provided the Committees with a document that briefly described different approaches to effectiveness monitoring. Tracy reviewed the document with the Committees and explained differences among the three primary approaches to effectiveness monitoring (Design-Based, Levels-of-Evidence, and Modeling approaches). Tracy also described the current status/trend and effectiveness monitoring programs within the Upper Columbia (i.e., the Integrated Status and Effectiveness Monitoring Program, the Okanogan Basin Monitoring and Evaluation Program, the Washington Salmon Recovery Funding Board Monitoring Program, and the PUD-funded monitoring programs). Although the Committees made no final decisions on effectiveness monitoring, they discussed the following:

- The recovery plan and other conservation documents identify restoration and enhancement actions within the channel migration zone (e.g., reconnect side channels and off-channel ponds) as important actions to restore native fish species. The Committees, therefore, expect to see more proposals that deal with off-channel restoration and enhancement actions. However, little is known about the effects of these actions on salmonid spawning and rearing. Therefore, the Committees would like to better understand the effects of these off-channel actions on the rearing and spawning of salmonids.
- The Committees expect to see a larger signal-to-noise ratio if monitoring of off-channel habitat actions occurs at the project or reach scale, not the watershed or population scale. Monitoring at a smaller scale is also less expensive than monitoring at the watershed or population scale.
- Because of the cost and effort needed to assess survival and productivity, the Committees are considering monitoring fish abundance, distribution, and size as the primary biological performance metrics. Surrogate metrics such as number and distribution of redds may also be included in the monitoring program.
- The Committees are also considering the measurement of physical/environmental performance metric such as presence of connectivity between mainstem and floodplain, stream flows, thalweg profile, length of side channels or floodplain channels, size of off-channel pond, number of pools, residual pool depth, residual pond depth, number of pieces of large woody debris per 100 m, bank stability, and riparian diversity and shading.
- An appropriate design for testing the effects of off-channel habitat actions would be a before-after (BA) or paired before-after, control-impact (BACI(P)) design at the reach or project scale. This would provide a higher level of certainty of inference than a levels-of-evidence or correlative approach.
- Treatment effects could range from off-channel habitat actions that are connected to the mainstem only during high flow to off-channel actions that are connected to the mainstem at all flows. This would allow the Committees to assess a gradient of treatment effects.
- It is unlikely that treatments can be assigned to streams randomly; therefore, the Committees would select which ones will be monitored from the suite of treatments that

will be implemented throughout the Upper Columbia region, including Canada. Potential bias can be reduced by randomly selecting which treatments will be monitored for effectiveness.

- The Committees are interested in "partnering" with existing programs, such as ISEMP or the Okanagan Nation Alliance program in Canada. The Committees asked Tracy to discuss this opportunity with the ISEMP planners. The Committees also asked Chris Fisher to talk with the Okanagan Nation Alliance about opportunities to support the monitoring component of the Okanagan River Restoration Initiative.
- Because monitoring data collected with funds from the Tributary Committees will likely be curated and managed by the Upper Columbia Data Steward, Chuck Peven suggested that the Committees partially fund the data steward position, which currently has funding for only one-two years. The Committees agreed not to provide funds for this position at this time. In addition, the Committees would need to ensure that funding the Data Steward position is consistent with the language in the HCPs.

The Committees will continue to think about effectiveness monitoring opportunities in the Upper Columbia and will discuss next steps during the February meeting.

X. Next Steps

If necessary, the Tributary Committees will meet on 14 February to conduct regular business and continue their discussion on effectiveness monitoring.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 14 February 2008

Members Present: Dale Bambrick (NOAA-Fisheries), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), Chuck Peven (Chelan PUD), Bob Rose (Yakama Nation) [1], and Tracy Hillman (Committee Chair).

Members Absent: David Morgan (USFWS) and Chris Parsons (WDFW)[2]

Others Present: Becky Gallaher (HCP Project Coordinator) and Ben Lenz (Grant PUD).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 14 February 2008 from 9:30 to 11:00 am.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following changes:

- Added brief updates from Dale Bambrick.
- Added a discussion on the Entiat and Wenatchee Interdisciplinary Teams.
- Dropped the Chelan PUD 2008 Action Plans review.
- Dropped the Permit Streamlining Workshop update.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 10 January 2008 meeting notes with revisions suggested by Dale Bambrick, Tom Kahler, David Morgan, Chris Parsons, and Chuck Peven.

III. Payment Authorizations

The Rocky Reach Tributary Committee authorized the following payment:

- $4,590.76 to Chelan County Natural Resource Department for the Entiat Instream Habitat Improvements Project.

[1] Bob joined the meeting via conference call.
[2] David and Chris provided their votes on decision items before or shortly after the meeting.

IV. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. Most are progressing well—or had no salient activity in the past month.

- Becky is currently preparing HCP Tributary Committee/Sponsor agreements with the Okanagan River Restoration Initiative, Roaring Creek Flow Enhancement and Barrier Removal Project, Entiat PUD Canal System Conversion Project, Wildhorse Spring Creek Project, Keystone Canyon Habitat Restoration Project, and Harrison Side Channel Project.
- The purchase and sale agreements for the Quintana-Leon and Tiegel properties are moving forward and should be completed by March 2008. The sponsor reported that the sale price for the Quintana-Leon property is above fair market value by 3% ($10,000 over the appraised fair market value of $290,000).
- The Entiat Habitat Improvements Project funded by the Rocky Reach Account is complete.
- Because of the need to secure additional funding, the Methow Conservancy was unable to complete the Methow Riparian Protection Phase III: MacDonald Property Project by 31 January 2008. Therefore, the Conservancy requested that the deadline be extended to 30 September 2008. **The Wells Committee approved the extension.**
- The Canadian Okanagan Basin TWG requested that the Tributary Committee/Sponsor Agreement for the Okanagan River Restoration Initiative—Construction (Phase IV) Project be changed to allow internal budget shifts for amounts up to $25,000, rather than the stated amount of $3,000. Under the proposed change, the sponsor would need to request a written budget amendment from the Wells Committee after the $25,000 threshold is met. The sponsor believes this will be a more practical limit for such a large project. **The Wells Committee approved the change**.
- The contract with LeMaster and Daniels for managing the Rock Island and Rocky Reach accounts expired on 31 December 2007. **The Rock Island and Rocky Reach Committees approved a <u>three-year</u> contract with LeMaster and Daniels**.

V. Dale Bambrick Updates

Dale Bambrick provided the Committees with two information updates:

- Dale reported that he, David Morgan, and Ben Lenz visited the proposed Wenatchee River Side Channel Extension Project (aka CMZ Site 2) on the Goodfellow and Chotzen properties (located at RM 1.4 on the north side of the river). The purpose of the proposed project is to increase the length of an existing side channel and create a series of off-channel ponds and backwater areas (primarily for birds). Large wood would be placed and anchored at the head and mouth of the proposed channel. Dale reported that the project as proposed would have limited benefit to salmonids and the potential risks could outweigh the possible benefits, which is consistent with the conclusion reached by the RTT. Some of the risks discussed included fish stranding, possible negative effects on the existing side channel, creation of heat sinks in the ponds (depends on interaction of surface water with groundwater), and potential failure of habitat-diversity structures. The recommendation by Dale and the RTT is to not use a "heavy-handed" approach, but rather allow the river and side channel to function through natural processes. Smaller-scale treatments, such as removal of the dike or berm may be appropriate.

- Dale also reported that Mike Kaputa (Chelan County NRD) called him and they had a candid discussion about the Project Cost Workshop held in December. Dale indicated that he shared with Mike the concerns that the Committees voiced in January (see January meeting notes).

VI. Entiat and Wenatchee Interdisciplinary Teams (IDTs)

Tracy Hillman reported that Steve Kolk (Bureau of Reclamation) is offering the Tributary Committees (one member as a representative) an invitation to participate on the Entiat and Wenatchee Interdisciplinary Teams (IDTs). The purpose of the IDTs is to "brainstorm project purpose, extent, and features." This work would occur in the spring or early summer about two years before construction and would involve one or more field meetings.

After discussion, the Committees decided that they would not send a representative to participate on the IDTs. However, the Committees will invite Reclamation to Tributary Committees meetings every 4 to 6 months to update the Committees on development of preferred alternatives. [*Note: after the meeting, Tracy shared the decision of the Committees with Steve Kolk, who indicated that he and Jennifer Molesworth would be available to meet with the Committees to provide updates on the development of alternatives.*]

VII. Effectiveness Monitoring

Tracy Hillman reported that he contacted Pamela Nelle and discussed the prospects of the Tributary Committees partnering with the Integrated Status and Effectiveness Monitoring Program (ISEMP) to assess the effectiveness of off-channel habitat restoration/alteration projects in the Upper Columbia. Pamela indicated that the ISEMP Program would be open to partnering with the Committees; however, the Committees would need to contract directly with the entities collecting habitat and fish data. Contracts would likely be with the Forest Service, Fish and Wildlife Service, Washington Department of Ecology, and Terraqua. The Committees would need to:

- Identify which treatment and control sites would be monitored.
- Determine the frequency of sampling.
- Specify deliverables (e.g., data, reports, etc.).
- Contact the entities that would be doing the monitoring to determine amount of effort and cost to do the work.

The advantage of partnering with ISEMP is that the Committees would be able to answer most of their questions regarding the effectiveness of different treatment levels of off-channel restoration projects. In addition, the same protocols and survey crews would be used at all restoration sites. The disadvantage would be developing contracts with several different entities.

Chris Fisher reported that he contacted the Okanagan Nation Alliance (ONA) about opportunities to support or supplement the monitoring component of the Okanagan River Restoration Initiative (ORRI). Chris provided the Committees with a table identifying the parameters measured, monitoring methods, duration of the study, expected outcomes, and current funding for monitoring the ORRI project. After reviewing the table, the Committees were satisfied that ONA was proposing to measure parameters that are of interest to the Committees (e.g., numbers and distribution of redds, egg-incubation success, holding and rearing habitat, floodplain re-vegetation, channel morphology and hydraulics, substrate composition, and channel/floodplain interactions). The Committees were not interested in the measurement of water quality in oxbows. The ONA currently has funding for the redd surveys and is seeking funding from various entities for five of the other surveys. These funds have not been secured. The channel/floodplain interactions and water quality studies have no funding. The Committees asked Chris to find out the status of potential funding for the studies not currently funded, save the water quality studies.

The Committees also discussed a "wait-and-see" approach. That is, with the current level of monitoring of off-channel restoration projects by ISEMP (in the Entiat), ONA (in Canada), and SRFB (in the Wenatchee), many of the questions regarding the effectiveness of off-channel restoration projects may be addressed under these monitoring programs. The disadvantage of this approach is that the various programs may not address all questions of interest to the Committees.

Dale Bambrick asked about the current level of effort used to monitor the effectiveness of the Nason Creek Off-Channel Project. The Yakama Nation (YN) is currently monitoring the project, but no one at the meeting was certain of the intensity or duration of the study. The Committees directed Tracy to contact Keely Murdoch with the YN and find out the extent of their monitoring efforts.

The Committees will continue to compile information on effectiveness monitoring opportunities in the Upper Columbia and will discuss next steps during the March meeting.

VIII. Next Steps

The next meeting of the Tributary Committees will be on Thursday, 13 March. Tentative agenda items include:

- Status of projects.
- Review of Small Projects Proposals.
- Funding strategy for 2008.
- Effectiveness monitoring discussion.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 12 March 2008

Members Present: Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Chris Parsons (WDFW), Chuck Peven (Chelan PUD), Bob Rose (Yakama Nation), and Tracy Hillman (Committee Chair).

Members Absent: Dale Bambrick (NOAA-Fisheries)[1]

Others Present: Becky Gallaher (HCP Project Coordinator).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Fish and Wildlife Conference Room in Wenatchee, Washington, on Wednesday, 12 March 2008 from 1:00 to 3:00 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 14 February 2008 meeting notes.

III. Payment Authorizations

The Rock Island Tributary Committee authorized the following payment:

- $125.00 to LeMaster and Daniels for Rock Island administration for the period January and February.

The Rocky Reach Tributary Committee authorized the following payment:

- $125.00 to LeMaster and Daniels for Rocky Reach administration for the period January and February.

IV. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. Most are progressing well—or had no salient activity in the past month.

- Becky reported that the target completion date for the Quintana Leon and Tiegel properties is 1 April 2008.

[1] Dale provided his votes on decision items before the meeting.

- Becky reported that the sponsor for the Okanagan River Restoration Initiative (Canadian Okanagan Basin TWG) asked the Wells Committee to amend Section 17 of the HCP TC/Sponsor Agreement, which currently requires the sponsor to contact the Committee to review the scopes of work for any work to be performed by the sponsor's contractors that equals or exceeds $5,000. The sponsor asked the Committee to change the limit from $5,000 to $15,000. Rather than amend the limit identified in this agreement, the Committee chose to delete Section 17 (Committee Review of Contractor Scope(s) or Work) from this particular agreement.

V. Recusal Language in the Tributary Committees Operating Procedures

Tracy Hillman reported that "Recusal Language" accepted by the Committees in March 2006 was not in the recent draft of the Tributary Committees Operating Procedures. The accepted recusal language identified in the March 2006 notes stated:

> *Committee members should recuse themselves from voting on a particular project if they represent an entity that may benefit from that project.*

This current version of the Operating Procedures states:

> *VII. FULL DISCLOSURE*
>
> *After full written disclosure of any potential conflict of interest, which shall appear in the minutes of the Committees and prior to project approval, the Committees may approve a project that may benefit a person or entity related to a specific committee member, or an entity which appointed the committee member.*

The Committees agreed that the language accepted in March 2006 should be added to the end of Section VII in the Operating Procedures. The Committees directed Tracy to make the changes and send the revised draft to members of the Committees.

VI. 2008 SRFB/Tributary Fund Timeline

Tracy Hillman and Becky Gallaher discussed the final schedule for the 2008 SRFB/Tributary Fund process (the entire schedule is attached at the end of the notes). The following dates are of interest to the Tributary Committees:

- 30 April: SRFB/Tributary Committees Fund kickoff meeting for the region.
- 2 June: Pre-proposals due to Tributary Committees.
- 10-11 June: Pre-proposal presentation workshop.
- 12 June: Tributary Committees internal review of pre-proposals.
- 23-27 June: Project tours.
- 10 July: Tributary Committees final review of pre-proposals.
- 8 August: Final proposals due to Tributary Committees.
- 28 August: RTT ratings delivered to Tributary Committees.
- 11 Sept: Project presentation to Tributary Committees (if needed).
- 12 Sept: Supplemental tours for Tributary Committees.

- 8 Nov: Tributary Committees make initial internal decisions.
- 11-12 Dec: SRFB makes formal decisions.
- Dec: Tributary Committees make supplemental decisions.

The Committees indicated that they had no issues or apparent conflicts with the schedule.

Tracy reported that the SRFB allocated 10.85% of the total funding to the Upper Columbia. This equates to just over $2,000,000, which is less than the $2,750,000 that was available in 2007.

VII. Effectiveness Monitoring

Nason Creek Off-Channel Project

Tracy Hillman reported that he contacted Keely Murdoch (Yakama Nation) and discussed the extent of their effectiveness monitoring efforts associated with the Nason Creek Off-Channel Project. Tracy shared the following information with the Committees:

- The Yakama Nation has funding for one year of effectiveness monitoring. Funding is currently from Chelan County.
- The monitoring design is a Before-After, Control-Impact design with one sample collected before construction and seasonal sampling occurring post-construction. Prior to construction, sampling occurred in the off-channel site (treatment site), in a control site (Nason Creek site near the treatment site), and in a reference site (off-channel site on the Chiwawa River). During the post-construction period, samples will be collected three times during each season (spring, summer, and fall) in the treatment, control, and reference sites.
- Performance indicators include fish densities (numbers/m^2 by species and life stage), readings from staff gauges, and numbers of cuttings/plantings that are alive. There is no funding for measuring habitat conditions along cross sections.
- Measurement methods include snorkel surveys.

According to Keely, as reported by Tracy, the study would benefit from additional years of sampling and the addition of PIT tag detectors. Currently, the side channel is wide and shallow, which provides limited habitat for juvenile salmonids, especially during winter. As a result, few fish are currently using the off-channel habitat. A spring, high-flow event is needed to scour a channel through the buildup of organic sediments within the off-channel site. Keely believes that the off-channel site will not reach a dynamic equilibrium for a few years. Consequently, fish responses to the site will likely change over time. Therefore, she believes additional years of monitoring are needed to evaluate the effects of the treatment.

The addition of PIT tag detectors within both culverts would allow the assessment of fish movement, residence time, and survival within the off-channel site. Tom Kahler and Chuck Peven reported that detectors could be set up to evaluate directional movement of fish and that the cost to do so would be about $5,000-10,000/site, depending on set up. Fish within Nason Creek are already being PIT tagged under the ISEMP program. PUD crews are collecting fish within Nason Creek for tagging and the Yakama Nation is PIT tagging fish collected at the smolt trap near the mouth of Nason Creek. Approximately 2,500 fish (mix of juvenile Chinook and steelhead) are tagged annually in Nason Creek under ISEMP.

The Committees asked Tracy to invite Keely to the April meeting to give a presentation on their program to monitor the effectiveness of the off-channel project on Nason Creek, to share preliminary results, and to identify ways to improve the study.

Okanagan River Restoration Initiative Project

Chris Fisher indicated that he will contact the Okanagan Nation Alliance about opportunities to support or supplement the monitoring component of the Okanagan River Restoration Initiative. Chris will find out the status of potential funding for the studies not currently funded (see February notes for details) and will report his findings to the Committees in April.

VIII. Update on Permit Streamlining Workshop

Chris Parsons provided an update on the Permit Streamlining Workshop held on 22 January and the Implementation Team Meeting held on 11 March. Chris indicated that the meetings were an overall success and that sponsors should have left the meetings with a better understanding of the permitting process. The meetings resulted in the following recommendations:

- Offer a permitting workshop before June for project sponsors needing to prepare permits. A "how-to" packet (including examples) would be provided to the sponsors to help them through the permitting process.
- Continue a forum for collaboration among all permitting agencies and project sponsors.
- Identify inconsistencies and redundancies in permitting agency requirements and goals.
- Shift state streamlining process from Olympia to the region.
- Offer certification classes for contractors and designers of fish projects in the Upper Columbia. Classes would likely be in February and November.
- Mediate the large woody debris (LWD) issue with WDNR land leases. WDFW requires sponsors to fully mitigate a project. This mitigation usually involves placement of LWD to achieve no net impact. However, on WDNR lands, WDNR charges the applicant for placement of LWD on their lands. The intent is to eliminate the charge.

Chris noted that the goal is to streamline the permitting process. This means that project sponsors need to involve permitting agencies early in the process. In addition, the sponsors need to have the agencies visit the project site before the contractors leave the site.

Chuck Peven noted that additional "thinking-out-of-the-box" ideas were discussed during the Implementation Team Meeting. He stated that one such idea was to have state and federal permitting agencies collaborate and identify where they had similar permit requirements and to explore whether this could lead to a streamlined process that covers both state and federal requirements. Another idea was to have the permitting agencies meet with project sponsors on a weekly basis.

IX. Small Projects Proposals

The Committees received two Small Projects Program applications; one from the Methow Conservancy (*Riparian Regeneration and Restoration Initiative*) and another from Cascadia Conservation District (*Entiat PUD Canal Log-Boom Installation*).

Riparian Regeneration and Restoration Initiative

The Methow Conservancy is the sponsor of the Riparian Regeneration and Restoration Initiative project. The intent of the project is to build re-useable cages that will protect seedlings and saplings of cottonwood, aspen, and willow trees within riparian areas along the Methow and Twisp rivers from wildlife browsing. The cages will allow young trees to grow beyond the damaging effects of herbivores and thereby improve natural regeneration of riparian vegetation in the Methow Valley. Because the cages are durable and reusable, the work can continue indefinitely with minimal need for future funding. The total cost of the project is $22,736.96. The sponsor requested $15,536.96 from HCP Tributary Funds. ***The Wells Tributary Committee approved funding for this project.***

Entiat PUD Canal Log-Boom Installation

Cascadia Conservation District is the sponsor of the Entiat PUD Canal Log-Boom Installation project. The purpose of the project is to allow continuous flow into the restored side channel by installing a log-boom that will reduce or eliminate large woody debris from clogging the entrance to the channel. The total cost of the project is $10,660.40. The sponsor requested $7,160.40 from HCP Tributary Funds.

The Committees identified the following issues that require the attention of the sponsor:

- Is wood currently recruited to the Entiat River in sufficient quantities to create a potential problem at the mouth of the side channel?
- Is there a history of wood collecting at the mouth of the side channel?
- If wood has collected at the mouth of the channel in the past, did it reduce or eliminate flows into the channel?
- Is there any information that indicates that the boom will actually divert wood, and not capture and collect wood?

In an effort to effect a funding decision quickly, the Committees directed Tracy to send an email to the sponsor requesting responses to these questions.

[*After receiving responses to the four questions from the sponsor and discussing the merits of the project in emails, on 25 March the Rocky Reach Tributary Committee approved funding for the Entiat PUD Canal Log-Boom Installation Project.*]

X. Next Steps

The next meeting of the Tributary Committees will be on Thursday, 10 April. Tentative agenda items include:

- Status of projects.
- Presentation by the Yakama Nation on monitoring the Nason Creek Off-Channel project.
- Effectiveness monitoring discussion.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

2008 UPPER COLUMBIA PROCESS SCHEDULE

Tributary Fund and SRFB

Project Proposal Development, Submission, and Review

DATE	ACTIVITY/MILESTONE (MEETING/DEADLINE)
MARCH	
March	SRFB/Tributary Fund cycles announced; SRFB Policy Manual available
APRIL	
30 April	**SRFB/Tributary Fund Kickoff Meeting for the Region; RTT Technical criteria presentation; Citizens' Committee criteria presentation**
MAY	
May	**Project Sponsors develop projects and pre-proposal materials (available from Tributary Committee)**
JUNE	
2 June	**Pre-proposals due to Tributary Committees and to Lead Entities**
4 June	**Pre-proposals delivered to RTT members and Tributary Committee; and SRFB Panel Members (via PRISM)**
10 June (afternoon)	***If necessary*, Pre-proposal Presentation Workshop: review pre-proposal with RTT and Citizens' Committee**
11 June (all day)	**Pre-proposal Presentation Workshop: review pre-proposals with RTT and Citizens' Committee**
12 June	Tributary Committees' internal review of pre-proposals
17 June	Conference Call to discuss project tour logistics (RTT, LEs, Trib and UCSRB)
20 June	**Pre-proposal Presentation Workshop meeting summary distributed**
23-27 June	***SRFB/Trib Fund/RTT project tours*** • **23rd – Okanogan** • **24th – Methow** • **25th – Entiat** • **26th – Wenatchee** • **27th – Contingency for spillover**
JULY	
10 July	Tributary Committees' final review of pre-proposals
17 July	Final comments from Tributary Committee due to project sponsors
AUGUST	
1 August	**Draft project review forms due from State Technical Review Panel to LEs and project sponsors**
8 August	**Final project proposals due to Tributary Committees and Lead Entities**
11 August	**Project proposals delivered to RTT and Citizens Committees**
19 August	***If needed*, RTT Meeting: formal project reviews and technical ranking**
20 August (all day)	**RTT Meeting: formal project reviews and technical ranking**

28 August	**RTT ratings delivered to Lead Entities and Tributary Committees**
SEPTEMBER	
4 September	**Individual Citizen's Committee project ranking**
8 September	**Lead Entity project applications due to SRFB and on to PRISM**
11 September	***If needed*, project presentations to Tributary Committees**
11 September	**Joint Citizen's Committee identifies combined ranked list**
12 September	Tributary Committees' supplemental tours of selected projects (project sponsors will be notified in advance of visit)
15 September	**Final ranked list with regional funding recommendations due to SRFB; information submission questionnaire**
OCTOBER	
6 October	**Second Draft project review forms due from State Technical Review Panel to LEs and project sponsors**
13-17 October	SRFB Review Panel project review
29 October	Draft report by Review Panel to SRFB
NOVEMBER	
8 November	Tributary Committees make initial internal decisions
19 November	Final report by Review Panel to SRFB
DECEMBER	
11-12 December	**SRFB makes formal decisions**
December	Tributary Committees make supplemental decisions

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 10 April 2008

Members Present: Dale Bambrick (NOAA-Fisheries), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Chris Parsons (WDFW), Chuck Peven (Chelan PUD), Bob Rose (Yakama Nation), and Tracy Hillman (Committee Chair).

Others Present: Becky Gallaher (HCP Project Coordinator), Ben Lenz (Grant PUD), Keith Truscott (Chelan PUD; for agenda items 6 and 7), Keely Murdoch (Yakama Nation; for agenda item 6 only), Alan Schmidt (Chelan County NRD; for agenda item 6 only), Lee Duncan (Chelan County NRD; for agenda item 6 only), and Bob Bugert (Chelan-Douglas Land Trust; for agenda item 7 only).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 10 April 2008 from 9:30 to 11:00 am.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following additions:

- Information updates from Tracy Hillman, Chuck Peven, David Morgan, and Bob Rose.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 12 March 2008 meeting notes with revisions suggested by Chuck Peven and Tracy Hillman.

III. Payment Authorizations

The Rock Island Tributary Committee authorized the following payments:

- $105.00 to LeMaster and Daniels for Rock Island administration in March.
- $1,268.87 to Chelan PUD for project coordination during the first quarter of 2008.

The Rocky Reach Tributary Committee authorized the following payments:

- $105.00 to LeMaster and Daniels for Rocky Reach administration in March.
- $603.04 to Chelan PUD for project coordination during the first quarter of 2008.

The Wells Tributary Committee authorized the following payment:

- $389.51 to Chelan PUD for project coordination during the first quarter of 2008.

IV. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. Most are progressing well—or had no salient activity in the past month.

- Becky reported that the Entiat log-boom will be installed on 15 April 2008.
- Becky reported that the sponsor for the Heath Floodplain Restoration Project has asked contractors to resubmit their bids for the restoration work. Bids are due by the end of April.
- Becky indicated that the sponsor for the Lower Beaver Creek Livestock Exclusion Project has asked for bids for the off-stream stock water system. In addition, the pump for the conveyance system has been ordered. The landowner has started fencing the south end of the stream.

V. Information Updates

Tracy Hillman provided the following announcements:

- Mike Schiewe will be giving a presentation to the Upper Columbia Salmon Recovery Board on 24 April. He will provide them with a general overview of the HCPs and answer questions. He will also provide the Board with a list of projects that the Tributary Committees have funded (Tracy and Becky are compiling information for Mike).
- Mike Schiewe sent letters to American Rivers and the Confederated Tribes of the Umatilla Indian Reservation inviting them to attend a meeting of the HCP Coordinating, Hatchery, and Tributary Committees. The intent is to provide them with a progress report on implementation and allow them to ask questions of Committee members. The meeting would likely be a half-day session. The date for the meeting has not been determined.

Chuck Peven announced that he will end his employment with Chelan PUD at the end of April and will begin a new career as an independent consultant in fisheries science (Peven Consulting, Inc.). Chuck indicated that Keith Truscott will return as the interim Chelan PUD representative on the Rocky Reach and Rock Island Tributary Committees (to which Dale Bambrick led a joyful cheer).

David Morgan reported that John Sunderland contacted him about the possibility of the Tributary Committees attending a rafting trip on the Methow River in May or early June. The trip is being organized for multiple salmon recovery entities. David indicated that John would contact Tracy and provide the Committees with more details about the trip.

Bob Rose announced that the Yakama Nation signed a Memorandum of Agreement (MOA) with the Federal Columbia River Power System Action Agencies that would provide $60 million ($6 million per year for 10 years) for salmon and steelhead recovery in the Upper Columbia. Among other things, the money will be used to protect, restore, and enhance habitat, improve the status of Pacific lamprey, and some will be used for monitoring (effectiveness and status/trend monitoring). Bob indicated that the Yakama Nation will be coordinating these activities with the Co-managers, Upper Columbia Salmon Recovery Board, Regional Technical Team, Tributary Committees, Bureau of Reclamation, and others. Bob noted that additional information on the MOA can be found at: http://www.salmonrecovery.gov/ and http://www.critfc.org/

VI. Nason Creek Oxbow Monitoring (Yakama Nation)

Keely Murdoch with the Yakama Nation provided the Committees with an overview of the work they are doing to monitor the effectiveness of the Nason Creek Oxbow Project. Keely also provided the Committees with three handouts: (1) quarterly report for the period September-December 2007, (2) quarterly report for the period January-March 2008, and (3) the original proposal for monitoring the Nason Creek Oxbow Reconnection Project. What follows are the highlights from her presentation.

- The Yakama Nation has funding for one year from Chelan County NRD.
- Their work currently measures changes in the status of riparian plantings and fish densities (fish/m^2). They are also monitoring water temperatures and flows in the oxbow.
- Fish densities by species are estimated on three different occasions (subsamples) within each season in the oxbow (treatment site), Nason Creek (control site), and an oxbow in the Chiwawa Basin (reference site). Inclement weather and high flows may preclude the collection of all three subsamples during winter and spring.

Keely recommended the following improvements to the monitoring program:

- Install PIT-tag detectors within both culverts to estimate survival, residence times, and life-history characteristics of fish in the oxbow. Under ISEMP, fish are already PIT tagged in Nason Creek and there is a PIT-tag array at the mouth of Nason Creek for detecting fish movement. According to Keely, there may be an opportunity to compare survival of fish in Nason Creek with those that use the Oxbow. This will depend on the number of fish tagged in Nason Creek and the number of tagged fish that use the oxbow. Another feature of adding PIT-tag detectors is that it will allow continuous monitoring of fish into and out of the oxbow. Snorkel surveys only provide a discrete snapshot of fish in the oxbow.
- Increase the sampling duration from one year to at least five years. According to Keely, the oxbow is wide and shallow, and has large amounts of fines (mostly organics). Additional years of high flows may be required to scour a deeper and narrower channel within the oxbow. Sampling for only one year may miss the changes in channel features, habitat conditions, and responses of fish to those changes. Alan Schmidt and Lee Duncan noted that they are already seeing scouring in some locations in the oxbow.
- Because of the dynamic conditions within the oxbow, it would be beneficial to measure physical habitat conditions along systematically placed transects within the oxbow. This would allow one to document responses of fish (i.e., densities) to changes in habitat conditions over time.

Chris Parsons asked about the possibility of dredging the fine materials from the oxbow to expose more coarse substrate. Keely and Alan indicated that they would rather wait and see if spring high flows remove the fines before they consider dredging.

When asked about the buildup of organic sediments and the potential for oxygen sags in the oxbow, Keely indicated that they currently do not monitor oxygen levels. Lee Duncan indicated that measuring oxygen levels could be included with temperature monitoring.

Chris Parsons asked about the possibility that the darkness within the culverts would attract predators, which could prey upon juvenile salmon and steelhead as they passed through the culverts. Keely and others indicated that the culverts were large enough to allow sufficient light into the culverts.

Chris Fisher asked if the low numbers of fish observed in the oxbow during winter was related to the lower water temperatures in the oxbow than in the main channel. Keely indicated that the lower temperatures may be the reason for the lower numbers, but also noted that additional thermographs are needed to more accurately estimate water temperatures throughout the oxbow. The low readings may be an artifact of the location of the existing thermograph.

Dale Bambrick commented that it is probably more important at this time to monitor fish use of the oxbow rather than attempt to implement more sophisticated monitoring methods for estimating survival estimates. Other members agreed and suggested that sampling within the Chiwawa reference site may not be appropriate at this time. However, a reference condition from the literature would be useful.

Lastly, the Committees asked Keely when she needed resolution on funding for the additional monitoring efforts. She indicated that they would need to have additional funds secured by summer 2008.

The Committees asked Tracy to offer Keely an invitation to submit a proposal that describes in detail the approach and cost for each task. Bob Rose indicated that he would work with Keely in developing a proposal that addressed the Committees interests and concerns.

VII. White River Land Exchange (Chelan-Douglas Land Trust)

Bob Bugert with the Chelan-Douglas Land Trust described the efforts of the Land Trust and the Trust for Public Lands in developing a large-scale land exchange program. The purpose of the program is to exchange private lands of high conservation value with public lands of lower conservation value. This would place lands with high conservation value into public ownership. Currently, the Land Trust is focused on 60-65 parcels of public lands of low conservation value (mostly riparian and shrub steppe) in the Entiat and Wenatchee districts. As part of this process, the Land Trust is looking for five types of support:

1. Technical and financial assistance to develop the decision-support modeling efforts.
2. Financial support for facilitation of a stakeholder process.
3. Financial support for the “due diligence” of conducting the real-estate transactions.
4. Assistance in securing support from both the legislative and executive branches of the federal government.
5. Assistance in securing support from non-governmental organizations.

Bob indicated that the Land Trust may seek financial support from the Tributary Committees to help facilitate the process of identifying areas of high conservation value (i.e., areas important for sensitive species). Bob also indicated that a consulting group known as Clearwater Environmental will help with the land exchanges. According to Bob, this group has extensive experience in negotiating land exchanges.

Bob noted that land exchanges are quite controversial, because exchanges may result in a net loss of public ownership. Bob indicated that their efforts are supported at the local level. The legal challenge will likely be at the national level.

Bob then provided an example of an exchange they are brokering in the White River basin. A private landowner (Schmitten) currently owns about 138 acres of valley-bottom land in the White River basin. The landowner is not interested in selling the property. Instead, the landowner would like to trade the 138 acres for 230 acres of Forest Service land on Nason Creek (near Coles Corner). The Forest Service land on Nason Creek has low conservation value but high commercial value. Because the Forest Service can only trade "value" for "value," it may be necessary to place a conservation easement on portions of the 230 acres to reduce its values and thereby provide an equitable exchange.

Bob indicated that there are other parcels in the White River basin and the Icicle that would be packaged as a bundle. Bob indicated that it is easier to broker exchanges of bundled parcels than single parcels.

The Committees asked if the Forest Service currently has parcels that are available for trade. Bob stated that they have 60 parcels with no to low conservation value that can be freed-up for development. Bob noted that most of these parcels are in shrub steppe habitat.

VIII. ORRI Effectiveness Monitoring

Chris Fisher provided the Committees with an updated table of effectiveness monitoring actions prepared by Chris Bull for the Okanagan River Restoration Initiative (ORRI). Of the eight parameters identified in the table, the Committees identified three that most interested them: (1) fish holding and rearing habitat, (2) channel morphometry and hydraulics, and (3) substrate composition. Based on the information in the table, there is currently no secured funding for these three parameters.

The Committees directed Tracy to send a letter to Chris Bull inviting the Okanagan Nation Alliance (or the Canadian Okanagan Basin Technical Working Group) to submit a proposal to the Tributary Committees for funding the monitoring of these three parameters. The proposal is to include a detailed description of the monitoring objectives, experimental design (e.g., before-after, control-impact design), sampling design for each parameter (including sampling duration and frequency, sampling areas, methods, etc.), measuring instruments, and analytical procedures for assessing treatment effects. The proposal is to include a detailed budget for each parameter. This is important because the Committees noted that the cost per year for some parameters (e.g., redd counts) seemed quite high.

IX. Small Projects Proposal

The Committees reviewed a Small Projects Program application from the Methow Salmon Recovery Foundation titled *Fort-Thurlow Pump Project*.

Fort-Thurlow Pump Project

The purpose of this project is to complete the piping modification on the Fort-Thurlow irrigation system on Beaver Creek. By connecting the second pump to the newly piped system, which was funded by the Salmon Recovery Funding Board, the project will create a completely enclosed and pressurized irrigation system. This will eliminate an existing 0.5-mile bypass reach for operational spill and benefit salmonids by adding 0.5 cfs of flow to Beaver Creek near the point of the diversion. The total cost of the project is $48,150. The sponsor requested $7,000 from HCP Tributary Funds. ***The Wells Tributary Committee approved funding for this project.***

X. Next Steps

The next meeting of the Tributary Committees will be on Friday, 13 June. There will be no meeting in May. Tentative agenda items include:

- Status report on funded projects.
- Review pre-proposals.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 13 June 2008

Members Present: Dale Bambrick (NOAA-Fisheries), Dennis Beich (WDFW), Lee Carlson (Yakama Nation), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Keith Truscott (Chelan PUD), and Tracy Hillman (Committee Chair).

Others Present: Becky Gallaher (HCP Project Coordinator) and Joe Miller (Chelan PUD).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Friday, 13 June 2008 from 9:00 am to 12:40 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following additions:

- Information updates from Keith Truscott, Becky Gallaher, Dale Bambrick, and Tracy Hillman.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 10 April 2008 meeting notes with revisions suggested by Tom Kahler and Tracy Hillman.

III. Payment Authorizations

The following are payments that the Committees authorized in May.

The Rock Island Tributary Committee authorized the following payments:

- $316,617.15 to Chelan-Douglas Land Trust for the White River Floodplain Project (purchase of the Quintana-Leon property).
- $200,539.18 to Chelan-Douglas Land Trust for the White River Floodplain Project (purchase of the Tiegel property).

The Rocky Reach Tributary Committee authorized the following payments:

- $5,677.34 to Cascadia Conservation District for the Entiat Instream Structure Engineering and Permitting Project (riparian planting pre-work and design and administration costs).
- $12,933.55 to Cascadia Conservation District for the LWD/Rootwad Acquisition and Transport Project (purchase of logs and administration costs).

- $2,989.75 to Cascadia Conservation District for the Entiat PUD Canal Log-Boom Installation Project (purchase of materials and rental of equipment).

The Wells Tributary Committee authorized the following payment:

- $8,456.17 to Stokes and Stokes (submitted by Okanogan Conservation District) for the Lower Beaver Creek Livestock Exclusion Project (purchase of materials and excavation costs).

The following are payments that the Committees authorized during the June meeting.

The Wells Tributary Committee authorized the following payment:

- $1,239.07 to the Methow Conservancy for the Riparian Regeneration and Restoration Initiative (purchase materials and cover mileage costs).

IV. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. Most are progressing well—or had no salient activity in the past month.

- Pipe has been installed for the off-stream stock-water system for the Lower Beaver Creek Livestock Exclusion Project.
- The conservation easement for the Wildhorse Spring Creek Conservation Easement Project has been drafted and is in the review process.
- Landowner outreach and landowner agreement development continues on the Entiat PUD Canal System Conversion Project.
- Cultural consultation is complete for three of the five properties under the Riparian Regeneration and Restoration Initiative Project. Materials have been purchased for the Fine-Morrison property.

V. Information Updates

Keith Truscott reported that Chelan PUD recently hired Joe Miller and that Joe will be attending Tributary Committees meetings with Keith. It is likely that Joe will replace Keith as the Chelan PUD representative on the Rocky Reach and Rock Island Tributary Committees sometime in the near future.

Becky Gallaher provided a brief report on the partial failure of the Entiat Canal Log Boom Installation Project. The log boom has not been completely successful in diverting debris away from the canal intake. Debris collecting on the boom created a significant reduction in stream flow into the canal. The sponsor is currently trying to fix the problem.

Dale Bambrick reported that NOAA Fisheries has contracted with Chuck Peven to help write the biological assessment and programmatic biological opinion that will cover habitat actions implemented under the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan. Dale also noted that Kate Terrell with the U.S. Fish and Wildlife Service is aware of this work.

Tracy Hillman reported that Mike Kaputa, Chelan County Natural Resource Department, contacted him with a request to meet with the Committees in July to discuss apparent conflicts between the Committees and the County and to identify solutions to improve relationships between the parties. After considerable discussion, the Committees directed Tracy to send a letter to Mike indicating that the Committees evaluate all CCNRD proposals objectively based on their technical merit and consistency with the objectives of the Tributary Committees. Tracy will draft a letter and send it to the members of the Committees for review.

VI. Time Extension Request

The Rocky Reach Tributary Committee received a request from Cascadia Conservation District to extend the agreement period for the Entiat Instream Structure Engineering and Permitting Project from 30 June 2008 to 30 June 2009. The extension will allow the District to continue their work and use the existing funds. ***The Rocky Reach Tributary Committee approved the time extension request.*** All other conditions of the agreement remain unchanged.

VII. Budget Amendment Request

The Wells Tributary Committee received a budget amendment request from the Methow Salmon Recovery Foundation asking for an additional $10,000 to complete the Heath Project. The request for an additional $10,000 increases the total award to $58,695, which exceeds the maximum contract allowed under the Small Projects Program as described in Section 3.6 of The Tributary Fund Policies and Procedures for Funding Projects, September 2007. However, given the circumstances associated with this project (early and persistent snow and cold weather conditions that increased costs for site clearing and snow management, and change orders to satisfy WDFW recommendations), ***the Wells Tributary Committee approved the budget amendment request.*** However, the Committee directed Tracy to make it clear in the letter to the Conservancy that this is a one-time budget amendment and the Committee will not view favorably such requests in the future.

VIII. Small Projects Proposal

The Committees reviewed a Small Projects Program application from the Okanogan Conservation District titled *Goodman Livestock Exclusion Project*.

Goodman Livestock Exclusion Project

The purpose of this project is to install about 800 feet of riparian exclusion fencing along Beaver Creek and provide an off-stream water source for livestock. This should protect existing riparian habitat and reduce bank instability and fine sediment recruitment to the channel. The total cost of the project is $8,080. The sponsor requested $7,980 from HCP Tributary Funds. The Wells Tributary Committee agreed to fund this project **if** the fence line just past the proposed solar trough and pipeline (as shown on the Goodman Proposed Project Map) angles to the left and runs parallel to Beaver Creek (not toward the stream as it is currently shown). This would place the connection of the proposed fence near the middle of the existing fence line, not at the end of the existing fence. The Committee believes that this change in the proposed fence line will better protect the existing riparian vegetation and stream channel.

IX. Monitoring Proposal

The Committees reviewed a Monitoring Proposal submitted by Mr. Chris Bull, the Okanagan River Restoration Initiative Project Coordinator, titled *ORRI Effectiveness Monitoring Project*.

ORRI Effectiveness Monitoring Project

The purpose of this project is to monitor the effectiveness of the Okanagan River Restoration Initiative Project. The proposal included four monitoring tasks: (1) Fish Holding and Rearing for $2,983, (2) Channel Morphometry and Hydraulics for $7,224, (3) Substrate Composition for $5,596, and (4) Sockeye Spawning/Incubation Success for $13,772. ***The Wells Tributary Committee approved funding for the first three tasks.***[1] The Committee elected not to fund the sockeye spawning and incubation success work at this time. At the end of the annual monitoring period, the sponsor will submit a report that summarizes the monitoring results and a budget for the next annual monitoring period.

X. General Salmon Habitat Program Pre-Proposals

The Committees received 13 pre-proposals submitted under the General Salmon Habitat Program. Cascadia Conservation District removed one of their proposed projects. Therefore, the Committees reviewed 12 pre-proposals.

Prior to review, Becky gave an update on the amount of funds available from each plan species account for the 2008 funding cycle:

- Rock Island Plan Species Account has about $1,478,265
- Rocky Reach Plan Species Account has about $1,097,188
- Wells Plan Species Account has about $894,224

The Committees reviewed each project and selected those that they believe warranted a full proposal in August. Projects that the Committees dismissed were either inconsistent with the intent of the Tributary Fund or did not have strong technical merit. The Committees directed Tracy to notify sponsors with appropriate projects to submit a full proposal, with a discussion of the questions/comments identified for each pre-proposal listed below.

Conservation Opportunities on Icicle Creek Project

The Committees recommend that the sponsor (Chelan-Douglas Land Trust) consider the following comments/suggestions as they develop the full proposal:

- Because conservation of this portion of lower Icicle Creek is not a priority of the Tributary Committees, the sponsor must demonstrate that this particular area is at high risk of development and has high biological benefit to Plan species.
- The Committees would like to see information on the location of the 100-year floodplain and the likelihood of land uses within and outside the 100-year floodplain.
- The Committees recommend that the sponsor seek the majority of funds from entities other than the Tributary Committees.

Twisp River Riparian Protection Project

The Committees recommend that the sponsor (Methow Conservancy) consider the following comments/suggestions as they develop the full proposal:

[1] Douglas PUD will provide funding for the approved monitoring tasks through the Wells Tributary Assessment Program, as per Section 7.5 of the Wells HCP, rather than through the Wells Plan Species Account.

- The Committees would like to see more information on the seven factors that were used to prioritize properties for conservation.
- The Committees have no interest in funding a conservation easement on the Coon property.
- The Committees recommend that the sponsor show a cost share for each property.
- The sponsor needs to explain or justify the $10,000-$13,000 appraisal and review fee for each property.
- The sponsor needs to explain or justify the $2,500-$3,000 easement-drafting fee for each property.

Twisp River Conservation Acquisition II Project

The Committees recommend that the sponsor (Methow Salmon Recovery Foundation) consider the following comments/suggestions as they develop the full proposal:

- The sponsor needs to describe what is meant by a "revocable trust" (e.g., Doran Family Revocable Trust).
- The sponsor should explain why a conservation easement for this project is less appropriate than an acquisition.
- The full proposal should identify the sponsor's future plans for each parcel.
- If the sponsor intends to sell some of the land, what will the sponsor do with the money? Will the Tributary Committees have any input on how those funds will be used?
- The sponsor needs to identify in the full proposal the cost of the house.

Poorman Creek Barrier Removal Project

The Committees recommend that the sponsor (Methow Salmon Recovery Foundation) consider the following comments/suggestions as they develop the full proposal:

- If available, the sponsor should provide information on seasonal stream flows in Poorman Creek.
- The sponsor should include a costs/benefits analysis for a steel bridge versus a steel arch pipe.

Goodfellow/Chotzen Floodplain Reconnection Project

The Committees recommend that this project, sponsored by Chelan County Natural Resource Department, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- The Committees believe that this site should be protected from land-use activities and allowed to experience natural events and processes that will shape the side channel and off-channel habitat.
- It was not clear why an excavated backchannel was necessary and what benefit to Plan species it would provide.

- The Committees were concerned that the connection with the floodplain during high flows may strand fish during low flow periods.

Nason Creek Kahler Complexity Project

The Committees recommend that this project, sponsored by Chelan County Natural Resource Department, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- This project is inconsistent with the intent of the Tributary Funds.
- The project is out of sequence with the reach-level strategy plan process.
- The project addresses a symptom rather than the processes that caused the problem.

Nason Creek Ray Rock Springs Complexity Project

The Committees recommend that this project, sponsored by Chelan County Natural Resource Department, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- This project is inconsistent with the intent of the Tributary Funds.
- The project is out of sequence with the reach-level strategy plan process.
- The project addresses a symptom rather than the processes that caused the problem.

Cashmere Pond Off-Channel Habitat Project

The Committees recommend that the sponsor (Chelan County Natural Resource Department) consider the following comments/suggestions as they develop the full proposal:

- The sponsor needs to describe why the proposed approach is better than simply removing the berm and allowing the river to rework naturally the side channel and pond.
- The Committees believe that if the project goes through as planned, there may be increased public use of the site. If this is true, what will the sponsor do to reduce the impacts of increased public use?
- The construction of an island may increase opportunities for bird predation. The sponsor needs to describe how this potential source of mortality will be minimized.
- The sponsor should describe the costs/benefits of using the dredge materials to create an island versus transporting the materials off site.
- The sponsor needs to explain or justify the $33,340 sum for salaries and benefits.

Middle Stillwater Design Only Project

The Committees recommend that the sponsor (Cascadia Conservation District) consider the following comments/suggestions as they develop the full proposal:

- Because the Committees typically do not fund assessments unless the proposed assessments lead directly and clearly to identification, location, and design of habitat protection or restoration projects, the sponsor must demonstrate how this assessment will lead to specific habitat actions at specific locations. To be consistent with the intent of the Tributary Funds, the resulting actions must address processes, not symptoms.

- The sponsor needs to make it clear how this project relates to the BOR and Entiat River Reach assessments.
- The sponsor needs to provide more detail in the budget. The budget should identify specific items/tasks and their associated costs.
- The sponsor needs to describe or justify the $33,000 estimate for Permits. It is not clear what permits are needed to conduct the assessment.

Entiat River Reach Assessments Project

The Committees recommend that this project, sponsored by Cascadia Conservation District, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- This project is inconsistent with the intent of the Tributary Funds.
- It is not clear how this project relates to the BOR and Middle Stillwater Design Only assessments.

Keystone Diversion Project

The Committees recommend that the sponsor (Cascadia Conservation District) consider the following comments/suggestions as they develop the full proposal:

- The Committees recommend that the full proposal focus on the rock-wing dam (which will replace the existing push-up dam) and riparian restoration. At this time, the Committees are not interested in funding more boulder clusters and woody debris structures in this reach until monitoring has assessed the effectiveness of structures already implemented in this reach.
- The sponsor needs to provide more detail in the budget. The budget should identify specific items/tasks and their associated costs.

Moody Canyon Engineered Log Jam (ELJ) Project

The Committees recommend that the sponsor (Cascadia Conservation District) consider the following comments/suggestions as they develop the full proposal:

- Although the Committees are disinclined to fund more instream-structure projects, the Committees would like more information and background on the costs/benefits of Engineered Log Jams (ELJs). The sponsor should provide more information on why this restoration technique is more appropriate at this site than other techniques. The proposal should include information on durability of ELJs, resistance to high flow events (say, 100-year events), and the expected life of ELJs.
- The Committees recommend that the full proposal focus only on the ELJ. At this time, the Committees are not interested in funding more boulder clusters and woody debris structures in this reach until monitoring has assessed the effectiveness of structures already implemented in this reach.

- The sponsor needs to provide more detail in the budget. The budget should identify specific items/tasks and their associated costs.

XI. Next Steps

Project tours will be Monday through Wednesday, 23-25 June. The next meeting of the Tributary Committees will be on Thursday, 10 July. Tentative agenda items include:

- Status report on funded projects.
- Time Extension Request.
- Review of Small Projects Application.
- Further discussions on pre-proposals following field visits.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 10 July 2008

Members Present: Dale Bambrick (NOAA-Fisheries), Dennis Beich (WDFW), Lee Carlson (Yakama Nation), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Keith Truscott (Chelan PUD), and Tracy Hillman (Committee Chair).

Others Present: Becky Gallaher (HCP Project Coordinator) and Joe Miller (Chelan PUD).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Fish and Wildlife Conference Room in Wenatchee, Washington, on Thursday, 10 July 2008 from 9:30 am to 11:15 am.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following additions:

- Information updates from Becky Gallaher and Tracy Hillman.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 13 June 2008 meeting notes with revisions suggested by Tom Kahler and Tracy Hillman.

III. Payment Authorizations

The following payment request was authorized by the Wells Committee at the end of June.

- $345,400.00 to Transnation Escrow for the MacDonald Property Conservation Easement (Methow Riparian Protection-MacDonald Property Project).

The following are payments that the Committees authorized during the July meeting.

The Rock Island Tributary Committee authorized the following payments:

- $1,258.16 to Chelan County PUD for second-quarter administration and coordination work.
- $90.00 to LeMaster and Daniels for second-quarter administration.

The Rocky Reach Tributary Committee authorized the following payments:

- $1,114.53 to Chelan County PUD for second-quarter administration and coordination work.
- $90.00 to LeMaster and Daniels for second-quarter administration.

The Wells Tributary Committee authorized the following payments:

- $575.12 to Chelan County PUD for second-quarter administration and coordination work.
- $100.69 to the Methow Salmon Recovery Foundation for project administration on the Fort Thurlow Pump Project.
- $6,908.31 to the Omak Machine Shop for the purchase of the pump and other materials for the Fort Thurlow Pump Project.
- $215.07 to the Methow Conservancy for travel time and purchase of tree cages for the Riparian Regeneration and Restoration Initiative Project.
- $168.28 to the Okanogan Conservation District for salaries, benefits, and expenses on the Lower Beaver Creek Livestock Exclusion Project.

IV. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects.

- The Methow Riparian Protection-MacDonald Property Project is complete. The project closed on 7 July.
- Fencing is complete and pipe has been installed for the off-stream stock-water system for the Lower Beaver Creek Livestock Exclusion Project.
- Under the LWD/Rootwad Acquisition and Transport Project, a total of 63 logs have been acquired and will be used for the Keystone, Knapp-Wham, and Blackbird Island projects. The cost per log was $350-400.
- The conservation easement for the Wildhorse Spring Creek Conservation Easement Project has been drafted and is in review.
- Landowner outreach and landowner agreement development continues on the Entiat PUD Canal System Conversion Project. It is expected that landowner agreements will be signed by the end of July.
- Cascadia Conservation District and the landowner are currently locating a site for the well for the Roaring Creek Flow Enhancement and Barrier Removal Project.
- All permitting and landowner agreements are complete for the Keystone Canyon Habitat Restoration Project. However, Marc Duboiski and Michelle Kremer with the SRFB want to remove the rock barbs and only use wood. Dale Bambrick will contact SRFB to find out why the SRFB wants to remove the rock barbs and only use wood.
- Solid Rock Contractors was selected to implement the Harrison Side Channel Project. A pre-construction conference is scheduled for 10 July. Trees with attached rootwads have been delivered to the site and rock will be delivered on 14 July.
- The sponsor of the Okanagan River Restoration Initiative would like to move forward on effectiveness monitoring. However, without a contract with Douglas PUD, the sponsor (Okanagan Nation Alliance) cannot begin monitoring work. Tom Kahler will do what he can to expedite a contract between Douglas PUD and the sponsor.
- A total of 60 trees have been caged on the Morrison property under the Riparian Restoration and Regeneration Initiative Project. Additional trees will be caged on the Gilbertsen property in August.

- The pump has been purchased for the Fort-Thurlow Pump Project. The pump should be installed and the project completed by 18 July.

V. Information Updates

Becky Gallaher reported that the SRFB changed the application form for restoration and acquisition projects. Becky will send an electronic version of the revised form to Committees members. The Committees will review the form and determine if it includes all the information required in the General Salmon Habitat Program application. By Friday, 18 July, the Committees will let Tracy and Becky know if the SRFB application form can also be used for General Salmon Habitat Program projects.

Tracy Hillman provided the following updates:

- Tracy reported that Okanogan Conservation District was able to modify the location of the livestock exclusion fence on Beaver Creek (Goodman Livestock Exclusion Project). Rather than angle the fence toward Beaver Creek, the revised fence line will run parallel with Beaver Creek. This satisfies the concern the Wells Committee identified in their letter to the sponsor.
- Tracy reported that he sent a letter to Mike Kaputa indicating the Committees desire to ease any concerns over the objectivity of their funding decisions and thereby obviating a proposed meeting in July. Tracy noted that he had not yet heard from Mike.
- Tracy reported that the Upper Columbia Region Technical Team (RTT) is planning a post-implementation project tour on 8-9 October. The purpose of the tour is to visit projects that were funded by the SRFB and/or Tributary Committees. The Committees indicated that they would participate in these tours and noted that site inspections are consistent with Section 6.4 in the Tributary Fund Policies and Procedures for Funding Projects (September 2007). The Committees identified the following projects that they would like to visit:
    - Entiat Instream Structure Engineering Project
    - Entiat Instream Habitat Improvements Project
    - Nason Creek Off-Channel Habitat Restoration Project
    - Alder Creek Culvert Replacement Project
    - Heath Floodplain Restoration Project

  The Committees asked Tracy to report this information to Derek Van Marter and the RTT.

VI. Time Extension Request

The Rocky Reach Tributary Committee received a request from Cascadia Conservation District to extend the agreement period for the Entiat PUD Canal Log-Boom Project from 26 June 2008 to 30 June 2009. The extension will allow the District to continue work on the log boom. ***The Rocky Reach Tributary Committee approved the time extension request.*** All other conditions of the agreement remain unchanged.

VII. Small Projects Proposal

The Committees reviewed a Small Projects Program application from the Chelan County Natural Resource Department titled *Sleepy Hollow Reserve Protection Feasibility Assessment*.

Sleepy Hollow Reserve Protection Feasibility Assessment

The purpose of this project is to evaluate about 240 acres of land on the north side of the lower Wenatchee River, downstream from the Sleepy Hollow Bridge, for various protection opportunities, including fee-simple acquisition, conservation easements, conservation buyers, landowner agreements, and regulatory measures. The County, in partnership with the Chelan-Douglas Land Trust and the Trust for Public Land, will hire a consultant to develop the work products. The total cost of the project is $25,000. The sponsor requested $20,000 from HCP Tributary Funds. The Committees reviewed the proposal and identified several issues that they would like the sponsor to address before the Committees make a funding decision.

- It appears the intent of the project is to develop a Conservation Plan for the Sleepy Hollow area. The Committees need more information on what will be included in the Plan. For example, what is the purpose of the Plan and will it include different protection and restoration scenarios?
- If a Conservation Plan will be prepared, will it include scenarios for protecting uplands and riparian areas, or only riparian areas?
- The Committees would like to see a delineation of the proposed conservation area that identifies uplands and areas already protected under County Ordinances.
- Finally, the Committees would like to know how the County Ordinances will be included in the Conservation Plan.

The Committees directed Tracy to send a letter to both Mike Kaputa (Chelan County NRD) and Bob Bugert (Chelan-Douglas Land Trust) requesting the additional information.

VIII. General Salmon Habitat Program Site Visits

Some Committees members attended the site visits on 23-25 June. The following points were shared with the Committees by those who attended the site visits.

Conservation Opportunities on Icicle Creek Project

It was recommended that the proposal provide specificity on the size and location of the parcels that will be protected. In addition, the proposal needs to describe clearly the biological benefits of lower Icicle Creek, linkages to restoration opportunities, and what level of protection will be provided beyond current regulatory mechanisms.

Twisp River Riparian Protection Project

It was recommended that the proposal separate the information on the different easements, including costs. Reviewers will need to evaluate each property separately. The proposal should include more information on the methods used to prioritize parcels. It was also recommended that additional efforts should be made to minimize the upland areas in the easements.

Twisp River Conservation Acquisition II Project

The proposal should include before and after pictures of the existing Methow Salmon Recovery Foundation property to demonstrate the potential benefits of the proposed acquisition.

Poorman Creek Barrier Removal Project

The proposal should compare the cost/benefits of a steel bridge with the proposed culvert.

Cashmere Pond Off-Channel Habitat Project

It was suggested that the project may be just as effective if the upstream berm was removed and the downstream outlet modified to prevent fish stranding in the pond. In addition, there was concern about excavating a 1,600-foot side channel. Many questioned the benefits of creating an island. A simpler, less engineered approach may be more reasonable.

Middle Stillwater Design Only Project

This project may be out of sequence if the results of the USFWS assessment (Watershed Assessment of River Stability and Sediment Supply) are not completed.

Keystone Diversion Project

It was recommended that this project be combined with the Moody Canyon Engineered Log Jam Project. The Keystone diversion should include an assessment of the screening and return flow structures. There were concerns about the effects of ice and ice dams on these structures and how ice dams could affect the road. The proposal should include the exact locations and configurations of the instream structures and it should clearly state the objectives for the structures.

Moody Canyon Engineered Log Jam (ELJ) Project

See notes above on the Keystone Diversion Project.

IX. Next Steps

The next meeting of the Tributary Committees will be on Thursday, 14 August. Tentative agenda items include:

- Status report on funded projects.
- Review of Salmon Habitat Proposals (members will receive proposals on 11 August).

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 14 August 2008

Members Present: Dennis Beich (WDFW), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Keith Truscott (Chelan PUD), and Tracy Hillman (Committee Chair).

Members Absent: Dale Bambrick (NOAA-Fisheries)[1] and Bob Rose (Yakama Nation)[2].

Others Present: Becky Gallaher (HCP Project Coordinator) and Joe Miller (Chelan PUD).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 14 August 2008 from 9:30 am to 1:00 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following additions:

- Additional information updates from Tracy Hillman and Becky Gallaher.
- Review of proposed Sleepy Hollow Reserve Protection Feasibility Assessment Project.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 10 July 2008 meeting notes.

III. Payment Authorizations

The Rock Island Tributary Committee authorized the following payment:

- $578.24 to Chelan County PUD for copying and mailing proposals.

The Rocky Reach Tributary Committee authorized the following payments:

- $578.24 to Chelan County PUD for copying and mailing proposals.
- $2,017.78 to Cascadia Conservation District for salaries and benefits on the Entiat Instream Structure Engineering Project.

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[1] Dale notified the chair in advance of his inability to attend, and provided his input on decision items before the meeting.
[2] Bob joined the meeting via conference call.

- $2,961.24 to Cascadia Conservation District for excavation and salaries on the LWD/Rootwad Acquisition and Transport Project (this is the final payment on this project).
- $1,459.62 to Cascadia Conservation District for materials and salaries on the Entiat PUD Canal Log Boom Project.

The Wells Tributary Committee authorized the following payments:

- $1,002.91 to Chelan County PUD for copying and mailing proposals.
- $18,283.15 to the Methow Salmon Recovery Foundation for materials for the Heath Floodplain Restoration Project.
- $141.55 to the Okanogan Conservation District for salaries and benefits on the Lower Beaver Creek Livestock Exclusion Project.
- $6,472.65 to Michael Parks for project materials and labor on the Goodman Livestock Exclusion Project.

IV. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects.

- The Methow Riparian Protection is complete. Final reports were received on the MacDonald and Prentice properties.
- One well site has been identified and landowner forms are in place for the Roaring Creek Flow Enhancement and Barrier Removal Project. The sponsor is working with the USFWS to get approval for placing a second well on the Entiat Hatchery property.
- All permitting and landowner agreements are complete for the Keystone Canyon Habitat Restoration Project. However, the SRFB halted the project because they want to remove the rock barbs and only use wood. During the July meeting, Dale Bambrick volunteered to contact SRFB to find out why they want to remove the rock barbs and only use wood. Dale will report his findings to the Committees when he returns.
- Under the Riparian Restoration and Regeneration Initiative Project, the sponsor will install about 60 cages on 21 August to protect trees on the Gilbertsen property.
- Chris Fisher asked about the status of the Clees Well and Pump Project. Becky reported that the project is complete and the final report can be found at http://www.midcolumbiahcp.org/Tributary/GSF%20Projects.htm.

V. Information Updates

The following information updates were provided during the meeting.

1. Tom Kahler reported that he had a discussion with Chris Johnson (Methow Salmon Recovery Foundation) about how to protect quality habitat under the high cost of conservation easements. Currently, the cost of conservation easements is based on appraisals. Given the high costs of conservation easements, only a limited number of easements can be purchased. In addition, because of the high value of conservation easements based on appraisals, there is a sense that landowners may seek to be paid for conservation easements even though they do not intend to develop their lands. Therefore, the Committees are interested in talking with sponsors about the possibility of sponsors

negotiating costs of easements with the landowners. The Committees would like to speak with the Methow Salmon Recovery Foundation, Methow Conservancy, and Chelan/Douglas Land Trust about the possibility of negotiating prices for easements. The Committees directed Tracy and Becky to organize a discussion with these sponsors following the presentations during the September meeting.

2. Tom Kahler reported that Douglas PUD has completed a contract with the Okanagan Nation Alliance (ONA) to partially fund effectiveness monitoring work on the Okanagan River Restoration Initiative (ORRI), as approved at the June 2008 meeting. As noted in Section 7.5 in the Wells HCP, funds for effectiveness monitoring come from a separate account (not the Plan Species Account). Thus, Douglas PUD had to initiate a "regular" contract with ONA. Tom reported that the contract included a couple of changes to the May 2008 budget: (1) an adjusted price for mileage, and (2) two additional days for report writing.

3. Becky Gallaher reported that she and Keith Truscott recently visited the following projects: Lower Beaver Creek Livestock Exclusion Project, Goodman Livestock Exclusion Project, Heath Floodplain Restoration Project, Thurlow Pump Project, and Clees Well and Pump Project. Pictures from the site visits can be viewed on the ftp site: ftp://ftp.chelanpud.org/tributary. Keith recommended that the Committees visit the Goodman Livestock Exclusion and Heath Floodplain Restoration projects during the October field tours.

4. Tracy Hillman reported that he received an email from Mike Kaputa (Chelan County NRD) responding to the letter the Committees sent to Mike in July about the Committees desire to ease any concerns over the objectivity of their funding decisions. Mike identified three issues that he would like input from the Committees.

   - ***Project Development—Who pays for the capacity to develop high-quality projects?*** Although the Committees understand the cost of developing high-quality projects, funds from the Plan Species Accounts are not used to support the capacity to develop projects.

   - ***Sensitive Projects—It is not clear how to approach the Committees regarding the development of large-scale and sensitive projects.*** The Committees discussed the possibility of providing technical advice to sponsors under certain circumstances, but did not come to agreement on how this would be accomplished or if the Committees should even provide such a service to sponsors. The Committees decided to revisit this issue during the September or October meeting.

   - ***Funding Rationale—Sponsors would appreciate receiving a rationale for funding or not funding a project.*** Although the Committees are not directed under their Policies and Procedures to provide a rationale for funding or not funding a project, most members agreed that a rationale should be provided to project sponsors. Feedback from the Committees provides sponsors with information that should help the sponsors develop better projects and proposals. The Committees decided to revisit this issue during the September or October meeting.

5. Finally, Tracy Hillman, after one year of service with the Committees, asked the members for feedback on how he could better serve the Committees as their Chairperson. Members requested that Tracy: (1) provide more information on funding available from other entities (e.g., Salmon Recovery Funding Board, Action Agencies, etc.) and (2)

provide occasional briefings on what other Committees are doing in the Upper Columbia. In an effort to keep the Committees more informed on the happenings of other Committees, Tracy indicated that he would work more closely with Derek Van Marter (Upper Columbia Salmon Recovery Board) and Casey Baldwin (Upper Columbia Regional Technical Team Chair).

VI. Small Projects Proposal

In July the Committees reviewed a Small Projects Program application from the Chelan County Natural Resource Department titled *Sleepy Hollow Reserve Protection Feasibility Assessment*. The purpose of the project is to evaluate about 240 acres of land on the north side of the lower Wenatchee River, downstream from the Sleepy Hollow Bridge, for various protection opportunities, including fee-simple acquisition, conservation easements, conservation buyers, landowner agreements, and regulatory measures. The County, in partnership with the Chelan-Douglas Land Trust and the Trust for Public Land, will hire a consultant to develop the work products. The total cost of the project is $25,000. The sponsor requested $20,000 from HCP Tributary Funds.

The Committees reviewed the proposal in July and identified the following issues that they asked the sponsor to address before the Committees could make a funding decision.

- The Committees requested more information on what will be included in the Plan. For example, what is the purpose of the Plan and will it include different protection and restoration scenarios?
- If a Conservation Plan will be prepared, would it include scenarios for protecting uplands and riparian areas, or only riparian areas?
- The Committees asked for a delineation of the proposed conservation area that identifies uplands and areas already protected under County Ordinances.
- Finally, the Committees wanted to know how the County Ordinances will be included in the Conservation Plan.

In an email, Mike Kaputa (Chelan County NRD) responded to the Committees request for additional information. After further consideration and discussion, the Committees were unable to reach a funding decision without further clarification. The Committees directed Tracy to send an email to Mike requesting additional information on the following items.

- Given that residential development must be located 200 feet from the ordinary high water mark of the river and side channel and that a variance from this standard is unlikely, what additional benefit will the proposed conservation plan provide that isn't already covered under existing County ordinances?

- The Committees need a more detailed budget showing exactly how the County proposes to use the funds and how the County intends to identify and evaluate alternatives.

VII. Review of General Salmon Habitat Program Proposals

The Committees reviewed eight proposals submitted for funding under the General Salmon Habitat Program. Committee members evaluated each proposal and assigned them to one of three preliminary tiers: Tier 1—fundable, Tier 2—fundable with questions, and Tier 3—do not fund. It is important to note that these are "preliminary ratings" and ratings may change after further discussion and evaluation. The following table summarizes the preliminary rankings of the proposals (these ratings may change after further discussion).

Proposed Project	Preliminary Rankings		
	Tier 1 (Fundable)	Tier 2 (Fundable with questions)	Tier 3 (Do not fund)
Lower Icicle Conservation Easement		X	
Twisp River Conservation Acquisition II		X	
Poorman Creek Barrier Removal		X	
Twisp River Riparian Protection		X	
Cashmere Pond Off-Channel Habitat Project		X	
Middle Stillwater Design Only		X	
Entiat River Reach Assessments (ERRAs)			X
Below the Bridge		X	

Because of the limited time (one day) the members had to review the proposals before the meeting, Committees members will review the proposals in more detail during the next two weeks and submit their questions on the proposals to Tracy and Becky by Friday, 29 August. Tracy and Becky will then compile the questions and send them to the project sponsors. The sponsors will use these questions to prepare their presentations for the Committees on Tuesday, 30 September.

VIII. Next Steps

The Tributary Committees will meet on Tuesday, 30 September for project presentations. The Committees would like to hear from sponsors of the following projects:

- Cashmere Pond Off-Channel Habitat Project (Chelan County Natural Resources Department)
- Middle Stillwater Design Only (Cascadia Conservation District)
- Below the Bridge (Cascadia Conservation District)
- Poorman Creek Barrier Removal (Methow Salmon Recovery Foundation)
- Twisp River Conservation Acquisition II (Methow Salmon Recovery Foundation)
- Twisp River Riparian Protection (Methow Conservancy)
- Lower Icicle Conservation Easement (Chelan/Douglas Land Trust)

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 30 September 2008

Members Present: Dale Bambrick (NOAA-Fisheries), Dennis Beich (WDFW), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Bob Rose (Yakama Nation), Keith Truscott (Chelan PUD), and Tracy Hillman (Committees Chair).

Others Present: Becky Gallaher (HCP Project Coordinator), and Lee Carlson and Brandon Rogers (Yakama Nation). Those present for presentations included Bob Bugert (Chelan-Douglas Land Trust); Greg Knott and Chris Johnson (Methow Salmon Recovery Foundation); Julie Grialou, John Sunderland, and Jason Paulsen (Methow Conservancy); Tom Gibbons, Rich Malinowski, and Mike Rickel (Cascadia Conservation District); Phil Archibald and Rick Woodsmith (U.S. Forest Service); Steve Kolk (Bureau of Reclamation); Joy Juelson and Michael Kane (Chelan County Natural Resource Department); and Bruce Heiner (Washington Department of Fish and Wildlife).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Douglas PUD Auditorium in East Wenatchee, Washington, on Tuesday, 30 September 2008 from 8:30 am to 2:30 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following additions:

- Additional information updates from Tracy Hillman.
- Minor reorganization of agenda to accommodate project sponsors.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 14 August meeting notes with revisions suggested by Tom Kahler and Tracy Hillman.

III. Payment Authorizations

The Rock Island Tributary Committee authorized the following payment:

- $33.97 to Chelan County PUD for administration and postage costs.

The Rocky Reach Tributary Committee authorized the following payment:

- $33.97 to Chelan County PUD for administration and postage costs.

The Wells Tributary Committee authorized the following payments:

- $2,566.16 to the Methow Conservancy for materials and staff time on the Riparian Regeneration and Restoration Project.
- $355.60 to the Okanogan Conservation District for staff time on the Goodman Livestock Exclusion Project.
- $33.97 to Chelan County PUD for administration and postage costs.

The Committees decided that from this point forward there is no need to vote on each payment request. The Committees will rely on the Coordinator and Chair to provide the Committees with updates on payment requests. The Coordinator, Chair, and the representative from the Yakama Nation will make sure that payment requests are within budget and do not include costs for items that were not included in the contract.

IV. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects.

- The Conservation Easement and the Purchase and Sale Agreement for the Wildhorse Spring Creek Conservation Easement has been drafted. We are waiting for notice of closing date and payment request from the project sponsor.
- The Okanagan River Restoration Initiative Project is progressing well. The sponsor is moving forward with the final engineering, outreach, pre-treatment monitoring and construction planning. A contractor was selected for removing the dyke, which is scheduled to occur in mid-October.
- The Goodman Livestock Exclusion Project is complete and the final report can be found at: http://www.midcolumbiahcp.org/Tributary/Small%20Projects.htm.

V. Information Updates

The following information updates were provided during the meeting.

1. Tracy Hillman reported that instead of a regular meeting in October, the Committees will meet with the Regional Technical Team (RTT) to conduct post-implementation project tours. On Wednesday, 8 October, the Committees and the RTT will visit the Entiat Instream Habitat Improvements project, Entiat River Off-Channel Rearing Habitat project, Alder Creek Culverts, Nason Creek Off-Channel project, Dryden Fish Enhancement CMZ project, and the Lower Wenatchee Complexity CMZ site 13 project. On Thursday, 9 October, they will visit the Beebe Creek Channel Reconfiguration project, Omak Creek Restoration project, Hancock Springs, and Fulton Dam.
2. Because some members will be unavailable in November, the Committees decided that they will not meet in November. The next regular meeting of the Committees will be on Friday, 19 December. At that time, they will make final funding decisions on General Salmon Habitat Fund proposals. The meeting will follow the release of the formal decisions by the Salmon Recovery Funding Board (SRFB). The SRFB will release their final decisions on 11-12 December.

3. Tracy reported that the Integrated Status and Effectiveness Monitoring Program (ISEMP) will hold a workshop on Thursday, 13 November in Wenatchee (time and place to be determined). The purpose of the workshop is to discuss data, hypotheses, and analyses. Members of the Committees are encouraged to attend.
4. Tracy reported that the Upper Columbia will present recommended projects to the State Review Panel on Thursday, 16 October. The Joint Citizen Advisory Committee will recommend the following projects to the SRFB for funding:
    - Twisp River Riparian Protection II—Zinn (includes a T.C. cost share)
    - North Road Culvert
    - Twisp River Conservation Acquisition II (includes a T.C. cost share)
    - Cashmere Pond (includes a T.C. cost share)
    - Twisp River Riparian Protection II—Spier (includes a T.C. cost share)
    - Below the Bridge (includes a T.C. cost share)
    - Twisp River Riparian Protection II—Buckley (includes a T.C. cost share)
    - Lower Icicle Conservation Easement (includes a T.C. cost share)
    - Poorman Creek Barrier Removal (includes a T.C. cost share)
    - Twisp River Riparian Protection II—Coon
5. Tracy reported that he contacted Julie Morgan, executive director of the Upper Columbia Salmon Recovery Board (UCSRB), about meeting with the Tributary Committees to provide updates on happenings within the Board. Julie indicated that she and Derek Van Marter would be willing to provide presentations to the Committees two-three times per year. In addition, at the request of the Committees, Derek and James White would be available to attend Committees meetings to answer any questions that members may have. The Committees agreed to have the UCSRB attend meetings at least twice per year. This will allow the Committees to coordinate better with the UCSRB.
6. Finally, Tracy reported that the UCSRB and WDFW met with the Washington Department of Transportation (WDOT) to discuss opportunities to improve coordination. As reported by Dennis Beich, WDOT is willing to include recovery efforts in the Upper Columbia, but in order to do so, conservation efforts must be identified and coordinated with WDOT before they develop their paving schedule. Tracy reported that WDOT will be sending their proposed future projects to Derek Van Marter so that the UCSRB can coordinate with the agency on recovery efforts.

VI. Small Projects Proposal

In July the Committees reviewed a Small Projects Program application from the Chelan County Natural Resource Department titled *Sleepy Hollow Reserve Protection Feasibility Assessment*. The purpose of the project is to evaluate about 240 acres of land on the north side of the lower Wenatchee River, downstream from the Sleepy Hollow Bridge, for various protection opportunities, including fee-simple acquisition, conservation easements, conservation buyers, landowner agreements, and regulatory measures. The County, in partnership with the Chelan-Douglas Land Trust and the Trust for Public Land, will hire a consultant to develop the work products. The total cost of the project is $25,000. The sponsor requested $20,000 from HCP Tributary Funds.

The Committees reviewed the proposal in July and identified the following issues that they asked the sponsor to address before the Committees could make a funding decision.

- The Committees requested more information on what will be included in the Plan. For example, what is the purpose of the Plan and will it include different protection and restoration scenarios?
- If a Conservation Plan will be prepared, would it include scenarios for protecting uplands and riparian areas, or only riparian areas?
- The Committees asked for a delineation of the proposed conservation area that identifies uplands and areas already protected under County Ordinances.
- Finally, the Committees wanted to know how the County Ordinances will be included in the Conservation Plan.

In an email, Mike Kaputa (Chelan County NRD) responded to the Committees request for additional information. After further consideration and discussion, the Committees were unable to reach a funding decision without further clarification. The Committees directed Tracy to send an email to Mike requesting additional information on the following items.

- Given that residential development must be located 200 feet from the ordinary high water mark of the river and side channel and that a variance from this standard is unlikely, what additional benefit will the proposed conservation plan provide that isn't already covered under existing County ordinances?

- The Committees need a more detailed budget showing exactly how the County proposes to use the funds and how the County intends to identify and evaluate alternatives.

In an email, Mike provided the additional information requested by the Committees. After reviewing all the available information, the Committees noted that this was an appropriate task for the County and that it could serve as a pilot project; however, it was not clear if the landowners potentially affected by the proposed plan agree to the conservation plan concept. Therefore, the Committees directed Tracy to send a letter to the County requesting that they provide signed landowner agreement forms from affected landowners in the proposed project area. This will provide the Committees with some certainty that the landowners are at least open to the idea of a conservation plan.

VII. Conservation Easement Cost Discussion

The Committees had a discussion with the Chelan-Douglas Land Trust, Methow Salmon Recovery Foundation, and the Methow Conservancy on the high cost of conservation easements. The Committees noted that based on the proposals they have received this year, costs of easements have ranged from about $4,000-$20,000 per acre or about $64-$281 per lineal feet of streambank. The Committees explored with the sponsors the option of negotiating prices rather than using appraisals in valuing easements. In short, the sponsors indicated that they have limited ability to negotiate the price of easements. Organizations that pursue conservation easements (e.g., Methow Conservancy) have to follow standards and practices, which are based on appraisals. According to the sponsors, landowners are unlikely to negotiate prices that are based on something other than appraisals. The sponsors assured the Committees that they are doing everything they can to keep the cost down and that they are seeking multiple sources of funding. In some cases, landowners are donating their lands to conservation efforts.

The sponsors also noted that they are engaged in County processes to effect changes in zoning restrictions and ordinances. If regulations are revised and enforced, there should be less need for conservation easements and the "new" regulations should affect appraisals. When asked about the

"Buffer Program," the sponsors indicated that landowners would probably not accept it. The sponsors stressed the point that finding willing landowners is not easy and requires a long process of establishing relationships and trust with the landowners. There is currently little trust between landowners and agencies.

VIII. General Salmon Habitat Program Project Presentations

The Committees listened to presentations on the following projects.

Lower Icicle Conservation Easement

Bob Bugert with the Chelan-Douglas Land Trust gave a presentation on the Lower Icicle Conservation Easement. The purpose of this project is to acquire a conservation easement on 65 acres of floodplain on Lower Icicle Creek. The easement would protect land on the Fromm property that is 80% within the 100-year floodplain and would address the following protection elements: extinguishment of all development rights, prohibition of paved roads, clearing and grading, wetland filling or draining, and mineral extraction. The easement would protect about 5,900 feet of streambank along Icicle Creek. The total estimated cost of the project is $1,306,200. The sponsor is requesting $300,000 from HCP Tributary Funds. A more precise cost estimate will be forthcoming.

Bob noted that this was the first of a three-phased approach. The first phase is to protect the 65-acre pasture, the second is to protect river-bottom lands on the opposite side of the creek, and the third is to protect the uplands. Bob stated that the Fromm's intend to run a small herd of cattle on the property, which, according to Bob, will demonstrate how grazing can be compatible with conservation objectives. A farm plan will be included as part of the conservation easement. Bob indicated that the Fromm's have agreed to the terms of the easement, but have requested some conditions that remain unresolved. The Fromm's would like to continue to use part of the pasture as a helipad for Forest Service fire crews. In addition, the Fromm's would like to make the pasture available for weddings. This may include the addition of a gravel road.

Bob noted that the reach-scale assessment prepared by the Bureau of Reclamation will be used to design restoration work intended to protect the streambanks along the pasture. Restoration work will likely include engineered log jams (ELJs). Finally, Bob noted that at this time the Fromm's do not intend to allow public access.

Poorman Creek Barrier Removal Project

Greg Knott with the Methow Salmon Recovery Foundation gave a presentation on the Poorman Creek Barrier Removal Project. The purpose of this project is to replace an undersized, perched culvert, which does not meet state or federal fish passage criteria for slope and velocity, with a prefabricated bottomless box culvert. The new culvert will restore access to spawning and rearing habitat for steelhead and rearing habitat for spring Chinook. In addition, the new culvert will improve downstream habitat in Poorman Creek by restoring bedload and wood transport through the culvert. The culvert is located about 0.2 miles upstream from the mouth of Poorman Creek. The total cost of the project is $191,579. The sponsor is requesting $53,748 from HCP Tributary Funds.

According to Greg, the replacement of the culvert will provide about 5 miles of spawning and rearing habitat for steelhead in Poorman Creek. There is another culvert about 1-mile upstream from the mouth of the creek that will be replaced by the Forest Service. Greg reported that steelhead do occur downstream from the proposed culvert-replacement site. Greg also noted that the replacement of the culvert will complete barrier-removal projects in the Twisp River basin. When questioned about the large size of substrate placed inside the culvert possibly affecting transport of woody debris, Greg noted that the drawings of boulders relative to the size of the culvert was misleading in the diagrams. The boulders placed inside the culvert will be small enough to allow passage of debris at all flows.

Twisp River Conservation Acquisition II Project

Chris Johnson with the Methow Salmon Recovery Foundation gave a presentation on the Twisp River Conservation Acquisition Project. The purpose of this project is to purchase and protect about 13.3 acres of land along the lower Twisp River (0.9-1.0 miles upstream from the mouth). The property is across the river from the properties acquired by the MSRF between 2003 and 2006. The MSRF intends to protect and restore the property by purchasing and retiring the development rights that conflict with riparian and floodplain functions. Once acquisition and protection easements have been completed, the home site, septic system, riprap, etc. will be removed. The property will be managed for a mix of uses supporting salmon recovery, passive public recreation, and environmental education. The project will protect more than 1,000 lineal feet of waterfront along the lower Twisp River. The total cost of the project is $481,814. The sponsor is requesting $220,000 from HCP Tributary Funds.

Chris noted that the MSRF will sell about 2 acres of uplands. Money from the sale will be used to restore habitat conditions (e.g., planting native vegetation, reconnecting the river and floodplain, etc.) on the property. Chris stated that the developed parcel will have a conservation easement that is compatible with the conservation objectives of the MSRF.

Twisp River Riparian Protection Project

Julie Grialou with the Methow Conservancy gave a presentation on the Twisp River Riparian Protection Project. The intent of this project is to purchase conservation easements on six properties (Zinn, Buckley, Pampanin, Kominak, Neighbor-Vasquez, and Speir) located along the Twisp River. In sum, the easements would protect about 174 acres, which includes 2.5 miles of riverfront and 99 acres of wetlands. The easements would prohibit home-building, road-building, industrial or commercial use, timber harvest or vegetation alteration, land surface or watercourse alteration, water pollution or activities that cause pollution, and motorized recreational use. In the absence of easements, these properties would likely be sub-divided and developed in the near future. The conservation of these properties along with the other properties already conserved by the Methow Conservancy and WDFW would protect a total of 5.8 river miles along the lower Twisp River Assessment Unit. The total cost of the project is $1,509,101. The sponsor is requesting $472,463 from HCP Tributary Funds.

Julie reported that all easements will exist in perpetuity. When questioned if the landowners are interested in selling their lands, Julie indicated that there is a very high probability of development on these lands and that there is intense pressure in the Methow valley for riverfront properties. For each property, she showed the number of home sites that could be permitted with and without an easement (from Table 2 in the proposal). Julie also noted that the county does not enforce current regulations in the Methow valley and she showed examples of where landowners had cleared riparian vegetation and built homes next to the river.

Below the Bridge Project

Tom Gibbons with the Cascadia Conservation District gave a presentation on the Below the Bridge Project. The intent of this project is to upgrade the existing Keystone Diversion and improve habitat diversity in the lower Entiat River by adding large woody debris (LWD) and boulder clusters. The existing push-up dam will be replaced with a rock-wing dam that will direct water into a sluiceway. Habitat diversity will be increased by placing in the river two LWD structures made up of five logs each and one engineered log jam consisting of 30 logs. The project also will place five boulder clusters in the river. In addition, native trees and shrubs will be planted in the riparian area. The project is located on both sides of the river between river miles 1.0 and 1.5. The total cost of the project is $398,998. The sponsor is requesting $150,000 from HCP Tributary Funds.

Tom provided the Committees with a handout that addressed the Committees' initial questions. The handout also explained the plan for planting native riparian vegetation. There was an error in the calculation of riparian area in the final proposal. The total area for planting consists of 5.63 acres, not 2.5 acres as identified in the proposal.

Middle Stillwater Design Only Project

Tom Gibbons with the Cascadia Conservation District gave a presentation on the Middle Stillwater Design Only Project. The intent of this project is to use existing information (assessments, technical analyses, studies, literature, reports, etc.) to create two, final engineering designs for multiple, complex wood structures (e.g., ELJs) for the Entiat River between river miles 21 and 23. A design team will follow the Conceptual Design Evaluation Process to determine the type and placement of restoration actions that will restore instream habitat diversity and natural rates of lateral channel migration. The sponsor anticipates using the final designs to apply for and secure grant funds to build the restoration actions. The total cost of the project is $318,140. The sponsor is requesting $253,887 from HCP Tributary Funds.

Tom provided the Committees with three handouts: one provided answers to the Committees' initial questions; the second provided miscellaneous information including Appendix D from the SRFB Manual, project objectives, statement of work for the Preston Reach Assessment, and background information on fluvial processes; and the third was a printout of the PowerPoint presentation. Tom indicated that there are ten landowners in the project area that are on board with the project. When asked about the loss of human life (e.g., a person swimming or rafting that is swept into one of the structures and killed), Tom wasn't sure but thought that the design engineer would be liable.

Cashmere Pond Off-Channel Habitat Protection Project

Bruce Heiner with the Washington Department of Fish and Wildlife gave a presentation on the Cashmere Pond Off-Channel Habitat Protection Project. The objective of this project is to connect the Cashmere pond to the Wenatchee River. This will prevent fish stranding in the pond and increase off-channel habitat in the lower Wenatchee River. The 1.8-acre pond is located at river mile 10.5 and is a relic of past gravel mining for the construction of Highway 2. The pond has no existing outlet channel during low flows and therefore traps fish during high flow. The intent of the project is to excavate from 2 to 10 feet below the existing pond bottom to provide deep-water habitat and excavate a new 1,600 lineal foot outlet channel. The existing 200-foot inlet channel will be stabilized. The outlet channel will initiate flows from the pond and be accessible to salmonids year-round. Woody debris will be added to the pond and outlet channel to provide habitat complexity and fish cover. The project should provide seasonal rearing habitat for Chinook salmon, coho salmon, and steelhead. The total cost of the project is $914,076. The sponsor is requesting $249,110 from HCP Tributary Funds.

Bruce indicated that the Bureau of Reclamation will assist with pump testing to determine groundwater flow and temperatures. He also noted that the inlet channel will be armored and will only provide flow to the pond during high flow conditions. By dropping the elevation of the pond, groundwater will flow from the pond into the excavated outlet channel. The outlet channel will be excavated below the surface of the water table. This should provide flow throughout the year in the outlet channel. Bruce also noted that because the outlet channel will be deepened (below the surface of the water table), irrigation will be needed to water vegetation along the banks of the channel. Once the vegetation becomes established (i.e., adequate root depth), irrigation should no longer be necessary.

IX. Next Steps

The Tributary Committees will meet with the Regional Technical Team (RTT) on 8 and 9 October to conduct post-implementation project inspections. No regular meetings are planned for October or November. The next regular meeting will be on Friday, 19 December. At that time, the Committees will make final funding decisions on General Salmon Habitat Fund proposals.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 19 December 2008

Members Present: Dale Bambrick[1] (NOAA-Fisheries), Dennis Beich[1] (WDFW), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Bob Rose[1] (Yakama Nation), Keith Truscott (Chelan PUD), and Tracy Hillman[1] (Committees Chair).

Others Present: Becky Gallaher (HCP Project Coordinator), Lee Carlson[1] (Yakama Nation), Joe Miller (Chelan PUD), and Ben Lenz (Grant PUD). Denny Rohr (PRCC Habitat Subcommittee facilitator) joined the last hour of the meeting.

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Fish and Wildlife Conference Room in Wenatchee, Washington, on Friday, 19 December 2008 from 10:00 am to 12:15 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following additions/changes:

- Time Extension Request from Cascadia Conservation District.
- Minor reorganization of agenda to accommodate an update on the ORRI project.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 30 September meeting notes with a revision suggested by Tracy Hillman.

The Committees agreed that the meeting minutes and the Regional Technical Team/Tributary Committees notes on the post-implementation project inspections will be posted to the website in January 2009.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. They are progressing well—or had no salient activity in the past month.

[1] Dale, Dennis, Bob, Lee, and Tracy joined the meeting via conference call.

IV. Time Extension Request

The Rock Island Tributary Committee received a request from Cascadia Conservation District to extend the agreement period for the WRIA's 45/46 Riparian Restoration Project from 31 January 2009 to 30 June 2010. The extension would allow the District to move forward with development and coordination of riparian restoration projects and public outreach and education in WRIAs 45 and 46. The Committee discussed the request and concluded that a time extension would be appropriate, but not to 30 June 2010. The Committee agreed to extend the agreement period to 31 August 2009. If the District needs additional time, then they will need to submit another request to the Committee that clearly describes why additional time is needed to complete the project.

The following time extensions were approved by the Rock Island Committee in October (this was not discussed during the meeting but is provided here for the record):

- The Committee approved a time extension on the Roaring Creek Flow Enhancement Project. The deadline was extended from 31 October 2008 to 31 December 2010.
- The Committee approved a time extension on the Wildhorse Spring Creek Conservation Easement. The deadline was extended from 31 October 2008 to 31 January 2009.

V. Review of 2008 General Salmon Habitat Program Proposals

The Committees reviewed seven General Salmon Habitat Program applications. One application, *Entiat River Reach Assessments (ERRAs)*, was withdrawn by the project sponsor.

Before reviewing the proposals, Becky Gallaher reported that currently there is about $2.4 million in the Rock Island Plan Species Account (~$623,000 will be added in January), $1.3 million in the Rocky Reach Plan Species Account (~$295,000 will be added in January), and about $664,000 in the Wells Plan Species Account (additional funds will be added to this account in January 2010).

Lower Icicle Conservation Easement

The Chelan-Douglas Land Trust is the sponsor of the Lower Icicle Conservation Easement. The purpose of this project is to acquire a conservation easement on 65 acres of floodplain on Lower Icicle Creek. The easement would protect land on the Fromm property that is 80% within the 100-year floodplain and would address the following protection elements: extinguishment of all development rights, prohibition of paved roads, clearing and grading, wetland filling or draining, and mineral extraction. The easement would protect about 5,900 feet of streambank along Icicle Creek. The total estimated cost of the project is $1,306,200. The sponsor is requesting $300,000 from HCP Tributary Funds.

The Committees acknowledged the importance of protecting riparian and off-channel habitat; however, they struggled with the cost of this easement. They also had concerns about a lack of public access, the narrow width of the riparian zone to be maintained, and the fact that the landowner will continue grazing the site, albeit at a very low intensity. The Committees would rather use limited resources to protect higher priority areas. Based on these concerns, ***the Tributary Committees elected not to fund this project***.

Twisp River Conservation Acquisition II Project

The Methow Salmon Recovery Foundation is the sponsor of the Twisp River Conservation Acquisition Project. The purpose of this project is to purchase and protect about 13.3 acres of land along the lower Twisp River (0.9-1.0 miles upstream from the mouth). The property is across the river from the properties acquired by the MSRF between 2003 and 2006. The MSRF intends to protect and restore the property by purchasing and retiring the development rights that conflict with riparian and floodplain functions. Once acquisition and protection easements have been completed, the home site, septic system, riprap, etc. will be removed. The property will be managed for a mix of uses supporting salmon recovery, passive public recreation, and environmental education. The project will protect more than 1,000 lineal feet of waterfront along the lower Twisp River. The total cost of the project is $481,814. The sponsor is requesting $220,000 from HCP Tributary Funds. ***The Rock Island Committee approved funding for this project.***

Poorman Creek Barrier Removal Project

The Methow Salmon Recovery Foundation is the sponsor of the Poorman Creek Barrier Removal Project. The purpose of this project is to replace an undersized, perched culvert, which does not meet state or federal fish passage criteria for slope and velocity, with a prefabricated bottomless box culvert. The new culvert will restore access to spawning and rearing habitat for steelhead and rearing habitat for spring Chinook. In addition, the new culvert will improve downstream habitat in Poorman Creek by restoring bedload and wood transport through the culvert. The culvert is located about 0.2 miles upstream from the mouth of Poorman Creek. The total cost of the project is $191,579. The sponsor is requesting $53,748 from HCP Tributary Funds. ***The Wells Committee approved funding for this project.***

Twisp River Riparian Protection Project

The Methow Conservancy is the sponsor of the Twisp River Riparian Protection Project. The intent of this project is to purchase conservation easements on five properties (Zinn, Buckley, Pampanin, Neighbor-Vasquez, and Speir)[2] located along the Twisp River. In sum, the easements would protect about 174 acres, which includes 2.5 miles of riverfront and 99 acres of wetlands. The easements would prohibit home-building, road-building, industrial or commercial use, timber harvest or vegetation alteration, land surface or watercourse alteration, water pollution or activities that cause pollution, and motorized recreational use. In the absence of easements, these properties would likely be sub-divided and developed in the near future. The conservation of these properties along with the other properties already conserved by the Methow Conservancy and WDFW would protect a total of 5.8 river miles along the lower Twisp River Assessment Unit. The total cost of the project is $1,109,102. The sponsor is requesting $322,463 from HCP Tributary Funds. The Tributary Committees approved funding for these properties as follows:

- ***The Rock Island Committee approved funding for the Zinn Property ($104,996)***
- ***The Rocky Reach Committee approved funding for the Buckley Property ($89,825)***
- ***The Wells Committee approved funding for the Pampanin Property ($48,649)***
- ***The Wells Committee approved funding for the Neighbor-Vasques Property ($55,000)***[3]
- ***The Wells Committee approved funding for the Speir Property ($23,993)***

Cashmere Pond Off-Channel Habitat Protection Project

Chelan County Natural Resource Department is the sponsor of the Cashmere Pond Off-Channel Habitat Protection Project. The objective of this project is to connect the Cashmere pond to the Wenatchee River. This will prevent fish stranding in the pond and increase off-channel habitat in

[2] The Methow Conservancy dropped the Kominak Property because WDFW is pursuing an easement on the property.
[3] The Methow Conservancy revised the estimate on 24 November based on a recently completed appraisal. The estimate was reduced from $75,000 to $55,000.

the lower Wenatchee River. The 1.8-acre pond is located at river mile 10.5 and is a relic of past gravel mining for the construction of Highway 2. The pond has no existing outlet channel during low flows and therefore traps fish during high flow. The intent of the project is to excavate from 2 to 10 feet below the existing pond bottom to provide deep-water habitat and excavate a new 1,600 lineal foot outlet channel. The existing 200-foot inlet channel will be stabilized. The outlet channel will initiate flows from the pond and be accessible to salmonids year-round. Woody debris will be added to the pond and outlet channel to provide habitat complexity and fish cover. The project should provide seasonal rearing habitat for Chinook salmon, coho salmon, and steelhead. The total cost of the project is $914,076. The sponsor is requesting $249,110 from HCP Tributary Funds. ***The Rock Island Committee approved funding for this project***.

The Committee elected to fund this project because they see value in restoring connectivity between the river and its floodplain. However, the Committee identified several issues that concerned them about this project. First, the Committee believes the project is over-priced. In the future, rather than relying solely on consultants, the Committee recommends that sponsors use the expertise of the Habitat Engineer that will soon be hired by WDFW. This should greatly reduce engineering-design costs and other overhead costs associated with project implementation oversight. Second, the Committee believes the project is over-engineered. As they noted in their earlier comments to the sponsor, the Committee believes that a less heavy-handed approach would be effective and much less expensive. Finally, the Committee would like to see a maintenance plan and efforts to monitor the occurrence of fish stranding.

Middle Stillwater Design Only Project

The Cascadia Conservation District is the sponsor of the Middle Stillwater Design Only Project. The intent of this project is to use existing information (assessments, technical analyses, studies, literature, reports, etc.) to create two, final engineering designs for multiple, complex wood structures (e.g., ELJs) for the Entiat River between river miles 21 and 23. A design team will follow the Conceptual Design Evaluation Process to determine the type and placement of restoration actions that will restore instream habitat diversity and natural rates of lateral channel migration. The sponsor anticipates using the final designs to apply for and secure grant funds to build the restoration actions. The total cost of the project is $318,140. The sponsor is requesting $253,887 from HCP Tributary Funds. ***The Tributary Committees elected not to fund this project.***

The Committees believe that this project should not move forward until all the assessments have been completed and all the information from those assessments (including LIDAR) have been incorporated into an agreed upon restoration strategy. The Committees may entertain a design-only project after they see the results of the assessments and how the information is used to identify restoration strategies that restore channel form and function.

Below the Bridge Project

The Cascadia Conservation District is the sponsor of the Below the Bridge Project. The intent of this project is to upgrade the existing Keystone Diversion and improve habitat diversity in the lower Entiat River by adding large woody debris (LWD) and boulder clusters. The existing push-up dam will be replaced with a rock-wing dam that will direct water into a sluiceway. Habitat diversity will be increased by placing in the river two LWD structures made up of five logs each and one engineered log jam consisting of 30 logs. The project also will place five boulder clusters in the river. In addition, native trees and shrubs will be planted in the riparian area. The project is located on both sides of the river between river miles 1.0 and 1.5. The total cost of the project is $398,998. The sponsor is requesting $150,000 from HCP Tributary Funds. ***The Rocky Reach Committee approved funding for this project***.

The Committee asked Tracy to reiterate to the sponsor that Plan Species Account funds should only be used to aid in the construction of the rock-wing dam (which will replace the existing push-up dam), the construction of the engineered log jam, and the restoration of the riparian community. The Committee does not want their funds used to construct more boulder clusters or small woody debris structures.

Summary of review of 2008 General Salmon Habitat Program Projects.

Project Name	Sponsor	Total Cost	Request from T.C.	Plan Species Account
Lower Icicle Conservation Easement	Chelan-Douglas Land Trust	1,306,200	300,000	None
Twisp River Conservation Acquisition II	Methow Salmon Recovery Foundation	481,814	220,000	Rock Island
Poorman Creek Barrier Removal	Methow Salmon Recovery Foundation	191,579	53,748	Wells
Twisp River Riparian Protection Zinn Property Buckley Property Pampanin Property Neighbor-Vasques Property Speir Property	Methow Conservancy	 349,988 299,418 119,720 260,000 79,976	 104,996 89,825 48,649 55,000* 23,993	 Rock Island Rocky Reach Wells Wells Wells
Cashmere Pond Off-Channel Habitat Project	Chelan County Natural Resource Dept	914,076	249,110	Rock Island
Middle Stillwater Design Only	Cascadia Conservation District	318,140	253,887	None
Below the Bridge (Keystone Diversion/Moody Canyon)	Cascadia Conservation District	398,998	150,000	Rocky Reach

***** The Methow Conservancy revised the estimate on 11/24 based on a recently completed appraisal. The estimate was reduced from $75,000 to $55,000. The sponsor also dropped the Kominak Property because WDFW is pursuing an easement on the property.

VI. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in October (this was not discussed during the meeting but is provided here for the record):

   Rock Island Plan Species Account:

   - $995.51 to Chelan County PUD for third quarter administration.
   - $205.00 to LeMaster and Daniels for third quarter financial management.

   Rocky Reach Plan Species Account:

   - $995.51 to Chelan County PUD for third quarter administration.
   - $205.00 to LeMaster and Daniels for third quarter financial management.
   - $56,590.29 to Chelan County Treasurer for time and materials on the Harrison Side Channel Project.

Wells Plan Species Account:

- $1,131.71to the Chelan County PUD for third quarter administration.

2. Approved Payment Requests in November (this was not discussed during the meeting but is provided here for the record):

   Rock Island Plan Species Account:

   - $405.25 to the Colville Confederated Tribes for salaries and benefits on the Wildhorse Spring Creek Conservation Easement.

   Wells Plan Species Account:

   - $2,336.00 to Douglas County PUD for administration for fiscal year ending 31 August 2008.
   - $865.46 to the Methow Conservancy for monitoring and installation of tree cages on three properties for the Riparian Regeneration and Restoration Initiative Project.

3. Approved Payment Requests in December:

   Rock Island Plan Species Account:

   - $9,625.85 to Cascadia Conservation District for development and distribution of outreach materials and ongoing project coordination on the WRIA 45/46 Riparian Restoration Project.

   Rocky Reach Plan Species Account:

   - $35.45 to Cascadia Conservation District for development of permits and responses to agencies on the Entiat Instream Structure Engineering and Permitting Project.

   Wells Plan Species Account:

   - $115,872.41 to the Okanagan Nation Alliance for construction on the Okanagan River Restoration Initiative.
   - $3,190.17 to Stokes and Stokes for connecting the pump to the pipeline on the Lower Beaver Creek Livestock Exclusion Project.
   - $127.61 to the Okanogan Conservation District for salaries and project coordination on the Lower Beaver Creek Livestock Exclusion Project.

4. Tracy Hillman reported that the HCP Policy Committees meeting that was scheduled for January 2009 has been postponed. No new date has been set. Tracy will provide the Tributary Committees with an update as soon as information is available.

5. Tracy Hillman reported that the Tributary Committees have not received any additional information from Chelan County Natural Resource Department on the *Sleepy Hollow Reserve Protection Feasibility Assessment Project.* Recall that in September the Committees requested that the County provide signed landowner agreement forms from affected landowners in the proposed project area.

6. Tom Kahler reported that Shayla Lawrence of the Okanagan Nation Alliance contacted him and was wondering by what date the Committees wanted to review the 2009 work plan for the ORRI monitoring project. The Committees agreed that they would need to receive the 2009 work plan by 1 May 2009. This will give the Committees time to review

the work plan and provide feedback to the sponsor by the end of May. Tracy or Becky will relay this information to Shayla.

7. Chris Fisher reported that he and Ben Lenz toured the Okanagan River Restoration Initiative (ORRI) Project on Thursday, 11 December. As a bit of background, the ORRI project proposed the reconnection of two historic channel meanders (Phase I) and the creation of two channel meanders (Phase II). Chris reported that during implementation, a dyke that channelized the Okanogan River was moved away from the channel to substantially increase floodplain area. The relocation of the dyke was completed in November 2008. Test pits were then dug within the area proposed for creation of two meanders. The test pits revealed that under an organic layer there was partially saturated, unconsolidated, coarse sand, which would likely not maintain lateral and vertical channel stability. This concerned the project manager, on-site engineer, and scientific advisor. A meeting in early January has been scheduled with project proponents and regulatory agencies to discuss modifications to the original plan.

   The proposed alternative to be discussed at the meeting is to omit the creation of the upper-most meanders and to investigate the reconnection of a relic side channel immediately upstream and on the east side of the channelized reach. Early assessments indicate that the dyke would need to be breached in two places (inlet and outlet) to accommodate the relic channel. Bottomless arch culverts or bridges would be used to maintain connectivity of the relic channel. In addition, the planners are considering maintaining the original channelized reach, but designing the channelized reach to be active only during high flow conditions. Recall that the reconnection of the two lower-most meanders initially included a single channel and disconnecting the channelized reach. Chris reported that the final design for Phase I is expected in March 2009. Phase II preliminary design should be completed in late 2009.

   As a final note, Chris reported that the Watershed Management of the Ministry required that the bike/hiker path (the Kettle Valley Railroad grade) be widened from 4.5 m to 8 m so that the Ministry could drive a vehicle on the path to conduct routine maintenance without disrupting recreational users. This requirement roughly costs an additional $272,000, which was absorbed in the 20% contingency.

8. Tracy Hillman reported that Ali Wick would like to have a rough schedule of Tributary Committees meetings in 2009. Tracy proposed that the Committees continue to meet the day after the Regional Technical Team meeting, which usually falls on the second Wednesday of each month. Therefore, the Tributary Committees would meet on the following dates:

Jan 14	Jul 9
Feb 12	Aug 13
Mar 12	Sep 10
Apr 9	Oct 15
May 14	Nov 5
Jun 11	Dec 10

   The Committees will review and discuss these dates during the January meeting.

VII. Next Steps

The Tributary Committees will meet on Wednesday, 14 January at Chelan PUD in Wenatchee. Tentative agenda items include:

- Presentation from Julie Morgan and Derek Van Marter (UCSRB) on activities planned by the Board in 2009.
- Review of SRFB/GSHP application forms.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

APPENDIX D

LIST OF ROCKY REACH HCP COMMITTEE MEMBERS

Rocky Reach Mid-Columbia HCP Committees

Coordinating Committee

Name	Organization
Michael Schiewe (Chair)	Anchor Environmental, L.L.C.
Jerry Marco	Colville Tribes
Keith Truscott	Chelan PUD
Bryan Nordlund	NMFS
Jim Craig	USFWS
Bill Tweit	WDFW
Steve Parker	Yakama Nation

Hatchery Committee

Name	Organization
Michael Schiewe (Chair)	Anchor Environmental, L.L.C.
Jerry Marco	Colville Tribes
Shaun Seaman	Chelan PUD
Kristine Petersen	NMFS
David Carie (Bill Gale as of 12/17/08)	USFWS
Kirk Truscott	WDFW
Tom Scribner	Yakama Nation

Tributary Committee

Name	Organization
Tracy Hillman (Chair)	BioAnalysts
Chris Fisher	Colville Tribes
Chuck Peven	Chelan PUD
Dale Bambrick	NMFS
David Morgan	USFWS
Dennis Beich	WDFW
Bob Rose	Yakama Nation

Policy Committee

Name	Organization
Michael Schiewe (Facilitator)	Anchor Environmental, L.L.C.
Joe Peone	Colville Tribes
Tracy Yount (Gregg Carrington as of 11/7/08)	Chelan PUD
Keith Kirkendall	NMFS
Mark Miller	USFWS
Bill Tweit	WDFW
Virgil Lewis	Yakama Nation

APPENDIX E

STATEMENTS OF AGREEMENT FOR COORDINATING COMMITTEES

FINAL

Rock Island HCP Coordinating Committees
Statement of Agreement
Chelan County PUD
Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation

January 22, 2008

Statement

The Rock Island HCP Coordinating Committee has reviewed the Chelan County PUD document, "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation,*" and accepts the plan for 2008 testing.

Background

On December 8, 2006, the Committees approved a Statement of Agreement for testing a 10% spill operation (10% SOA) in 2007 at Rock Island Dam to assess yearling Chinook survival. The SOA outlined an agreed to project survival testing plan for 2008 and 2009 (spill level and species studied) based on results of the 2007 test. Given the 2007 project survival results for yearling Chinook (97.25%), the SOA calls for 10% spill operation for 2 additional years study of yearling Chinook and a first year's study of steelhead. In addition, the Committees agreed that that additional testing using paired-release study for sockeye is necessary to accurately evaluate project survival. Therefore, sockeye salmon will also be included in the 2008 project survival testing. For reference, the "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation*") has been attached (Attachment A.1).

FINAL

January 22, 2008

Statement of Agreement – Approval of the Study Plan for the Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2008
Rocky Reach HCP Coordinating Committees

Agreement Statement:
The Rocky Reach HCP Coordinating Committee approves the study plan and agrees that Chelan PUD should implement the work in the document entitled, **"Study Plan for the Rocky Reach Juvenile Fish Bypass System."**

Statement of Agreement – Approval of the 2008 Fish Spill Plan, Rocky Reach and Rock Island Dams
Rocky Reach and Rock Island HCP Coordinating Committees
March 25, 2008

Agreement Statement:
The Rocky Reach and Rock Island HCP Coordinating Committees approve the plan and agree that Chelan PUD should implement the work in the document entitled, **"2008 Fish Spill Plan, Rocky Reach and Rock Island Dams."**

March 25, 2008

Statement of Agreement – Approval of the 2008 Rocky Reach Study Plan
Rocky Reach HCP Coordinating Committee

Agreement Statement: The Rocky Reach HCP Coordinating Committee, with one abstention (see meeting notes from February 29, 2008 Rocky Reach & Rock Island CC conference call) agrees that Chelan PUD should implement the study plan entitled, "***Study Proposal for Sockeye Salmon Testing at Rocky Reach Dam for 2008***".

Study Plan Summary
In 2008, the District will continue monitoring and research activities to improve survival of juvenile sockeye salmon at Rocky Reach Dam. Based on the results from the 2007 study, the District will employ a two-pronged approach to improving survival; improve survival through the powerhouse, and continue to increase passage through the surface collector.

Three primary objectives are identified for the 2008 study:

1. Maximize survival of juvenile sockeye passing through the powerhouse.

In general, less than 10% of the fish passing the project go through Units 1 and 2, while approximately 30% of the fish pass through Units 3 - 5. It's believed that by running a block of turbines contiguously, it concentrates flow in the tailrace, creating a narrower, higher velocity water column, which would make it more difficult for predators to stage and await smolts passing through the powerhouse. Therefore, the District will operate units 3 - 5 at an average of 12.5 kcfs; the turbine discharge level which appeared to produce the highest direct survival in the 1996 balloon tag test.
Individual turbines:
Powerhouse block load design:

Units 1-2: average of 16 kcfs
Units 3-5: average of 12.5 kcfs
Units 6-7: average of 14 kcfs
Units 8-11: average of 17 kcfs

Powerhouse sequencing:
The powerhouse will operate with "soft constraints" on the use of turbines during the "test" condition. During this condition, Unit C1 (unit closest to the bypass entrance) would be the first on and the last off. As total river flow increases, Unit C2 and upper units would be added sequentially moving north (higher numbered units) up to the target

discharge, as flow increases. Essentially the same operation will occur as river flow decreases, only in reverse order from upper units to lower units, thus maintaining the desired test condition to have a sequential block of adjacent turbines operating.

During the "no test" condition, powerhouse turbine priority will be similar, except that flow will be spread through more turbines operating at lower flows, as selected by the normal operating program "Waterview".

Similar to 2007, the 2008 study will be conducted without spill to avoid confounding the comparison between powerhouse operations in 2007 and the proposed operation in 2008. The operation of the powerhouse through Waterview is the reference condition in both years (without spill).

2. Maximize passage of juvenile sockeye through the fish bypass system.

By running Units 1 and 2 at high flow (avg. 16 kcfs), it is believed that more fish will likely be drawn towards and pass through the surface collector. This was demonstrated in 2007 results by a greater percentage of fish passing through the collector during the test condition (39%) compared to the non-test condition (34%)

In addition to evaluating juvenile route-specific survival at Rocky Reach Project, the District has determined that additional behavioral information in the forebay is needed. Prior analyses suggest that fish that migrate closer to the right bank are more prone to enter and pass through the bypass system. However, previous hydrophone arrays upstream of the dam precluded detection in large areas between the Boat Restriction Zone (BRZ) and the acoustic array within the forebay. Therefore, extended acoustic arrays will be deployed in 2008 to monitor fish movement in more of the forebay between the BRZ and historical array.

3. ***Establish a more-representative estimate of dam passage survival, as defined in the HCP, using an additional release of fish downstream of the dam.***

Currently, a triple release model is used to estimate dam passage survival, but this method does not include any measure of forebay mortality. The triple release model does not do an adequate job of estimating total dam passage survival because survival estimation begins at the concrete rather than in the forebay.

In 2008, an additional release group downstream of Rocky Reach will be used to estimate dam passage survival using an alternative paired release model. The new additional release of fish will occur at the Hydropark detection location.

The fish that are detected at the Rocky Reach BRZ will be used as a "virtual" release to estimate survival from the Rocky Reach BRZ to Hydropark. Concurrently, a paired release from Rocky Reach tailrace and at Hydropark will be used to estimate survival from the tailrace release to Hydropark. The ratio of those two survival estimates, one from the “virtual” release, and one from the paired release, will be the estimated dam passage survival.

March 25, 2008

Rocky Reach HCP Coordinating Committee
Statement of Agreement
Acoustic-Tag Investigations of Sockeye Salmon Smolt Survival and Migration Dynamics at Rocky Reach in 2007

Statement

The Rocky Reach HCP Coordinating Committee has reviewed the Chelan County PUD report, ***Acoustic-Tag Investigations of Sockeye Salmon Smolt Survival and Migration Dynamics at Rocky Reach in 2007*** and agrees with the findings stated in the report and accepts the report as final.

Statement of Agreement
Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2007
Rocky Reach HCP Coordinating Committee

March 25, 2008

The Rocky Reach HCP Coordinating Committee has reviewed the 2007 Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System report and agrees with the findings stated in the report and accepts the report as final.

Rock Island HCP Coordinating Committee
Statement of Agreement
Survival of Yearling Chinook Salmon Smolts through the Rock Island Project in 2007; Comparison of Sockeye Salmon Smolt Survival Estimates through Rock Island using Paired-Release and Single-Release Methods
March 25, 2008

Statement

The Rock Island HCP Coordinating Committee has reviewed the Chelan County PUD reports, ***Survival of Yearling Chinook Salmon Smolts through the Rock Island Project in 2007;*** and ***Comparison of Sockeye Salmon Smolt Survival Estimates through Rock Island using Paired-Release and Single-Release Methods*** and agrees with the findings stated in the reports and accepts the reports as final.

Background

On December 8, 2006, the Committees approved a Statement of Agreement for testing a 10% spill operation (10% SAO) in 2007 at Rock Island Dam to assess yearling Chinook survival. A paired-release study design using acoustic tags was used to estimate project passage survival at Rock Island Dam. In addition, sockeye investigations (using similar acoustic tags) at the upstream Rocky Reach Dam enabled researchers to conduct a single-release analysis of sockeye passage survival at Rock Island Dam.

Statement of Agreement
Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System 2006
Rocky Reach HCP Coordinating Committee
March 25, 2008

The Rocky Reach HCP Coordinating Committee has reviewed the 2006 Biological Evaluation of the Rocky Reach Juvenile Fish Bypass System report and agrees with the findings stated in the report and accepts the report as final.

Rock Island HCP Coordinating Committee
Statement of Agreement
Chelan County PUD
2009 Continued Evaluation of Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation

December 16, 2008

Statement

The Rock Island HCP Coordinating Committee has reviewed the draft results of Chelan County PUD's 2008 Rock Island Survival Study with 10% spill operations and has agreed as outlined in the original Statement of Agreement approved on December 8, 2006 that the results warrant continued project survival evaluation of yearling Chinook, steelhead, and sockeye in 2009 under a 10% spill operation. Study protocol and logistics detail will be implemented as outlined in the RI 2008 "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation*". It was noted by the Committee that unexpectedly high variability exists between the 2007 and 2008 estimates of yearling Chinook survival. Continued detailed analysis comparing results of 2007 and 2008 (plant operations, tag/tagger effect, environmental conditions, fish health) is recommended as a means to explain the unusual variability. Should an element or combination of elements arise as likely contributors to the variance then efforts to improve study design and/or protocol to implement corrective action (if possible) will be considered.

If 2009 results continue to contribute to this unexplained extreme variability (unexplained high or low survival estimate) from previous years' study then the Committee will consider discussion regarding the need for additional information, including the option of an additional year of survival study .

Background

On December 8, 2006, the Committees approved a Statement of Agreement for testing a 10% spill operation (10% SOA) in 2007 at Rock Island Dam to assess yearling Chinook survival. The 10% SOA outlined an agreed project survival testing plan for 2007 and 2008 and beyond) based on results of the 2007 and 2008 tests. Although the 2-year average (2007 & 2008) of Project Survival for yearling Chinook is 93.5% and sets in motion as outlined in the 10% SOA a third year of yearling Chinook testing in 2009 at 10% spill operation, the Committee expressed some concern with the high level of variability between 2007 and 2008 results and will pursue additional data analysis in attempts to describe elements contributing to the variance. The first-year steelhead and sockeye results (97% & 93.3%; paired-release model) met the pre-determined survival metrics of the 10% SOA to continue survival testing in 2009. For reference, the December 2006 10% SOA and the "*Study Plan to Estimate Rock Island Project Survival for Yearling Chinook, Steelhead, and Sockeye during a 10% Spill Operation*" have been attached (Attachment A.1, 2).

Deleted: SOA 2009 CPUD RI 10% Survival Study V2 12_02_08 bt .doc¶

APPENDIX F

STATEMENTS OF AGREEMENT FOR HATCHERY COMMITTEES

Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding Pilot Study for Partial Water Reuse
February 20, 2008

Statement

The Rocky Reach and Rock Island HCP Hatchery Committees (hereafter “Committees”) agree that Chelan County PUD (hereafter “District) can perform a partial water reuse pilot study. Approximately 100,000 Wells Summer Chinook from the District’s hatchery compensation program will be reared on partial water reuse water utilizing circular ponds. The Committees agree to allow the District to perform the study as outlined in the attached *Pilot Water Reuse Fish Rearing Criteria* and the *Partial Water Reuse Pilot Study Monitoring and Evaluation*. The study will be for one (1) year and the Committees will decide whether to pursue additional years of study based on the results of the first year of the pilot study.

The study will continue as long as the health of the fish remains comparable to the control group reared under protocols as detailed in the *Hatchery Facility Evaluation Suggested Guidelines for Anadromous Fish Hatchery Programs.* The pilot study will be discontinued if fish health criteria and mortality limits agreed to by the Committees prior to the start of the study are not met or if limits are exceeded.

A subset of the study (those in the circular ponds) and control fish will be PIT tagged to allow for evaluation of the study. All study fish will be differentially marked with coded wire tags. The number of study and control fish to be PIT tagged will be determined by the Committees.

Background

<u>Background</u>

Water and space are major limiting factors in hatchery facilities. The District would like to investigate alternative methods for using water, and potentially space, when revising either existing facilities or constructing new ones. One such method for conserving water during rearing is partial water re-use. Successful application of water re-use technology has been previously demonstrated with Atlantic Chinook using 75 % reuse water. Twenty-five percent of the water is instantaneously added and the 75% reused water is oxygenated and CO_2 stripped before reentering the pond. The effluent (at the bottom of the pond) contains practically all of the waste products and unused fish food.

The District proposes to test this configuration at a rearing density (0.12 lbs./cu.ft.-in). Based on case studies from existing applications, this reuse technology may be practical and feasibility for application to Upper Columbia hatchery sites at this density.

Objective

Determine if circular ponds with 75% reuse can be used to rear Chinook from ponding to yearling size at Eastbank, while producing fish with growth, health and vigor desired for the supplementation programs.

P I L O T   W A T E R   R E U S E

F I S H   R E A R I N G   C R I T E R I A

DATE: April 2, 2009

TO: Hatchery Committee

FROM: Sam Dilly

RE: Pilot Study Rearing Criteria

This draft Pilot Water Reuse Fish Rearing Criteria was developed in collaboration with WDFW staff and Chelan PUD representatives January 23, 2008. WDFW staff reviewed the criteria and provided recommendations that were accepted by the District and are included in the pilot program. These final criteria will be part of the pilot study covered in the Statement of Agreement February 2008.

Pilot study disease and rearing criteria

1. Juvenile summer Chinook disease identification and treatment requires consideration of multiple variables and conditions. The pilot water reuse study will track water quality and study conditions per the attached monitoring and evaluation paper. The Fish Health Monitoring and Evaluation is structured adequately, contains the correct magnitude of testing and observation and will be followed. However, rearing conditions, test duration, and further discussion among WDFW staff and Chris Good, fish veterinarian with Freshwater Institute, may lead to additional testing or other testing to improve the pilot test data. The data will create the basis for disease identification and treatment.

2. Observed fish disease and sickness among pilot study fish will be treated. Upon observation of abnormal fish behavior or physical condition, the Complex Manager, John Penny, will contact Bob Rogers (WDFW Fish Pathologist) and the District. In coordination, Bob Rogers, John Penny, and Chris Good will develop:

a. Possible cause of the fish health condition

b. Recommended changes to pilot conditions

c. Recommended treatments and

d. Record of observations and actions to resolve the conditions

3. An acute fish health event (epizootic) could be defined as 0.08 percent mortality for three consecutive days (0.0008 X 50,000 fish = 40 fish). The District and WDFW recognize waiting to observe continued fish health deterioration to this point is not recommended or practical. Upon observing as few as five daily mortalities, WDFW and the District will begin discussions. Upon documenting sickness, disease, or causative conditions, and group consultation, WDFW will prepare treatment recommendations and may take action. Anticipated actions include:

    a. Changing the reuse water proportion

    b. Changing water quality

    c. Treatment with medications (water treatment or feed)

4. WDFW and the District will inspect pilot study fish, compile data, and create recommendations for final fish rearing and release. At the September 2008 HC meeting there will be a data review and recommendation for final rearing conditions. Location, cohort co-mingling, and possible continued cohort biological analysis will be decided at that time.

5. Fish mortality among pilot study fish will be compared to survival standards per Table 1. Mortality will be compared to cohorts in a standard raceway as well. Wenatchee Summer Chinook have been reared in Eastbank raceways for over 17 years. Historical survival rates will provide a general basis for comparison at the study's end.

6. If mortality exceeds life stage standards the study will be terminated unless extenuating circumstances exist. Standards are contained in Table 1.

Table 1
Pilot Study Survival Standard

Standard	Ponding To 30-days	Ponding To 100-days	Ponding To Release	Transport To Release
Percent Survival	97	93	90	95

Temporary equipment failures, acute treatable fish illness, and unforeseen conditions that affect fish will not give cause to stop the study. Conditions that can not be changed or remedied will give cause to stop the study. Chronic illness, with mortality (approaching survival standards), and poor performance compared to cohorts in raceways will give cause to stop the study. If necessary either a flow through system in the circular ponds or transfer to annex raceways will occur.

Partial Water Reuse Pilot Study
Monitoring and Evaluation

The District will investigate a partial reuse aquaculture system incorporating circular culture tanks with dual drains. Such technologies have been successfully applied elsewhere to improve rearing volume use, reduce site footprint, improve control over culture conditions, and reduce water consumption and energy costs.

The pilot project at the Eastbank Hatchery will use Chelan River (A.K.A. TRI Yearling) Summer Chinook. The following piloting parameters have been defined but may be subject to change:

Table 1:
Pilot Project Parameters[1]

Parameter	Criteria
Per tank volume	3884.6 ft3
Total tank volume	7769.2 ft3
Density index	0.125 lb/cf-in
Max rearing density	9.2 kg/m3 (1.24 lb/gal)
Minimum Flow Index	0.75 lb/gpm-in
Tank exchange rate	calculated
Condition factor	0.0121 g/cm3
Release length	4.6 in (11.7 cm)
Release weight	23.5 fish/lb (19.4 g)
Total number of fish	104,500
Total fish biomass	4,467 lb (9848.7 kg)
Maximum temperature	59 °F (15 °C)
Reuse rate	75%
Total flow rate (2 tanks, flow index based)[2]	1295 gpm (4902 lpm)
Influent flow rate (2 tanks)	323 gpm (1222 lpm)

1 Based upon moving fish in November to acclimation facility
2 Single pass water use provisions will be provided

To facilitate an effective piloting process, the District will use a hatchery consultant to design an aquaculture systems, supply and support equipment, perform training, and assist with data analysis during the pilot.

Design Concept

Based on design parameters, the estimated equipment requirements are:

1. **30 ft Diameter Circular Culture Tank System (Qty = 2)**
    a. 30 ft diameter x 6 ft wall height circular culture tank, FRP walls and floor, sectional
    b. Bottom drain sump and screen
    c. Side drain (Cornell style) and screen
    d. Bottom drain standpipe
    e. Spraybar assembly
2. **Partial Reuse Aquaculture System**
    a. Drum filter (Qty = 1)
    b. 89 micron screens

c. Pump sump (Qty = 1)
d. Reuse pumps (Qty = 2 or 3)
e. Oxytower Gas Transfer System (Qty = 2)
    i. CO_2 stripper and Low Head Oxygenator (LHO)
    ii. Gas transfer media

3. **Motor Control Panel (Qty = 1)**
    a. Alarm relays
4. **Water Quality Monitoring System**
    a. Analyzers (4-DO, 1-Temperature, 1-pH)
    b. Flow meter (1 for influent 1 for reuse)
    c. Multi-channel transmitter unit with local display and alarm relays
    d. Data logging capabilities
    e. Software package for PC
5. **Effluent Treatment**
    a. Radial Flow Settlers (Qty = 2)
6. **Ancillary Equipment**
7. **Culture tank jump screens or covers**
8. **Feeding systems will be manual (to make a consistent comparison)**
9. **Spare parts and materials as needed or related tools.**

<u>Scope of Work</u>

The pilot study work is organized into the following tasks:

1. **Scoping and concept design**
    a. Site review and layout analysis.
    b. Identify design constraints and preferences.
    c. Production parameters.
    d. Rearing parameters.
    e. Water quality parameters.
    f. Calculate mass balance and verify flow and treatment requirements.
    g. Develop process and layout drawings.
    h. Check equipment list and performance criteria.
    i. Calculate influent and effluent water quality.
    j. Prepare water quality report template.
2. **Detailed system design and design coordination**
    a. Aquaculture system process design.
    b. Layout of aquaculture systems.
    c. Detailed design analysis and design calculations
    d. Prepare detailed list of electrical loads, mechanical loads, and other service requirements.
    e. Integrate aquaculture system to site.
    f. Develop construction drawing
3. **Equipment supply**
4. **Construction**
5. **Commissioning**
6. **Training**
    a. Prepare and provide Operation and Maintenance Manual for System and for Components.
    b. Prepare training program for O&M personnel.
    c. Coordinate and conduct O&M personnel training.

7. **Operational support**
    a. Provide qualified personnel for operational advice and water quality troubleshooting.
8. **Monitoring Parameters**
    a. The following parameters will be monitored continuously with analyzers and meters:
        i. Dissolved Oxygen (DO) in each of the tank side drains (2 places).
        ii. Dissolved Oxygen (DO) in the header tank.
        iii. Dissolved Oxygen (DO) in the pump sump.
        iv. Water temperature in the header tank.
        v. Water pH in the header tank.
        vi. Water flow rate on influent water supply (make-up water).
        vii. Water flow rate on the reuse flow directly downstream of the pumps.
    b. The following parameters are to be monitored using a colorimetric test kit or laboratory methods (frequency to be determined):
        i. Dissolved carbon dioxide at the pump sump and the header tank.
        ii. Dissolved total ammonia nitrogen (TAN) at the pump sump.
        iii. Alkalinity (as calcium carbonate) at the pump sump.
        iv. Biological Oxygen Demand (BOD) in the culture tanks and in the effluent.
        v. Total Suspended Solids (TSS) in the culture tanks and in the effluent.
    c. The following additional parameters are examples of additional parameters that will be read and/or recorded manually (frequency to be determined):
        i. Pressure as measured with gauges upstream and downstream of pumps.
        ii. Flow split between bottom and side drain of tank (using portable flow meter)
        iii. Rotational period at perimeter of the culture tanks (using a float)
        iv. Oxygen use rate (at oxygen flow meter on LHO inlet)
        v. Daily feed usage and feeding time of day
9. **Data analysis and reporting**
    a. Provide analysis and trend development for water quality data. Track dissolved oxygen, dissolved CO_2, ph, temperature, Total Ammonia Nitrogen, BOD, and TSS. Analysis will be performed monthly but may be more frequent if so required for troubleshooting purposes.
    b. Prepare a monthly summary report of system performance and water quality.

The following schedule of milestones is estimated:

Table 2:
Pilot Project Parameters

Milestone	Estimated Completion Date
Scoping and concept design	2008-01-31
Detailed design documents	2008-02-29
Equipment delivery	2008-03-31
Pilot equipment installation	2008-04-30
Commissioning	2008-05-15
O&M training	2008-05-30
Piloting period	2008-06-01 (start) to 2009-05-31 (end)
Decommissioning or contract renewal	2009-06-01

Note: All dates assume initiation of contract by December 20, 2007.

Partial Water Reuse Fish Health Monitoring and Evaluation

Background

Modern partial reuse aquaculture systems have the capacity to reuse up to 85% while maintaining water quality parameters (e.g. DO, CO_2, ammonia) within safe limits. The capacity to reuse water makes the technology applicable to those who are investigating methods to reduce source water usage. One of the most important concerns for using any different technology is how fish health might be affected.

The pilot study purpose is to investigate and document fish health differences among fish raised in traditional raceways compared to fish raised in a partial reuse system.

A partial water reuse system will be constructed at the Eastbank Hatchery to rear approximately 100,000 Summer Chinook salmon for a 5-month period (June 2008–November 2008) while the remainder of this population will be raised for the same period at Eastbank Hatchery in traditional flow-through raceway units. Both groups will be differentially marked and transferred to the acclimation pond prior to release. In addition, 10,000 fish of the test and the same number of control fish will be PIT tagged for evaluation of survival and travel time comparison to McNary dam (see attached correspondence). Fish health and welfare will be evaluated according to the below plan.

Proposed Study Details

Start date: June, 2008
End date: November, 2008

(For a complete time-line of the proposed study, see Appendix A)

Hypothesis – Fish growth and health$_{\text{partial reuse}}$ ≥ Fish growth and health$_{\text{traditional raceway}}$

Study design – This study follows a prospective cohort epidemiological design, and will assess specific health and welfare indicators between two cohorts of fish of the same background (genetic strain, early rearing environment, etc.) exposed to two different rearing systems, with other exposures (water source, management, feeding rates, etc.) being equal.

Methodology

1. **Performance –** Fish will be sampled from both cohorts at regular monthly intervals for length and weight, from which growth curves and (with feeding data) feed conversion ratios will be generated. These data will be analyzed for statistically significant differences over time between the two cohorts.

2. **Fish Health –** There will be multiple assessments:
    a. Mortality data will be collected throughout the study period, and a proportional hazards survival analysis will be carried out at the end of the study to determine differences in overall survival between the two cohorts.
    b. Samples of 60 fish from each cohort (120 fish total per sampling event) will be collected at the start, middle, and end of the rearing period. These fish will be euthanized, packed in ice and shipped overnight to an accredited fish disease

diagnostic laboratory for screening of listed viral, bacterial, and parasitic pathogens, following Blue Book protocols (see Appendix B). This testing will reveal the presence or absence of subclinical infections, and will be used to assess changes in subclinical infection over time between the two cohorts.

c. In the event of clinical disease outbreaks during the study period, WDFW fish pathologist will diagnose and treat the study populations with support from a fish pathologist. Diagnostic and treatment records for each cohort will be summarized at the end of the study, and compared statistically.
d. At the end of the study, 50 fish from each cohort will be euthanized, and samples of multiple tissues (gill, heart, liver, spleen, pyloric cecae, intestine, swim bladder, anterior and posterior kidney, skin, and fillet) will be sent to a fish pathologist for histopathological assessment to determine the extent of organ pathology within each cohort.
e. At the end of the study, 50 fish from each cohort will be bled, and frozen plasma samples will be sent to a diagnostic laboratory for biochemistry profiles as agreed upon with WDFW for further comparison of pathological processes, as well as indictors of long-term stress (see Appendix C).
f.

3. **Fish Welfare –** At the end of the study, 50 fish from each cohort will have their fin condition assessed. This will be carried out for all rayed fins, with measurements by digital calipers to calculate the overall fin indices (i.e. length of longest ray of each fin standardized to fork length) for each fish. Differences in fin indices between the two cohorts will be assessed statistically. This work will be coordinated with WDFW to insure proper techniques and methods are used.

Table 1:
Estimated Effort and Time

Task	Effort
Field Work	
Site Visits and Field Work (Principal Investigator)	15 days
Site Visits and Field Work (Technician)	5 days
Field Work TOTAL	**20 days**
Laboratory Analyses – Allowances	
Pathogen Screening: 6 samples	
Diagnostic pathology (blood chemistry)	
Sample Shipment, Field Work Equipment, etc.	
Laboratory Analyses TOTAL	
Data Analysis and Report Preparation	
Monthly Data Collection and Study Coordination	5 days
Analysis and Report Writing	15 days
Data Analysis TOTAL	**20 days**
PROJECT TOTAL[1]	**40 Days**

[1] Diagnostic veterinary services to address clinical disease are not included in this estimate. These services are assumed to be part of the normal hatchery program.

Appendix A:
Detailed Project Time-Line

<table>
<tr><th>Date</th><th>Activity</th></tr>
<tr><td>June 2008</td><td>Chris Good to travel to Eastbank Hatchery
First sampling of 60 fish per system for pathogen screening (see Appendix B) as cohorts begin early rearing at Eastbank
<u>Details:</u>
Sampling for pathogen screening requires MS-222 for euthanasia, and hard-sided coolers packed with ice for shipment
Purposive sampling is employed (as opposed to random sampling), in that smaller, unthrifty fish or those exhibiting clinical signs will be targeted</td></tr>
<tr><td>August 2008</td><td>Chris Good to travel to Eastbank Hatchery
Second sampling of 60 fish per system for pathogen screening</td></tr>
<tr><td>November 2008</td><td>Chris Good plus technician final visit to Eastbank Hatchery
Final sampling of 60 fish per system for pathogen screening
Blood sample collection from 50 fish per system for biochemistry profile analysis
<u>Details:</u>
Blood collection will require 3ml syringes with 22-guage needles, blood collection tubes and freezer space to freeze samples prior to shipment (hard-sided cooler plus ice).
Tissue collection from 50 fish per system for histological assessment
<u>Details:</u>
Tissue collection requires dissection kits, histological grade formalin, and plastic jars for specimen fixation
Once fixation is complete (48 hours), tissues are removed, placed in Whirlpak bags with small amounts of formalin, and shipped to the pathologist in a hard-sided cooler
Fin data collection for 50 fish per system for fin health assessment, and this requires use of a digital microcaliper</td></tr>
<tr><td>Throughout study period</td><td>Routine mortality data collection following established facility protocols
Routine feeding data collection
Routine performance (length, weight, etc.) data collection
As needed veterinary sampling and diagnoses for clinical disease conditions as they arise</td></tr>
</table>

<u>Appendix B</u> Listed Pathogen Screening

The following fish pathogens will be screened in samples of 60 fish from each system according to Blue Book guidelines. The sample size of 60 fish in populations greater than 100,000 provides a 95% confidence of pathogen detection when pathogen apparent prevalence is at least 5%.

Pathogen	**Disease**	**Detection Method**
Bacteria		
Aeromonas salmonicida	Furunculosis	Culture
Yersinia ruckeri	Enteric redmouth disease	Culture
Renibacterium salmoninarum	Bacterial kidney disease	ELISA
Viruses		
IHNV	Infectious hematopoietic necrosis	Cell culture on CHSE, EPC
IPNV	Infectious pancreatic necrosis	Same
VHSV	Viral hemorrhagic septicemia	Same
Parasites		
Myxobolus cerebralis	Whirling disease	Tissue digestion / light microscopy
Additional Screening		**As determined by WDFW**

Appendix C Plasma Chemistry Analysis

The following plasma chemistry parameters are typical of a small animal panel as performed by a veterinary diagnostic laboratory. Specific parameters, such as the electrolytes, glucose, and liver enzymes, provide useful data for interpreting fish stress and underlying pathological processes.

Sodium	Albumin	Cholesterol
Potassium	Globulin	Creatine kinase
Chloride	Glucose	Iron
Bicarbonate	ALT	Total iron binding capacity
Anion gap	AST	Saturation
Urea nitrogen	Alkaline Phosphatase	Lipemia
Creatinine	GGT	Hemolysis
Calcium	Total bilirubin	Icterus
Phosphate	Direct bilirubin	Plasma Protien
Magnesium	Indirect bilirubin	hematocrits
Total protein	Amylase	Blood Osmolatity
Cortisol	Lactate	

REPRINTED E-MAIL FROM STEVE HAYS

OK - here we have it for adults.

These statistical powers are based on PIT tag recoveries at Columbia River fishways, assuming about a 0.5% SAR for Turtle Rock adults escaping ocean harvest and making it to Bonneville Dam, and using all PIT recoveries (3, 4, 5, and 6 year old returns).

With PIT tag releases of 10,000 fish each for reuse and control, a 2x1 survival difference beween control and test fish has a high power of being detected, a 1.5x1 survival difference has a power of .70 (not bad) if you are willing to use a .10 alpha level of significance, and only a 1-in-5 chance of detecting a 10% (1.08x1) SAR reduction from reuse rearing conditions with a .10 alpha level

To put this into perspective, if your PIT tag returns actually do equal 0.00499 for the controls, then the table below gives an idea of how many fewer fish could return from the reuse group before you would fail to reject the null hypothesis when, in fact, there was a difference in SAR. So, from a conservative viewpoint of do no harm and we detected 50 PIT tagged controls, then if we detected fewer than 33 adults we could conclude that the SAR was reduced because of rearing on reuse water (with a 1 in 10 chance of having convicted an innocent rearing technology). With control returns greater than 50, the likelihood of rejecting the null hypothesis (no difference in SAR) gets progressively closer to the Test .91 column.

Control	Test .91	Test .67	Test .50
100	91	67	50
90	82	60	45
80	73	53	40
70	64	47	35
60	55	40	30
50	45	33	25
40	36	27	20
30	27	20	15
20	18	13	10
10	9	7	5

Steven Hays
Fish and Wildlife Senior Advisor
Chelan County Public Utility District
PO Box 1231
Wenatchee, Washington 98807
(509) 661-4181

-----Original Message-----
From: John Skalski [mailto:skalski@u.washington.edu]
Sent: Monday, February 04, 2008 10:52 AM
To: Hays, Steve
Subject: Re: Statistical power

Steve,
Here is the updated table with the SAR values you suggested.

Power calculations for estimates of SAR_C = 0.00499, tested against SAR_T = 0.00454 and 0.00333, and 0.00250.

Release Size		% S_C greater than	α-level	Power
R_C	R_T	S_T	1-tailed	(1-β)
10,000	10,000	10%	0.05	0.1184
10,000	10,000	50%	0.05	0.5710
10,000	10,000	100%	0.05	0.8922
10,000	10,000	10%	0.10	0.2063
10,000	10,000	50%	0.10	0.7062
10,000	10,000	100%	0.10	0.9454
20,000	20,000	10%	0.05	0.1607
20,000	20,000	50%	0.05	0.8250
20,000	20,000	100%	0.05	0.9925
20,000	20,000	10%	0.10	0.2650
20,000	20,000	50%	0.10	0.9028
20,000	20,000	100%	0.10	0.9974

John

Statement of Agreement
Approval of Chiwawa Rearing/Acclimation Facility – Wenatchee Steelhead Feasibility Criteria (Report Issue Date – 03-03-08)

Rocky Reach and Rock Island HCP Hatchery Committees
March 19, 2008

Statement of Agreement The Rocky Reach and Rock Island HCP Hatchery Committees agree to approve the Chiwawa Rearing/Acclimation Facility – Wenatchee Steelhead Feasibility Report criteria (Issue Date – 03-03-08).
Background Current hatchery rearing practices split the incubation and early rearing of steelhead between Eastbank and Chelan Falls hatcheries. Final rearing occurs at Turtle Rock after Columbia River temperatures begin to cool in the fall. In the spring, fish are placed in trucks and driven to release locations in the Wenatchee River Basin. Stray rates from the steelhead program have been documented to be greater than 10% outside of the Wenatchee Basin, which is inconsistent with criteria agreed to in the HCP Hatchery Committees monitoring and evaluation program, and the Upper Columbia Salmon and Steelhead Recovery Plan. As such, the steelhead program is not meeting some of the objectives established by the HCP HC. It is reasonable to assume that because fish are reared over winter on a water source upstream of the Wenatchee River, that homing fidelity to the Wenatchee River may be compromised. The Statement Of Agreement Concerning Location of a Long-term Steelhead Rearing Facility (dated May 17, 2006) by the Rocky Reach and Rock Island HCP Hatchery Committees agreed that further investigation should be conducted to determine if the existing Chiwawa hatchery facility for Spring Chinook can be used for over winterization of steelhead. Subsequent to that SOA, the Rocky Reach and Rock Island HCP Hatchery Committees agreed in the SOA on Production Levels for Chelan County PUD's Steelhead Hatchery Program (dated June 20, 2007) that the capacity of the new rearing facility (adjoining the existing Chiwawa hatchery facility for Spring Chinook) would be for 450,000 smolts and that such smolts would be reared exclusively on Wenatchee River water. At the November 12, 2007 meeting the HCP HC agreed to a memo developed by Kirk Truscott (WDFW) regarding the configuration of acclimation ponds for the new Chiwawa steelhead facility. Such memo precipitated the design criteria of six ponds and the ability to volitionally release and then trap and transport from each individual pond.

FINAL

Statement of Agreement For Use of Bonaparte Pond For Rearing up to 100,000 Summer Chinook From The Similkameen Program in the 2008 – 2009 Rearing Season

Rock Island HCP Hatchery Committee
October 22, 2008

Statement of Agreement

Based on an expected transfer population of near program production level (576,000) Methow/Okanogan River summer Chinook at Eastbank FH and that an adequate quantity and quality of groundwater capable of de-icing the Bonaparte Pond this winter has now been developed , the Rock Island HCP Hatchery Committee approves the rearing of 100,000 of the 2007 brood year Similkameen summer Chinook at Bonaparte Pond for the 2008 – 2009 rearing season. These fish will be raised initially at Eastbank along with the remaining Similkameen production fish and will be transferred to the Bonaparte Pond in late October/early November '08. Chelan County PUD will be responsible for the cost to rear these fish and the Colville Confederated Tribes will be responsible for operation of the pond and rearing/releasing the fish. Fish health monitoring will be provided by WDFW. Fish raised at the Bonaparte pond will be differentially marked with coded wire tags at Eastbank FH prior to transfer to Bonaparte Pond. Should the available number of fish for transfer from Eastbank FH be less than 300,000, the Rock Island HCP Hatchery Committee will re-assess the number of fish transferred to Bonaparte Pond. Use of and production level for this pond for Similkameen Program production in subsequent years will require approval of the Rock Island Hatchery Committee.

Background
The artificial production program focused on summer Chinook salmon in the Okanogan sub basin has demonstrated a high degree of success. Annually, approximately 576,000 summer Chinook salmon parr are reared to yearling stage at the Similkameen acclimation pond on the Similkameen River. This program is funded by Chelan Public Utility District and the facility is operated by the Washington Department of Fish and Wildlife (WDFW).

Summer Chinook salmon are reared for approximately six months on water from the Similkameen River. In doing so, the homing instincts of hatchery fish are strengthened and exhibit a high fidelity to this reach of river. Naturally produced spawners also occupy this reach. During years of good in-river and ocean survival abundant hatchery and naturally produced adults return to the vicinity of the acclimation pond. The abundant adult returns to this reach have resulted in superimposition and has negatively affected the Natural Recruitment Rate (NNR) for the Simlikameen spawning aggregate. Furthermore, suitable summer Chinook habitat in the Okanogan River (those areas with appropriate substrate and gradient), appear to be underutilized.

In an effort to increase NNR for the Methow/Okanogan summer Chinook in the Similkameen River and to promote adult spawning distribution in suitable spawning habitat in the Okanogan River, the Colville Confederated Tribes, in collaboration with WDFW have initiated rearing approximately 100,000 summer Chinook salmon approximately 1 mile south of Tonasket, Washington. The rearing facility is a modified sedimentation pond of the Oroville Tonasket Irrigation District, referred to as the Bonaparte Acclimation Pond.

Bonaparte Pond was modified several years ago for the purpose of rearing/acclimating Chinook salmon smolts as part of the new Chief Joseph Hatchery Program (CJHP). During the past several years the pond has been used to evaluate over-winter acclimation/rearing capabilities using spring or summer Chinook smolts from either the USFWS Leavenworth Hatchery Complex facilities or the WDFW Similkameen program. The pond successfully over-winter acclimated spring Chinook smolts during the 2002-03 and 2004-05 seasons. Rearing summer Chinook salmon in the pond was successful during the 2005/2006 season and mortalities were low and likely reflective of the relatively mild and stable weather conditions that year. Ice-over did occur throughout most of December and prevented the removal of dead fish and may have contributed to a mild outbreak of bacterial gill disease. However, early diagnosis and treatment prevented substantial losses.

During the 2006-07 season ice formed on the pond in late November and remained through mid February. This condition severely limited the ability of the CCT fisheries staff to feed fish, clean the pond and monitor fish health. As a result of the extended period of ice on the pond, a 90 % fish mortality occurred. Due to the high level of mortality experienced in the 2006-07 season, the HCP Hatchery Committee suspended the use of the pond for over-winter acclimation until a solution to the pond freezing condition could be addressed.

The CCT has now secured funds to develop a groundwater supply adjacent to the pond. If an adequate supply (200-400 gpm) of relatively warm, 45 to 55 F degree groundwater could be made available to blend with the colder Okanogan River water, pond icing may be prevented. The success of this type of effort assumes that a deep aquifer with some degree of isolation from the river will be required.

A hydro-geologic assessment was conducted at the pond site last year using a hydro-geological consultant provided by Chelan PUD. Recommendations from the assessment concluded that an exploratory well should be drilled to bedrock at the pond site and if a deep aquifer is identified the well should be developed and tested. The CCT is preparing to drill on the pond site within the next 45 days and if successful develop a well by late summer capable of providing adequate groundwater to prevent pond icing later this year. If CCT is unable to develop an adequate groundwater source we would withdraw the proposal for this year.

Redistributing 100,000 summer Chinook salmon smolts from the Similkameen acclimation pond and rearing these fish on water from the Okanogan River is expected to reduce superimposition in the Similkameen River and promote spawning in currently under-utilized habitat within the Okanogan River.

FINAL 11-19-08

Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding use of Blackbird Pond for Steelhead Rearing
November 19, 2008

Statement

The Rocky Reach and Rock Island HCP Hatchery Committees (hereafter "Committees") agree to the use of Blackbird pond located near the Wenatchee River in the City of Leavenworth, for the rearing of up to 50,000 steelhead as part of Chelan County PUD's (hereafter "District") Wenatchee steelhead mitigation obligation. This arrangement will continue until otherwise agreed to by the Committees.

The District has been working in cooperation with the Icicle Chapter of Trout Unlimited (hereafter "TU") on this project and will continue to do so and will fund improvements to the pond to allow for fresh water from the Wenatchee River to flow through the pond and to ensure fish egress is controlled. The District will be responsible for maintenance of this pond during the rearing of steelhead. In addition, the District will ensure alarms and backup systems are provided to ensure adequate water flows for rearing the steelhead.

Long-term plans of the HC include rearing steelhead on Wenatchee River water. These fish would be reared in this pond for approximately 45 days in the spring of each year. Fish reared in this location would be progeny of either "hatchery x hatchery" or "hatchery x wild" parents. Fish release protocols will be compliant with the current 1395 permit. NMFS has concurred that this program is consistent with the permit. The agreement between TU and the District has an initial 5-year term with the ability to renew annually thereafter.

Background

TU had operated a kids fishery in the Blackbird pond until it was determined that conditions in the pond were not adequate to maintain this program. On June 21st, 2007, TU approached the HC and asked their support to rear steelhead in this pond. The HC agreed to provide support as long as the pond could be modified to safely rear steelhead. On October 15th 2008, the HC again voiced support for this project.

The District has worked with TU to develop an agreement related to funding improvements and on-going operations. Blackbird pond improvements will allow for fresh water from the Wenatchee River to flow through the pond and to ensure fish egress is controlled. The District will be responsible for maintenance of this pond during the rearing of steelhead. In addition, the District will ensure alarms and backup systems are provided to ensure adequate water flows for rearing the steelhead. WDFW has reviewed the agreement and concurs with the provisions in that agreement. WDFW will be responsible for operating the pond under an annual Task Authorization with the District. WDFW will provide a letter acknowledging and supporting this agreement between the District and TU.

Washington Department of Ecology has issued a temporary water right to TU for this operation (good through 2010 with the ability to extend if necessary) and intends to complete the process to secure the permanent right in 2009. TU, the District and District contractors have rights to access, modify and utilize Blackbird pond from the City of Leavenworth under a special use permit.

Rocky Reach and Rock Island HCP Hatchery Committees
FINAL Statement of Agreement
Regarding Pilot Study for Partial Water Reuse
December 8, 2008

Statement

The Rocky Reach and Rock Island HCP Hatchery Committees (hereafter "Committees") agree that Chelan County PUD (hereafter "District) can perform the second year of the partial water reuse pilot study. Approximately 200,000 Wells Summer Chinook from the District's Turtle Rock Island program will be converted from the subyearling program (reducing the subyearling program by 200,000 fish) and will be reared on partial water reuse utilizing circular ponds. This effectively doubles the density from the 2008 pilot study. The Committees agree to allow the District to perform the study as outlined in the attached *Pilot Water Reuse Fish Rearing Criteria (2009)* and the *Partial Water Reuse Pilot Study Monitoring and Evaluation (2009) (*See Attachments A,B, and C to this document).

This action increases the Turtle Rock Island Summer Chinook yearling production to 400,000 fish.

The study will continue as long as the health of the fish remains comparable to the control group reared under protocols as detailed in the *Hatchery Facility Evaluation Suggested Guidelines for Anadromous Fish Hatchery Programs.* The pilot study will be discontinued if fish health criteria and mortality limits detailed in the *Pilot Water Reuse Fish Rearing Criteria (2009)* are not met (health criteria) or exceeded (mortality limits).

A subset of the study (those in the circular ponds) and control fish will be PIT tagged to allow for evaluation of the study. All study fish will be differentially marked with coded wire tags. The number of study and control fish to be PIT tagged will be determined by the Committees.

Implementation is subject to National Marine Fisheries Service (NMFS) concurrence that the impacts to Endangered Species Act (ESA) species remain within those that were contemplated in the existing ESA authorizations.

Background

2007 yearling Chinook reared in the pilot water reuse tanks at the Eastbank Hatchery are performing well. Generally, the fish reared in the circular ponds are larger, are more uniform in size, and have experienced fewer mortalities than the fish reared in conventional raceways. Data indicates the pilot study system has capacity to rear fish at a greater density than they are currently reared. Chelan PUD proposes to rear yearling Chinook at a greater density for the purpose of better understanding how the pilot system may perform before any full scale implementation of this hatchery technology. Chelan PUD recommends using subzero production as a donor broodstock for this program.

The District and WDFW have developed a plan for providing rearing capacity at District facilities for all life stages of this program. (See Attachments B and C to this document – "Pilot Water Reuse Rearing Criteria" and "2009 Partial Water Reuse Pilot Study").

December 22, 2008

Partial Water Reuse Pilot Study Monitoring and Evaluation (2009)

The District will investigate a partial reuse aquaculture system incorporating circular culture tanks with dual drains. Such technologies have been successfully applied elsewhere to improve rearing volume use, reduce site footprint, improve control over culture conditions, and reduce water consumption and energy costs.

The pilot project at the Eastbank Hatchery will use Chelan River (A.K.A. TRI Yearling) Summer Chinook. The following piloting parameters have been defined but may be subject to change:

Table 1: Pilot Project Parameters[1]

Parameter	Criteria
Per tank volume	3884.6 ft3
Total tank volume	7769.2 ft3
Density index	0.226lb/cf-in
Max rearing density	16.3 kg/m3
Minimum Flow Index	1.4 lb/gpm-in
Tank exchange rate	Calculated
Condition factor	0.0121 g/cm3
Release length	4.5 in (114. cm)
Release weight	25fish/lb (18.1 g)
Total number of fish	200,000
Total fish biomass	7,980.7 lb (3,620 kg)
Maximum temperature	59 °F (15 °C)
Reuse rate	75%
Total flow rate (2 tanks, flow index based)[2]	1295 gpm (4902 lpm)
Influent flow rate (2 tanks)	323 gpm (1222 lpm)

1 Based upon moving fish in November 1, 2009 to acclimation facility
2 Single pass water use provisions will be provided

Based on experience gained during 2008, the District will install features to boost dissolved oxygen concentration continue training staff, and make adjustments as required to improve operation.

1. **Operational support**
   a. Provide qualified personnel for operational advice and water quality troubleshooting.
2. **Monitoring Parameters**
   a. The following parameters will be monitored continuously with analyzers and meters:
      i. Dissolved Oxygen (DO) in each of the tank side drains (2 places).
      ii. Dissolved Oxygen (DO) in the header tank.
      iii. Dissolved Oxygen (DO) in the pump sump.
      iv. Water temperature in the header tank.
      v. Water pH in the header tank.
      vi. Water flow rate on influent water supply (make-up water).

vii. Water flow rate on the reuse flow directly downstream of the pumps.

b. The following parameters are to be monitored using a colorimetric test kit or laboratory methods (frequency to be determined):
   i. Dissolved carbon dioxide at the pump sump and the header tank.
   ii. Dissolved total ammonia nitrogen (TAN) at the pump sump.
   iii. Alkalinity (as calcium carbonate) at the pump sump.
   iv. Biological Oxygen Demand (BOD) in the culture tanks and in the effluent.
   v. Total Suspended Solids (TSS) in the culture tanks and in the effluent.

c. The following additional parameters are examples of additional parameters that will be read and/or recorded manually (frequency to be determined):
   i. Pressure as measured with gauges upstream and downstream of pumps.
   ii. Flow split between bottom and side drain of tank (using portable flow meter)
   iii. Rotational period at perimeter of the culture tanks (using a float)
   iv. Oxygen use rate (at oxygen flow meter on LHO inlet)
   v. Daily feed usage and feeding time of day

3. **Data analysis and reporting**
   a. Provide analysis and trend development for water quality data. Track dissolved oxygen, dissolved CO_2, ph, temperature, Total Ammonia Nitrogen, BOD, and TSS. Analysis will be performed monthly but may be more frequent if so required for troubleshooting purposes.
   b. Prepare a monthly summary report of system performance and water quality.

December 22, 2008

Partial Water Reuse Fish Health Monitoring and Evaluation

Background

Modern partial reuse aquaculture systems have the capacity to reuse up to 85% while maintaining water quality parameters (e.g. DO, CO_2, ammonia) within safe limits. The capacity to reuse water makes the technology applicable to those who are investigating methods to reduce source water usage. One of the most important concerns for using any different technology is how fish health might be affected.

The pilot study purpose is to investigate and document fish health differences among fish raised in traditional raceways compared to fish raised in a partial reuse system.

The Eastbank Hatchery partial water reuse pilot system will rear 200,000 Summer Chinook salmon for a 4-month period (June 2009–November 2009) while 50,000 cohorts will be raised for the same period at Eastbank Hatchery in a traditional flow-through raceway units. Both groups will be differentially marked and transferred to the acclimation pond prior to release. In addition, 10,000 fish of the test and the same number of control fish will be PIT tagged for evaluation of survival and travel time comparison to McNary dam (see attached correspondence). Fish health and welfare will be evaluated according to the below plan.

Proposed Study Details

Start date: June, 2009
End date: November, 2009

(For a complete time-line of the proposed study, see Appendix A)

Hypothesis – Fish growth and health$_{\text{partial reuse}}$ $\geq$ Fish growth and health$_{\text{traditional raceway}}$

Study design – This study follows a prospective cohort epidemiological design, and will assess specific health and welfare indicators between two cohorts of fish of the same background (genetic strain, early rearing environment, etc.) exposed to two different rearing systems, with other exposures (water source, management, feeding rates, etc.) being equal.

Methodology

1. **Performance –** Fish will be sampled from both cohorts at regular intervals for length and weight, from which growth curves and (with feeding data) feed conversion ratios will be generated. These data will be analyzed for statistically significant differences over time between the two cohorts.

2. **Fish Health –** There will be multiple assessments:
   a. Mortality data will be collected throughout the study period, and a proportional hazards survival analysis will be carried out at the end of the study to determine differences in overall survival between the two cohorts.
   b. Samples of 60 fish from each cohort (120 fish total per sampling event) will be collected at the middle and end of the rearing period. These fish will be euthanized, packed in ice and shipped overnight to an accredited fish disease

diagnostic laboratory for screening of listed viral, bacterial, and parasitic pathogens, following Blue Book protocols (see Appendix B). This testing will reveal the presence or absence of subclinical infections, and will be used to assess changes in subclinical infection over time between the two cohorts.

c. In the event of clinical disease outbreaks during the study period, WDFW fish pathologist will diagnose and treat the study populations with support from a fish pathologist. Diagnostic and treatment records for each cohort will be summarized at the end of the study, and compared statistically.
d. At the end of the study, 50 fish from each cohort will be euthanized, and samples of multiple tissues will be sent to a fish pathologist for histopathological assessment to determine the extent of organ pathology within each cohort.
e. At the end of the study, fish from each cohort will be bled and tested as agreed upon with with WDFW for further comparison of pathological processes, as well as indictors of long-term stress. (see Appendix C)

3. **Fish Welfare –** At the end of the study, 50 fish from each cohort will have their fin condition assessed. This will be carried out for all rayed fins, with measurements by digital calipers to calculate the overall fin indices (i.e. length of longest ray of each fin standardized to fork length) for each fish. Differences in fin indices between the two cohorts will be assessed statistically. This work will be coordinated with WDFW to insure proper techniques and methods are used.

Appendix A:
Detailed Project Time-Line

Date	Activity
June 2009	• First sampling of 60 fish per system for **pathogen screening** as co**horts begin early** rearing at Eastbank •
August 2008	• Second sampling of 60 fish per system for **pathogen screening**
November 2008	• Final sampling of 60 fish per system for **pathogen screening** • Blood sample collection from 50 fish per system for **biochemistry profile analysis** •
Throughout study period	• Routine mortality data collection following established facility protocols • Routine feeding data collection • Routine performance (length, weight, etc.) data collection • As needed veterinary sampling and diagnoses for clinical disease conditions as they arise

Appendix B Listed Pathogen Screening

The following fish pathogens will be screened in samples of 60 fish from each system according to Blue Book guidelines. The sample size of 60 fish in populations greater than 100,000 provides a 95% confidence of pathogen detection when pathogen apparent prevalence is at least 5%.

Pathogen	Disease	Detection Method
Bacteria		
Aeromonas salmonicida	Furunculosis	Culture
Yersinia ruckeri	Enteric redmouth disease	Culture
Renibacterium salmoninarum	Bacterial kidney disease	ELISA
Viruses		
IHNV	Infectious hematopoietic necrosis	Cell culture on CHSE, EPC
IPNV	Infectious pancreatic necrosis	Same
VHSV	Viral hemorrhagic septicemia	Same
Parasites		
Myxobolus cerebralis	Whirling disease	Tissue digestion / light microscopy
Additional Screening		**As determined by WDFW**

Appendix C Plasma Chemistry Analysis

The following plasma chemistry parameters are typical of a small animal panel as performed by a veterinary diagnostic laboratory. Specific parameters, such as the electrolytes, glucose, and liver enzymes, provide useful data for interpreting fish stress and underlying pathological processes.

Sodium	Albumin	Cholesterol
Potassium	Globulin	Creatine kinase
Chloride	Glucose	Iron
Bicarbonate	ALT	Total iron binding capacity
Anion gap	AST	Saturation
Urea nitrogen	Alkaline Phosphatase	Lipemia
Creatinine	GGT	Hemolysis
Calcium	Total bilirubin	Icterus
Phosphate	Direct bilirubin	Plasma Protien
Magnesium	Indirect bilirubin	hematocrits
Total protein	Amylase	Blood Osmolatity
Cortisol	Lactate	

PILOT WATER REUSE
FISH REARING CRITERIA (2009)

DATE: April 2, 2009

TO: Hatchery Committee

FROM: Shaun Seaman

RE: Pilot Study Rearing Criteria

This is a copy of the criteria memo that was accepted by the HC for the 2008 reuse pilot study. The dates in this document have been modified for the 2009 rearing season but the original criteria remain as written for the first year of study and will apply to the 2009 study.

This draft Pilot Water Reuse Fish Rearing Criteria was developed in collaboration with WDFW staff and Chelan PUD representatives January 23, 2008. WDFW staff reviewed the criteria and provided recommendations that were accepted by the District and are included in the pilot program. These final criteria will be part of the 2009 pilot study covered in the Statement of Agreement October 2008.

Pilot study disease and rearing criteria

1. Juvenile summer Chinook disease identification and treatment requires consideration of multiple variables and conditions. The pilot water reuse study will track water quality and study conditions per the attached monitoring and evaluation paper. The Fish Health Monitoring and Evaluation is structured adequately, contains the correct magnitude of testing and observation and will be followed. However, rearing conditions, test duration, and further discussion among WDFW staff and Chris Good, fish veterinarian with Freshwater Institute, may lead to additional testing or other testing to improve the pilot test data. The data will create the basis for disease identification and treatment.

2. Observed fish disease and sickness among pilot study fish will be treated. Upon observation of abnormal fish behavior or physical condition, the Complex Manager, John Penny, will contact Bob Rogers (WDFW Fish Pathologist) and the District. In coordination, Bob Rogers, John Penny, and Chris Good will develop:

    a. Possible cause of the fish health condition

    b. Recommended changes to pilot conditions

    c. Recommended treatments and

    d. Record of observations and actions to resolve the conditions

3. An acute fish health event (epizootic) could be defined as 0.08 percent mortality for three consecutive days (i.e. 0.0008 X 50,000 fish = 40 fish). The District and WDFW recognize waiting to observe continued fish health deterioration to this point is not recommended or practical. Upon observing as few as five daily mortalities, WDFW and the District will begin discussions. Upon documenting sickness, disease, or causative conditions, and group consultation, WDFW will prepare treatment recommendations and may take action. Anticipated actions include:

    a. Changing the reuse water proportion

    b. Changing water quality

    c. Treatment with medications (water treatment or feed)

4. WDFW and the District will inspect pilot study fish, compile data, and create recommendations for final fish rearing and release. At the September 2009 HC meeting there will be a data review and recommendation for final rearing conditions. Location, cohort co-mingling, and possible continued cohort biological analysis will be decided at that time.

5. Fish mortality among pilot study fish will be compared to survival standards per

6. If mortality exceeds life stage standards the study will be terminated unless extenuating circumstances exist. Standards are contained in Table 1.

Table 1
Pilot Study Survival Standard

Standard	Ponding To 30-days	Ponding To 100-days	Ponding To Release	Transport To Release
Percent Survival	97	93	90	95

Temporary equipment failures, acute treatable fish illness, and unforeseen conditions that affect fish will not give cause to stop the study. Conditions that can not be changed or remedied will give cause to stop the study. Chronic illness, with mortality (approaching survival standards), and poor performance compared to cohorts in raceways will give cause to stop the study. If necessary either a flow through system in the circular ponds or transfer to annex raceways will occur.

2009 Partial Water Reuse Pilot Study

Chelan PUD and WDFW have observed no adverse affect on fish reared for 22-weeks in water reuse facilities. During this period the circular rearing pond flow has changed from flow through (0% reuse) to nearly 80% reuse. Based on this information the District hypothesizes that fish reared at higher density in the reuse system will perform equal to normal density fish reared in raceways. The District has proposed to rear 400,000 (200,000 in reuse tanks and 200,000 in standard raceways) yearling summer Chinook during 2008-2010 to test the hypothesis.

Chelan PUD met with WDFW staff and reviewed the necessary hatchery complex changes required to raise 400,000 yearling summer Chinook from the 2008 broodstock. John Penny and Sam Dilly met at Eastbank Hatchery on October 14, 2008 and identified changes to the fish management practices for the next year to accommodate the pilot test. The Table below identifies agreed upon program changes to accommodate the pilot study.

Life Stage	**Start-Finish**	**Program Modifications**	**Impacts**	**Mitigate Actions**
Incubation	Oct 2008 – June 2009	Place eggs from 2 females (double) in one tray for several stocks to create additional chilled incubation space for 200k eggs	Water hardening and chilled water source limit impacts of double loading	Reduce tray loads in February when space is available and test results provide health clearance
Early Rearing (Eastbank)	June 2009-Oct 2009	Place 200k fish in round ponds. Move Sockeye to occupy 4 RR annex troughs Place 53,000 Chinook in EBH standard raceway for comparison	Instead of rearing Sockeye at Eastbank Hatchery, Sockeye are reared at RR annex. Turtle Rock Chinook are reared at the annex, in one Eastbank standard raceway, and the pilot system	Provide adequate staff to move among facilities performing essential function Buy and plan for more CWTs
Final Rearing	Oct 2009-May 2010	Place 200k Chinook in net pens at Chelan Falls (100k of each cohort). Place 200,000 fish in Turtle Rock Island ponds	Requires more fish management at Chelan Falls Program requires more feed and staff activity	Secure additional net pens, provide adequate staff to manage essential functions

Based on the table information both WDWF and Chelan PUD are prepared to perform the 2009 pilot study.

FINAL 12-17-08

Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding Okanogan Sockeye Requirement
December 17, 2008

Statement

The Rocky Reach and Rock Island HCP Hatchery Committees (hereafter "Committees") agree that the Okanagan Nation Alliance 2006-2017 Experimental Reintroduction of Sockeye Salmon into Skaha Lake (Canada) will be a component of Chelan County PUD's (hereafter "the District") Okanogan Sockeye obligation (artificial propagation and monitoring and evaluation) until 2017 unless new information becomes available and the Committees agree otherwise. A comprehensive analysis and determination of project contribution will proceed in 2013 as described in the SOA dated July 20, 2005.

Background

On July 20, 2005, the Committee agreed to the Statement of Agreement (SOA) titled "Funding of Skaha Lake Sockeye Salmon Reintroduction to fulfill Chelan PUD's HCP Mitigation for Okanogan Sockeye Salmon" (attached). The SOA documented that the Committees agreed that the District's Okanogan Sockeye mitigation responsibilities (591,040 smolts) would be met by the Skaha Lake Reintroduction Program until 2013 unless new information becomes available and the HCP HC determined otherwise. Additionally the SOA outlined that after four years of monitoring the Committee would review fry to smolt survival. In the event that fry to smolt survival is less that forty percent, program changes would be made. Consistent with that commitment, and the overall commitment to adaptive management, alternative fry release strategies are currently being evaluated. In the first three years of the reintroduction program, a total of approximately 523,000 smolts have been produced.

The District jointly funds the Skaha Lake Reintroduction Program with Grant County Public Utility District No. 2 (Grant). In October 2008, the Priest Rapids Coordinating Committee Hatchery Subcommittee agreed that the Skaha Reintroduction Program would fulfill Grant's sockeye mitigation requirements until 2017. The Okanagan Nation Alliance – the managers of the Skaha Lake Reintroduction Program – has outlined a schedule for the construction of a dedicated Okanogan sockeye hatchery. Currently the Shuswap Falls Hatchery in British Columbia, Canada, is being used for this program. This hatchery does not have the physical (infrastructure) capacity to meet the hatchery mitigation requirements for both the District and Grant. In addition, use of this hatchery for the Okanagan Sockeye reintroduction program is secondary to another hatchery program; however since the beginning of the reintroduction program the Shuswap Falls Hatchery has been able to be used wholly for the ONA Okanagan Sockeye Reintroduction Program. With the construction of a dedicated Okanogan sockeye hatchery this will provide enough capacity to raise enough fry to meet the smolt hatchery obligation for both the District and Grant (assuming approximately a 50% fry to smolt survival). Coincidentally, the dedicated Okanogan sockeye hatchery capacity is not only the same amount needed to meet the District's Okanogan sockeye and Grant's sockeye mitigation requirement (as previously described) but also the agreed to capacity of Skaha Lake by the Canadian federal and British Columbia provincial fish managers. It is planned that the egg take of 2010 will be reared in part using the new hatchery facility. The purpose of this SOA is to align the obligations of the funding partners in the development of the appropriate hatchery agreements and for the long-term management of the program.

The ultimate success of the experimental project will include consideration of the results of adult monitoring indicating the program's contribution to the Okanogan population. This is consistent with the goals articulated in *Conceptual Approach to Monitoring and Evaluating the Chelan County Public Utility District Hatchery Programs* which states under Goal #2 to increase abundance of the natural population of unlisted plan species while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity. In addition, a goal is to provide harvest opportunities in years when spawning escapement is sufficient to support harvest. The Committees will be kept apprised of progress with the program and monitoring results through periodic updates and annual reports.

APPENDIX G

SHUSWAP RIVER HATCHERY INFORMATION

SHUSWAP RIVER HATCHERY PROGRESS REPORT – DECEMBER, 2008

SOCKEYE SALMON

1. Okanagan River Stock

a) Incubation Data

Incubation units: 11 Kitoi boxes
Water source: well
Water temperature: 1.5 °C – 8.0 °C
(The heat exchanger was activated on December 6, 2008)
Supplemental oxygen flow: 0.5 lpm
Water flow: 50 lpm – 55 lpm per unit

ATU range on December 31, 2008: 486 – 547
Number of eggs in incubation: 1,651,700

b) Final Inventory Data

Number of “green eggs”: 1,827,000
Number of “morts”: 167,900
Number of eyed eggs: 1,659,100
% survival: 90.8

CHINOOK SALMON

1. Middle Shuswap River Stock

a) Incubation Data

Water temperature: 8.0 °C – 8.5 °C
Water flow: 14 lpm – 15 lpm

ATU range on December 31, 2008: 756 – 852
Number of alevins in incubation: 210,340

2. Lower Shuswap River Stock

a) Incubation Data

Water temperature: 8.0 °C – 8.5 °C
Water flow: 14 lpm – 15 lpm
ATU range on December 31, 2008: 614 – 777
Number of alevins in incubation: 512,610

COHO SALMON

1. Duteau Creek Stock 2008

a) Incubation Data

Water temperature:	0.5 °C – 5.0 °C
Water source:	river with well backup
Water flow:	13 lpm – 14 lpm
ATU range on December 31, 2008:	221 – 262
Number of eyed eggs in incubation:	42,640 (includes 3,090 from a BKD low positive female)*

* Eggs from one BKD high positive female were discarded before final inventory

b) Final Inventory Data

Number of "green eggs":	44,150
Number of "morts":	1,510
Number of eyed eggs:	42,640
% survival:	96.6

SHUSWAP RIVER HATCHERY PROGRESS REPORT – JANUARY, 2009

SOCKEYE SALMON

1. Okanagan River Stock

a) Incubation Data

Incubation units: 11 Kitoi boxes
Water source: well
Water temperature: 2.5 °C – 5.0 °C
Water flow: 50 lpm – 55 lpm per unit
Supplemental oxygen flow: 0.5 lpm – 1.5 lpm

ATU range on January 31, 2009: 610 – 671
Number of alevins in incubation on January 31, 2009: 1,638,200

Note:
Eggs were loaded on the substrate at ATU ranging from 510 to 517.
The hatch started at ATU: 581 – 589.

CHINOOK SALMON

1. Middle Shuswap River Stock

a) Ponding Data

Period: January 11 – 23, 2009
Rearing units: six Capilano troughs
Unit loading: 30,250 – 36,820
ATU range at ponding: 908 – 960
Avg. fish mass range: 0.29g – 0.47g

Number of fish ponded: 210,120
Number of eyed eggs: 211,600
% survival: 99.3

b) Rearing Data

Water temperature: 8.5 °C
Water flow: 200 lpm – 240 lpm
D.O. level: above 9.5 ppm at the outflow of the lower unit
Feeding level: SKRETTING BioVita #0;
2.8 % of biomass daily.
Feeding frequency: 16 – 8 times a day
Cleaning frequency: twice a day; vacuuming and screen brushing.

Number of fish in rearing on January 31, 2009: 209,900
Avg. fish mass range on January 28, 2009: 0.43g – 0.63g

2. Lower Shuswap River Stock

a) Incubation Data

Water temperature: 8.5 °C
Water flow: 14 lpm – 15 lpm
ATU range on January 31, 2009: 877 – 952

Number of alevins in incubation: 138,600

b) Ponding Data

Period: from January 20, 2009
Rearing units: four IRT-s
Unit loading: 123,890 – 127,260
ATU range at ponding: 900 – 975
Avg. fish mass range: 0.28g – 0.53g

Number of fish ponded until January 31, 2009: 370,260

c) Rearing Data

Water temperature: 8.5 °C
Water flow: 700 lpm
D.O. level: above 10.0 ppm at the outflow
Feeding level: SKRETTING BioVita #0;
2.8 % of biomass daily
Feeding frequency: 16 times a day
Cleaning frequency: twice a day; vacuuming and screen brushing.

Number of fish in rearing on January 31, 2009: 369,940

COHO SALMON

1. Duteau Creek Stock 2008

a) Incubation Data

Water temperature: 0.5 °C – 2.0 °C
Water source: river with well backup
Water flow: 13 lpm – 14 lpm

ATU range on January 31, 2009: 250 – 291
Number of eggs in incubation: 42,640

SHUSWAP RIVER HATCHERY PROGRESS REPORT – FEBRUARY, 2009

SOCKEYE SALMON

1. Okanagan River Stock

a) Incubation Data

Incubation units: 11 Kitoi boxes
Water source: well
Water temperature: 2.0 °C – 8.0 °C
Water flow: 50 lpm - 55 lpm
Supplemental oxygen flow: 0.5 lpm – 1.5 lpm

ATU range on March 3, 2009: 776 – 844
Number of alevins in incubation: 1,637,800

b) Thermal Otolith Marking

Marking was conducted by slowly elevating the incubation temperature to a stable temperature of the well water source (8.0 °C), then, sharply dropping temperature by 4.0 °C – 4.5 °C for 24 hours. The heat exchanger was activated for the “cool” marking periods. The marking cycle is presented in the table below. The last two markings were applied only to alevins in the last six Kitoi boxes (#6 - #11)

Date 2009	Background Temp. (°C)	ATU Range	Marking Temp. (°C)	Duration (hours)
Feb. 11	8.0	653 – 713		24
Feb. 12			4.0	24
Feb. 13	8.0			24
Feb. 14			4.0	24
Feb. 15	8.0			24
Feb. 16			4.0	24
Feb. 17	8.0			24
Feb. 18	8.0			24
Feb. 19			4.0	24
Feb. 20	8.0			24
Feb. 21			3.5	24
Feb. 22	8.0			24
Feb. 23			4.0	24
Feb. 24	8.0			24
Feb. 25			4.0	24
Feb. 26	8.0			24
Feb. 27	8.0			24
Feb. 28			4.0	24
Mar. 01	8.0			24
Mar. 02			4.0	24
Mar. 03	8.0	776 – 844		24

CHINOOK SALMON

<u>1. Middle Shuswap River Stock</u>

a) Rearing Data

Rearing unit: one concrete raceway (from February 18, 2009)
Water temperature: 8.0 °C
Water flow: 1,500 lpm – 1,800 lpm
D.O. level: above 9.0 ppm at the outflow
Supplemental oxygen flow: 0.5 lpm (from March 03, 2009)
Feeding level: SKRETTING BIOVITA #0 and #1;
2.0% of biomass daily
Feeding frequency: 8 times a day
Cleaning frequency: once a day; vacuuming and screen brushing

Number of fish in rearing on March 04, 2009: 209,670
Average fish mass on March 04, 2009: 1.60 g

2. Lower Shuswap River Stock

a) Ponding Data

Period:	January 20 – February 11, 2009
Rearing units:	four IRT-s
Unit loading:	123,890 – 129,830
ATU range at ponding:	900 – 988
Avg. fish mass range:	0.27 g – 0.53 g

Number of fish ponded:	508,660
Number of eyed eggs:	514,180
% survival:	98.9

b) Rearing Data

Rearing units:	four IRT-s
Water temperature:	8.0 °
Water flow:	600 lpm – 700 lpm per unit
D.O. level:	above 9.0 ppm at the outflow
Feeding level:	SKRETTING BIOVITA #0 and #1; 2.3% of biomas daily;
Feeding frequency:	16 - 8 times a day
Cleaning frequency:	twice a day; vacuuming and screen brushing

Number of fish in rearing on March 02, 2009: 507,190
Average fish mass range on March 02, 2009: 0.73 g – 1.23 g

COHO SALMON

1. Duteau Creek Stock 2008

a) Incubation Data

Water temperature: 0.5 °C – 2.0 °C
Water source: river with well backup
Water flow: 13 lpm – 14 lpm

ATU range on February 28, 2009: 279 – 320
Number of eggs in incubation: 42,640

Rearing Units: two concrete IRT-s
Water temperature: 4.0 °C – 5.5 °C
Water source: mixed river and well
Water flow: 700 lpm per unit
D.O. level: above 9.5 ppm at the outflow
Feeding level: SKRETTING Bio Vita Fry 1.5 mm pellet;
0.8 – 1.0 kg every other day
Feeding frequency: once a day
Cleaning frequency: every other day, vacuuming and screen brushing

Number of fish in rearing on February 29, 2008: 26,930
Avg. fish mass range on February 29, 2008: 12.87 g – 12.90 g

APPENDIX H

BROODSTOCK COLLECTION PROTOCOLS

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE
Mid-Columbia Field Office
3515 Chelan Hwy 97-A Wenatchee, WA 98801 (509) 664-1227 FAX (509) 662-6606

April 2, 2008

To: Mid-Columbia HCP Hatchery Committee

From: Kirk Truscott

Subject: **DRAFT 2008 UPPER COLUMBIA RIVER SALMON AND STEELHEAD BROODSTOCK OBJECTIVES AND SITE-BASED BROODSTOCK COLLECTION PROTOCOLS**

This protocol was developed for hatchery programs rearing spring Chinook salmon, sockeye salmon, summer Chinook salmon and summer steelhead associated with the mid-Columbia Habitat Conservation Plans (HCPs), spring Chinook salmon and steelhead programs associated with the 2008 Biological Opinion for the Priest Rapids Hydroelectric Project (FERC No. 2114) and fall Chinook consistent with Grant County Public Utility District and Federal mitigation obligations associated with Priest Rapids and John Day dams, respectively. These programs are funded by Chelan, Douglas, and Grant County Public Utility Districts (PUDs) and are operated by the Washington Department of Fish and Wildlife (WDFW). Additionally, the Yakama Nation's Coho Reintroduction Program broodstock collection protocol, when provided by the Yakama Nation, will be included in this protocol because of the overlap in trapping dates and locations.

This protocol is intended to be a guide for 2008 collection of salmon and steelhead broodstocks in the Methow, Wenatchee, and Columbia River basins. It is consistent with previously defined program objectives such as program operational intent (i.e., conservation and/or harvest augmentation), mitigation production levels (HCPs, Priest Rapids Dam 2008 Biological Opinion and to comply with ESA permit provisions.

Notable in this years protocols are: (1) Wenatchee spring Chinook broodstock collection strategies targeting Chiwawa hatchery origin Chinook at Tumwater Dam, intended to provide improved hatchery origin broodstock collection and to reduce the number of Chiwawa hatchery-origin strays in other Wenatchee basin UCR spring Chinook spawning aggregates; (2) Natural origin Chiwawa spring Chinook collection at the Chiwawa Weir, consistent with ESA Section 10 Permit 1196; (3) Methow spring Chinook broodstock protocol targeting natural origin spring Chinook at Wells Dam and at the Twisp River weir; (4) utilization of genetic sampling/assessment to differentiate Twisp River and non Twisp River natural origin adults collected at Wells Dam and CWT interrogation during spawning of hatchery spring Chinook collected at the Twisp Weir, Methow FH and Winthrop NFH to differentiate Twisp and Methow Composite hatchery fish to aid in maintaining discrete Twisp and Methow Composite production components; (6) the collection of hatchery origin spring Chinook for the Methow River Basin program in excess of production requirements for BKD management, and (5) the use of ultra-sound technology to determine sex of Wenatchee summer Chinook during collection to aid in achieving the appropriate female equivalents for programmed production. These protocols may be adjusted in-season, based on actual run monitoring at mainstem dams and other sampling locations.

Above Wells Dam

Spring Chinook

Natural origin fish inclusion into the broodstock will be a priority, with natural origin fish specifically being targeted. Natural origin fish collections will not exceed 33 percent of the MetComp and Twisp natural origin run escapement at Wells Dam.

To facilitate BKD management, to comply with ESA Section 10 permit take provisions and to meet programmed production, hatchery origin spring Chinook will be collected in numbers excess to program production requirements. Based on historical Methow FH spring Chinook ELISA levels above 0.12, the hatchery origin spring Chinook broodstock collection will include hatchery origin spring Chinook in excess to broodstock requirements by approximately 26 percent. The parties to the HCP have acknowledged that targeting broodstock collection objectives at levels that provide for culling of eggs from higher ELISA level hatchery origin females and prioritizing natural origin fish for rearing to yearling smolt stage is a viable approach to balance the promotion of fish health while limiting indirect reductions in genetic diversity and reduced program production, particularly for ESA listed supplementation programs. For purposes of BKD management and to comply with maximum production levels and other take provisions specified in ESA Section 10 permit 1196, culling will include the destruction of eggs from hatchery origin females with ELISA levels greater than 0.12 and or that number of hatchery origin eggs required to maintain production at 550,000 yearling smolts. Culling of eggs from natural origin females will not occur, unless their ELISA levels are determined by WDFW Fish Health to be a substantial risk to the program. Juveniles from natural origin females with ELISA levels greater than 0.12 will be differentially tagged for evaluation purposes. To monitor the efficacy of culling in reducing the prevalence of BKD in Methow Basin spring Chinook, annual monitoring and evaluation of the prevalence and level of BKD in returning hatchery and natural origin spring Chinook will continue and will be reported in the annual monitoring and evaluation report for this program.

The 2008 Methow spring Chinook broodstock collection will occur at Wells Dam, Twisp River Weir, Methow FH and Winthrop NFH. Limited on-station release of smolts from the Methow FH, absence of a trapping facility on the Chewuch River and poor trapping success at Foghorn Dam on the mainstem Methow River preclude reasonable certainty of meeting adult collection requirements via tributary and Methow FH outfall collections. The aforementioned limitations are the principle reasons for the inclusion of broodstock collection at Wells Dam and Winthrop NFH during 2008.

Recent WDFW genetic assessment of natural origin Methow spring Chinook (Small et al. 2007) suggest that Twisp natural-origin spring Chinook can be identified with sufficient confidence that natural origin collections can occur at Wells Dam, thereby facilitating natural origin inclusion in the broodstock, while maintaining the ability to manage separately the Twisp origin spring Chinook spawning aggregate. Although Twisp natural origin fish can be assigned to the Twisp population with confidence, some gene flow between the Twisp and Methow Composite spawning aggregates are anticipated as a result of collecting natural origin broodstock at Wells Dam. Based on projected Proportion Natural Origin (pNOB) broodstock composition for Twisp and Methow Composite programs (9% and 19%, respectively) and composite brood year assignment errors for wild Twisp and MetComp spring Chinook provided in Snow et al. (2007), the projected non-source fish contributions to the Twisp and MetComp hatchery programs for 2008 are 0.66% and 1.04%, respectively. In this instance, percent non-source fish contribution may be considered a gene flow estimate between the two program production elements (Twisp and Methow Composite) and is an unavoidable consequence associated with natural origin broodstock collection at Wells Dam during 2008. Furthermore, it is unlikely that the program in 2008 would result in an unacceptable non-source contribution even if the return of natural origin spring Chinook is substantially larger than projected. Assignment errors comparable to the composite errors presented in Snow et al. (2007) and pNOBs less than or equal to 28.0% and 37% for the Twisp and MetComp programs, respectively would result in a 2.0% or less gene flow within both the Twisp and MetComp programs. Given the relatively low projected escapement of natural origin spring Chinook to the Methow Basin in 2008 (Table 1) and a collection objective to limit natural origin extraction to no greater than 33%, it is unlikely that pNOBs will approach the 28% and 37% levels for the Twisp and MetComp programs where gene flow could exceed 2.0%. Although gene flow between the two hatchery production components is likely, it is expected to be relatively low in 2008 and supports a hatchery broodstock collection program objective to infuse natural origin fish into the hatchery program to maintain/improve genetic diversity and reduced domestication. For complete discussion regarding Methow Spring Chinook genetic monitoring and evaluation see Snow et al. (2007).

Non-lethal tissue samples (fin clips) for genetic analysis and scale samples will be obtained from adipose present, non-CWT, non-ventral clipped spring Chinook (suspected natural origin spring Chinook) collected at Wells Dam for origin analysis. Natural origin fish retained for broodstock will be tagged with a PIT tag (dorsal sinus) for tissue sample/genetic analysis cross-reference. Tissue samples will be preserved and sent to WDFW genetics lab in Olympia Washington for genetic/stock analysis. The spring Chinook sampled will be retained at Methow FH and will be sorted as Twisp or non-Twisp natural origin fish prior to spawning. The number of natural origin Twisp and Methow Composite (non-Twisp) spring Chinook retained will be dependent upon the number of natural origin adults returning and the collection objective limiting extraction to no greater than 33% of the natural origin spring Chinook return past Wells Dam. Based on the broodstock collection schedule (every third day and 16 hours/day), natural origin spring Chinook extraction is expected to be 33% or less.

Weekly estimates of natural-origin spring Chinook passage past Wells Dam will be provided through stock assessment and broodstock collection activities and will provide the opportunity to adjust, in-season, the extraction of natural origin spring Chinook to maintain no greater that 33% extraction of Twisp and Methow Composite natural origin components while maximizing the opportunity for the inclusion of natural origin spring Chinook in the broodstock. Additionally, in-season estimates of Twisp and Methow Composite natural origin escapement past Wells Dam provides the opportunity to utilize both Wells Dam and the Twisp Weir as natural origin collection sites for the Twisp production component, thereby providing additional flexibility to account for differences between projected and actual returns of Twisp and Methow Composite natural origin fish. Twisp and Methow Composite hatchery origin spring Chinook will be captured at the Twisp Weir, Methow FH outfall and at the Winthrop NFH if needed to address broodstock shortfalls.

The Methow FH rears spring Chinook salmon for three acclimation/release sites in the Methow River Basin, including: (1) Methow River (Methow FH); (2) Twisp River (Twisp Acclimation Pond) and (3) Chewuch River (Chewuch Acclimation Pond). The total production level target is 550,000 smolts divided equally among the three release sites (approximately 183,000 smolts per site).

Pre-season run-escapement of Methow origin spring Chinook past Wells Dam during 2008 are estimated at 2,742 spring Chinook, including 2,592 hatchery and 150 natural origin Chinook (Table 1 and Table 2). In-season estimates of natural origin spring Chinook will be adjusted proportional to the estimated returns to Wells Dam at weekly intervals and may result in adjustments to the broodstock collection targets presented in this document.

Based on current juvenile rearing capacity at Methow FH, programmed production levels (550,000 smolts), BKD management strategies, projected return for BY 2008 Methow Basin spring Chinook at Wells Dam (Table 1 and Table 2), and assumptions listed in Table 3, the following broodstock collection protocol was developed.

The 2008 Methow spring Chinook broodstock collection will target 393 adult spring Chinook. Based on the pre-season run forecast, Twisp fish are expected to represent 8% of the adipose present, CWT tagged hatchery adults and 19% of the natural origin spring Chinook passing above Wells Dam (Tables 1 and 2). Based on this proportional contribution, and a collection objective to limit extraction to no greater than 33%, the 2008 Twisp origin broodstock collection will be predominantly hatchery origin and total 75 fish (10 wild and 65 Hatchery), representing 70% of the broodstock necessary to meet Twisp program production of 183,000 smolts. Methow Composite fish are expected to represent 92% of the adipose present CWT tagged hatchery adults and 81% of the natural origin spring Chinook passing above Wells Dam (Tables 1 and 2). Based on this proportional contribution and a collection objective to limit extraction to no greater than 33%, the 2008 Methow Composite (combined Methow and Chewuch river spawning aggregates) broodstock collection will be predominantly hatchery origin and total 318 spring Chinook (40 wild and 278 Hatchery). The broodstock collected for the Methow Composite production represents 100% of the broodstock necessary to meet Methow Composite program production of 367,000 smolts (combined Methow and Chewuch production), and sufficient to backfill the expected shortfall of 54,900 Twisp River spring Chinook. The Twisp River releases will be limited to releasing progeny of broodstock identified as wild Twisp and or known Twisp hatchery origin fish, per ESA Permit 1196. The Chewuch Pond and Methow FH releases will include progeny of broodstock identified as wild non-Twisp origin and known Methow Composite hatchery origin fish.

Table 1. Brood Year 2003-2005 age-class return projection for wild spring Chinook Dam above Wells during 2008.

BY	Smolt Estimate: Twisp [1/]	Smolt Estimate: Methow Basin [2/]	Age-at-Return Twisp: Age-3	Twisp: Age-4	Twisp: Age-5	Twisp: Total	Methow Basin: Age-3	Methow Basin: Age-4	Methow Basin: Age-5	Methow Basin: Total	SAR [3/]
2003	723	19,026	0	3	**1**	5	6	79	**37**	122	0.0064
2004	5,873	22,941	2	**24**	11	38	7	**95**	44	147	0.0064
2005	5,372	55,381	**2**	22	10	34	**18**	230	106	354	0.0064
2008 Return Year			**2**	**24**	**1**	**28**	**18**	**95**	**37**	**150**	

[1/]- Smolt estimate based on sub-yearling and yearling emigration (Snow et al. 2007)

[2/]- Estimated Methow Basin smolt emigration, based on Twisp Basin smolt emigration, proportional redd deposition in the Twisp River and Twisp Basin smolt production estimate.

[3/]- Median Chiwawa River wild SAR as a surrogate wild SAR for Methow spring Chinook

Table 2. Brood Year 2003-2005 age-class run-escapement projection for Methow Basin hatchery-origin spring Chinook, 2008.

BY	Smolt release: Methow FH	Projected age-class return: Age-3	Age-4	Age-5	SAR	Total
2003	48,831	14	119	**20**	0.0031	**153**
2004	65,146	18	**159**	27	0.0031	**204**
2005	156,633	**44**	383	64	0.0031	**491**
2008 Return Year		**44**	**159**	**20**		**223**
BY	Chewuch Accl.	**Age-3**	**Age-4**	**Age-5**	**SAR**	**Total**
2003	127,614	36	312	**52**	0.0031	**400**
2004	204,906	58	**501**	83	0.0031	**642**
2005	232,811	**66**	569	95	0.0031	**729**
2008 Return Year		**66**	**501**	**52**		**618**
BY	Twisp	**Age-3**	**Age-4**	**Age-5**	**SAR**	**Total**
2003	150,440	42	276	**12**	0.0022	**330**
2004	96,461	27	**177**	8	0.0022	**212**
2005	27,658	**8**	51	2	0.0022	**61**
2008 Return Year		**8**	**177**	**12**		**197**
	Winthrop					**1554**
2008 Return Year						**1554**
Basin Total		**118**	**837**	**84**		**2,592**

Table 3. Assumptions and calculations to determine number of broodstock needed for BY 2008 production of 550,00 smolts

Smolt release		**550,000**	**Smolts**
Fertilization-to-release survival	90%		
Egg-take (Production)		611,000	Eggs
26% cull allowance [2/]		134,300	
Total Egg Take		**745,000**	**Eggs**
Fecundity	4,000 [1/]	186	Females spawned
Female to male ratio	1 to 1	374	Total spawned
Pre-spawn survival	**95%**	**393**	**Broodstock collection target**

[1/]- Based on historical program age-4 fecundities and expected 2008 return age structure (Table 1).

[2/-] Hatchery origin component only, and is based on projected natural origin collection.

Trapping at Wells Dam will begin on 01 May and continue through 27 June 2008. Natural origin spring Chinook will be retained from the run, consistent with spring Chinook run timing at Wells Dam (weekly collection quotas). Once the weekly quota target is reached, broodstock collection will cease until the beginning of the next week. If a shortfall occurs in the weekly trapping quota, the shortfall will carry forward to the following weeks collection quota. All natural origin spring Chinook collected at Wells Dam for broodstock will be held at the Methow FH.

To meet Methow FH broodstock collection for hatchery origin Methow Composite and Twisp River stocks, adipose-present coded-wire tagged hatchery fish will be collected at Methow FH, Winthrop NFH and the Twisp Weir beginning 01May and continuing through 21 August 2008. All hatchery origin fish collected at Methow FH, Twisp Weir and Winthrop NFH for broodstock will be held at the Methow FH.

Steelhead

Steelhead mitigation programs above Wells Dam utilize adult broodstock collections at Wells Dam and incubation/rearing at Wells Fish Hatchery (FH). The Wells Steelhead Program also provides eggs for UCR steelhead reared at Ringold FH, not as a mitigation requirement, but rather an opportunity to reduce the prevalence of early spawn hatchery steelhead in the mitigation component above Wells Dam. Typically, Wells hatchery origin steelhead held at Wells FH spawn earlier than natural origin steelhead. Early maturation of hatchery fish in the hatchery may indicate a propensity for these fish to spawn early in the natural environment as well and may have a negative effect on hatchery spawner success. In efforts to minimize impacts from early maturation, the Wells Hatchery program has transferred eggs from the earliest spawn hatchery steelhead to Ringold FH. Preliminary evaluations indicate that the mean spawn timing of HxH steelhead at Wells FH has been delayed and may be a function of these actions (Figure 1). Based on these preliminary evaluations, WDFW proposes to continue the transfer eggs from early spawn hatchery origin steelhead to Ringold FH.

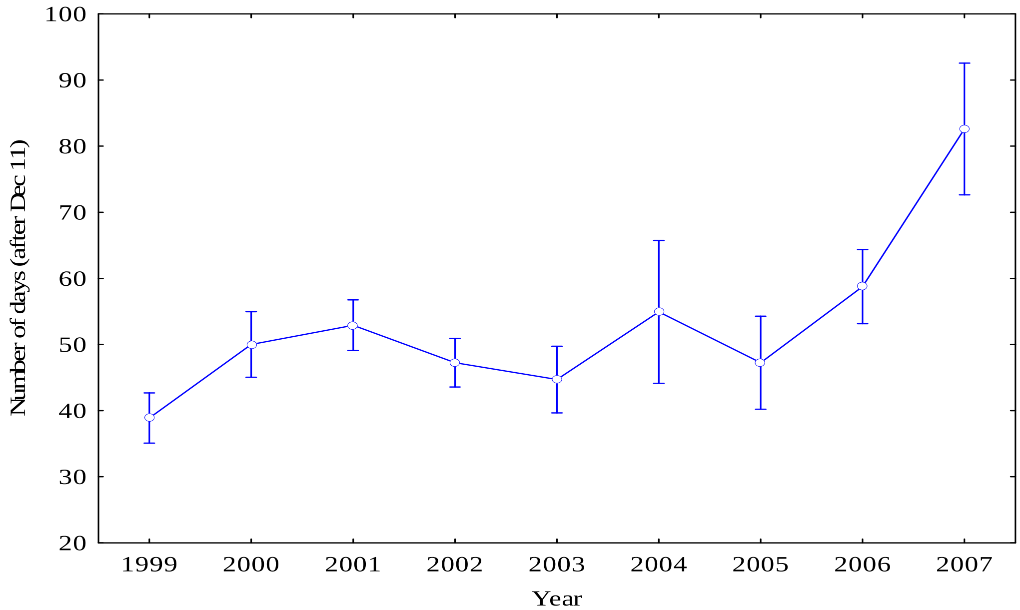


Figure 1. Mean spawn timing of HxH steelhead at Wells FH, BY 1999-2007 (WDFW unpublished Data).

Based on mitigation program production objectives (Table 4) and program assumptions (Table 5), the following broodstock collection protocol was developed.

Trapping at Wells Dam will selectively retain 366 steelhead (east and west ladder collection). The collection will retain no greater than 33% natural origin broodstock for the mitigation programs and 100% hatchery origin within the Ringold FH production component. Overall collection will be limited to no more than 33% of the entire run or 33% of the natural origin return. The east and west ladder trapping at Wells Dam will begin on 01 August and terminate by 31 October and will be operated concurrently, three days per week, up to 16 hours per day, if required to meet broodstock objectives. Trapping on the east ladder will be concurrent with summer Chinook broodstocking efforts through 14 September and will continue through 31 October, concurrent with west ladder steelhead collections. Adult return composition including number, origin, age structure, and sex ratio will be assessed in-season at Priest Rapids and Wells dams. Broodstock collection adjustments may be made based on in-season monitoring and evaluation.

Table 4. Adult steelhead collection objectives for programs supported through adult steelhead broodstock collection at Wells Dam.

Program	# Smolts	# eyed eggs	% Wild	# Wild	# Hatchery	Total Adults
DCPUD [1/]	349,000	401,149	33%	59	119	178
GCPUD [1/]	80,000	91,954	33%	14	27	41
USFWS [1/]	80,000	91,954	33%	14	27	41 [3/]
Sub-Total	**509,000**	**585,057**	**33%**	**87**	**174**	**260**
Ringold	180,000	240,000	0%	0	106	106 [3/]
Sub-Total	**180,000**	**240,000**	**0%**	**0**	**106**	**106**
Grand Total [2/]	**689,000**	**825,057**	**24%**	**87**	**289**	**366**

1/- Above Wells Dam releases. Target HxW parental adults as the hatchery component

2/- Based on steelhead production consistent with Mid Columbia HCP's, GCPUD BiOp and Section 10 Permit 1395.

3/- Based on adults required for eyed egg allotment

Table 5. Program assumptions used to determine adult collection required to meet steelhead production objectives for programs above Wells Dam and at Ringold Springs Fish Hatchery.

Program assumption	Standard
Pre-spawn survival	97%
Female to male ratio	1.0 : 1.0
Fecundity	5,400
Propagation survival	
87% fertilization to eyed egg	87%
86% eyed egg to yearling release	86% [1/]
75% fertilization to yearling release	75% [1/]

1/- Not applicable to Ringold Springs Fish Hatchery

Summer/fall Chinook

Summer/fall Chinook mitigation programs above Wells Dam utilize adult broodstock collections at Wells Dam and incubation/rearing at Eastbank Fish Hatchery. The total production level target is 976,000 summer/fall Chinook smolts for two acclimation/release sites on the Methow and Similkameen rivers (Carlton Pond and Similkameen Pond, respectively).

The TAC 2008 Columbia River UCR summer Chinook return projection to the Columbia River (Appendix A) and BY 2004, 2005 and 2006 spawn escapement to tributaries above Wells Dam indicate sufficient summer Chinook will return past Wells Dam to achieve full broodstock collection for supplementation programs above Wells Dam. Based on initial run expectations of summer Chinook to the Columbia River, program objectives and program assumptions (Table 6); the following broodstock collection protocol was developed.

WDFW will retain 556 natural-origin summer/fall Chinook at Wells Dam east ladder, including 278 females. Collection will be proportional to return timing between 01 July and 13 September. Trapping will occur 3-days/week, 16 hours/day. The 3-year old component will be limited to 10 percent of the broodstock collection. If the probability of achieving the broodstock goal is reduced based on actual natural-origin escapement levels, broodstock origin composition will be adjusted to meet the broodstock collection objective.

Table 6. Assumptions and calculations to determine number of broodstock needed for summer/fall Chinook production at Carlton and Similkameen ponds.

Program Assumption		**Carlton Pond**	**Similkameen Pond**	**Total**
Smolt release		**400,000**	**576,000**	**976,000**
Fertilization-to-release survival	90%			
Eggtake Target		**512,821**	**738,462**	**1,251,282**
Fecundity	5,000			
Female target		**103**	**148**	**250**
Female to male ratio	1 to 1			
Broodstock target		**205**	**295**	**501**
Pre-spawn survival	95%			
Total collection target		**228**	**328**	**556**

Columbia River Mainstem below Wells Dam

Summer/fall Chinook

Summer/fall Chinook mitigation programs that release juveniles directly into the Columbia River between Wells and Rocky Reach dams are supported through adult broodstock collections at Wells Dam. The total production level supported by this collection is 520,000 yearling and 1,562,000 sub-yearling Chinook. For 2008, summer Chinook broodstock collections at Wells FH will also include 250,000 green eggs to support the Yakama Nation reintroduction of summer Chinook to the Yakima River Basin. The Wells HCP HC tentatively approved the green egg collection for the Yakama Nation summer Chinook reintroduction program.

Adults returning from this program are to support harvest opportunities and are not intended to increase natural production and have been termed segregated harvest programs. These programs have contributed to harvest opportunities; however, adults from these programs have been documented contributing to the adult spawning escapement in tributaries upstream and downstream from their release locations. Because adults from these programs contribute to the natural spawn escapement, the broodstock collection will incorporate 10 percent natural-origin fish into the broodstock to reduce the potential genetic risk to the naturalized summer/fall Chinook stocks in the upper Columbia River region. Based on mitigation objectives and program assumptions (Table 7), the following broodstock collection protocol was developed.

WDFW will collect 1,393 run-at-large summer Chinook including 1,254 hatchery fish from the volunteer ladder trap at Wells Fish Hatchery outfall and 139 natural-origin fish from the Wells Hatchery outfall, and/or Wells Dam east and west ladders. Overall extraction of natural-origin fish passing Wells Dam (Wells program and above Wells Dam summer/fall Chinook programs) will not exceed 33 percent. West ladder collections will begin 01 July and completed by 14 September and will be consistent with run timing past Wells Dam. Due to fish health concerns associated with the volunteer collection site, the volunteer collection will begin 10 July and terminate by 31 August, or when the summer Chinook broodstock collection objective is met, which ever is earliest. The 3-year old component will be limited to 10 percent of the broodstock collection.

Table 7. Assumptions and calculations to determine number of broodstock needed for summer/fall Chinook production at Wells and Turtle Rock Island hatcheries.

	Standard		**Wells FH**		**Turtle Rock FH**		**Lake Chelan** [1/]	**YN** [2/]	
Program Assumption	**Sub-yearling**	**Yearling**	**Sub-yearling**	**Yearling**	**Sub-yearling**	**Yearling**	**eye-egg**	**green-egg**	**Total**
Smolt release			484,000	320,000	1,078,000	200,000	NA	250,000	NA
Fertilization-to-release survival	81%	78%					NA	NA	NA
Eggtake Target			597,531	410,256	1,330,864	256,410	100,000	250,000	2,945,062
Fecundity	4,700	4,700							
Female target			127	87	283	55	21	53	627
Female to male ratio	1 to 1	1 to 1							
Broodstock target			254	175	566	110	42	106	1,253
Pre-spawn survival	90%	90%							
Total collection target			**282**	**194**	**629**	**122**	**47**	**118**	**1,393**

[1/]- Lake Chelan eggs will be incorporated into the last egg take and incubated at Wells Hatchery until eyed stage and then shipped to the Lake Chelan RSI program.

[2/]- Green eggs for YN reintroduction program in the Yakima River Basin.

Coho
Yakama Nation will provide broodstock collection objectives for the coho reintroduction program in the Methow River basin. WDFW will work collaboratively with the Yakama Nation to facilitate coho collections at Wells Dam.

Wenatchee River Basin

Spring Chinook
The Eastbank Fish Hatchery (FH) rears spring Chinook salmon for the Chiwawa River acclimation pond located on the Chiwawa River. The program production level target is 672,000 smolts, requiring a total broodstock collection of 379 spring Chinook (Table 8).

Table 8. Assumptions and calculations to determine number of broodstock needed for Chiwawa program release of 672,000 smolts.

Program Assumption	Standard	Chiwawa program
Smolt release		**672,000**
Fertilization-to-release survival	83%	
Eggtake Target		**809,639**
Fecundity	4,400	
Female target		**184**
Female to male ratio	1 to 1	
broodstock target		**368**
Pre-spawn survival	97%	
Total broodstock collection		**379**

Natural origin fish inclusion into the broodstock will continue to be a priority, with natural origin fish specifically being targeted. Consistent with ESA Section 10 Permit 1196, natural origin fish collections will not exceed 33 percent of the return to the Chiwawa River and will provide, at a minimum, 33 percent of the total broodstock retained.

In addition to production levels and ESA permit provisions, the 2008 broodstock collection, will again, as in 2007, target hatchery origin Chinook at Tumwater Dam and will also include, as a interim measure to reduce straying of Chiwawa River spring Chinook, the translocation of age-4 and age-5 adipose-clipped, CWT hatchery spring Chinook not required for broodstock. Translocation for Chiwawa spring Chinook is limited t age-4 and age-5 spring Chinook because age-3 Chiwawa spring Chinook returning will be the first returns associated with the Chiwawa water-warming project, and will therefore be allowed to migrate in-river for efficacy evaluation of the water-warming project.

Pre-season estimates have 3,948 spring Chinook destine for the Chiwawa River, of which 519 (13.1%) and 3,429 fish (86.9%) are expected to be natural and hatchery origin spring Chinook, respectively (Table 9 and 10). Based on the projected 2008 Chiwawa River run-size and origin composition, and provisions in ESA Section 10 Permit 1196, WDFW will retain 379 spring Chinook for broodstock purposes, representing 100% of the program broodstock objective. One hundred and seventy-one (171) natural origin spring Chinook will be retained at the Chiwawa Weir and 208 adipose-clipped, CWT hatchery origin spring Chinook will be collected at Tumwater Dam. In-season assessment of the magnitude and origin composition of the spring Chinook return above Tumwater Dam will be used to provide in-season adjustments to the total broodstock collection, consistent ESA Section 10 Permit 1196.

Table 9. BY 2003-2005 age-class return projection for wild spring Chinook above Tumwater Dam during 2008

	Smolt Estimate		Chiwawa				Wen. Basin above Tumwater Dam				
Brood Year	**Chiwawa** [1/]	**Wen. Basin** [2/]	**Age-3** [3/]	**Age-4** [3/]	**Age-5** [3/]	**Total**	**Age-3** [3/]	**Age-4** [3/]	**Age-5** [3/]	**Total**	**SAR** [4/]
2003	27,897	63,334	9	116	**54**	179	20	263	**122**	405	0.006
2004	101,172	197,944	32	**421**	194	647	63	**823**	380	1,267	0.006
2005	140,737	338,079	**45**	585	270	901	**108**	1,406	649	2,164	0.006
Total 2008 Return			**45**	**421**	**54**	**519**	**108**	**823**	**122**	**1,053**	

[1/]- Smolt production estimate.

[2/]- smolt production estimate based on proportional redd disposition in the Wenatchee Basin above Tumwater Dam and Chiwawa smolt production estimate.

[3/]- Based on average age-at-return for natural-origin spring Chinook above Tumwater Dam (WDFW unpublished data).

[4/]- Median Chiwawa spring Chinook SAR to the Wenatchee Basin (BY 1996-2003)(WDFW unpublished data).

Table 10. BY 2003-2005 age-class return projection for Chiwawa Hatchery spring Chinook above Tumwater Dam during 2008

	Smolt Estimate	Adult Return				
Brood Year	**Chiwawa** [1/]	**Age-3** [2/]	**Age-4** [2/]	**Age-5** [2/]	**Total**	**SAR** [3/]
2003	222,131	359	1,043	**308**	1,710	0.0077
2004	494,517	800	**2,323**	685	3,808	0.0077
2005	494,012	**799**	2,320	685	3,804	0.0077
Total 2008 Return		**799**	**2,323**	**308**	**3,429**	

[1/]- Chiwawa smolt release (Hillman et al. 2007)

[2/]- Based on average age-at-return for natural-origin spring Chinook above Tumwater Dam (Hilllman et al. 2007) . and total estimated BY return.

[3/]- Median Chiwawa hatchery spring Chinook SAR to the Wenatchee Basin (BY 1996-2001)

Trapping at Tumwater Dam will begin 01 May and will be concurrent with trapping for the Spring Chinook Reproductive Success Study. Collection at both Tumwater Dam and Chiwawa Weir will be based on weekly quotas, consistent with average run timing at Tumwater Dam. If the weekly quota is attained prior to the end of the week, retention of spring Chinook for broodstock will cease. If the weekly quota is not attained, the shortfall will carry forward to the next week. To reduce

Chiwawa River hatchery origin fish in other sub-basins, coded-wire tagged spring Chinook that are in excess to weekly quota requirements will be captured and translocated to the Chiwawa River at a location approximately 10 miles upstream from the Chiwawa Weir. The number of hatchery origin fish retained at Tumwater Dam will be adjusted in-season, based on estimated Chiwawa River natural-origin returns provided through extrapolation of returns past Tumwater Dam. If hatchery origin Chinook are retained in excess to that required to maintain a minimum 33 percent natural origin composition in the broodstock, excess fish will be returned to the Chiwawa River beginning the third week of July. Capture and translocation of coded-wire tagged spring Chinook from Tumwater Dam to the Chiwawa River will require additional staff and equipment (distribution trucks).

Broodstock collection at the Chiwawa Weir will begin 01 June and terminate no later than 10 September. Spring Chinook trapping at the Chiwawa Weir will follow a 4-days up and 3-days down schedule, consistent with weekly broodstock collection quotas that approximate the historical run timing and a maximum 33 percent retention of the projected natural-origin escapement to the Chiwawa River. If the weekly quota is attained prior to the end of the 4-day trapping period, trapping will cease. If the weekly quota is not attained within the 4- day trapping period, the shortfall will carry forward to the next week.

All bull trout and spring Chinook in excess of broodstock needs trapped at the Chiwawa weir will be transported by tank truck and released into a resting/recovery pool at least 1.0 km upstream from the Chiwawa River Weir.

Steelhead

The steelhead mitigation program in the Wenatchee Basin use broodstock collections at Dryden and Tumwater dams located on the Wenatchee River. Broodstock collection will target 50% natural origin fish and 50% hatchery origin fish, not to exceed 33% of the natural origin steelhead return to the Wenatchee Basin. Based on these limitations and the assumptions listed below (Table 11), the following broodstock collection protocol was developed.

WDFW will retain 208 mixed origin steelhead at Dryden and Tumwater dams, including 104 natural origin and 104 hatchery origin steelhead. Collection will be proportional to return timing between 01 July and 12 November. Collection may also occur between 13 November and 3 December at both traps, concurrent with the Yakama Nation coho broodstock collection activities. Hatchery x hatchery parental cross and unknown hatchery parental cross adults will be excluded from the broodstock collection. Hatchery steelhead parental origins will be determined through evaluation of VIE tags and PIT tag interrogation during collection. Adult return composition including number, origin, age structure, and sex ratio will be assessed in-season at Priest Rapids and at Dryden Dam. Broodstock collection adjustments may be made based on these in-season monitoring and evaluation.

In the event that steelhead collections fall substantially behind schedule, WDFW may capture some adult steelhead from the mainstem Wenatchee River by hook and line. In addition to trapping and hook and line collection efforts, Tumwater and Dryden dams may be operated between February and early April to supplement broodstock numbers if the fall trapping effort provides fewer than 208 adults.

Table 11. Assumptions and calculations to determine number and origin of adult steelhead needed for Wenatchee Basin Steelhead program release of 400,000 smolts.		
Program Assumption	**Standard**	**Wenatchee program**
Smolt release		**400,000**
Fertilization-to-release survival	75%	
Eggtake Target		**533,333**
Fecundity	5,400	
Female target		**99**
Female to male ratio	1 to 1	
broodstock target		**198**
Pre-spawn survival	95%	
Total broodstock collection		**208**
Natural : hatchery ratio	1 to 1	
Natural origin collection total		**104**
Hatchery origin collection total		**104**

Summer/fall Chinook

Summer/fall Chinook mitigation programs in the Wenatchee River Basin utilize adult broodstock collections at Dryden and Tumwater dams, incubation/rearing at Eastbank Fish Hatchery (FH) and acclimation/release from the Dryden Acclimation Pond. The total production level target is 864,000 smolts.

The TAC 2008 Columbia River UCR summer Chinook return projection to the Columbia River (Appendix A) and BY 2004, 2005 and 2006 spawn escapement to the Wenatchee River indicate sufficient summer Chinook will return to the Wenatchee River to achieve full broodstock collection for the Wenatchee River summer Chinook supplementation program. Review of recent summer/fall Chinook run-timing past Dryden and Tumwater dam indicates that previous broodstock collection activities have omitted the early returning summer/fall Chinook, primarily due to limitations imposed by ESA Section 10 Permit 1347 to minimize impacts to listed spring Chinook. In an effort to incorporate broodstock that better represent the summer/fall Chinook run timing in the Wenatchee Basin, the broodstock collection will front-load the collection to account for the disproportionate collection timing. Approximately 43 percent of the summer/fall Chinook passage to the upper Basin occurs prior to the end of the first week of July; therefore, the collection will provide 43 percent of the objective by the end of the first week of July. Weekly collection after the first week of July will be consistent with run timing of summer/fall Chinook during the remainder of the trapping period. Collections will be limited to a 33 percent extraction of the estimated natural-origin escapement to the Wenatchee Basin. Based on these limitations and the assumptions listed below (Table 12), the following broodstock collection protocol was developed.

WDFW will retain 492 natural-origin, summer Chinook at Dryden and Tumwater dams, including 246 females. To better assure achieving the appropriate females equivalents for programmed production, the collection will utilize ultra-sound equipment to determine the sex of each fish retained for broodstock. Trapping at Dryden Dam will begin 01 July and terminate no later than 31 August and operate up to 7-days/week, 24-hours/day. Trapping at Tumwater Dam may begin 15

July and terminate no later than 31 October and operate 3-days/week, 8-hours/day. Up to 25 percent (123) of the total broodstock collection may occur at Tumwater Dam.

If the probability of achieving the broodstock goal is reduced, based on the estimated escapement levels, broodstock composition will be adjusted to meet the broodstock collection objective of 492 fish.

Table 12. Assumptions and calculations to determine number of summer Chinook broodstock needed for Wenatchee Basin program release of 864,000 smolts.

Program Assumption	Standard	Wenatchee program
Smolt release		**864,000**
Fertilization-to-release survival	78%	
Eggtake Target		**1,107,692**
Fecundity	5,000	
Female target		**222**
Female to male ratio	1 to 1	
broodstock target		**443**
Pre-spawn survival	90%	
Total broodstock collection		**492**

Sockeye

Sockeye Salmon mitigation in the Wenatchee River Basin utilizes adult broodstock collections at Tumwater Dam, incubation/rearing at Eastbank Fish Hatchery (FH) and rearing/pre-smolt releases from the net pens in Lake Wenatchee. The total production level for the 2008 BY is 200,000 pre-smolts. 1/

The TAC 2008 UCR sockeye return projection to Columbia River (Appendix A) indicates sufficient Lake Wenatchee sockeye will be available to meet broodstock collection objectives. Based on TAC projected return, 100% natural-origin broodstock composition and assumptions listed below (Table 13), the following broodstock collection protocol was developed.

WDFW will retain 260 natural origin sockeye, proportional to run timing at Tumwater Dam. Due to the unequal sex ratio in previous years, attempts will be made to collect an equal number of males and females. Trapping may begin on 15 July and terminate by 15 August. Trapping will occur no more than 3-days/week, 8- hours/day.

1/- Chelan HCP Hatchery Committee has agreed to future production level of 280,000 fish, pending appropriate infrastructure improvements.

Table 13. Assumptions and calculations to determine number of sockeye salmon broodstock needed for Wenatchee Basin program release of 200,000 pre-smolts.		
Program Assumption	**Standard**	**Wenatchee program**
Smolt release		**200,000**
Fertilization-to-release survival	78%	
Eggtake Target		**256,410**
Fecundity	2,615	
Female target		**99**
Female to male ratio	1 to 1	
broodstock target		**198**
Pre-spawn survival	76%	
Total broodstock collection		**260**

Coho

Yakama Nation will provide broodstock collection objectives and program assumptions for the coho reintroduction program in the Wenatchee River basin. WDFW will work collaboratively with the Yakama Nation to facilitate coho broodstock collections at Dryden and Tumwater Dam.

White River Spring Chinook Captive Brood

Smolt production associated with the White River Captive Broodstock Program (150,000 smolts) will be separate from the smolt production objective associated with the Chiwawa River adult supplementation program. Spawning, incubation, rearing acclimation and release are components of Grant PUD ESA Section 7 Consultation on Interim Operations for Priest Rapids Hydroelectric Project (FERC 2114) NOAA Fisheries Consultation No. 19999/01878.

Broodstock collection efforts for brood year 2008 will be addressed in a document separate from this 2008 broodstock collection/protocol document and developed through the Priest Rapids Coordinating Committee Hatchery Committee (PRCC HC).

Priest Rapids Fall Chinook

Collection of fall Chinook broodstock at Priest Rapids Hatchery will generally begin in early September and continue through mid November. Smolt release objectives specific to Grant PUD (5,000,000 sub-yearlings) and Federal (1,700,000 sub-yearlings) mitigation commitments and biological assumptions are detailed in Table 14.

Table 14. Assumptions and calculations to determine the number of fall Chinook broodstock needed for the Priest Rapids program release of 6,700,000 sub-yearling fall Chinook		
Biological Assumptions	**Standard**	**Program Objective**
Smolt Production level:		
Grant PUD Mitigation-PUD Funded		**5,000,000**
John Day Mitigation- Federally Funded		**1,700,000**
Fert.-to-release survival	87%	
Eggtake Target		**7,700,000**
Fecundity	*4,500*	
Female requirement		**1,711**
Sex ratio	*1:1*	
Pre-Spawn Survival	*88%*	
Broodstock Required		**3,888**

Appendix A

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

Fishing & Shellfishing

Columbia River Salmon and Steelhead -
2008 Forecasts: Spring Chinook, Summer Chinook and Sockeye

	2007 Forecast	2007 Return	2008 Forecast
Upriver Spring Chinook [1/]	78,500	86,230	269,300
Snake River Spring/Summer Chinook [2/]	*38,500*	*46,200*	*145,400*
Snake River Wild Spring/Summer Chinook [3/]	*13,100*	*10,600*	*21,100*
Upper Columbia Spring Chinook [2/]	*9,200*	*8,600*	*23,300*
Upper Columbia Wild Spring Chinook [4/]	*1,200*	*900*	*2,900*
Upper Columbia Summer Chinook	45,600	37,200	52,000
Willamette Spring Chinook	52,000	40,468	34,000
Cowlitz, Kalama, Lewis River Spring Chinook[6]	15,900		
Yakima Spring Chinook[6]	4,100	2,982	10,060
Klickitat Spring Chinook[6]	1,200	1,105	1,100
Wind[6]	2,100	4,272	
Little White Salmon[6]	6,000	6,254	
Sockeye[5/]	27,300	26,700	75,600
Wenatchee Stock	*6,600*	*4,400*	*13,700*
Okanogan Stock	*20,700*	*23,300*	*61,200*
Snake River Sockeye	*300*	*57*	*700*
Steelhead			
Wild Winter Steelhead	16,200		
Summer Steelhead			
Skamania Hatchery	*12,300*		
Skamania Wild	*4,400*		

A-Index Hatchery	*199,900*		
A-Index Wild	*41,600*		
B-Index Hatchery	*45,600*		
B Index Wild	*10,800*		
Total Summer Steelhead	314,600		

1/ Includes Snake River Summer Chinook.

2/ Included in Upriver Spring Chinook number.

3/ Included in Snake River Spring/Summer Chinook number.

4/ Included in Upper Columbia Spring Chinook number.

5/ Includes Wenatchee, Okanogan, and Snake River stocks.

6/ To mouth of tributary

Prepared by *U.S. v Oregon* Technical Advisor Committee
December 10, 2007

MID-COLUMBIA COHO BROODSTOCK COLLECTION PROTOCOLS 2008

Yakama Nation
Fisheries Resource Management
Mid-Columbia Field Office
7051 Hwy. 97
Peshastin, Washington 98847

This draft broodstock collection protocol targets smolt release numbers anticipated for 2010. This document provides for sufficient operational planning as required to achieve broodstock collection goals and spawning protocols outlined herein.

BROODSTOCK COLLECTION GOALS

In preparation of moving forward with our proposed long-term plan for coho reintroduction in mid-Columbia tributaries, the 2008 brood year production goals are currently set for 1,000,000 and 500,000 smolts. These releases will occur in the Wenatchee and Methow River basins, respectively. Coho returning to the Wenatchee River will primarily be collected at Tumwater Dam with supplemental collections to occur at Dryden Dam and Leavenworth National Fish Hatchery (LNFH). The program goal will be to acquire at least 50% of the proposed broodstock from Tumwater Dam while supplementing the remaining collection at Dryden and LNFH to ensure that overall goals are met. A shift in emphasis towards collection at Tumwater Dam is necessary for further, planned development of the current localized broodstock during implementation of Broodstock Development Phase II (BPDII). BDPII, as outlined in the Mid-Columbia Coho Restoration Master Plan, will rely on upper basin trapping facilities to continue brood adaptation towards geographically and historically high coho escapement areas. Currently, Tumwater Dam is the only viable trapping location that would intercept all upper basin returning coho. In the Methow River, coho will be collected at Wells Dam and Winthrop National Fish Hatchery (WNFH) with Wells Fish Hatchery (FH) as a supplemental brood source location.

Collection goals are based on pre-spawn mortality, average female fecundity, eye-up rates, and hatch rates observed during the past four brood years (2004-2007). Past protocols were derived from observed means for all the programs' brood years. Trends during the past four brood years' has revealed an increase in average fish fecundity and eye-up rate with a decline in pre-spawn mortality. By using all brood years collectively, we would overestimate actual adults needed to meet program goals and create a problematic gamete overage. In the Wenatchee River Basin, a maximum of 960 coho will be necessary to produce 1,000,000 smolts. The proposed goal has been reduced slightly from the previous year because of the aforementioned increased survival observed at every critical rearing stage (Table 1). In the Methow Basin, a maximum of 619 coho will be necessary to produce 500,000 smolts (Table 2). Similar to the Wenatchee basin, these collection goals have been reduced due to increased survival. If insufficient numbers return to the Methow River, two alternatives are available for brood supplementation. The first alternative would require broodstock to be collected from Wells FH via their adult trap. This collection point would target adult coho that originated from the 2007 release at Wells FH; approximately 150,000 smolts. The second alternative would be to collect additional gametes in the Wenatchee River Basin to compensate for Methow project shortfalls.

The Methow River broodstock collection goals are expressed as number of adult coho needed if broodstock was collected solely at Wells Dam or as swim-ins to WNFH (Table 2). The disparities in collection goals are due to observed differences in sex ratios at Wells Dam and WNFH. Ultimately, the combination of females collected at both facilities will drive the total number of broodstock needed for the Methow River program.

Table 1. Wenatchee River Broodstock Collection Goals: 2008

Program Goal (smolts)	% Eyed *	Eyed egg-to-release survival rate	Eggs required for program goal	Eggs per female**	Pre-spawn mortality rate***	Adult Females Required	Total Broodstock Collection ****
1.0 million	.87	.90	1.277 million	2,925	.0313	***451***	***960***

** Observed mean eyed egg rate for the 2004-2007 brood years.*
*** Observed mean fecundity for the 2004-2007 brood years.*
**** Observed pre-spawn mortality rate for the 2004-2007 brood years.*
***** Based on mean male-to-female ratio (53.0%M: 47.0%F) observed in 2000-2007.*

Table 2. Methow River Broodstock Collection Goals: 2008

Program Goal (smolts)	% Eyed*	Eyed egg-to-release survival rate	Eggs required for program goal	Eggs per female**	Pre-spawn Mortality rate***	Adult Females Required (both facilities)	Total Broodstock Collection Swim –in/ Wells Dam****
500,000	.87	.90	640,560	2,669	.0577	***255***	***619/550***

** Observed mean eyed-egg rate for 2005- 2007 brood years. BY 2004 eyed-egg rate was excluded due to a change in the protocols which resulted in poor survival and years 2001-2003 were not a good representation of the current brood development.*
*** Observed mean fecundity for 2004-2007 brood years.*
**** Observed pre-spawn mortality rate for the 2001-2007 brood years.*
***** Based on a mean male-to-female ratio for Winthrop NFH (58.8%M: 41.2%F) for the 2001-2007 BY and Wells Dam (53.6%M: 46.4.0%F) observed for the 2002-2007 BY.*

BROODSTOCK COLLECTION PROTOCOL

Wenatchee River Basin

To maximize genetic diversity, we will collect a representative sample of returning coho from throughout the run. Based on information collected from 2000-2007, we expect the first coho to arrive at Dryden Dam during the first week of September. The run typically continues through the last week of November with peak migration normally occurring between mid to late October. Tumwater run timing, based on past run information, is typically two weeks after Dryden. We expect the first coho mid-September and continue through November with peak migration occurring late October. In an attempt to drive broodstock fitness of the localized broodstock so that it may become better suited for upper basin success, bi-weekly broodstock collection goals have been established accounting for both Tumwater Dam and Dryden Dam. Tumwater collections will focus on incorporating at least 480 coho (50%) from upper basin returns into the broodstock. Dryden will then become the secondary focus but continue to collect throughout the historical, spatial distribution of returning coho but at a smaller sample rate (Table 3). To maximize collection opportunities at Tumwater Dam, upper basin released smolts were marked with a blank wire tag in the adipose fin. This mark was conducted to differentiate upper basin releases from Icicle Creek releases at Dryden Dam. As these uniquely marked, upper basin origin adults enter Dryden Dam, they will be identified as such, PIT tagged, and passed upstream for re-collection at Tumwater Dam. This recapture methodology is necessary to determine at what rate fish passing Dryden Dam are successfully continuing upstream. In past years' observations, coho have had difficulties migrating through the Tumwater corridor for a myriad of assumed reasons. One of these hypothetical rationales is that during most return years, coho experience both high flow and low flow velocity barriers within certain portions of Tumwater Canyon, which restricts them from successfully migrating upstream. Dryden broodstock collections, originating from Leavenworth NFH, will be equally important to ensure program goals are met. If during any two-week period the broodstock collection goals are not met, the deficit will be carried over to the following week. Bi-weekly goals are intended to serve as a guide for collection from throughout the run but may be adjusted mid-season if necessary to ensure that the broodstock collection goal is being met. A minimum of one male will be collected for each female to adhere to spawning protocols.

Table 3. Wenatchee Coho Broodstock Collection Goals, 2008

Week ending	**9/1-9/13**	**9/14-9/27**	**9/28-10/11**	**10/12-10/25**	**10/26-11/8**	**11/9-11/22**	**Total**
Estimated % of run	2.5	7.5	35	35	15	5	100
Tumwater collection (% of bi-weekly total)	0 **(0)**	36 **(50)**	175 **(52)**	175 **(52)**	70 **(49)**	24 **(50)**	480 **(50)**
Dryden collection (% of bi-weekly total)	24 **(100)**	36 **(50)**	161 **(48)**	161 **(48)**	74 **(51)**	24 **(50)**	480 **(50)**
Broodstock Collection Goal (*cumulative totals*)	24	72 (***96***)	336 (***432***)	336 (***768***)	144 (***912***)	48 (***960***)	960

Between September 1 and November 14, broodstock collection at Dryden Dam will take place daily in coordination with Eastbank Fish Hatchery Complex personnel (WDFW). Yakama Nation will provide a minimum of two people each day during this time period to assist in operation and collection at Dryden Dam fish trapping facilities. Between November 15 and December 7, the Yakama Nation is permitted to operate the trapping facility independently but will coordinate with Eastbank FH, WDFW, and CCPUD personnel regarding collections, trap maintenance, and operation.

In 2008, as mentioned previously, Tumwater Dam collection efforts will be maximized so that we may incorporate upper basin coho. If we foresee that our bi-weekly broodstock collection goals, through trapping efforts at Tumwater and Dryden dams will not be met, adult coho will concurrently be trapped at Leavenworth NFH adult ladder to make up the difference. Tumwater Dam operation will be coordinated with Eastbank Fish Hatchery personnel and/or WDFW hatchery evaluation crews. Increased collections at Tumwater Dam in 2008 will be possible due to WDFW's steelhead reproductive success study, which began in 2007. This will allow for collection up to 7 days/week and 16 hours/day between September 1 and December 7, 2008. Differential marking (colored floy-tags) will be utilized on all coho collected at sites other than Dryden Dam, so not to affect future smolt-to-adult survival analyses.

BROODSTOCK COLLECTION PROTOCOL

Methow River Basin

During 2005 and 2006, the primary collection site for the Methow program was Wells Dam. The shift in collection from WNFH to Wells Dam during this tine period was due to insufficient numbers that were volitionally entering the hatchery. Unlike previous years, the 2007 collection was comprised of approximately 61.5% swim-ins. This was the second year that higher than expected numbers of coho entered the hatchery facility. This shift in collection efforts tends to demonstrate that possibly a selection factor was also occurring within the Methow basin. Adults entering volitionally at WNFH are now becoming a predominant component of the broodstock that had not been seen in past years. Although maximizing the successful spawning of these individuals has been a high priority for propelling broodstock development, we also recognize that Wells Dam is still an integral part for establishing a localized broodstock within the Methow River Basin. If production goals are met again in 2008, this would represent the second consecutive year of meeting BDPI requirements with one year remaining before completed this broodstock phase. We will continue to maximize the swim-in component during this broodstock localization process. At Wells Dam, we propose to trap coho three days per week, coinciding and coordinating with WDFW steelhead collections, between September 15 and October 9, at both east and west ladder traps. Between October 10 and December 7, trapping will increase to 7 days per week and up to 16 hours/day, or as needed. If during this timeframe WDFW is not operating one or both of the traps, whether meeting steelhead collection goals or agency decision, YN personnel will operate the facilities solely for coho broodstock collection. All trapping operations will be coordinated with WDFW and DCPUD. When YN personnel are required to manage the traps, active operation will occur. All non-target fish will be passed upstream and properly documented with minimal handling. YN personnel will be responsible for transportation of coho broodstock to WNFH. After November 1, if fish numbers warrant further collection, the west ladder facility may be operated passively. YN personnel will monitor trap operations on a regular basis. If collection goals are not being met, supplemental collection may occur at Wells FH adult trap.

When operating the west ladder trap, coho salmon will be shunted directly from the ladder into the holding facility at Wells FH. Removal of coho from the temporary holding area will be coordinated with Wells FH personnel. No more than 50 coho will be held at a time (1 fish / 10 cu. ft.). When operating the east ladder facility, trapped coho will be placed directly into a transport tank. All coho transported from Wells Dam will have a unique mark to differentiate them from volunteer swim-ins at WNFH.

Bi-weekly collection goals can be found in Table 4. If during any two-week period, the broodstock collection goals are not met, the deficit will be carried over to the following week. The bi-weekly collection goals are intended to serve as a guide to ensure collection from throughout the run but may be adjusted mid-season if necessary to ensure that the total collection goal is met.

The bi-weekly collection goals are expressed in numbers of adult coho needed if broodstock is collected solely at WNFH. Due to the difference in sex ratios observed at WNFH and Wells Dam, the actual number of adult coho collected may need adjustment. Ultimately, the combined number of females collected from both facilities will drive the total number of broodstock collected. A minimum of one male will be collected for each female to adhere to spawning protocols.

Table 4. Methow Coho Collection Goals, 2008.

Week ending	**9/15-9/27**	**9/28-10/11**	**10/12-10/25**	**10/26-11/8**	**11/9-11/22**	**11/23-12/7**	**Total**
Estimated % of run	5	15	40	25	10	5	100
Broodstock Collection Goal (*cumulative totals*)	31	93 (***124***)	248 (***372***)	155 (***527***)	61 (***588***)	31 (***619***)	619

APPENDIX I

2008 CHELAN PUD ACTION PLAN

2008 Rocky Reach and Rock Island
HCP Action Plan

	Dec 2007			Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec			Actual Completion Date
Action Item	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	1	15	31	
HCP COORDINATING COMMITTEE																																								
2007 study results	D											F																												
Deliver 2007 RR Bypass Evaluation report		F																																						11-Dec-07
Deliver 2008 Bypass Evaluation plan	D							F																																11-Jan-08
Deliver 2008 Bypass Report																																					D		F	
Deliver 2008 study plan					D					F																														
Deliver 2008 Study results																																			D				F	
Pikeminnow long-line control programs																																								
Pike minnow angling control programs																																								
Avian Predation programs																																								
Northern Pikeminnow Ladder Trapping RI/RR																																								
Deliver 2008 RI/RR Operations Plan								D			F																													
Deliver 2008 Spill Report																																					F			
Spring Studies																																								
RR 9% Summer Spill																																								
RI 10% Spring spill																																								
RI 20% Summer Spill																																								
RR Juvenile Fish Bypass Operations																																								
Bull Trout Monitoring (BiOp issue)																																								30-Jun-09
HCP Annual Report								D						F																										
HCP HATCHERY COMMITTEE																																								
Integrated Hatchery Improvement Plan										D												D								F										
Eastbank Aquifer Temperature Review								D			F																			D									F	
Determine 2009 hatchery projects																				D												F								
Chelan Falls Rearing Facility (permit & design)																															D									
Chiwawa Steelhead Ponds (permit & design)																															D									
Hatchery M & E Report										D						F																								
2008 Hatchery M & E work plans																					D							F												
2008 Hatchery Operations work plan																															D					F				
2008 Hatchery Operations budget																									D						F									
Tumwater PIT Tag Coil Reciever Completion								X																																
Circular Pond Pilot - Fish in ponds																			X																					
Circular Pond Pilot - Fish out of ponds																																		X						
HCP TRIBUTARY COMMITTEE																																								
Plan Species Account Annual Deposit						X																																		
Project solication process																																								To Be Determined
Project approval deadline																																								To Be Determined
Implementation																																								Ongoing

D = Draft
F = Final

APPENDIX J

2008 ANNUAL FINANCIAL REPORT FOR THE PLAN SPECIES ACCOUNTS



PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

MEMORANDUM

DATE:	**January 6, 2009**
TO:	**Becky Gallaher** **Natural Resources Programs Facilitator**
C:	**Keith Truscott** **Natural Resources Programs Department Manager**
FROM:	**Debbie Litchfield** **Treasurer/Director – Finance Division** Debbie Litchfield
RE:	**Rocky Reach Hydro Project Habitat Conservation Plan** **2008 Annual Financial Report, Plan Species Account**

In accordance with Section 7.4.3 of the Rocky Reach Habitat Conservation Plan attached is the 2008 year end annual financial report of the Plan Species Account activity completed by Chelan County Public Utility District No. 1.

Chelan County PUD
Rocky Reach Hydroelectric Project
Habitat Conservation Plan
Plan Species Cash Account Activity
Annual Financial Report Per Section 7.4.3
Reporting Period: 1/1/2008 - 12/31/2008

Beginning Balance:	**1/1/2008**		**$ 1,076,168.79**
Transfers In:			
Rocky Reach Funding		295,514.00	
Interest Earnings		41,752.66	
			337,266.66
Transfers Out:			
Payments		(106,353.42)	
Bank Service Fees		(94.00)	
			(106,447.42)
Ending Balance:	**12/31/2008**		**$ 1,306,988.03**

The Plan Species Account was established per the Rocky Reach Habitat Conservation Plan, Section 7.4. Interest earnings shall remain in the Account in accordance with Appendix E, Section 7.4.1.

APPENDIX K

MONITORING AND EVALUATION OF THE CHELAN COUNTY PUD HATCHERY PROGRAMS – 2007 ANNUAL REPORT

(Appendix K is provided only in the CD-ROM versions of this report and in the submittal to FERC. This appendix is available from Chelan PUD upon request. In addition, appendices to the M&E report are not included and are also available upon request.)

MONITORING AND EVALUATION OF THE CHELAN COUNTY PUD HATCHERY PROGRAMS

2007 Annual Report

June 1, 2008

Prepared by:

T. Hillman
M. Miller
BioAnalysts, Inc.
Boise, ID

C. Peven
Chelan PUD
Wenatchee, WA

M. Tonseth
T. Miller
K. Truscott
A. Murdoch
WA Dept of Fish and Wildlife
Wenatchee, WA

Prepared for:
HCP Hatchery Committee
Wenatchee, WA

TABLE OF CONTENTS

PREFACE

This annual report is the result of coordinated field efforts conducted by Washington Department of Fish and Wildlife (WDFW), the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), Chelan County Public Utility District (Chelan PUD), and BioAnalysts, Inc. An extensive amount of work was conducted in 2006 and 2007 to collect the data needed to monitor the effects of the Chelan County PUD Hatchery Programs. This work was directed and coordinated by the Habitat Conservation Plan (HCP) Hatchery Committee, consisting of the following members: David Carie, U.S. Fish and Wildlife Service (USFWS); Jerry Marco, Confederated Tribes of the Colville Reservation (Colville Tribes); Kristine Petersen, National Marine Fisheries Service (NMFS); Shaun Seaman, Chelan County PUD; Tom Scribner, the Yakama Nation; and Kirk Truscott, WDFW.

The approach to monitoring the hatchery programs was guided by the "*Conceptual Approach to Monitoring and Evaluating the Chelan County Public Utility District Programs*" written by Andrew Murdoch and Chuck Peven. Technical aspects of the monitoring and evaluation program were developed by the Hatchery Evaluation Technical Team (HETT), which consists of the following scientists: Matt Cooper, USFWS; Steve Hays, Chelan PUD; Tracy Hillman, BioAnalysts; Tom Kahler, Douglas PUD; Rick Klinge, Douglas PUD; Russell Langshaw, Grant PUD; Ben Lenz, Grant PUD; Andrew Murdoch, WDFW; Keely Murdoch, Yakama Nation; Kristine Petersen, NMFS; Chuck Peven, Chelan PUD; and Ali Wick, Anchor Environmental. The HETT developed an "*Analytical Framework for Monitoring and Evaluating PUD Hatchery Programs*" (Hays et al. 2006), which directs the analyses of hypotheses developed under the conceptual approach. Most of the analyses outlined in the Analytical Framework paper will be conducted after the fifth year of monitoring.

Most of the work reported in this paper was funded by Chelan PUD. Bonneville Power Administration purchased the Passive Integrated Transponder (PIT) tags that were used to mark juvenile Chinook and steelhead. This is the second annual report written under the direction of the HCP.

"I often say that when you can measure something and express it in numbers, you know something about it. When you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind. It may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the stage of science, whatever it may be."

Lord Kelvin

SECTION 1: INTRODUCTION

Chelan PUD implements hatchery programs as part of two Habitat Conservation Plan (HCP) agreements related to the operation of Rocky Reach and Rock Island dams. The HCPs define the goal of achieving no net impact to spring Chinook, summer/fall Chinook, sockeye salmon, steelhead, and coho salmon affected by the operation of these dams. The two HCPs identify general program objectives as "*contributing to the rebuilding and recovery of naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest*." The fish resource management agencies initially developed the following general goal statements for each hatchery program, which were adopted by the Hatchery Committee:

(1) *Support the recovery of ESA listed species by increasing the abundance of natural adult population, while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity.*

Includes the Wenatchee spring Chinook, Wenatchee summer steelhead, and Methow spring Chinook programs.

(2) *Increase the abundance of the natural adult population of unlisted plan species, while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity. In addition, provide harvest opportunities in years when spawning escapement is sufficient to support harvest.*

Includes the Wenatchee sockeye, Wenatchee summer/fall Chinook, Methow summer/fall Chinook, Okanogan summer/fall Chinook, and Okanogan sockeye programs.

(3) *Provide salmon for harvest and increase harvest opportunities, while segregating returning adults from natural tributary spawning populations.*

Includes the Turtle Rock summer/fall Chinook program.

Thus, there are two different types of artificial propagation strategies that address the different goals of the program: supplementation and harvest augmentation. The supplementation programs primarily focus on increasing the natural production of fish in tributaries. A fundamental assumption of this strategy is that hatchery fish returning to the spawning grounds are "reproductively similar" to naturally produced fish. The second program type, harvest augmentation, focuses on increasing harvest opportunities. This is accomplished by releasing hatchery fish directly into the Columbia River with the intent that returning adults remain segregated from the naturally spawning populations in tributaries.

Monitoring is needed to determine if the programs are performing properly. The HCP Hatchery Committee adopted a monitoring and evaluation (M&E) approach that will guide the assessment of the hatchery programs. The approach, developed by Murdoch and Peven (2005), identified the following objectives:

(1) Determine if supplementation programs have increased the number of naturally spawning and naturally produced adults of the target population relative to a non-supplemented population (i.e., reference stream) and the changes in the natural replacement rate (NRR) of the supplemented population is similar to that of the non-supplemented population.

(2) Determine if the run timing, spawn timing, and spawning distribution of both the natural and hatchery components of the target population are similar.

(3) Determine if genetic diversity, population structure, and effective population size have changed in natural spawning populations as a result of the hatchery program. Additionally, determine if hatchery programs have caused changes in phenotypic characteristics of natural populations.

(4) Determine if the hatchery adult-to-adult survival (i.e., hatchery replacement rate or HRR) is greater than the natural adult-to-adult survival (i.e., natural replacement rate or NRR) and equal to or greater than the program specific HRR expected value based on survival rates listed in the BAMP (1998).

(5) Determine if the stray rate of hatchery fish is below the acceptable levels to maintain genetic variation between stocks.

(6) Determine if hatchery fish were released at the programmed size and number.

(7) Determine if the proportion of hatchery fish on the spawning grounds affects the freshwater productivity (i.e., number of juveniles per redd) of supplemented streams when compared to non-supplemented streams.

(8) Determine if harvest opportunities have been provided using hatchery returning adults where appropriate (e.g., Turtle Rock program).

Two additional objectives that were not explicit in the goals specified above but were included in the M&E approach because they relate to goals and concerns of all artificial production programs include:

(9) Determine whether bacterial kidney disease (BKD) management actions lower the prevalence of disease in hatchery fish and subsequently in the naturally spawning population. In addition, when feasible, assess the transfer of *Renibacterium salmoninarum* (Rs) infection at various life stages from hatchery fish to naturally produced fish.

(10) Determine if the release of hatchery fish impact non-target taxa of concern (NTTOC) within acceptable limits.

Attending each objective is one or more testable hypotheses (see Murdoch and Peven 2005). Each hypothesis will be tested statistically following the routines identified in Hays et al. (2006). Most of these analytical routines will be conducted at the end of five-year monitoring blocks, as outlined in the M&E plan (Murdoch and Peven 2005; Hays et al. 2006).

Throughout each five-year monitoring period, annual reports will be generated that describe the M&E data collected during a specific year. This is the second annual report developed under the direction of the M&E guidance approach (Murdoch and Peven 2005). The purpose of this report is to describe monitoring activities conducted in 2007. Activities included broodstock collection, collection of life-history information, within hatchery spawning and rearing activities, juvenile monitoring within streams, and redd and carcass surveys. Data from reference areas are not included in this annual report, because the process of selecting reference areas is still occurring. To the extent currently possible, we have included information collected before 2007.

This report is divided into several sections, each representing a different species (i.e., steelhead, sockeye salmon, spring Chinook, and summer Chinook). For all species we provide broodstock information; hatchery rearing history, release data, and survival estimates; juvenile migration and productivity estimates; redd counts, distribution, and spawn timing; spawning escapements; and life-history characteristics. For salmon species, we also provide information on carcasses.

Finally, we end each section by addressing compliance issues with ESA/HCP mandates. For each Chelan PUD Hatchery Program, WDFW and the PUD are authorized annual take of ESA-listed spring Chinook and steelhead through Section 10 of the Endangered Species Act (ESA), including:

1. ESA Section 10(a)(1)(A) Permit No. 1395, which authorizes the annual take of adult and juvenile endangered upper Columbia River (UCR) spring Chinook and threatened UCR steelhead associated with implementing artificial propagation programs for the enhancement of UCR steelhead. The authorization includes takes associated with adult broodstock collection, hatchery operations, juvenile fish releases, monitoring and evaluation activities, and management of adult returns related to UCR steelhead artificial propagation programs in the UCR region (NMFS 2003a).
2. ESA Section 10(a)(1)(A) Permit No. 1196, which authorizes the annual take of adult and juvenile endangered UCR spring Chinook and threatened UCR steelhead associated with implementing artificial propagation programs for the enhancement of UCR spring Chinook. The authorization includes takes associated with adult broodstock collection, hatchery operations, juvenile fish releases, and monitoring and evaluation activities supporting UCR spring Chinook artificial propagation programs in the UCR region (NMFS 2004).
3. ESA Section 10(a)(1)(A) Permit No. 1347, which authorizes the annual incidental take of adult and juvenile endangered UCR spring Chinook and threatened UCR steelhead through actions associated with implementing artificial propagation programs for the enhancement of non-listed anadromous fish populations in the UCR. The authorization includes incidental takes associated with adult broodstock collection, hatchery operations, juvenile fish releases, and monitoring and evaluation activities associated with non-listed summer Chinook, fall Chinook, and sockeye salmon artificial propagation programs in the UCR region (NMFS 2003b).

SECTION 2: SUMMARY OF METHODS

Sampling in 2007 followed the methods and protocols described in Murdoch and Peven (2005) and Peven (2006). In this section we only briefly review the methods and protocols. More detailed information can be found in Murdoch and Peven (2005) and Peven (2006).

2.1 Broodstock Sampling

Methods for collecting broodstock during 2007 are described in Appendix A in WDFW (2007). Methods for sampling broodstock are described in Appendices A and B in Murdoch and Peven (2006). Generally, 2007 broodstock were collected over the migration period (to the extent allowed in ESA-permit provisions) in proportion to their temporal occurrence at collection sites, with in-season adjustments dictated by 2007 run timing and trapping success relative to achieving weekly and annual collection objectives. Pre-season weekly collection objectives are shown in Table 2.1 and assumptions associated with broodstock trapping are provided in Table 2.2.

Table 2.1. Weekly collection objectives for steelhead, sockeye, and Chinook in 2007.

Collection week beginning day	Chiwawa Spring Chinook[a]		Wild Wenatchee Summer Chinook	Wild ME/OK Summer Chinook	Wenatchee Steelhead		Wild Wenatchee Sockeye[b]	
	Hatchery	Wild			Hatchery	Wild	Male	Female
20 May	1							
27 May	5	2						
3 June	11	5						
10 June	17	5						
17 Jun	19	6						
24 Jun	22	6						
1 Jul	27	7	126	87	1	1		
8 Jul	14	5	98	83	1	1		
15 Jul	4	2	82	83	1	1	20	20
22 Jul	3	1	63	73	1	1	41	41
29 Jul	0	1	44	59	1	1	25	25
5 Aug			29	44	4	4	20	20
12 Aug			21	40	7	7	16	16
19 Aug			16	26	8	8	8	8
26 Aug			13	24	7	7		
2 Sep				23	6	6		
9 Sep				14	6	6		
16 Sep					8	8		
23 Sep					9	9		
30 Sep					17	17		
7 Oct					15	15		
14 Oct					8	8		
21 Oct					4	4		
28 Oct								

Collection week beginning day	Chiwawa Spring Chinook[a]		Wild Wenatchee Summer Chinook	Wild ME/OK Summer Chinook	Wenatchee Steelhead		Wild Wenatchee Sockeye[b]	
	Hatchery	Wild			Hatchery	Wild	Male	Female
Total	**123**	**40**	**492**	**556**	**104**	**104**	**130**	**130**

[a] Collection quota based on 30 April 2007 run-escapement abundance and migration timing estimate.
[b] Collection targeted equal numbers of males and females.

Table 2.2. Biological and trapping assumptions associated with collecting broodstock for the Chelan PUD Hatchery Programs.

Assumptions	Wenatchee Steelhead	Wenatchee Sockeye	Chiwawa Spring Chinook	Wenatchee Summer Chinook	ME/OK Summer Chinook
Production level	400,000 yearling smolts	200,000 subyearlings	672,000 yearling smolts	864,000 yearling smolts	976,000 yearling smolts
Broodstock required	208 adults (not to exceed 33% of population)	260 adults (not to exceed 33% of population)	379 adults (not to exceed 33% of population)	492 adults (not to exceed 33% of the population)	556 adults (not to exceed 33% of the population)
Trapping period	7 July – 12 Nov	7 July – 28 Aug	1 May – 12 Sep	7 Jul – 12 Sep	7 Jul – 15 Sep
# days/week	5	3	4	5	3
# hours/day	24	16	24	24	16
Broodstock composition	50% wild; 50% WxW and/or HxW	100% wild	Sliding scale; minimum 33% wild (depends on the number of wild fish)	100% wild	100% wild
Trapping site	Dryden Dam (Tumwater will be used if weekly quota not achieved at Dryden Dam)	Tumwater Dam	Tumwater Dam (hatchery fish only) and the Chiwawa Weir (both hatchery and wild fish)	Dryden Dam (Tumwater will be used if weekly quota not achieved at Dryden Dam)	Wells Dam east ladder

Several biological parameters were measured during broodstock collection at adult collection sites. Those parameters included the date and start and stop time of trapping; number of each species collected for broodstock; origin, size, and sex of trapped fish; age from scale analysis; and pre-spawn mortality. For each species, trap efficiency, extraction rate, and trap operation effectiveness were estimated following procedures in Appendix B in Murdoch and Peven (2006). In addition, a representative sample of most species trapped but not taken for broodstock were sampled for origin, sex, age, and size (stock assessment). All steelhead trapped were sampled.

2.2 Within Hatchery Monitoring

Methods for monitoring hatchery activities are described in Appendix C in Murdoch and Peven (2005). Biological information collected from all spawned adult fish included age at maturity, length at maturity, spawn timing, and fecundity of females. In addition, all fish were checked for tags and females were sampled for disease.

Throughout the rearing period in the hatchery, fish were sampled for growth, health, and survival. Each month, lengths and weights were collected from a sample of fish and rearing density indices were calculated. In addition, fish were examined monthly for health problems following standard fish health monitoring practices for hatcheries. Various life-stage survivals were estimated for each hatchery stock. These estimates were then compared to the standard survival rates identified in Table 2.3 to provide insight as to how well the hatchery operations were performing. Failure to achieve a survival standard could indicate a problem with some part of the hatchery program. However, failure to meet a standard may not be indicative of the overall success of the program to meet the goals identified in Section 1.

Table 2.3. Standard life-stage survival rates for fish reared within the Chelan PUD hatchery programs.

Life stage	Standard survival rate (%)
Collection-to-spawning (females)	90
Collection-to-spawning (males)	85
Unfertilized egg-to-eyed	92
Unfertilized egg-to-ponding	98
30 d after ponding	97
100 d after ponding	93
Ponding-to-release	90
Transport-to-release	95
Unfertilized egg-to-release	81

Nearly all hatchery fish from each stock were marked (adipose fin clip) or tagged (coded-wire tag or elastomer tag). Different combinations of marks and tags were used depending on the stock. In addition, about 10,000 juvenile hatchery fish from each stock of steelhead (HxW-early production, HxW-late production, and WxW) and spring Chinook were PIT tagged during late July and September to aid in estimating survival rates (e.g., smolt-to-adult) outside the hatchery. About 15,000 juvenile sockeye were PIT tagged in June.

Lastly, the size and number of fish released were assessed and compared to programmed production levels. The goal of the program is that numbers released and their sizes should fall within 10% of the programmed targets identified in Table 2.4. However, because of constraints due to run size and proportions of wild and hatchery adults, production levels may not be met every year.

Table 2.4. Targets for fish released from the Chelan PUD hatchery programs; CV = coefficient of variation.

Hatchery stock	Release targets	Size targets		
		Fork length (CV)	Weight (g)	Fish/pound
Wenatchee Summer Chinook	864,000	176 (9.0)	45.4	10
Okanogan Summer Chinook	576,000	176 (9.0)	45.4	10
Methow Summer Chinook	400,000	176 (9.0)	45.4	10
Turtle Rock Summer Chinook (yearlings)	200,000	176 (9.0)	45.4	10
Turtle Rock Summer Chinook (subyearlings)	1,620,000	112 (9.0)	11.4	40
Chiwawa Spring Chinook	672,000	176 (9.0)	37.8	12
Wenatchee Sockeye	200,000	133 (9.0)	22.7	20

Hatchery stock	Release targets	Size targets		
		Fork length (CV)	Weight (g)	Fish/pound
Wenatchee Steelhead	400,000	198 (9.0)	75.6	6

2.3 Juvenile Sampling

Juvenile sampling within streams included operation of rotary smolt traps, snorkel observations, and PIT tagging. Methods for sampling juvenile fish are described in Appendix E in Murdoch and Peven (2005).

Smolt traps were located on the Wenatchee River at river km 9.6 at the West Monitor Bridge (Lower Wenatchee Trap) and about 0.5 km downstream from the mouth of Lake Wenatchee (Upper Wenatchee Trap), and in the Chiwawa River about 1 km upstream from the mouth (Chiwawa Trap). All traps operated throughout the smolt migration period. The Chiwawa Trap operated throughout most of the year (March through November) and not during icing or extreme high flow conditions. The following data were collected at each trap site: water temperature, discharge, number and identification of all species captured, degree of smoltification for anadromous fish, presence of marks and tags, size (fork lengths and weights), and scales from steelhead and sockeye salmon smolts. Trap efficiencies at each trap site were estimated by using mark-recapture trials conducted over a wide range of discharges. Linear models relating discharge and trap efficiencies were developed to estimate daily trap efficiencies during periods when no mark-recapture trials were conducted. The total number of fish migrating past the trap each day was estimated as the quotient of the daily number of fish captured and the estimated daily trap efficiency. Summing the daily totals resulted in the total emigration estimate.

Snorkel observations were used to estimate the number of juvenile spring Chinook salmon, juvenile rainbow/steelhead, and bull trout within the Chiwawa River basin. The focus of the study was on juvenile spring Chinook salmon. Sampling followed a stratified random design with proportional allocation of sites among strata. Strata were identified based on unique combinations of geology, land type, valley bottom type, stream state condition, and habitat types. A total of 189 randomly selected sites were surveyed during August (Table 2.5). Counts of fish within each sampling site were adjusted based on water temperatures. That is, non-linear models that described relationships between water temperatures and detection efficiencies (Hillman et al. 1992) were used to estimate total numbers of fish within sampling sites. These numbers were then converted to densities by dividing total fish numbers by the wetted surface area and water volume of sample sites. Total numbers within a stratum were estimated as the product of fish densities times the total wetted surface or water volume for the stratum. The sum of fish numbers across strata resulted in the total number of fish within the basin. The calculation of total numbers, densities, and degrees of certainty are fully explained in Hillman and Miller (2004).

Working in collaboration with the Integrated Status and Effectiveness Monitoring Program (ISEMP) funded by NOAA Fisheries and Bonneville Power Administration (BPA), crews PIT tagged juvenile wild Chinook and wild and hatchery steelhead throughout the Wenatchee basin. Tags were injected into juvenile fish collected at the Chiwawa Trap, Upper Wenatchee Trap, and the Lower Wenatchee Trap. In addition, fish were collected and tagged in the Chiwawa River upstream from the trap, in Nason Creek, and in the upper Wenatchee River between Tumwater and Lake Wenatchee. The proposed number of wild spring Chinook and steelhead to be tagged at each location is provided in Table 2.6. The goal of this work was to better understand the life-history characteristics of fish in the Wenatchee Basin and to estimate SARs. This in turn improves the ability to detect potential impacts of the hatchery program on wild fish.

Table 2.5. Location of strata and numbers of randomly sampled sites within each strata that were sampled in the Chiwawa River basin in 2007.

Reach/stratum	River kilometers (RKm)	Number of randomly selected sites
Chiwawa River		
1	0.0-6.1	12
2	6.1-8.9	6
3	8.9-12.7	8
4	12.7-14.3	6
5	14.3-17.4	4
6	17.4-19.0	7
7	19.0-32.2	39
8	32.2-40.9	22
9	40.9-46.4	11
10	46.4-50.1	8
Phelps Creek		
1	0.0-0.6	3
Chikamin Creek (includes Minnow Creek)		
1	0.0-1.5	29
Rock Creek		
1	0.0-1.2	12
Peven Creek (unnamed stream on USGS map)		
1	0.0-0.1	6
Big Meadow Creek		
1	0.0-1.6	21
Alder Creek		
1	0.0-0.1	2
Brush Creek		
1	0.0-0.1	4
Y Creek		
1	0.0-0.1	2

Table 2.6. Number of wild spring Chinook and steelhead proposed for tagging at different locations within the Wenatchee Basin, 2007.

Sampling location	Target sample size	
	Wild spring Chinook	Wild steelhead
Chiwawa Trap	2,500-8,000	500-2,000
Chiwawa River	500-2,000	500-2,000
Upper Wenatchee Trap	500-1,000	50-250
Upper Wenatchee	500-2,000	500-2,000
Nason Creek	500-2,000	500-2,000
Lower Wenatchee Trap	1,000-2,000	500-2,500
Total	**5,500-17,000**	**2,550-10,750**

Survival rates for various juvenile life-stages were calculated based on estimates of seeding levels (total egg deposition), numbers of parr, numbers of emigrants, and numbers of smolts. Total egg deposition was estimated as the product of the number of redds counted in the basin times the mean fecundity of female spawners. Fecundity was estimated from females collected for broodstock using an electronic egg counter. Numbers of emigrants and smolts were estimated at trapping sites and numbers of parr were estimated using snorkel observations only in the Chiwawa Basin. Survival estimates could not be calculated for some stocks (e.g., summer Chinook) because life-stage abundance estimates were lacking.

2.4 Spawning/Carcass Surveys

Methods for conducting carcass and spawning ground surveys are detailed in Appendix F in Murdoch and Peven (2005). Information collected during spawning surveys included spawn timing, redd distribution, and redd abundance. Data collected during carcass surveys included sex, size (fork length and postorbital-to-hypural length), scales for aging[1], degree of egg voidance, DNA samples, and identification of marks or tags. The sampling goal for carcasses was 20% of the spawning population. Crews also conducted snorkel surveys to assess the incidence of precocial fish spawning naturally in streams.

Both redd and carcass surveys were conducted in reaches that encompassed the spawning distribution of most populations. Steelhead surveys were the exception. These surveys were conducted within major spawning areas in the basin and therefore may not capture the entire spawning distribution of the population. Steelhead surveys were conducted during March through June in reaches and index areas described in Table 2.7. Total redd counts were estimated by expanding counts within non-index areas by expansion factors developed within index areas.

[1] In this report we use two methods of describing age. One is termed the “European Method.” This method has two digits, separated by a period. The first digit represents the number of winters the fish spent in freshwater before emigrating to the sea. The second digit indicates the number of winters the fish spent in the ocean. For example, a fish designated as 1.2 spent one winter in freshwater and two in the ocean. A fish designated as 0.3 emigrated to the ocean in its first year and spent three winters in the ocean. The other method describes the total age of the fish (egg-to-spawning adult, i.e., gravel-to-gravel), so fish demarcated as 0.3 or 1.2 are considered 4-year-olds, from the same brood.

Table 2.7. Description of reaches and index areas surveyed for steelhead redds in the Wenatchee Basin.

Stream	Code	Reach	Index/reference area
Wenatchee River	W2	Sleepy Hollow Br to L. Cashmere Br	Monitor Boat Rmp to Cashmere Boat Rmp
	W6	Leavenworth Br to Icicle Rd Br	Leavenworth Boat Ramp to Icicle Ck
	W8	Tumwater Dam to Tumwater Br	Swift Boat Ramp to Tumwater Br
	W9	Tumwater Br to Chiwawa R	Tumwater Br to Plain
	W10	Chiwawa R to Lk Wenatchee	Chiwawa Pump St. to Lk Wenatchee
Peshastin Creek	P1	Mouth to Camas Cr	Kings Br to Camas Cr
	P2A	Camas Cr to Mouth of Scotty Cr	Ingalls Cr to Ruby Cr
	P2	Camas Cr to Mouth of Scotty Cr	FR7620 to Shaser Cr
Ingalls Creek	D1	Mouth to Trailhead RM 1	Mouth to Trailhead RM 1
	D2	Trailhead to Wilderness Bd RM 1.5	Trailhead to Wilderness Bd RM 1.5
Chiwawa River	C1	Mouth to Grouse Cr	Mouth to Rd 62 Br RM 6.4
	C2	Grouse Cr to Rock Cr	Chikamin Cr to Log Jam
Clear Creek	V1	Mouth to Hwy 22	Mouth to Hwy 22
	V2	Hwy 22 to Lower Culvert RM 2	Hwy 22 to Lower Culvert
Nason Creek	N1	Mouth to Kahler Cr Br	Mouth to Swamp Cr
	N3	Hwy 2 Br to Lower RR Br	Hwy 2 Br to Merrit Br
	N4	Lower RR Br to Whitepine Cr	Rayrock to Church Camp
Icicle River	I1	Mouth to Hatchery	Mouth to Boulder Block
Little Wenatchee	L2	Mouth to Lost Cr	Old Fish Weir to Lost Cr
	L3	Lost Cr to Rainy Cr Br	Lost Cr to Rainy Cr Br
White River	H2	Sears Cr Br to Napeequa R	Riprap Bank to Napeequa R
	H3	Napeequa R to Mouth of Panther Cr	Napeequa R to Grasshopper Meadows
Napeequa River	Q1	Mouth to RM 1	Mouth to RM1

Spring Chinook redd and carcass surveys were conducted during August through September in the Chiwawa River (including Rock and Chikamin creeks), Nason Creek, Icicle Creek, Peshastin Creek (including Ingalls Creek), upper Wenatchee River, Little Wenatchee River, and the White River (including the Napeequa River and Panther Creek). Survey reaches for spring Chinook are described in Table 2.8.

Table 2.8. Description of reaches surveyed for spring Chinook redds and carcasses in the Wenatchee Basin.

Stream	Code	Reach	River mile (RM)
Chiwawa River	C1	Mouth to Grouse Creek	0.0-11.7
	C2	Grouse Creek to Rock Creek	11.7-19.3
	C3	Rock Creek to Schaefer Creek	19.3-22.4
	C4	Schaefer Creek to Atkinson Flats	22.4-25.6
	C5	Atkinson Flats to Maple Creek	25.6-27.0
	C6	Maple Creek to Trinity	27.0-30.3
Rock Creek	R1	Mouth to End	0.0-0.5
Chikamin Creek	K1	Mouth to End	0.0-0.5
Nason Creek	N1	Mouth to Kahler Creek Bridge	0.0-3.9
	N2	Kahler Creek Bridge to Hwy 2 Bridge	3.9-8.3
	N3	Hwy 2 Bridge to Lower RR Bridge	8.3-13.2
	N4	Lower RR Bridge to Whitepine Creek	13.2-15.4
Little Wenatchee River	L2	Old Fish Weir to Lost Creek	2.7-5.2
	L3	Lost Creek to Rainy Creek	5.2-9.2
	L4	Rainy Creek to Falls	9.2-Falls
White River	H2	Sears Creek Bridge to Napeequa River	6.4-11.0
	H3	Napeequa River to Grasshopper Meadows	11.0-12.9
Napeequa River	Q1	Mouth to End	0.0-1.0
Panther Creek	T1	Mouth to End	0.0-0.7
Wenatchee River	W9	Tumwater Bridge to Chiwawa River	35.6-48.4
	W10	Chiwawa River to Lake Wenatchee	48.4-54.2
Icicle Creek	I1	Mouth to Boulder Block	0.0-4.0
Peshastin Creek	P1	Mouth to Camas Creek	0.0-5.9
	P2	Camas Creek to Mouth of Scotty Creek	5.9-16.3
Ingalls Creek	D1	Mouth to Trailhead	0.0-1.0

Surveys for live sockeye and carcass were conducted during August through October in the White, Napeequa, and Little Wenatchee rivers. No sockeye redds were counted in 2007. Live fish counts were used to estimate spawning escapements using the area-under-the-curve (AUC) method.

Table 2.9. Description of reaches surveyed for sockeye salmon carcasses and live fish in the Wenatchee Basin.

Stream	Code	Reach	River mile (RM)
Little Wenatchee River	L1	Mouth to Old Fish Weir	0.0-2.7
	L2	Old Fish Weir to Lost Creek	2.7-5.2
	L3	Lost Creek to Rainy Creek	5.2-9.2
White River	H1	Mouth to Sears Creek Bridge	0.0-6.4
	H2	Sears Creek Bridge to Napeequa River	6.4-11.0
	H3	Napeequa River to Grasshopper Meadows	11.0-12.9
Napeequa River	Q1	Mouth to End	0.0-1.0

Wenatchee summer Chinook surveys were conducted during September through November within ten reaches on the Wenatchee River (Table 2.10). Both peak redd counts and total redd counts were estimated in the Wenatchee River. Total redd counts were only conducted within index areas, not throughout the entire river. Total redd counts for the entire river were estimated by expanding the peak counts within non-index areas by expansion factors developed within index areas.

Table 2.10. Description of reaches and index areas surveyed for summer Chinook redds in the Wenatchee Basin.

Code	Reach	River mile	Index/reference area
W1	Mouth to Sleepy Hollow Br	0.0-3.5	Monitor Br to L. Cashmere Br
W2	Sleepy Hollow Br to L. Cashmere Br	3.5-9.5	
W3	L. Cashmere Br to Dryden Dam	9.5-17.5	
W4	Dryden Dam to Peshastin Br	17.5-20.0	Dryden Dam to Peshastin Br
W5	Peshastin Br to Leavenworth Br	20.0-23.9	
W6	Leavenworth Br to Icicle Rd Br	23.9-26.4	Icicle to Takeout
W7	Icicle Rd Br to Tumwater Dam	26.4-30.9	Swiftwater Campground to Tumwater Br
W8	Tumwater Dam to Tumwater Br	30.9-35.6	
W9	Tumwater Br to Chiwawa River	35.6-48.4	Swing Pool to Railroad Tunnel
W10	Chiwawa River to Lake Wenatchee	48.4-54.2	Swamp to Bridge

Summer Chinook surveys were also conducted in the Methow, Okanogan, and Similkameen rivers during September through November. Total redd counts were conducted in these rivers. Table 2.11 describes the survey reaches in these rivers.

Table 2.11. Description of reaches surveyed for summer Chinook redds and carcasses on the Methow, Okanogan, and Similkameen rivers.

Stream	Code	Reach	River mile (RM)
Methow River	M1	Mouth to Methow Bridge	0.0-14.8
	M2	Methow Bridge to Carlton Bridge	14.8-27.2
	M3	Carlton Bridge to Twisp Bridge	27.2-39.6
	M4	Twisp Bridge to MVID	39.6-44.9
	M5	MVID to Winthrop Bridge	44.9-49.8
	M6	Winthrop Bridge to Hatchery Dam	49.8-51.6
Okanogan River	O1	Mouth to Mallot Bridge	0.0-16.9
	O2	Mallot Bridge to Okanogan Bridge	16.9-26.1
	O3	Okanogan Bridge to Omak Bridge	26.1-30.7
	O4	Omak Bridge to Riverside Bridge	30.7-40.7
	O5	Riverside Bridge to Tonasket Bridge	40.7-56.8
	O6	Tonasket Bridge to Zosel Dam	56.8-77.4
Similkameen River	S1	Driscoll Channel to Oroville Bridge	0.0-1.8
	S2	Oroville Bridge to Enloe Dam	1.8-5.7

Except for sockeye, total spawning escapements for each population were estimated as the product of total number of redds times the ratio of fish per redd for a specific stock. Fish per redd ratios were estimated as the ratio of males to females sampled at broodstock collection sites. Total spawning escapement for sockeye salmon was estimated using the AUC approach (where escapement = (AUC/redd residence time) x observer efficiency). This method relied on weekly counts of live sockeye and assumed a redd residence time of 11 days (from Hyatt et al. 2006) and an observer efficiency of 100%.[2]

During sockeye carcass surveys in 2007, crews collected tissue samples for genetic analysis. Tissue was collected from the operculum of wild and hatchery carcasses (target of 144 wild and 144 hatchery fish). Sampling within a population was proportional to the distribution of carcasses across survey reaches. That is, samples were collected in all reaches but the number collected within a given reach was proportional to the density of carcasses within that reach. Methods for analyzing these samples are described in Appendix H in Murdoch and Peven (2005).

Derived metrics calculated from carcass surveys, broodstock sampling, stock assessments, and harvest records included proportion of hatchery spawners, stray rates, age-at-maturity, length-at-age, smolt-to-adult survival (SAR), hatchery replacement rates (HRR), exploitation rates, harvest rates, and natural replacement rates (NRR). The expected SARs and HRRs for different stocks raised in the Chelan PUD hatchery programs are provided in Table 2.12. Methods for calculating these variables are described in Appendices D, F, and G in Murdoch and Peven (2005).

[2] Estimates for residence time and observer efficiency are from the literature. These parameters will be estimated in the Wenatchee Basin beginning in 2008.

Table 2.12. Expected smolt-to-adult (SAR) and hatchery replacement rates (HRR) for stocks raised in the Chelan PUD Hatchery Programs (from Table 6 in Appendix D in Murdoch and Peven 2005).

Program	Number of broodstock	Smolts released	SAR	Adult equivalents	Number of smolts/adult	HRR
Chiwawa Spring Chinook	379	672,000	0.003	2,016	333	5.3
Wenatchee Summer Chinook	492	864,000	0.003	2,592	333	5.3
Similkameen Summer Chinook	328	576,000	0.003	1,728	333	5.3
Methow Summer Chinook	228	400,000	0.003	1,200	333	5.3
Wenatchee Sockeye	260	200,000	0.007	1,400	143	5.4
Wenatchee Steelhead	208	400,000	0.010	4,000	100	19.2

Derived data that rely on CWTs (e.g., HRR, SAR, stray rates, etc.) are two to four years behind release information because of the lag time for returning adult fish to enter the fishery and the processing of tags. Consequently, complete information on rates and ratios based on CWTs is generally only available for years prior to 2001. In addition, methods for calculating derived variables are still being developed by the Hatchery Evaluation Technical Team (HETT). Therefore, estimates of derived data in this report are subject to change after the HETT and Hatchery Committee decide on standard methods for calculating derived data.

SECTION 3: WENATCHEE STEELHEAD

3.1 Broodstock Sampling

This section focuses on results from sampling 2006 and 2007 brood years of Wenatchee steelhead, which were collected at Dryden and Tumwater dams. The 2006 brood begins the tracking of the life cycle of steelhead released in 2007. The 2007 brood is included because juveniles from this brood are still maintained within the hatchery.

Origin of Broodstock

A total of 199 Wenatchee steelhead from the 2005 return (2006 brood) were collected at Dryden and Tumwater dams (Table 3.1). About 51% of these were natural origin (adipose fin present, no CWT, and no elastomer tags) fish and the remaining 49% were hatchery origin (pink right, orange right, or green left elastomer tagged) adults. Origin was determined by analyzing scales and/or otoliths. The total number of steelhead spawned from the 2006 return was 162 adults (57% natural origin and 43% hatchery origin).

A total of 176 steelhead were collected from the 2006 return (2007 brood) at Dryden and Tumwater dams; 79 natural origin (adipose fin present, no CWT and no elastomer tags) and 97 hatchery origin (pink right, orange right, or green left elastomer tagged) adults. A total of 134 steelhead were spawned; 57% were natural origin fish and 43% were hatchery fish (Table 3.1). Origins were confirmed by sampling scales and/or otoliths.

Table 3.1. Numbers of wild and hatchery steelhead collected for broodstock, numbers that died before spawning, and numbers of steelhead spawned, 1998-2007. Unknown origin fish (i.e., undetermined by scale analysis, no elastomer, CWT, or fin clips, and no additional hatchery marks) were considered naturally produced. Mortality includes fish that died of natural causes typically near the end of spawning and were not needed for the program or were immature fish killed at spawning.

Brood year	Wild steelhead					Hatchery steelhead					Total number spawned
	Number collected	Prespawn loss	Mortality	Number spawned	Number released	Number collected	Prespawn loss	Mortality	Number spawned	Number released	
1998	35	0	0	35	0	43	4	2	37	0	72
1999	58	5	1	52	0	67	1	2	64	0	116
2000	39	2	1	36	0	101	9	12	60	20	96
2001	64	5	8	51	0	114	5	6	103	0	154
2002	99	0	1	96	2	113	1	0	64	48	160
2003	63	10	4	49	0	92	2	0	90	0	139
2004	85	3	0	75	7	132	1	0	61	70	136
2005	95	8	0	87	0	114	7	1	104	2	191
2006	101	5	0	93	3	98	0	0	69	29	162
2007	79	0	2	76	1	97	0	14	58	25	134
Average	***72***	***4***	***2***	***65***	***1***	***97***	***3***	***4***	***71***	***19***	***136***

Age/Length Data

Broodstock ages were determined from examination of scales and/or otoliths. For both the 2006 and 2007 returns, natural origin steelhead consisted primarily of 2-salt adults, while hatchery origin adults for both return years consisted mostly of 1-salt fish (Table 3.2).

Table 3.2. Percent of hatchery and wild steelhead of different ages (saltwater ages) collected from broodstock, 1998-2007.

Return year	Origin	Saltwater age		
		1	2	3
1998	Wild	39.4	60.6	0.0
	Hatchery	20.9	79.1	0.0
1999	Wild	50.0	48.3	1.7
	Hatchery	81.8	18.2	0.0
2000	Wild	56.4	43.6	0.0
	Hatchery	67.9	32.1	0.0
2001	Wild	51.7	48.3	0.0
	Hatchery	14.9	85.1	0.0
2002	Wild	55.6	44.4	0.0
	Hatchery	94.6	5.4	0.0
2003	Wild	13.1	85.3	1.6
	Hatchery	29.4	70.6	0.0
2004	Wild	94.8	5.2	0.0
	Hatchery	95.2	4.8	0.0
2005	Wild	22.1	77.9	0.0
	Hatchery	20.5	79.5	0.0
2006	Wild	28.7	71.3	0.0
	Hatchery	60.3	39.7	0.0
2007	Wild	40.3	59.3	0.0
	Hatchery	62.1	37.9	0.0
Average	***Wild***	***45.3***	***54.4***	***0.3***
	Hatchery	***54.8***	***45.2***	***0.0***

There was little difference between mean lengths of hatchery and natural origin steelhead for both the 2006 and 2007 return years (Table 3.3). Natural origin fish were on average <1 to 5 cm larger than hatchery origin fish of the same age.

Table 3.3. Mean fork length (cm) at age (saltwater ages) of hatchery and wild steelhead collected from broodstock, 1998-2007; N = sample size and SD = 1 standard deviation.

Return year	Origin	Steelhead fork length (cm)								
		1-Salt			2-Salt			3-Salt		
		Mean	N	SD	Mean	N	SD	Mean	N	SD
1998	Wild	63	15	4	79	20	5	-	0	-
	Hatchery	61	9	4	73	34	4	-	0	-
1999	Wild	65	29	5	74	28	5	77	1	-
	Hatchery	62	54	4	73	12	4	-	0	-
2000	Wild	64	22	3	74	17	5	-	0	-
	Hatchery	60	57	3	71	27	4	-	0	-
2001	Wild	61	33	6	77	31	5	-	0	-
	Hatchery	62	17	4	72	97	4	-	0	-
2002	Wild	64	55	4	77	44	4	-	0	-
	Hatchery	63	106	4	73	6	4	-	0	-
2003	Wild	69	8	6	77	52	5	91	1	-
	Hatchery	66	27	4	75	65	4	-	0	-
2004	Wild	63	73	6	78	4	2	-	0	-
	Hatchery	61	59	3	73	3	1	-	0	-
2005	Wild	59	21	4	74	74	5	-	0	-
	Hatchery	59	23	4	72	89	4	-	0	-
2006	Wild	63	27	5	75	67	6	-	0	-
	Hatchery	61	41	4	72	27	5	-	0	-
2007	Wild	64	31	6	76	46	5	-	0	-
	Hatchery	60	60	4	71	36	5	-	0	-

Sex Ratios

Male steelhead in the 2006 return made up about 43% of the adults collected, resulting in an overall male to female ratio of 0.75:1.00 (Table 3.4). For the 2007 return, males made up about 48% of the adults collected, resulting in an overall male to female ratio of 0.93:1.00. On average, the sex ratio is less than the 1:1 ratio assumed in the broodstock protocol (Table 3.4).

Table 3.4. Numbers of male and female wild and hatchery steelhead collected for broodstock, 1998-2007. Ratios of males to females are also provided.

Return year	Number of wild steelhead			Number of hatchery steelhead			Total M/F ratio
	Males (M)	Females (F)	M/F	Males (M)	Females (F)	M/F	
1998	13	22	0.59:1.00	15	28	0.54:1.00	0.56:1.00
1999	22	36	0.61:1.00	35	32	1.09:1.00	0.84:1.00
2000	18	21	0.86:1.00	60	41	1.46:1.00	1.26:1.00
2001	38	26	1.46:1.00	40	74	0.54:1.00	0.78:1.00
2002	32	67	0.48:1.00	81	32	2.53:1.00	1.14:1.00
2003	19	44	0.43:1.00	44	48	0.92:1.00	0.68:1.0
2004	43	42	1.02:1.00	90	42	2.14:1.00	1.58:1.00
2005	36	59	0.61:1.00	46	68	0.68:1.00	0.65:1.00
2006	38	63	0.60:1.00	47	51	0.92:1.00	0.75:1.00
2007	36	43	0.84:1.00	49	48	1.02:1.00	0.93:1.00
Total	***295***	***423***	***0.70:1.00***	***507***	***464***	***1.09:1.00***	***0.90:1.00***

Fecundity

Fecundities for Wenatchee steelhead returning in 2006 and 2007 averaged 5,492 and 5,660 eggs per female, respectively, which were not greatly different than the 10-year average (Table 3.5). Mean fecundities for the 2006 and 2007 returns were greater than the 5,400 eggs per female assumed in the broodstock protocol.

Table 3.5. Mean fecundity of wild, hatchery, and all female steelhead collected for broodstock, 1998-2007.

Return year	Mean fecundity		
	Wild	Hatchery	Total
1998	6,202	5,558	5,924
1999	5,691	5,186	5,424
2000	5,858	5,729	5,781
2001	5,951	6,359	6,270
2002	5,776	5,262	5,626
2003	6,561	6,666	6,621
2004	5,118	5,353	5,238
2005	5,545	6,061	5,832
2006	5,688	5,251	5,492
2007	5,840	5,485	5,660
Average	***5,823***	***5,691***	***5,787***

3.2 Hatchery Rearing

Rearing History

Number of eggs taken

Based on the unfertilized egg-to-release survival standard of 81%, a total of 493,827 eggs are required to meet the program release goal of 400,000 smolts. Between 1998 and 2007, the egg take goal was reached 50% of the time (Table 3.6).

Table 3.6. Numbers of eggs taken from steelhead broodstock, 1998-2007.

Brood year	Number of eggs taken
1998	224,315
1999	303,083
2000	280,872
2001	549,464
2002	503,030
2003	532,708
2004	408,538
2005	672,667
2006	546,382
2007	462,662
Average	***448,372***

Number of acclimation days

Juvenile steelhead were transferred from Chelan FH to Turtle Rock FH in December 2006 and from Eastbank FH to Turtle Rock FH in January 2007. At Turtle Rock FH, juvenile steelhead were reared on Columbia River water (range, 111-148 d) before being trucked and released into the Wenatchee River and tributaries.

Acclimation of Wenatchee juvenile steelhead has occurred on occasion in the Chiwawa Ponds when space is available. At Chiwawa Ponds, steelhead were reared under the same water source as spring Chinook (Chiwawa and Wenatchee River water). Typically, Wenatchee steelhead are reared on Columbia River water from January through April before being trucked and released into the Wenatchee Basin (Table 3.7).

Table 3.7. Water source and mean acclimation period for Wenatchee steelhead, brood years 1998-2006.

Brood year	Release year	Parental origin	Water source	Number of Days
1998	1999	H x H	Wenatchee/Chiwawa	36
		H x W	Wenatchee/Chiwawa	36
		W x W	Wenatchee/Chiwawa	36
1999	2000	H x H	Wenatchee/Chiwawa	138
		H x W	Wenatchee/Chiwawa	138
		W x W	Wenatchee/Chiwawa	138
		H x W	Eastbank	0
		W x W	Eastbank	0
2000	2001	H x H	Wenatchee/Chiwawa	122
		H x W	Wenatchee/Chiwawa	122
		H x W	Wenatchee/Chiwawa	122
		W x W	Wenatchee/Chiwawa	122
2001	2002	H x H	Columbia	92
		H x H	Wenatchee/Chiwawa	63
		H x W	Columbia	92
		H x W	Wenatchee/Chiwawa	63
		W x W	Columbia	153
2002	2003	H x H	Columbia	98
		H x W	Columbia	98
		W x W	Columbia	117
2003	2004	H x H	Columbia	88
		H x W	Wenatchee/Chiwawa	84
		W x W	Columbia	148
2004	2005	H x H	Columbia	160
		H x W	Columbia	160
		W x W	Columbia	160
2005	2006	H x H	Columbia	116
		H x W	Columbia	113
		W x W	Columbia	141
2006	2007	Early H x W	Columbia	111
		Late H x W	Columbia	112
		W x W	Columbia	148

Release Information

Numbers released

The release of 2006 brood Wenatchee steelhead achieved 75% of the 400,000 target goal with about 299,937 fish released directly into the Wenatchee and Chiwawa rivers and Nason Creek (Table 3.8). Distribution of juvenile steelhead released in each of the three basins was determined by the mean proportion of steelhead redds in each basin. About 31.0% and 16.3% of the steelhead were released in Nason Creek and the Chiwawa River, respectively. The balance of the program was split between the Wenatchee River downstream from Tumwater Dam (12.6%) and the Wenatchee River upstream from the dam (40.1%).

Table 3.8. Numbers of steelhead smolts released from the hatchery, brood years 1998-2006. The release target for steelhead is 400,000 smolts.

Brood year	Release year	Number of smolts
1998	1999	172,078
1999	2000	175,661
2000	2001	184,639
2001	2002	335,933
2002	2003	302,060
2003	2004	374,867
2004	2005	294,114
2005	2006	452,184
2006	2007	299,937
Average		***287,941***

Numbers elastomer tagged

Wenatchee hatchery steelhead from the 2006 brood were marked with elastomer tags in the clear tissue posterior of the eye to denote parental origin. About 52% of the juveniles released were also adipose fin clipped (Table 9).

Table 3.9. Release location and marking scheme for the 1998-2006 brood Wenatchee steelhead.

Brood year	Release location	Parental origin	Ad-clip (%)	VIE color/side	Tag rate	Number released
1998	Chiwawa River	H x H	0.0	Red Left	0.994	52,765
	Chiwawa River	H x W	0.0	Green Left	0.990	37,013
	Chiwawa River	W x W	0.0	Orange Left	0.827	82,300
1999	Wenatchee River	H x H	0.0	Green Left	0.911	45,347
	Wenatchee River	H x W	0.0	Orange Left	0.927	30,713
	Chiwawa River	H x H	0.0	Red Right	0.936	25,622
	Chiwawa River	H x W	0.0	Green Right	0.936	43,379
	Chiwawa River	W x W	0.0	Orange Right	0.936	30,600

Brood year	Release location	Parental origin	Ad-clip (%)	VIE color/side	Tag rate	Number released
2000	Chiwawa River	H x H	0.0	Red Left	0.963	33,417
	Chiwawa River	H x W	0.0	Green Left	0.963	57,716
	Chiwawa River	H x W	0.0	Green Right	0.949	48,029
	Chiwawa River	W x W	0.0	Orange Right	0.949	45,477
2001	Nason Creek	H x W	0.0	Green Right	0.934	75,276
	Nason Creek	W x W	0.0	Orange Right	0.934	48,115
	Chiwawa River	H x W	0.0	Green Left	0.895	92,487
	Chiwawa River	H x H	0.0	Red Left	0.895	120,055
2002	Chiwawa River	H x H	0.0	Red Left	0.920	156,145
	Chiwawa River	H x W	0.0	Green Left	0.928	33,528
	Nason Creek	W x W	0.0	Orange Right	0.928	112,387
2003	Wenatchee River	H x H	0.0	Red Left	0.968	117,663
	Chiwawa River	H x W	0.0	Green Left	0.927	191,796
	Nason Creek	W x W	0.0	Orange Right	0.962	65,408
2004	Wenatchee River	H x H	0.50	Red Left	0.804	39,636
	Chiwawa River	H x W	0.0	Green Left	0.977	153,959
	Nason Creek	W x W	0.0	Pink Right	0.940	100,519
2005	Wenatchee River	H x H	100.0	Red Left	0.983	104,552
	Wenatchee River	H x W	61.6	Green Left	0.979	190,319
	Chiwawa River	H x W	61.6	Green Left	0.979	18,634
	Chiwawa River	W x W	0.0	Pink Right	0.969	14,124
	Nason Creek	W x W	0.0	Pink Right	0.969	124,555
2006	Wenatchee River	H x W (early)	100.0	Green Right	0.918	66,022
	Wenatchee River	H x W (late)	67.1	Green Left	0.935	92,176
	Chiwawa River	H x W (late)	67.1	Green Left	0.935	41,240
	Chiwawa River	W x W	0.0	Pink Right	0.945	7,500
	Nason Creek	W x W	0.0	Pink Right	0.945	92,999

Numbers PIT tagged

2006 Brood Wenatchee Summer Steelhead (WxW)—A total of 10,019 WxW steelhead were PIT tagged at the Chelan Falls Hatchery between 21 and 23 August 2006 (Table 3.10). The mean size of steelhead tagged was 72 mm; no fish smaller than 60 mm were tagged. Fish were not fed for 24 hours before or after tagging. Four days following tagging, the fish were transferred to raceways outside the hatchery complex. These fish were transported to the Turtle Rock Hatchery on 4 December. None of these fish were adipose fin clipped.

A total of 9,515 PIT-tagged WxW steelhead were released during spring 2007 (Table 3.10). Of the 10,019 WxW steelhead tagged, 152 died. Most of these (47%) were fish tagged on the third day (23 August). Another 352 shed their tags. Most of these (61%) were also fish tagged on the third day. Most shedding occurred within three weeks after tagging.

The relatively large loss of steelhead and PIT tags from the third tagging group may be related to the short period of time between tagging and being transferred to another raceway. These fish were also off food for a shorter period of time than the other two tagging groups. It is recommended that the time period between tagging and moving be increased for future tagging events.

Table 3.10. Summary of PIT-tagging activities for WxW steelhead from the Chelan Falls Hatchery, 2006. Dead fish counted before 15 September likely represent deaths associated with tagging; deaths after 15 September were probably not related to tagging.

Tagging date	Number of fish tagged	Number of fish that died		Number of tags shed	Number of tagged fish alive
		Before 9/15	After 9/15		
8/21	3,301	24	16	74	3,187
8/22	3,418	24	17	64	3,313
8/23	3,300	57	14	214	3,015
Total	***10,019***	***105***	***47***	***352***	***9,515***

2006 Brood Wenatchee Summer Steelhead (early-spawn HxW)[3]—A total of 10,035 early-spawn HxW steelhead were PIT tagged at the Eastbank Hatchery (raceway 4) on 5-7 September 2006 (Table 3.11). The mean size of steelhead tagged was 85 mm; no fish smaller than 60 mm were tagged. Fish were not fed for 24 hours before or after tagging. These fish were transported to the Turtle Rock Hatchery in early January 2007. All of these fish were adipose fin clipped.

A total of 9,533 PIT-tagged HxW steelhead were released during spring 2007 (Table 3.11). Of the 10,035 steelhead tagged, 479 died and another 24 shed their tags.

Table 3.11. Summary of PIT-tagging activities for early-spawn HxW steelhead from the Eastbank Hatchery, 2006. Dead fish counted before 15 September likely represent deaths associated with tagging; deaths after 15 September were probably not related to tagging.

Tagging date	Number of fish tagged	Number of fish that died		Number of tags shed	Number of tagged fish alive
		Before 9/15	After 9/15		
9/5	3,331	2	151	6	3,172
9/6	3,504	5	173	9	3,317
9/7	3,200	2	146	9	3,044
Total	***10,035***	***9***	***470***	***24***	***9,533***

[3] This is a mixed group consisting of about 55,000 early-spawn HxW and about 15,000 HxH steelhead. Because most (78%) of the fish are HxW juveniles, the group is referred to as "early-spawn HxW."

2006 Brood Wenatchee Summer Steelhead (HxW)—A total of 10,031 HxW steelhead were PIT tagged at the Eastbank Hatchery (raceway 3) on 11-13 September 2006 (Table 3.12). The mean size of steelhead tagged was 80 mm; no fish smaller than 60 mm were tagged. Fish were not fed for 24 hours before or after tagging. These fish were transported to the Turtle Rock Hatchery in early January 2007. None of these fish were adipose fin clipped.

A total of 9,089 PIT-tagged HxW steelhead were released during spring 2007 (Table 3.12). Of the 10,031 steelhead tagged, 922 died and another 20 shed their tags. The relatively high mortality rate was associated with a power outage on 7 January 2007, which caused an anoxic condition that killed at least 836 tagged fish in the hatchery.[4]

Table 3.12. Summary of PIT-tagging activities for HxW steelhead from the Eastbank Hatchery, 2006. Dead fish counted before 15 September likely represent deaths associated with tagging; deaths after 15 September were probably not related to tagging. A power outage on 7 January 2007 killed about 836 PIT-tagged fish.

Tagging date	Number of fish tagged	Number of fish that died		Number of tags shed	Number of tagged fish alive
		Before 9/15	After 9/15		
9/11	3,315	1	279	6	3,029
9/12	3,552	1	346	6	3,199
9/13	3,164	2	293	8	2,861
Total	***10,031***	***4***	***918***	***20***	***9,089***

2007 Brood Wenatchee Summer Steelhead (WxW)—A total of 10,051 steelhead were tagged at the Chelan Hatchery during 24-27 September 2007. These fish came from raceway 2 and consisted of wild x wild crosses.

As of the end of January 2008, a total of 43 tagged steelhead have died and no shed tags have been identified. This leaves a total of 10,008 tagged steelhead alive at the hatchery. These fish were transferred to the Turtle Rock Hatchery on 19 January. They will remain at this facility until release in the spring of 2008.

2007 Brood Wenatchee Summer Steelhead (HxW-early production)—A total of 10,052 steelhead were tagged at Eastbank Hatchery between 4 and 13 September 2007. These fish came from raceway 4 and consisted of hatchery x wild-early spawn crosses.

As of the end of January 2008, a total of 48 tagged steelhead have died and another 10 have shed their tags. This leaves an estimated 9,994 tagged steelhead alive at the hatchery. These fish were transferred to the Turtle Rock Hatchery between 4 and 6 February 2008 where they will remain until release in the spring of 2008.

2007 Brood Wenatchee Summer Steelhead (HxW-late production)—A total of 10,063 steelhead were tagged at Eastbank Hatchery between 4 and 13 September 2007. These fish came from raceway 3 and consisted of hatchery x wild-late spawn crosses.

[4] Because of the length of the power outage, hatchery personnel began releasing steelhead into the Columbia River. During the release, power was restored and the release ceased. An underdetermined (assumed small) number of steelhead was released into the Columbia River.

As of the end of January 2008, a total of 41 tagged steelhead have died and another 71 have shed their tags. This leaves an estimated 9,951 tagged steelhead alive at the hatchery. These fish were transferred to the Turtle Rock Hatchery between 4 and 6 February 2008 where they will remain until release in the spring of 2008.

Fish size and condition at release

All 2006 brood steelhead were trucked and released as yearling smolts in May of 2007. Of the three parental groups, only the early H x W group exceeded length and weight targets. The late H x W and the W x W group (which is typically the last group ponded and therefore has a shorter rearing period) did not meet size-at-release targets. All three groups did not meet the target for coefficient of variation for fork length (Table 3.13).

Table 3.13. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of steelhead smolts released from the hatchery, brood years 1998-2006. Size targets are provided in the last row of the table.

Brood year	Release year	Parental origin	Fork length (mm)		Mean weight	
			Mean	CV	Grams (g)	Fish/pound
1998	1999	H x H	201	11.1	92.3	5
		H x W	190	12.8	76.9	6
		W x W	173	12.0	55.3	8
1999	2000	H x H	181	8.9	70.6	6
		H x W	187	7.2	75.3	6
		W x W	184	11.3	71.5	6
2000	2001	H x H	218	15.2	122.4	4
		H x W	209	10.6	107.5	4
		W x W	205	10.7	100.9	5
2001	2002	H x H	179	17.4	67.0	7
		H x W	192	15.6	82.8	6
		W x W	206	11.6	102.6	4
2002	2003	H x H	194	13.1	83.0	6
		H x W	191	13.0	77.4	6
		W x W	180	19.1	70.3	7
2003	2004	H x H	191	14.4	73.1	6
		H x W	199	12.9	83.9	5
		W x W	200	11.1	90.1	5
2004	2005	H x H	204	11.3	87.2	6
		H x W	202	13.5	71.9	5
		W x W	198	12.4	76.6	6
2005	2006	H x H	215	12.6	116.6	4
		H x W	198	11.8	86.3	5

Brood year	Release year	Parental origin	Fork length (mm)		Mean weight	
			Mean	CV	Grams (g)	Fish/pound
		W x W	189	15.4	55.3	6
2006	2007	H x H (early)	213	12.1	109.6	4
		H x W (late)	186	11.8	68.3	7
		W x W	178	11.1	58.6	8
Targets			***198***	***9.0***	***75.6***	***6***

Survival Estimates

Overall survival of Wenatchee steelhead from green (unfertilized) egg to release was significantly below the standard set for the program, primarily because of poor green egg-to-eyed egg and eyed egg-to-ponding survival (Table 3.14). In addition, nearly 8% of the 2006 brood H x W component died of asphyxiation at Eastbank Hatchery because of a severe January 2007 wind storm that knocked out power to the facility (including pumps) for several hours. The Wenatchee steelhead program, from its inception, has experienced highly variable fertilization rates. It is unknown at this time what mechanisms may be influencing stock performance at these stages. Early post ponding mortality in the W x W group resulting from chronic bacterial cold water disease was abated with treatments of florfenicol.

Table 3.14. Hatchery life-stage survival rates (%) for steelhead, brood years 1998-2006. Survival standards or targets are provided in the last row of the table.

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
1998	92.0	100.0	85.5	91.7	99.2	98.8	97.8	99.9	76.7
1999	91.2	100.0	66.9	93.0	95.9	94.9	93.1	99.7	58.0
2000	83.9	96.2	77.6	86.7	99.3	98.9	97.7	99.5	65.7
2001	90.0	100.0	73.0	91.8	99.1	97.8	91.3	99.7	61.1
2002	99.0	100.0	69.2	93.1	95.9	94.4	89.6	89.6	57.7
2003	87.0	96.8	86.3	83.8	97.2	94.8	97.6	85.3	70.6
2004	97.6	98.5	83.4	93.7	97.8	94.1	92.2	99.9	72.0
2005	91.3	95.1	81.3	92.1	95.6	91.8	89.7	99.6	67.2
2006	99.1	95.3	73.2	85.4	95.4	94.6	87.8	98.5	54.9
Standard	***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

3.3 Disease Monitoring

Rearing of the 2006 brood Wenatchee summer steelhead was typical to previous years with fish being held on Chelan spring, Eastbank well, and Columbia River water before being released directly into Nason Creek and the Chiwawa and Wenatchee rivers. Mortality due to bacterial cold water disease (BCWD) began to increase in the W x W juveniles at Chelan in May, shortly after ponding. Aggressive Florfenicol treatments appeared to abate the condition and losses resulting from BCWD quickly declined.

3.4 Natural Juvenile Productivity

During 2007, juvenile steelhead were sampled at the Upper Wenatchee, Lower Wenatchee, and Chiwawa traps and counted during snorkel surveys within the Chiwawa basin.

Parr Estimates

A total of 14,073 (±10.5%) subyearling (<100 mm) and 8,448 (±9.7%) yearling (100-200 mm)[5] steelhead/rainbow were estimated in the Chiwawa River basin in August 2007 (Table 3.15 and 3.16). During the survey period 1992-2007, numbers of subyearling and yearling steelhead/rainbow have ranged from 1,410 to 45,727 and 2,533 to 22,128, respectively, in the Chiwawa Basin (Table 3.15 and 3.16; Figure 3.1). Numbers of all fish counted in the Chiwawa Basin are reported in Appendix A.

Juvenile steelhead/rainbow were distributed primarily throughout the lower seven reaches of the Chiwawa River (downstream from Rock Creek). Their densities were highest in the lower portions of the river and in tributaries. Subyearling steelhead/rainbow most often used riffle and multiple channel habitats in the Chiwawa River, although they also associated with woody debris in pool and glide habitat. In tributaries they were generally most abundant in small pools. Those that were observed in riffles selected stations in quiet water behind small and large boulders or occupied stations in quiet water along the stream margin. In pool and multiple-channel habitats, subyearling steelhead/rainbow used the same kinds of habitat as subyearling Chinook.

Yearling steelhead/rainbow most often used pool, riffle, and multiple-channel habitats. Those that used pools were usually in deeper water than subyearling steelhead/rainbow and Chinook. Like subyearling steelhead/rainbow, yearling steelhead/rainbow selected stations in quiet water behind boulders in riffles, but the two age groups rarely occurred together. Yearling steelhead/rainbow appeared to use deeper and faster water than did subyearling steelhead/rainbow.

Table 3.15. Total numbers of subyearling steelhead/rainbow trout estimated in different steams in the Chiwawa Basin during snorkel surveys in August 1992-2007; NS = not sampled.

Sample Year	Chiwawa River	Phelps Creek	Chikamin Creek	Rock Creek	Peven Creek	Big Meadow Creek	Alder Creek	Brush Creek	Y Creek	Total
1992	4,927	NS	NS	NS	NS	NS	NS	NS	NS	**4,927**
1993	3,463	0	356	185	NS	NS	NS	NS	NS	**4,004**
1994	953	0	256	24	0	177	0	0	0	**1,410**
1995	6,005	0	744	90	0	371	40	107	0	**7,357**
1996	3,244	0	71	40	0	763	127	0	0	**4,245**
1997	6,959	224	84	324	0	1,124	58	50	0	**8,823**
1998	2,972	22	280	96	113	397	18	22	0	**3,921**
1999	5,060	20	253	189	0	255	34	27	0	**5,838**
2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	**NS**

[5] A steelhead/rainbow trout larger than 200 mm (8 in) was considered a resident trout.

Sample Year	Chiwawa River	Phelps Creek	Chikamin Creek	Rock Creek	Peven Creek	Big Meadow Creek	Alder Creek	Brush Creek	Y Creek	Total
2001	35,759	192	1,449	1,826	0	6,345	156	0	0	**45,727**
2002	12,137	0	2,252	889	0	4,948	277	18	0	**20,521**
2003	9,911	296	996	1,166	96	5,366	73	116	0	**18,020**
2004	8,464	110	583	113	40	957	35	78	0	**10,380**
2005	4,852	120	2,931	477	45	2,973	65	0	0	**11,463**
2006	10,669	21	858	872	34	3,647	73	71	0	**16,245**
2007	8,442	53	2,137	348	11	2,955	65	28	34	**14,073**
Average	***8,254***	***76***	***946***	***474***	***26***	***2,329***	***79***	***40***	***3***	***11,797***

Table 3.16. Total numbers of yearling steelhead/rainbow trout estimated in different steams in the Chiwawa Basin during snorkel surveys in August 1992-2007; NS = not sampled.

Sample Year	Chiwawa River	Phelps Creek	Chikamin Creek	Rock Creek	Peven Creek	Big Meadow Creek	Alder Creek	Brush Creek	Y Creek	Total
1992	2,533	NS	NS	NS	NS	NS	NS	NS	NS	**2,533**
1993	2,530	0	228	102	NS	NS	NS	NS	NS	**2,860**
1994	4,972	0	476	296	5	107	0	0	0	**5,856**
1995	8,769	0	494	71	0	183	0	0	0	**9,517**
1996	11,381	0	6	27	0	435	0	0	0	**11,849**
1997	6,574	160	0	105	0	66	0	0	0	**6,905**
1998	10,403	0	133	49	0	0	0	0	0	**10,585**
1999	21,779	0	68	201	0	82	0	0	0	**22,130**
2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	**NS**
2001	9,368	16	186	407	0	646	0	0	0	**10,623**
2002	7,200	0	199	165	0	1,526	0	0	0	**9,090**
2003	4,745	362	426	599	0	47	0	0	0	**6,179**
2004	7,700	107	209	0	0	174	0	0	0	**8,190**
2005	4,624	63	957	257	0	287	0	0	0	**6,188**
2006	7,538	76	748	1,186	0	985	0	0	0	**10,533**
2007	6,976	0	945	96	0	431	0	0	0	**8,448**
Average	***7,806***	***56***	***363***	***254***	***0***	***382***	***0***	***0***	***0***	***8,766***

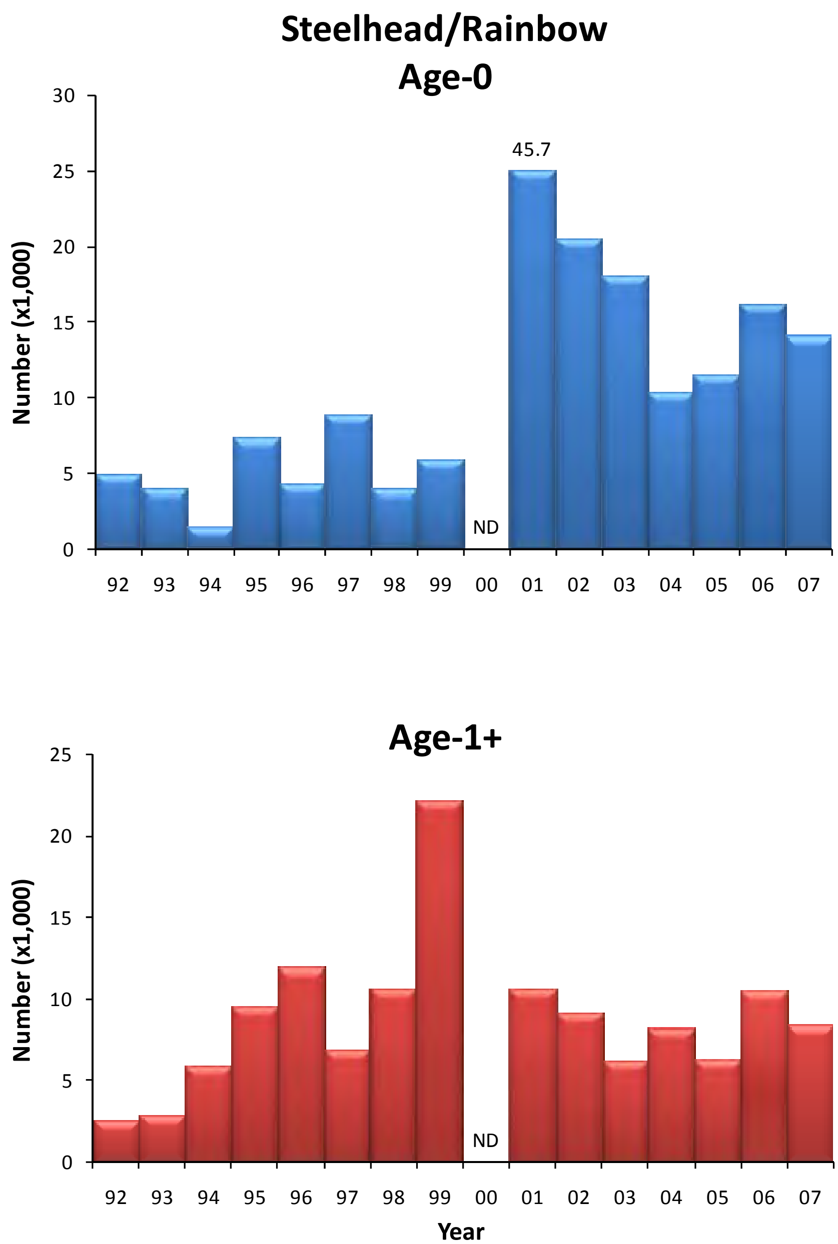


Figure 3.1. Numbers of subyearling and yearling steelhead/rainbow trout within the Chiwawa River Basin in August 1992-2007; ND = no data.

Emigrant and Smolt Estimates

Numbers of steelhead smolts and emigrants were estimated at the Upper Wenatchee, Chiwawa, and Lower Wenatchee traps in 2007.

Chiwawa Trap

The Chiwawa Trap operated between 27 February and 27 November 2007. During that time period the trap was inoperable for 23 days because of high river flows, debris, snow/ice, or mechanical failure. The trap operated in two different positions depending on stream flow; lower position at flows greater than 12 m^3/s and an upper position at flows less than 12 m^3/s. Monthly captures of all fish collected at the Chiwawa Trap are reported in Appendix B.

A total of 152 wild steelhead/rainbow smolts, 1,964 hatchery smolts, and 1,056 wild parr were captured at the Chiwawa Trap. Nearly all (98%) of the hatchery smolts were collected in May, while most (82%) of the wild steelhead smolts were captured during March and April (Figure 3.2). Although steelhead/rainbow parr emigrated throughout the sampling period, most emigrated during March through June and in August (Figure 3.2). No mark-recapture efficiency trials were conducted with steelhead/rainbow at the Chiwawa Trap to estimate total population sizes.

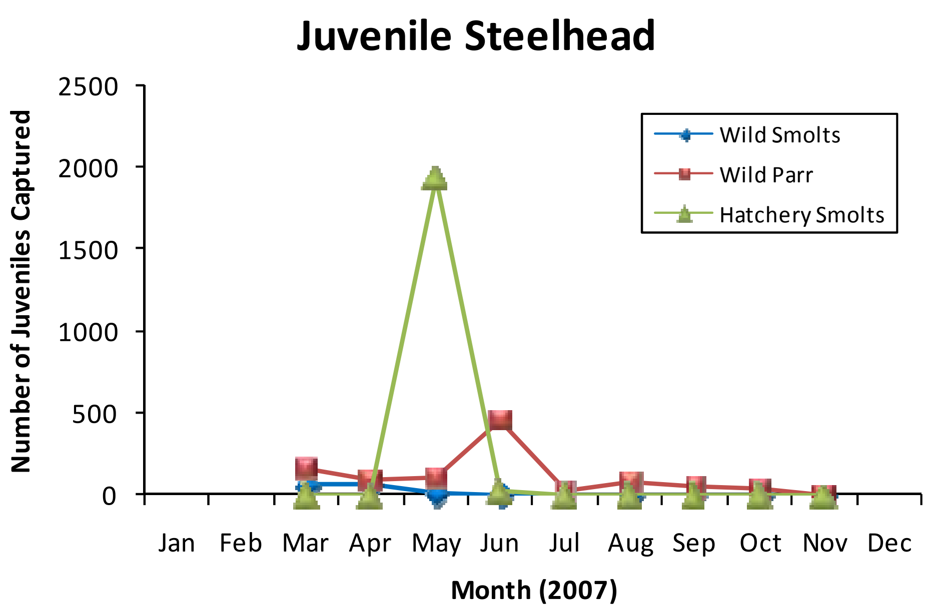


Figure 3.2. Monthly captures of wild smolts, wild parr, and hatchery smolt steelhead/rainbow at the Chiwawa Trap, 2007.

Upper Wenatchee Trap

The Upper Wenatchee Trap operated nightly between 4 March and 23 July 2007. During the 4.5-month sampling period, a total of 15 wild steelhead/rainbow smolts, 178 hatchery smolts, and 65 wild parr were captured at the Upper Wenatchee Trap. Monthly captures of all fish collected at the Upper Wenatchee Trap are reported in Appendix B.

Lower Wenatchee Trap

The Lower Wenatchee Trap operated nightly between 1 February and 5 August 2007. During that time period, the trap was inoperable for 14 days because of high river flows, debris, snow/ice, or mechanical failure. During the five-month sampling period, a total of 433 wild steelhead/rainbow smolts, 2,697 hatchery smolts, and 62 wild parr were captured at the Lower Wenatchee Trap. Based on capture efficiencies estimated from the flow model, the total number of wild yearling steelhead/rainbow that emigrated past the Lower Wenatchee Trap was 85,443 (± 94,717). Most of the wild yearling steelhead/rainbow migrated during April and May. Nearly all (98%) the hatchery yearling steelhead/rainbow migrated during May. Monthly captures of all fish collected at the Lower Wenatchee Trap are reported in Appendix B.

PIT Tagging Activities

A total of 3,139 juvenile steelhead/rainbow trout (2,950 wild and 189 hatchery) were PIT tagged and released in 2007 throughout the Wenatchee Basin (Table 3.17). Most (67%) of these were tagged in the Chiwawa Basin and in the Wenatchee River between Tumwater and Lake Wenatchee. Few were tagged and released at the Upper Wenatchee trap. A total of 461 juvenile steelhead/rainbow trout were tagged and released at the Lower Wenatchee trap. See Appendix C for a complete list of all fish captured, tagged, lost, and released.

Table 3.17. Numbers of wild and hatchery steelhead/rainbow trout that were captured, tagged, and released at different locations within the Wenatchee Basin, 2007. Numbers of fish that died or shed tags are also given.

Sampling location	Origin	Number captured for tagging	Number tagged	Number that died	Number of shed tags	Total number of fish released
Chiwawa Trap	Wild	885	840	8	0	832
	Hatchery	4	3	0	0	3
	Total	**889**	**843**	**8**	**0**	**835**
Chiwawa River	Wild	179	167	0	0	167
	Hatchery	52	47	0	0	47
	Total	**231**	**214**	**0**	**0**	**214**
Upper Wenatchee Trap	Wild	41	38	1	0	37
	Hatchery	0	0	0	0	0
	Total	**41**	**38**	**1**	**0**	**37**
Upper Wenatchee River	Wild	1,020	1,001	0	0	1,001
	Hatchery	69	64	0	0	64
	Total	**1,089**	**1,065**	**0**	**0**	**1,065**
Nason Creek[a]	Wild	483	453	1	0	452
	Hatchery	116	75	0	0	75
	Total	**599**	**528**	**1**	**0**	**527**
Lower Wenatchee Trap	Wild	473	462	1	0	461
	Hatchery	0	0	0	0	0
	Total	**473**	**462**	**1**	**0**	**461**
Totals	***Wild***	***3,081***	***2,961***	***11***	***0***	***2,950***
	Hatchery	***241***	***189***	***0***	***0***	***189***
	Total	***3,322***	***315***	***11***	***0***	***3,139***

[a] An additional 1,312 wild steelhead/rainbow were tagged and released by the Yakama Nation at the Nason Creek smolt trap.

3.5 Spawning Surveys

Surveys for steelhead redds were conducted during March through May, 2007, in the Wenatchee River (including Beaver and Chiwaukum creeks), Chiwawa River (including Rock, Chikamin, Meadow, Twin, Alder, and Clear creeks), Nason Creek (including White Pine, Roaring, and an unnamed stream), Icicle Creek, Peshastin Creek (including Mill, Ingalls, Ruby, Tronsen, Scotty, Shaser, and Schafer creeks), Little Wenatchee River, and White River (including the Napeequa River and Panther Creek). Surveys were conducted in both index and non-index areas throughout the Wenatchee Basin (see Appendix D for more details).

Redd Counts

A total of 159 steelhead redds were counted in the Wenatchee Basin in 2007 (Table 3.18). This is about a 60% decrease from the estimate in 2006 (the lower count may be in part related to the poor survey conditions encountered during the spawning surveys in 2007; see Appendix D). Most spawning occurred in Nason Creek (49%) and the Wenatchee River (29%) (Table 3.18; Figure 3.3). Peshastin Creek contained 11% of all redds in the Wenatchee Basin. No redds were observed in the Little Wenatchee River and the number of redds in the Chiwawa Basin was well below the average for that area.

Table 3.18. Numbers of steelhead redds estimated within different streams/watersheds within the Wenatchee Basin, 2001-2007; NS = not sampled. Redd counts beginning in 2004 have been conducted within the same areas and with the same methods. Therefore, comparing redd numbers before 2004 with estimates since may not be valid.

Survey year	Number of steelhead redds							
	Chiwawa	Nason	Little Wenatchee	White	Wenatchee River[a]	Icicle	Peshastin	Total
2001	25	27	NS	NS	116	19	NS	**187**
2002	80	80	1	0	315	27	NS	**503**
2003	64	121	5	3	248	16	15	**472**
2004	62	127	0	0	151	23	34	**397**
2005	162	412	0	2	459	8	97	**1,140**
2006	19	77	NS	0	191	41	67	**395**
2007	11	78	0	1	46	6	17	**159**
Average[b]	***64***	***174***	***0***	***1***	***212***	***20***	***54***	***523***

[a] Includes redds in Beaver and Chiwaukum creeks.
[b] The average is based on estimates from 2004 to present.

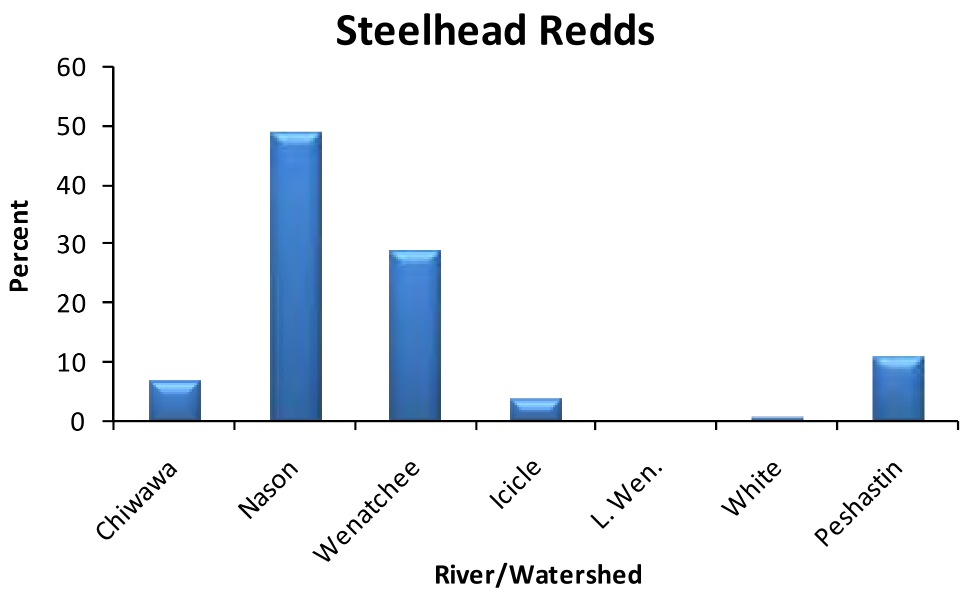


Figure 3.3. Percent of the total number of steelhead redds counted in different streams/watersheds within the Wenatchee Basin during March through May, 2007.

Redd Distribution

Steelhead redds were not evenly distributed among reaches within survey streams in 2007 (Table 3.19). Most of the spawning in the Chiwawa Basin occurred in Reach 1 and in Clear Creek. No redds were observed in Chikamin, Meadow, or Alder creeks. Most of the spawning in the Nason Creek basin occurred in Nason Creek (primarily in Reaches 2 and 3), with no spawning in tributaries. All spawning in the Peshastin Creek basin occurred in Peshastin Creek (mostly in Reach 2). No redds were found in Peshastin Creek tributaries. About 95% of the spawning in the Wenatchee River occurred upstream from Tumwater Dam. Of the 159 total redds estimated in the Wenatchee Basin in 2007, 84% (134 redds) occurred upstream from Tumwater Dam. The remaining 25 redds occurred in the lower Wenatchee River, Peshastin Creek, and Icicle Creek.

Table 3.19. Numbers and percentages of steelhead redds counted within different streams/watersheds within the Wenatchee Basin during March through May, 2007.

Stream/watershed	Reach	Number of redds	Percent of redds within stream/watershed
Chiwawa	Chiwawa 1	3	27.3
	Rock Creek	--	--
	Chikamin Creek	0	0.0
	Meadow Creek	0	0.0
	Alder Creek	0	0.0
	Clear Creek	8	72.7
	Total	**11**	**100**
Nason	Nason 1	11	14.1
	Nason 2	25	32.1

Stream/watershed	Reach	Number of redds	Percent of redds within stream/watershed
	Nason 3	35	44.9
	Nason 4	7	8.9
	White Pine Creek	0	0.0
	Un-named Creek	0	0.0
	Roaring Creek	0	0.0
	Total	**78**	**100**
White	White 2	0	0.0
	White 3	1	100.0
	Panther Creek	0	0.0
	Naqeequa River	0	0.0
	Total	**1**	**100**
Icicle	Icicle	6	100.0
	Total	**6**	**100**
Peshastin	Peshastin 1	6	35.3
	Peshastin 2	11	64.7
	Mill Creek	0	0.0
	Ingalls Creek	--	--
	Tronsen Creek	0	0.0
	Scotty Creek	0	0.0
	Shaser Creek	0	0.0
	Schafer Creek	0	0.0
	Total	**17**	**100**
Wenatchee	Wenatchee 1	--	--
	Wenatchee 2	0	0.0
	Wenatchee 3	--	--
	Wenatchee 4	--	--
	Wenatchee 5	--	--
	Wenatchee 6	2	4.4
	Wenatchee 7	--	--
	Wenatchee 8	0	0.0
	Wenatchee 9	10	21.7
	Wenatchee 10	34	73.9
	Beaver Creek	0	0.0
	Chiwaukum Creek	--	--
	Total	**46**	**100**

Spawn Timing

Steelhead began spawning during the second week of April in the Wenatchee River and Nason Creek and progressed upstream as water temperatures increased. Spawning occurred at temperatures between 3.2 and 6.9°C. Most spawning began when mean daily temperatures reached about 4.2°C. Peak spawning in the Wenatchee River occurred the third week of April, in Peshastin Creek the fourth week of April, and in Nason Creek the first week of May (Figure 3.4).

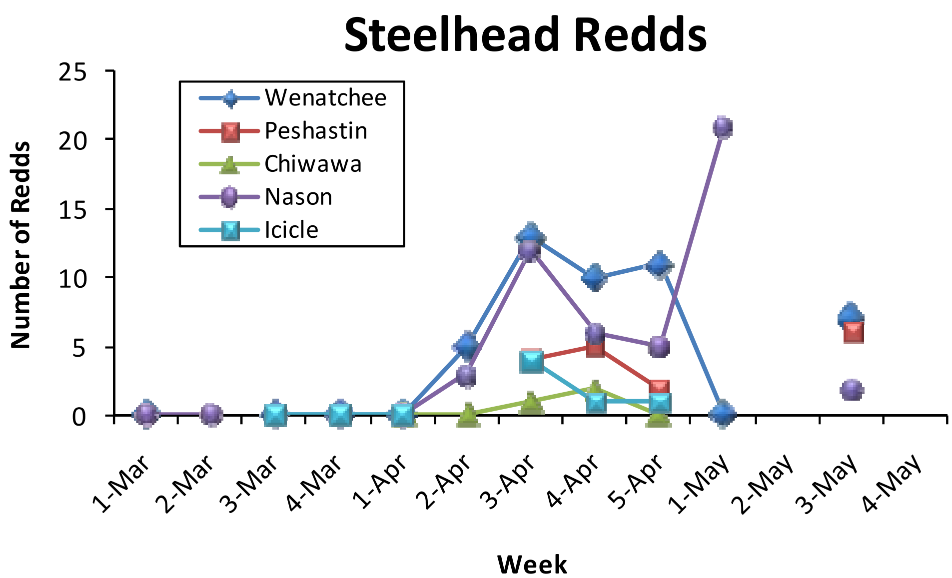


Figure 3.4. Numbers of steelhead redds counted during different weeks in different index areas within the Wenatchee Basin, March through May 2007.

Spawning Escapement

Spawning escapement for steelhead upstream from Tumwater Dam was calculated as the number of redds (upstream from the dam) times the fish per redd ratio (based on sex ratios estimated at Tumwater Dam using video surveillance). The estimated fish per redd ratio for steelhead in 2007 was 1.94 (Table 3.20). Multiplying this ratio by the total number of redds upstream from the dam resulted in a total spawning escapement of 260 steelhead (Table 3.20). This means that of the 657 steelhead counted at Tumwater, only about 40% of them spawned upstream from the dam. This estimate was lower than the average of 50%.

The low estimated spawning escapement in 2007 may have resulted from the difficult survey conditions that biologists experienced in that year. That is, poor survey conditions may have obscured redds that were missed by the biologists. The effect of other factors, such as pre-spawning mortality, fallback, illegal harvest, etc. remain unknown.

Table 3.20. Numbers of steelhead counted at Tumwater Dam, fish/redd estimates (based on male-to-female ratios estimated at Tumwater Dam), numbers of steelhead redds counted upstream from Tumwater Dam, total spawning escapement upstream from Tumwater Dam (estimated as the total number of redds times the fish/redd ratio), and the proportion of the Tumwater Dam count that made up the spawning escapement.

Survey year	Total count at Tumwater Dam	Fish/redd	Number of redds			Spawning escapement	Proportion of Tumwater count that spawned
			Index area	Non-index area	Total redds		
2001	820	2.08	118	19	137	285	0.35
2002	1,720	2.68	296	179	475	1,273	0.74
2003	1,810	1.60	353	88	441	706	0.39
2004	1,869	2.21	277	92	369	815	0.44
2005	2,650	1.61	828	136	964	1,552	0.59
2006	1,053	2.05	192	34	226	463	0.44
2007	657	1.94	105	29	134	260	0.40
***Average*[a]**	***1,557***	***1.95***	***351***	***73***	***423***	***773***	***0.50***

[a] The average is based on estimates from 2004 to present.

3.6 Life History Monitoring

Life history characteristics of steelhead were assessed by examining fish collected at broodstock collection sites, examining videotape at Tumwater Dam, and by reviewing tagging data and fisheries statistics. Some statistics could not be calculated at this time because few fish have been tagged with CWTs. All steelhead released from the hatchery received elastomer tags and about 30,000 were PIT tagged. With the placement of remote PIT tag detectors in spawning streams in 2007, statistics such as origin on spawning grounds, stray rates, and SARs can be estimated more accurately.

Migration Timing

There was little difference in migration timing of wild and hatchery fish enumerated at Tumwater Dam (Table 3.21; Figure 3.5). Steelhead passed Tumwater Dam during most months with the majority passing during July through October and April. The highest proportion of both wild and hatchery fish migrated during October.

Table 3.21. The proportion of wild and hatchery steelhead enumerated at Tumwater Dam during different months of the migration period, 1999-2007. The presence of eroded fins and/or missing adipose fins was used to distinguish hatchery fish from wild fish during video monitoring at Tumwater Dam. Proportions include steelhead collected for broodstock. N = sample size.

Brood year	Origin	Proportion of steelhead enumerated at Tumwater Dam												N
		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
1999	Wild	0.018	0.245	0.182	0.100	0.027	0.164	0.000	0.000	0.000	0.055	0.200	0.009	110
	Hatch	0.128	0.179	0.167	0.026	0.000	0.154	0.000	0.000	0.000	0.090	0.218	0.038	78
2000	Wild	0.007	0.058	0.306	0.252	0.191	0.043	0.000	0.000	0.004	0.054	0.068	0.018	278
	Hatch	0.004	0.057	0.323	0.217	0.129	0.008	0.000	0.000	0.000	0.114	0.141	0.008	263
2001	Wild	0.011	0.198	0.263	0.171	0.177	0.004	0.000	0.000	0.000	0.042	0.124	0.011	475

Brood year	Origin	Proportion of steelhead enumerated at Tumwater Dam												N
		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
	Hatch	0.000	0.120	0.133	0.104	0.219	0.016	0.000	0.000	0.003	0.110	0.258	0.037	383
2002	Wild	0.001	0.144	0.127	0.162	0.218	0.158	0.006	0.000	0.001	0.068	0.096	0.018	991
	Hatch	0.001	0.015	0.056	0.195	0.366	0.196	0.001	0.000	0.003	0.040	0.098	0.029	734
2003	Wild	0.000	0.153	0.376	0.155	0.066	0.002	0.040	0.056	0.042	0.050	0.054	0.006	924
	Hatch	0.001	0.073	0.140	0.086	0.047	0.010	0.053	0.208	0.066	0.208	0.107	0.003	910
2004	Wild	0.006	0.100	0.110	0.132	0.312	0.084	0.000	0.000	0.005	0.035	0.204	0.013	866
	Hatch	0.010	0.112	0.085	0.117	0.291	0.039	0.000	0.000	0.003	0.062	0.224	0.060	1,038
2005	Wild	0.018	0.084	0.066	0.358	0.262	0.038	0.002	0.000	0.000	0.038	0.122	0.013	1,192
	Hatch	0.054	0.156	0.024	0.316	0.175	0.021	0.000	0.000	0.000	0.030	0.176	0.047	1,489
2006	Wild	0.011	0.076	0.026	0.048	0.485	0.045	0.000	0.003	0.005	0.087	0.195	0.018	619
	Hatch	0.000	0.087	0.012	0.089	0.417	0.043	0.000	0.060	0.006	0.161	0.105	0.019	515
2007	Wild	0.000	0.117	0.229	0.236	0.125	0.010	0.003	0.000	0.013	0.036	0.210	0.021	385
	Hatch	0.003	0.092	0.020	0.069	0.102	0.007	0.003	0.000	0.020	0.102	0.507	0.076	304
Average	***Wild***	***0.007***	***0.120***	***0.168***	***0.193***	***0.231***	***0.058***	***0.008***	***0.009***	***0.009***	***0.051***	***0.132***	***0.014***	***5,840***
	Hatch	***0.018***	***0.101***	***0.079***	***0.171***	***0.217***	***0.047***	***0.009***	***0.039***	***0.013***	***0.091***	***0.179***	***0.036***	***5,710***

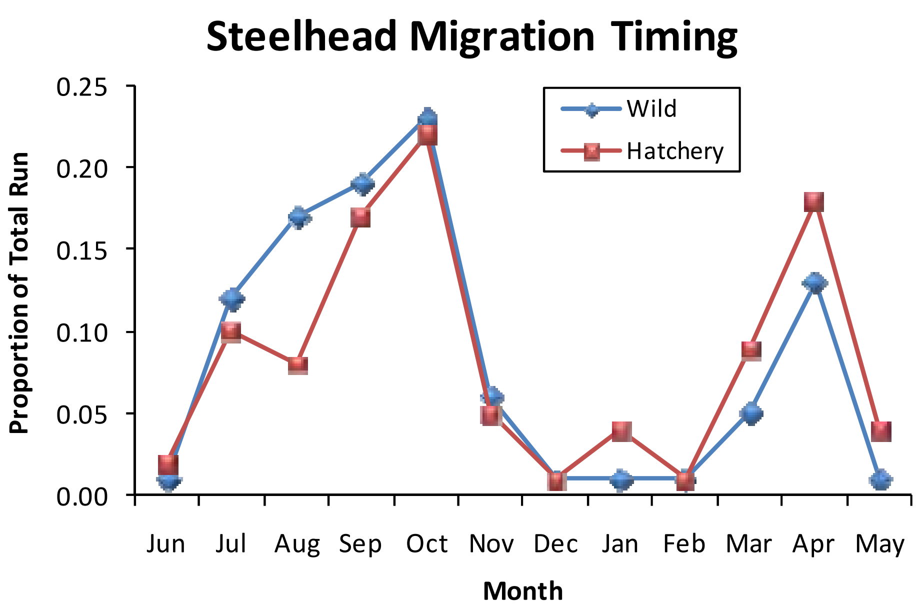


Figure 3.5. Proportion of wild and hatchery steelhead sampled at Tumwater Dam for the combined brood years of 1999-2007.

Age at Maturity

Nearly all steelhead broodstock collected at Tumwater and Dryden dams lived in saltwater 1 to 2 years (saltwater age) (Table 3.22; Figure 3.6). Very few saltwater age-3 fish returned and those that did were wild fish. In general there was little difference between the saltwater age of wild and hatchery fish. A slightly greater number of wild fish returned as saltwater age-2 fish than age-1 fish. In contrast, a slightly greater number of hatchery fish returned as saltwater-1 fish.

Table 3.22. Proportions of wild and hatchery steelhead broodstock of different ages collected at Tumwater and Dryden dams, 1998-2006. Age represents the number of years the fish lived in salt water.

Sample year	Origin	Saltwater age			Sample size
		1	2	3	
1998	Wild	0.39	0.61	0.00	35
	Hatchery	0.21	0.79	0.00	43
1999	Wild	0.50	0.48	0.02	58
	Hatchery	0.82	0.18	0.00	67
2000	Wild	0.56	0.44	0.00	39
	Hatchery	0.68	0.32	0.00	101
2001	Wild	0.52	0.48	0.00	64
	Hatchery	0.15	0.85	0.00	114
2002	Wild	0.56	0.44	0.00	99
	Hatchery	0.95	0.05	0.00	113
2003	Wild	0.13	0.85	0.02	63
	Hatchery	0.29	0.71	0.00	92
2004	Wild	0.95	0.05	0.00	85
	Hatchery	0.95	0.05	0.00	132
2005	Wild	0.22	0.78	0.00	95
	Hatchery	0.21	0.79	0.00	114
2006	Wild	0.29	0.71	0.00	101
	Hatchery	0.60	0.40	0.00	98
2007	Wild	0.40	0.59	0.00	79
	Hatchery	0.62	0.38	0.00	97
Average	***Wild***	***0.45***	***0.54***	***0.01***	***92***
	Hatchery	***0.55***	***0.45***	***0.00***	***97***

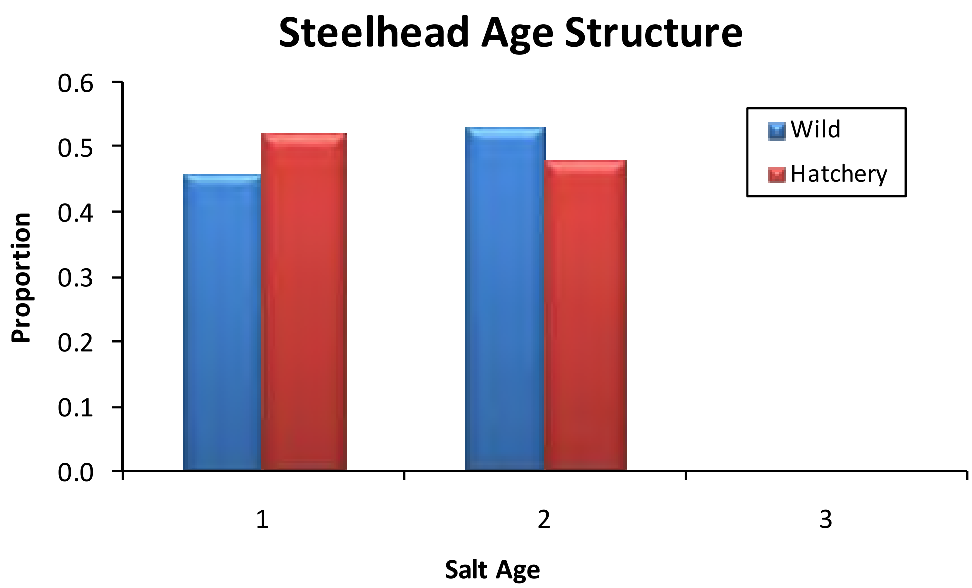


Figure 3.6. Proportions of wild and hatchery steelhead of different saltwater ages sampled at Tumwater Dam for the combined years 1998-2006.

Size at Maturity

On average, hatchery steelhead collected at Tumwater and Dryden dams were about 2 cm smaller than wild steelhead (Table 3.23). This may be related to the fact that slightly more wild steelhead return as saltwater age-2 fish than hatchery steelhead.

Table 3.23. Mean fork length (cm) at age (saltwater ages) of hatchery and wild steelhead collected from broodstock, 1998-2007; N = sample size and SD = 1 standard deviation.

Return year	Origin	Steelhead fork length (cm)								
		1-Salt			2-Salt			3-Salt		
		Mean	N	SD	Mean	N	SD	Mean	N	SD
1998	Wild	63	15	4	79	20	5	-	0	-
	Hatchery	61	9	4	73	34	4	-	0	-
1999	Wild	65	29	5	74	28	5	77	1	-
	Hatchery	62	54	4	73	12	4	-	0	-
2000	Wild	64	22	3	74	17	5	-	0	-
	Hatchery	60	57	3	71	27	4	-	0	-
2001	Wild	61	33	6	77	31	5	-	0	-
	Hatchery	62	17	4	72	97	4	-	0	-
2002	Wild	64	55	4	77	44	4	-	0	-
	Hatchery	63	106	4	73	6	4	-	0	-
2003	Wild	69	8	6	77	52	5	91	1	-
	Hatchery	66	27	4	75	65	4	-	0	-
2004	Wild	63	73	6	78	4	2	-	0	-

Return year	Origin	Steelhead fork length (cm)								
		1-Salt			2-Salt			3-Salt		
		Mean	N	SD	Mean	N	SD	Mean	N	SD
	Hatchery	61	59	3	73	3	1	-	0	-
2005	Wild	59	21	4	74	74	5	-	0	-
	Hatchery	59	23	4	72	89	4	-	0	-
2006	Wild	63	27	5	75	67	6	-	0	-
	Hatchery	61	41	4	72	27	5	-	0	-
2007	Wild	64	31	6	76	46	5	-	0	-
	Hatchery	60	60	4	71	36	5	-	0	-

Contribution to Fisheries

Nearly all harvest on Wenatchee steelhead occurs within the Columbia basin. Harvest rates on steelhead in the Lower Columbia River fisheries (both tribal and non-tribal) are generally less than 5-10% (NMFS 2004). WDFW regulates steelhead harvest in the Upper Columbia. Under certain conditions, WDFW may allow a harvest on hatchery steelhead (adipose fin clipped fish). The intent is to reduce the number of hatchery steelhead that exceed habitat seeding levels in spawning areas and to increase the proportion of wild steelhead in spawning populations.

The Hatchery Evaluation Technical Team (HETT) is currently developing methods for calculating harvest rates on Wenatchee steelhead. These methods will be presented to the Hatchery Committee for their review in 2008.

Origin on Spawning Grounds

At this time, origin of steelhead (wild or hatchery) on spawning grounds cannot be determined precisely. However, based on scales collected during steelhead run composition sampling at Dryden Dam in 2006 (2007 spawners), naturally produced steelhead made up 37% of the escapement. More precise estimates of wild and hatchery spawners within tributaries can be generated after remote PIT tag detectors are installed within spawning tributaries.

Straying

Stray rates are currently difficult to estimate because fish are not handled on spawning grounds. As remote PIT-tag detectors are installed in spawning streams, we will be able to more accurately determine steelhead stray rates.

Genetics

A report on the genetic analysis of Wenatchee steelhead will be completed in 2008.

Natural Replacement Rates

Natural replacement rates (NRR) were calculated as the ratio of natural origin recruits (NOR) to the parent spawning population. For brood years 1989-2001, NRR in the Wenatchee averaged 0.83

(range, 0.07-3.13) (Table 3.24). NRRs for more recent brood years will be calculated as soon as the data are available.

Table 3.24. Spawning escapements, natural origin recruits (NOR), and natural replacement rates (NRR) for Wenatchee steelhead, 1989-2001. Numbers of hatchery and wild steelhead were based on radio telemetry results, numbers of steelhead passing Priest and Wells dams, and the number of steelhead harvested or removed fro broodstock. *(The numbers in this table may change as the HETT and HC refine the methods for estimating steelhead escapement, NORs, and NRRs.)*

Brood year	Spawning escapement			NOR	NRR
	Hatchery	Wild	Total		
1989	1,849	1,001	2,851	348	0.122
1990	1,487	936	2,423	342	0.141
1991	990	481	1,471	321	0.218
1992	1,333	888	2,221	262	0.118
1993	2,951	566	3,516	241	0.068
1994	985	309	1,294	342	0.265
1995	1,637	303	1,940	427	0.220
1996	1,036	409	1,445	1,037	0.717
1997	245	269	514	1,609	3.129
1998	391	278	668	1,225	1.832
1999	114	268	382	796	2.085
2000	738	406	1,144	1,260	1.101
2001	1,065	773	1,838	1,301	0.707
Average	***1,140***	***530***	***1,670***	***731***	***0.825***

Hatchery Replacement Rates

Hatchery replacement rates were estimated as hatchery adult-to-adult returns. These rates should be greater than the NRRs and greater than or equal to 19.2 (the value in BAMP; Murdoch and Peven 2005). In years with data, HRRs and adjusted HRRs were consistently greater than NRRs (Table 3.25). In contrast, HRRs exceeded the BAMP target of 19.2 in only one year and adjusted HRRs exceeded the BAMP target in two of the six years (Table 3.25).

Table 3.25. Hatchery replacement rates (HRR), adjusted HRR (for estimated tag loss), NRR, and BAMP target (19.2) for Wenatchee steelhead, 1998-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating steelhead HRRs and NRRs.)*

Brood year	HRR	Adjusted HRR	NRR	BAMP
1998	1.89	3.49	1.83	19.2
1999	15.47	23.16	2.09	19.2
2000	2.60	3.33	1.10	19.2
2001	57.97	63.37	0.71	19.2
2002	11.76	12.18		19.2
2003	6.56	6.56		19.2

Brood year	HRR	Adjusted HRR	NRR	BAMP
Average	***16.04***	***18.68***	***1.43***	***19.2***

Smolt-to-Adult Survivals

Smolt-to-adult ratios (SARs) are calculated as the number of returning hatchery adults divided by the number of hatchery smolts released. SARs are generally based on CWT returns. However, Wenatchee steelhead have not been extensively tagged with CWTs. Therefore elastomer-tagged fish were used to estimate SARs from release to capture at Priest Rapids Dam. Two different estimates are provided. One (unadjusted) is based on elastomer tag recaptures at Priest Rapids Dam; the other (adjusted) is corrected for tag loss after release (based on the number of unmarked hatchery adults that could not be accounted for). SARs for steelhead may change once a more accurate methodology for estimating adult survival has been developed.

Unadjusted SARs for Wenatchee steelhead ranged from 0.0017 to 0.0307 (mean = 0.0076) for brood years 1996-2003 (Table 3.26). Accounting for post-release tag loss, SARs ranged from 0.0016 to 0.0336 (mean = 0.0105) for brood years 1998-2003.

Table 3.26. Smolt-to-adult ratios (SARs) for Wenatchee hatchery steelhead, 1996-2002; NA = not available. Unadjusted estimates were based on elastomer tags recaptured at Priest Rapids Dam. Adjusted estimates were corrected for tag loss after release.

Brood year	Number released	SAR (unadjusted)	SAR (adjusted)
1996	348,693	0.0034	NA
1997	429,422	0.0041	NA
1998	172,078	0.0009	0.0016
1999	175,661	0.0110	0.0165
2000	184,639	0.0017	0.0022
2001	335,933	0.0307	0.0336
2002	302,060	0.0063	0.0065
2003	374,867	0.0027	0.0027
Average	***278,355***	***0.0076***	***0.0105***

3.7 ESA/HCP Compliance

Broodstock Collection

Collection of brood year 2006 broodstock for Wenatchee steelhead at Tumwater and Dryden dams began on 5 July and ended on 11 November 2005 and represented a slightly shortened collection duration from the 1 July – 12 November collection period detailed in the 2005 broodstock collection protocol. The broodstock collection protocols specified a total collection of 208 steelhead, including 104 natural-origin steelhead. Actual broodstock collection totaled 199 steelhead collected at Tumwater and Dryden dams, including 101 natural-origin fish (50.8% of the total collection), consistent with the 2005 protocol and the ESA Permit 1395 target of 50% natural-origin broodstock composition.

About 140 steelhead were handled and released at Dryden Dam during Wenatchee steelhead broodstock collection. These fish were released because the weekly quota for either hatchery or wild steelhead had been attained, but not both, or because they were non-target (red VIE), or they were unidentifiable hatchery-origin steelhead. All steelhead released were allowed to fully recover from the anesthesia and released immediately upstream from the Dryden Dam trap site.

In addition to steelhead encountered at Dryden Dam during steelhead broodstock collection, 121 spring Chinook salmon and four bull trout were captured and released unharmed immediately upstream from the trap facility. Consistent with ESA Section 10 Permit 1395 impact minimization measures, all ESA species handled at this site were subject of water-to-water transfers.

Hatchery Rearing and Release

Although nearly 8% of the 2006 brood H x W component died of asphyxiation at Eastbank Hatchery because of a power outage associated with a winter storm, the 2006 brood Wenatchee steelhead reared throughout all life-stages without significant mortality events (defined as >10% population mortality associated with a single event). However, the 2006 brood had poor fertilization to eyed-egg and eyed-egg to ponding survival resulting in an unfertilized-to-release survival of 54.9%, considerably less than the program target of 81% (see Section 3.2).

Juvenile rearing occurred at three separate facilities including Eastbank Fish Hatchery, Chelan Falls Fish Hatchery, and Turtle Rock Fish Hatchery. Multiple facilities were used to take advantage of variable water temperatures to manipulate growth of juveniles from different parental crosses. Typically, wild steelhead spawn later than their hatchery cohort and are therefore reared at Chelan Falls Fish Hatchery on warmer water to accelerate their growth so they achieve a size at release similar to HxH and HxW parental cross progeny reared on cooler water at Eastbank Fish Hatchery. All parental cross groups receive final rearing at Turtle Rock Fish Hatchery on Columbia River surface water before direct release (scatter planting) in the Wenatchee River basin.

The 2006 brood steelhead smolt release in the Wenatchee Basin totaled 299,937smolts, representing approximately 75% of the program target of 400,000 smolts identified in the Rocky Reach and Rock Island Dam HCPs and in ESA Section 10 Permit 1395. As specified in ESA Section 10 Permit 1395, all steelhead smolts released were externally marked or tagged and a representative number were PIT tagged (see Section 3.2)

Hatchery Effluent Monitoring

Per ESA Permits 1196, 1347, and 1395, permit holders shall monitor and report hatchery effluents in compliance with applicable National Pollution Discharge Elimination Systems (NPDES) (EPA 1999) permit limitations. There were no NPDES violations reported at Chelan PUD Hatchery facilities during the period 1 January 2007 through 31 December 2007. NPDES monitoring and reporting for Chelan PUD Hatchery Programs during 2007 are provided in Appendix E.

Smolt and Emigrant Trapping

Per ESA Section 10 Permit No. 1395, the permit holders are authorized a direct take of 20% of the emigrating steelhead population and a lethal take not to exceed 2% of the fish captured (NMFS

2003). Based on the estimated wild steelhead population (smolt trap expansion) and hatchery juvenile steelhead population estimate (hatchery release data) for the Wenatchee Basin, the reported steelhead encounters during 2007 emigration complied with take provisions in the Section 10 permit and are detailed in Table 3.27. Additionally, juvenile fish captured at the trap locations were handled consistent with provisions in ESA Section 10 Permit 1395 Section B.

Table 3.27. Estimated take of Upper Columbia River steelhead resulting from juvenile emigration monitoring in the Wenatchee Basin, 2006. NA = not available.

Trap location	Population estimate				Number trapped				Total	Take allowed by Permit
	Wild[a]	Hatchery[b]	Parr[c]	Fry	Wild	Hatchery	Parr	Fry		
Chiwawa Trap										
Population	NA	48,890	NA	NA	152	1,964	1,056	0	3,172	
Encounter rate	NA	NA	NA	NA	NA	0.0402	NA	NA	NA	0.20
Mortality	NA	NA	NA	NA	0	0	4	NA	4	
Mortality rate	NA	NA	NA	NA	0.0000	0.0000	0.0038	NA	0.0013	0.02
Upper Wenatchee Trap										
Population	1,085	299,937	4,833	NA	15	178	65	0	258	
Encounter rate	NA	NA	NA	NA	0.0138	0.0006	0.0134	NA	0.0008	0.20
Mortality	NA	NA	NA	NA	0	0	0	0	0	
Mortality rate	NA	NA	NA	NA	0.0000	0.0000	0.0000	NA	0.0000	0.02
Lower Wenatchee Trap										
Population	85,443	299,937	9,839	NA	433	2,697	62	0	3,192	
Encounter rate	NA	NA	NA	NA	0.0051	0.0090	0.0063	NA	0.0081	0.20
Mortality	NA	NA	NA	NA	3	0	1	NA	3	
Mortality rate	NA	NA	NA	NA	0.0069	0.0000	0.0161	NA	0.0009	0.02
Wenatchee Basin Total										
Population	85,443	299,937		NA	600	4,869	1,183	0	6,652	
Encounter rate	NA	NA	NA	NA	0.0070	0.0162	NA	NA	NA	0.20
Mortality	NA	NA	NA	NA	3	0	1	NA	7	
Mortality rate	NA	NA	NA	NA	0.0050	0.000	0.0008	NA	0.0011	0.02

[a] Smolt production estimates based on juvenile emigration monitoring (Miller 2008).

[b] 2007 smolt release data for the Wenatchee basin.

[c] Estimated parr emigrating past juvenile trap sites (Miller et al. 2008)

Spawning Surveys

Steelhead spawning ground surveys were conducted in the Wenatchee Basin during 2007, as authorized by ESA Section 10 Permit No. 1395. Because of the difficulty of quantifying the level of take associated with spawning ground surveys, the Permit does not specify a take level associated with these activities, even though it does authorize implementation of spawning ground surveys. Therefore, no take levels are reported. However, to minimize potential impacts to established redds, wading was restricted to the extent practical, and extreme caution was used to avoid established redds when wading was required.

Stock Assessment at Priest Rapids Dam

Upper Columbia River steelhead stock assessment sampling at Priest Rapids Dam (PRD) is authorized through ESA Section 10 Permit No. 1395 (NMFS 2003). Permit authorizations include interception and biological sampling of 10% of the UCR steelhead passing PRD to determine upriver adult population size, estimate hatchery to wild ratios, determine age-class contribution, and evaluate the need for managing hatchery steelhead consistent with ESA recovery objectives, which include fully seeding spawning habitat with naturally produced Upper Columbia River steelhead supplemented with artificially propagated enhancement steelhead (NMFS 2003). The 2007-08 run-cycle summary is pending the completion of the run-cycle (31 May 2008) and final age-at-return assessment based on scale analysis (will be included as Appendix F).

SECTION 4: WENATCHEE SOCKEYE SALMON

4.1 Broodstock Sampling

This section focuses on results from sampling 2005 and 2006 Wenatchee sockeye broodstock, which were collected at Tumwater Dam. The 2005 brood begins the tracking of the life cycle of sockeye that were released as parr into Lake Wenatchee in 2006 and some of which began smolt migrations in 2007. The 2006 brood is included because juveniles from this brood were released as parr in the lake in 2007. Complete information is not currently available for the 2007 brood (this information will be provided in the 2008 annual report). Collection of sockeye broodstock targets naturally produced fish and equal numbers of male and female fish.

Origin of Broodstock

The 2005 broodstock consisted of mostly naturally produced sockeye collected at Tumwater Dam between 15 July and 22 August 2005 (Table 4.1). A total of 165 sockeye were spawned of which 159 were naturally produced fish; the remaining six fish were of unknown origin. The 2006 broodstock consisted of mostly naturally produced Wenatchee sockeye salmon collected at Tumwater Dam between 17 July and 3 August 2006 (Table 4.1). A total of 214 naturally produced sockeye were spawned.

Table 4.1. Numbers of wild and hatchery sockeye salmon collected for broodstock, numbers that died before spawning, and numbers of sockeye spawned, 1989-2006. Unknown origin fish (i.e., undetermined by scale analysis, no CWT or fin clips, and no additional hatchery marks) were considered naturally produced. Mortality includes sockeye that died of natural causes typically near the end of spawning and were not needed for the program, surplus sockeye killed at spawning, sockeye that died but were not recovered from the net pens, and sockeye that may have jumped out of the net pens.

Brood year	Wild sockeye					Hatchery sockeye					Total number spawned
	Number collected	Prespawn loss	Mortality	Number spawned	Number released	Number collected	Prespawn loss	Mortality	Number spawned	Number released	
1989	299	93	47	115	44	0	0	0	0	0	115
1990	333	7	7	302	17	0	0	0	0	0	302
1991	357	18	16	199	124	0	0	0	0	0	199
1992	362	18	5	320	19	0	0	0	0	0	320
1993	307	79	21	207	0	0	0	0	0	0	207
1994	329	15	9	236	69	5	0	0	5	0	241
1995	218	5	7	194	12	3	0	0	3	0	197
1996	291	2	0	225	64	20	0	0	0	20	225
1997	283	12	3	192	76	19	0	0	19	0	211
1998	225	37	25	122	41	6	0	0	6	0	128
1999	90	7	1	79	3	60	0	0	60	0	139
2000	256	19	1	170	66	5	0	0	5	0	175
2001	252	27	10	200	15	8	1	0	7	0	207
2002	257	0	1	256	0	0	0	0	0	0	256
2003	261	12	9	198	42	0	0	0	0	0	198
2004	211	13	12	177	9	0	0	0	0	0	177

2005	243	29	12	166	36	0	0	0	0	0	166
2006	260	2	4	214	40	0	0	0	0	0	214
Average	***269***	***22***	***11***	***198***	***38***	***6***	***0***	***0***	***6***	***1***	***204***

Age/Length Data

Ages of sockeye were determined from scales and otoliths collected from broodstock. The 2005 return was comprised primarily of age-4 returning adults (74.2%; Table 4.2). Age-5 adults made up 25.8% of the remaining broodstock. No age-6 fish were collected. The 2006 return consisted primarily of age-5 adults (65.5%; Table 4.2). Age-4 and 6 sockeye made up 34.0% and 0.5% of the 2006 return, respectively.

Table 4.2. Percent of hatchery and wild sockeye salmon of different ages (total age) collected from broodstock, 1994-2006.

Return year	Origin	Total age		
		4	5	6
1994	Wild	57.3	41.7	1.0
	Hatchery	40.0	60.0	0.0
1995	Wild	77.3	20.7	2.0
	Hatchery	66.7	33.3	0.0
1996	Wild	65.8	34.2	0.0
	Hatchery	0.0	0.0	0.0
1997	Wild	86.5	13.5	0.0
	Hatchery	57.9	42.1	0.0
1998	Wild	9.9	88.6	1.5
	Hatchery	66.7	33.3	0.0
1999	Wild	21.8	74.7	3.5
	Hatchery	90.0	8.3	1.7
2000	Wild	97.7	2.3	0.0
	Hatchery	100.0	0.0	0.0
2001	Wild	69.9	29.6	0.5
	Hatchery	71.4	28.6	0.0
2002	Wild	31.6	67.6	0.8
	Hatchery	0.0	0.0	0.0
2003	Wild	2.6	90.5	6.9
	Hatchery	0.0	0.0	0.0
2004	Wild	97.5	2.0	0.5
	Hatchery	0.0	0.0	0.0
2005	Wild	74.2	25.8	0.0
	Hatchery	0.0	0.0	0.0
2006	Wild	34.0	65.5	0.5
	Hatchery	0.0	0.0	0.0

Return year	Origin	Total age		
		4	5	6
Average	***Wild***	***55.9***	***42.8***	***1.3***
	Hatchery	***70.4***	***29.4***	***0.2***

Lengths of sockeye for the 2005 and 2006 return years are provided in (Table 4.3). Lengths of age-4, 5, and 6 sockeye sampled in 2006 averaged 52, 56, and 56 cm, respectively.

Table 4.3. Mean fork length (cm) at age (total age) of hatchery and wild sockeye salmon collected for broodstock, 1994-2006; SD = 1 standard deviation.

Return year	Origin	Sockeye fork length (cm)								
		Age-4			Age-5			Age-6		
		Mean	N	SD	Mean	N	SD	Mean	N	SD
1994	Wild	56	125	3	55	91	3	54	2	3
	Hatchery	57	2	1	56	3	1	-	0	-
1995	Wild	51	153	2	55	41	4	54	4	5
	Hatchery	53	2	4	59	1	-	-	0	-
1996	Wild	52	146	4	53	76	3	-	0	-
	Hatchery	-	0	-	-	0	-	-	0	-
1997	Wild	50	166	3	53	26	5	-	0	-
	Hatchery	54	11	4	59	8	2	-	0	-
1998	Wild	51	13	4	55	117	3	53	2	3
	Hatchery	52	4	2	55	2	8	-	0	-
1999	Wild	52	19	4	50	65	4	56	3	1
	Hatchery	50	54	3	56	5	4	56	1	-
2000	Wild	52	167	2	54	4	3	-	0	-
	Hatchery	54	5	1	-	0	-	-	0	-
2001	Wild	54	151	3	56	65	4	58	1	-
	Hatchery	51	5	5	55	2	4	-	0	-
2002	Wild	54	77	2	56	165	4	57	2	0
	Hatchery	-	0	-	-	0	-	-	0	-
2003	Wild	54	5	4	60	172	2	60	13	4
	Hatchery	-	0	-	-	0	-	-	0	-
2004	Wild	53	192	3	56	4	3	63	1	-
	Hatchery	-	0	-	-	0	-	-	0	-
2005	Wild	51	132	3	57	46	4	-	0	-
	Hatchery	-	0	-	-	0	-	-	0	-
2006	Wild	52	70	3	56	135	4	54	2	3
	Hatchery	-	0	-	-	0	-	-	0	-

Sex Ratios

Male sockeye in the 2005 return made up about 54% of the adults collected, resulting in an overall male to female ratio of 1.15:1.00 (Table 4.4). In 2006, males made up about 50% of the adults collected, resulting in an overall male to female ratio of 1.00:1.00. Ratios for both years are at or near the 1:1 ratio target in the broodstock protocol.

Table 4.4. Numbers of male and female wild and hatchery sockeye collected for broodstock, 1989-2006. Ratios of males to females are also provided.

Return year	Number of wild sockeye			Number of hatchery sockeye			Total M/F ratio*
	Males (M)	Females (F)	M/F	Males (M)	Females (F)	M/F	
1989	162	137	1.18:1.00	-	-	-	1.18:1.00
1990	177	156	1.13:1.00	-	-	-	1.13:1.00
1991	260	97	2.68:1.00	-	-	-	2.68:1.00
1992	180	182	0.99:1.00	-	-	-	0.99:1.00
1993	130	177	0.73:1.00	-	-	-	0.73:1.00
1994	162	167	0.97:1.00	1	4	0.25:1.00	0.95:1.00
1995	102	116	0.88:1.00	1	2	0.50:1.00	0.87:1.00
1996	150	161	0.93:1.00	-	-	-	0.93:1.00
1997	139	144	0.97:1.00	10	9	1.11:1.00	0.97:1.00
1998	115	110	1.05:1.00	2	4	0.50:1.00	1.03:1.00
1999	22	68	0.32:1.00	37	23	1.61:1.00	0.65:1.00
2000	155	101	1.53:1.00	3	2	1.50:1.00	1.53:1.00
2001	114	138	0.83:1.00	4	4	1.00:1.00	0.83:1.00
2002	128	129	0.99:1.00	-	-	-	0.99:1.00
2003	161	100	1.61:1.00	-	-	-	1.61:1.00
2004	108	103	1.05:1.00	-	-	-	1.05:1.00
2005	130	113	1.15:1.00	-	-	-	1.15:1.00
2006	130	130	1.00:1.00	-	-	-	1.00:1.00
Total	***2,525***	***2,329***	***1.08:1.00***	***58***	***48***	***1.21:1.00***	***1.09:1.00***

Fecundity

Fecundities for the 2005 and 2006 returns of sockeye salmon averaged 2,718 and 2,656 eggs per female, respectively (Table 4.5). These fecundities are close to the 18-year average of 2,615. Fecundities for this program are based upon the total (pooled) number of eyed eggs divided by the number of females spawned. Mean fecundities derived from individual fecundities cannot be calculated because of the need to pool three females per incubation tray.

Table 4.5. Mean fecundity of female sockeye salmon collected for broodstock, 1989-2006. Fecundities were determined from pooled egg lots and were not identified for individual females.

Return year	Mean fecundity
1989	2,344
1990	2,225
1991	2,598
1992	2,341
1993	2,340
1994	2,798
1995	2,295
1996	2,664
1997	2,447
1998	2,813
1999	2,319
2000	2,673
2001	2,960
2002	2,856
2003	3,511
2004	2,505
2005	2,718
2006	2,656
Average	***2,615***

4.2 Hatchery Rearing

Rearing History

Number of eggs taken

Based on the unfertilized egg-to-release survival standard of 81%, a total of 246,914 eggs are required to meet the program release goal of 200,000 smolts. Between 1989 and 2006, the egg take goal was reached in most years (Table 4.6). The number of eggs taken in 2006 was above the egg take target by 18%.

Table 4.6. Numbers of eggs taken from sockeye broodstock, 1989-2006.

Return year	Number of eggs taken
1989	133,600
1990	333,779
1991	231,254
1992	381,561
1993	231,700

Return year	Number of eggs taken
1994	338,562
1995	247,900
1996	314,390
1997	254,459
1998	163,278
1999	190,732
2000	227,234
2001	301,925
2002	356,982
2003	319,470
2004	225,499
2005	211,985
2006	292,136
2007	292,136
Average	***264,247***

Number of acclimation days

Wenatchee sockeye have only been acclimated on Lake Wenatchee water. For brood years 1989 through 1998, unfed fry were transferred from Eastbank FH to Lake Wenatchee Net Pens until release (Table 4.7). Juvenile sockeye were reared at Eastbank FH (1999 brood – present) until July in an effort to increase growth before release.

Table 4.7. Water source and mean acclimation period for Wenatchee sockeye, brood years 1989-2005.

Brood year	Release year	Transfer date	Release date	Number of Days	Water source
1989	1990	5-Apr	24-Oct	202	Lake Wenatchee
1990	1991	10-Apr	19-Oct	192	Lake Wenatchee
1991	1992	1-Apr	20-Oct	202	Lake Wenatchee
1992	1993	5-Apr	7-Sep	155	Lake Wenatchee
		5-Apr	26-Oct	204	Lake Wenatchee
1993	1994	5-Apr	1-Sep	149	Lake Wenatchee
		5-Apr	17-Oct	195	Lake Wenatchee
1994	1995	4-Apr	15-Sep	164	Lake Wenatchee
		4-Apr	23-Oct	202	Lake Wenatchee
1995	1996	4-Apr	25-Oct	204	Lake Wenatchee
1996	1997	4-Apr	22-Oct	201	Lake Wenatchee
1997	1998	1-Apr	9-Nov	222	Lake Wenatchee
1998	1999	1-Apr	29-Oct	211	Lake Wenatchee

Brood year	Release year	Transfer date	Release date	Number of Days	Water source
1999	2000	25-Jul	28-Aug	34	Lake Wenatchee
		26-Jul	1-Nov	98	Lake Wenatchee
2000	2001	2-Jul	27-Aug	56	Lake Wenatchee
		3-Jul	27-Sep	86	Lake Wenatchee
2001	2002	15-Jul	28-Aug	44	Lake Wenatchee
		16-Jul	22-Sep	68	Lake Wenatchee
2002	2003	30-Jun	25-Aug	56	Lake Wenatchee
		1-Jul	22-Oct	113	Lake Wenatchee
2003	2004	6-Jul	25-Aug	50	Lake Wenatchee
		7-Jul	3-Nov	119	Lake Wenatchee
2004	2005	5-Jul	29-Aug	55	Lake Wenatchee
		6-Jul	2-Nov	120	Lake Wenatchee
2005	2006	11-Jul	30-Oct	111	Lake Wenatchee

Release Information

Numbers released

The 2005 Wenatchee sockeye program achieved 70.3% of the 200,000 target goal with about 140,542 fish being released (Table 4.8).

Table 4.8. Numbers of sockeye parr released, brood years 1989-2005. The release target for sockeye is 200,000 fish.

Brood year	Release year	Number released
1989	1990	260,400
1990	1991	372,102
1991	1992	167,523
1992	1993	340,557
1993	1994	190,443
1994	1995	252,859
1995	1996	150,808
1996	1997	284,630
1997	1998	197,195
1998	1999	121,344
1999	2000	167,955
2000	2001	190,174
2001	2002	200,938
2002	2003	315,783

Brood year	Release year	Number released
2003	2004	240,459
2004	2005	172,923
2005	2006	140,542
Average		***221,567***

Numbers tagged

A total of 15,049 juvenile sockeye were PIT tagged at the Eastbank Hatchery during 12-20 June 2007. These fish were transported to the Lake Wenatchee net pens on 9 July and released into the lake on 31 October 2007. At the time of release, a total of 65 fish had died and another 220 had shed their tags. Thus, the total number of PIT-tagged sockeye released into the lake was 14,764.

Fish size and condition at release

The 2005 brood sockeye were released as parr in 2006 and emigrated as yearling smolts in spring of 2007. Size at release was 112.0% and 192.5% of the fork length and weight goals, respectively. The 2005 brood year was below the CV goal for length by 16.7% (Table 4.9).

Table 4.9. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of sockeye released, brood years 1989-2005. Size targets are provided in the last row of the table.

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1989	1990	128	-	18.2	25
1990	1991	131	-	18.9	24
1991	1992	117	3.0	20.6	22
1992	1993	73	6.8	4.2	44
1993	1994	103	-	13.6	40
1994	1995	75	6.1	4.5	38
1995	1996	137	8.2	14.7	30
1996	1997	107	5.6	15.1	30
1997	1998	122	6.1	21.3	21
1998	1999	112	5.4	17.0	27
1999	2000	94	9.5	9.5	48
		134	11.5	31.3	15
2000	2001	123	6.5	22.3	20
		146	8.4	26.0	12
2001	2002	118	7.4	20.7	22
		135	7.3	30.5	15
2002	2003	73	5.6	4.4	104

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
		118	7.7	13.7	23
		145	9.4	38.6	13
2003	2004	79	4.6	4.8	96
		118	5.9	17.0	26
		158	8.1	44.3	10
2004	2005	116	4.5	17.2	18
		151	7.0	39.3	12
2005	2006	149	7.5	43.7	10
Targets		***133***	***9.0***	***22.7***	***20***

Survival Estimates

Overall survival of Wenatchee sockeye from green (unfertilized) egg to release was below the standard set for the program as a result of poor green egg-to-eye and eye-to-ponding survival. Investigations to determine the effects of holding adults on warm surface water at Lake Wenatchee on gamete maturation/viability in addition to reducing negative phototactic behavior at swim up (potential influences on survival at the fertilization to ponding stages) should be considered (Table 4.10).

Table 4.10. Hatchery life-stage survival rates (%) for sockeye salmon, brood years 1989-2005. Survival standards or targets are provided in the last row of the table.

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
1989	41.6	100.0	88.1	63.9	99.2	98.9	98.1	65.2	55.2
1990	96.2	99.4	90.8	96.3	99.9	99.2	95.0	98.4	83.0
1991	91.8	94.1	79.2	94.8	99.8	99.3	96.4	96.4	72.4
1992	91.1	98.8	92.3	98.0	99.9	99.8	98.6	98.8	89.2
1993	57.1	99.2	89.2	98.3	99.6	99.1	93.7	93.8	82.2
1994	89.8	99.2	79.2	96.0	99.5	98.6	98.3	98.2	74.7
1995	97.5	99.1	87.5	95.0	99.0	93.3	73.2	73.2	60.8
1996	99.2	100.0	95.1	98.7	99.7	99.3	96.4	96.5	90.5
1997	92.8	99.3	84.8	97.9	97.9	97.6	95.5	94.9	79.3
1998	75.4	95.5	77.7	98.4	98.6	98.2	97.1	97.2	74.3
1999	92.3	100.0	92.2	97.3	99.6	99.3	98.2	99.7	88.1
2000	84.5	98.1	93.8	97.7	96.7	96.1	91.4	96.8	83.7
2001	75.4	99.2	78.5	97.6	98.0	97.6	86.9	95.1	66.6

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Femal e	Male							
2002	100.0	100.0	95.7	97.8	99.6	99.2	94.6	99.8	88.5
2003	91.0	98.1	87.2	96.9	99.0	98.2	94.8	95.5	80.1
2004	88.7	92.6	88.0	93.1	97.9	97.4	93.7	96.1	76.7
2005	98.5	98.5	85.3	94.9	97.8	96.6	95.5	99.2	77.2
Standard	***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

4.3 Disease Monitoring

Rearing of the 2005 brood sockeye was typical to previous years with fish being held on Lake Wenatchee water in net pens for 111 days before being released directly into the lake. Mortality due to Columnaris began to increase in the juveniles in late August about 2 weeks after the last adult sockeye broodstock were transferred from Tumwater Dam to holding pens at lake Wenatchee. A 2% TM-100 treatment was initiated for control, which abated the condition. No further outbreaks or disease issues were observed or detected.

4.4 Natural Juvenile Productivity

During 2007, juvenile sockeye salmon were sampled at the Upper Wenatchee and Lower Wenatchee traps.

Emigrant and Smolt Estimates

Upper Wenatchee Trap

The Upper Wenatchee Trap operated nightly between 4 March and 23 July 2007. During the 4.5-month sampling period, a total of 38,628 wild sockeye and 2,387 hatchery sockeye smolts were captured at the Upper Wenatchee Trap. Based on a pooled daily trap efficiency of 1.4% for wild sockeye (based on 9 mark-recapture trials) and 1.4% for hatchery sockeye (based on 5 mark-recapture trials), the total number of smolts that emigrated past the trap in 2007 was 2,797,313 (±131,973) wild and 183,475 (±36,799) hatchery sockeye. This was the first brood year, since 1999, that all hatchery sockeye parr were released at a similar size and time and the third brood year that hatchery smolt estimates for the late release group were greater than the number of fish released. Because the estimated number of hatchery smolts was greater than the number of parr released, we assumed that survival was 100% and adjusted the smolt estimate accordingly (Table 4.11).

Overestimates of hatchery sockeye smolts may be the result of some hatchery fish migrating at age-2 or an underestimate of the actual trap efficiency. We suggest the later, because coded wire tags recovered from outmigrating smolts between 2001 and 2005 indicated that all hatchery smolts emigrated as age-1 fish the spring following release. Additional studies are needed to determine the source of errors in trap efficiency estimates and to find possible alternatives. Monthly captures of all fish and results of capture efficiency tests at the Upper Wenatchee Trap are reported in Appendix B.

Table 4.11. Estimated numbers of wild and hatchery sockeye smolts that emigrated from Lake Wenatchee during run years 1997-2007.

Run year	Numbers of sockeye smolts	
	Wild smolts	Hatchery smolts
1997	55,359	28,828
1998	1,447,259	55,985
1999	1,944,966	112,524
2000	985,490	24,684
2001	39,353	94,046
2002	729,716	121,511
2003	5,303,056	140,322
2004	5,771,187	216,023
2005	723,413	122,399
2006	1,266,971	159,500
2007	2,797,313	140,542
Average	***1,914,917***	***110,579***

Age classes of wild sockeye smolts were determined from a length frequency analysis based on scales collected randomly each year since 1997 (Table 4.12). For the available run years, most wild sockeye smolts migrated as age 1+ fish. Only in two years (1997 and 2005) did more smolts migrate as age 2+ fish. Relatively few smolts migrated at age 3+.

Table 4.12. Age structure and estimated number of wild sockeye smolts that emigrated from Lake Wenatchee, 1997-2007.

Run year	Proportion of wild smolts			Total wild emigrants
	Age 1+	Age 2+	Age 3+	
1997	0.075	0.906	0.019	55,359
1998	0.955	0.037	0.008	1,447,259
1999	0.619	0.381	0.000	1,944,966
2000	0.599	0.400	0.001	985,490
2001	0.943	0.051	0.006	39,353
2002	0.961	0.039	0.000	729,716
2003	0.740	0.260	0.000	5,303,056
2004	0.929	0.071	0.000	5,771,187
2005	0.168	0.707	0.125	723,413
2006	0.994	0.006	0.000	1,266,971
2007	0.959	0.038	0.003	2,797,313
Average	***0.722***	***0.263***	***0.015***	***1,914,917***

Lower Wenatchee Trap

The Lower Wenatchee Trap operated nightly between 1 February and 5 August 2007. Due to high river flows, debris, snow/ice, or mechanical failure, trap 1 and trap 2 were inoperable for 14 and 68 days, respectively. During the seven-month sampling period, a total of 6,340 wild sockeye smolts and 248 hatchery sockeye smolts were captured at the Lower Wenatchee Trap. Most of the smolts migrated during April and May. Monthly captures and mortalities of all fish collected at the Lower Wenatchee Trap are reported in Appendix B.

Freshwater Productivity

Egg-smolt survival estimates for wild sockeye salmon are provided in Table 4.13. Estimates of egg deposition were calculated based on the spawner escapement at Tumwater Dam and the sex ratio and fecundity of the broodstock. Egg-smolt survival rates for brood years 1995-2003 have ranged from 0.012 to 0.212 (mean = 0.092).

Table 4.13. Estimated egg deposition (estimated as mean fecundity times estimated number of females), numbers of smolts, and survival rates for wild Wenatchee sockeye salmon, 1995-2006; NA = not available.

Brood year	Number of females	Mean fecundity	Total eggs	Numbers of wild smolts				Egg-smolt survival
				Age 1+	Age 2+	Age 3+	Total	
1995	2,136	2,295	4,902,120	4,174	53,549	0	57,723	0.012
1996	3,767	2,664	10,035,288	1,382,133	741,032	985	2,124,150	0.212
1997	5,404	2,447	13,223,588	1,203,934	394,196	236	1,598,366	0.121
1998	2,024	2,813	5,693,512	590,309	2,007	0	592,316	0.104
1999	513	2,319	1,189,647	37,110	28,459	0	65,569	0.055
2000	11,413	2,673	30,506,949	701,257	1,378,795	0	2,080,052	0.068
2001	21,685	2,960	64,187,600	4,024,884	409,754	90,427	4,525,065	0.070
2002	17,226	2,856	49,197,456	5,361,433	511,453	0	5,872,886	0.119
2003	2,158	3,511	7,576,738	166,385	7,602	8,392	182,379	0.024
2004	15,469	2,505	38,749,845	1,259,369	106,298	NA	NA	NA
2005	5,867	2,718	15,946,506	2,682,623	NA	NA	NA	NA
2006	4,273	2,656	11,349,088	NA	NA	NA	NA	NA
Average	***7,661***	***2,701***	***20,692,361***	***1,583,056***	***363,315***	***11,116***	***1,899,834***	***0.092***

Juvenile survival rates for hatchery sockeye salmon are provided in Table 4.14. Release-smolt survival rates for brood years 1995-2005 have ranged from 0.000 to 1.000 (mean = 0.556). Egg-smolt survival rates for the same brood years ranged from 0.000 to 0.707 (mean = 0.263). On average, egg-smolt survival of hatchery sockeye is about three times greater than egg-smolt survival of wild sockeye. On three separate occasions, however, the estimated number of hatchery smolts equaled or exceeded the number of hatchery parr released in the lake. As noted above, this suggests that the pooled trap efficiencies are biased high.

Table 4.14. Juvenile survival rates for hatchery Wenatchee sockeye, brood years 1995-2005; NA = not available.

Brood year	Number of eggs	Number of parr released	Date of release	Estimated number of smolts	Egg-smolt survival	Release-smolt survival
1995	247,900	150,808	10/25/96	28,828	0.116	0.191
1996	314,390	284,630	10/22/97	55,985	0.178	0.197
1997	254,459	197,195	11/9/98	112,524	0.442	0.571
1998	163,278	121,344	10/27/99	24,684	0.151	0.203
1999	190,732	84,466	8/28/00	30,326	0.159	0.359
		83,489	11/1/00	63,720	0.334	0.763
2000	227,234	92,055	8/27/01	30,918	0.136	0.336
		98,119	9/27/01	90,593	0.399	0.923
2001	301,925	96,486	8/28/02	36,484	0.121	0.378
		104,452	9/23/02	103,838	0.344	0.994
2002	356,982	98,509	6/16/03	5,192	0.015	0.053
		104,855	8/25/03	98,412	0.276	0.939
		112,419	10/22/03	112,419	0.315	1.000
2003	319,470	32,755	6/15/04	0	0.000	0.000
		104,879	8/25/04	19,574	0.061	0.187
		102,825	11/3/04	102,825	0.322	1.000
2004	225,499	81,428	8/29/05	159,500	0.707	0.922
		91,495	11/2/05			
2005	211,985	70,386	10/30/06	140,542	0.663	1.000
		70,156	10/30/06			

4.5 Spawning Surveys

Spawning surveys were conducted in the Little Wenatchee and White (including the Napeequa River) rivers from 30 August to 19 October 2007. Surveys in 2007 only included counting numbers of live sockeye spawners. No redds were counted in 2007 (see Appendix G for more details).

Spawn Timing

Sockeye began spawning during the first week of September and peaked around the third week of September (Figure 4.1). Peak spawning was determined using the total number of spawners observed on the spawning grounds.

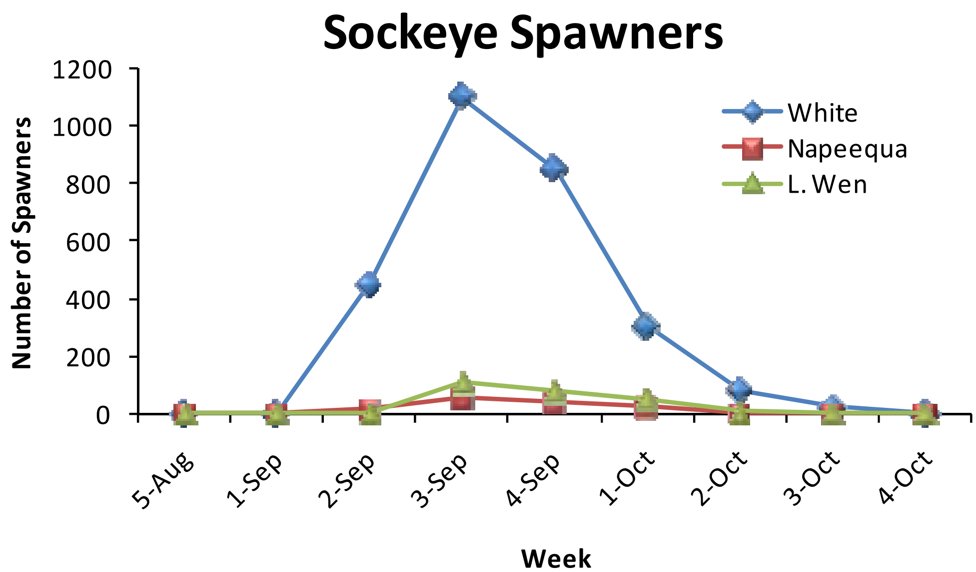


Figure 4.1. Numbers of sockeye spawners counted during different weeks in different sampling streams within the Wenatchee Basin, August through October 2007.

Spawning Escapement

Spawning escapement of sockeye salmon in 2007 was estimated using the area-under-the-curve (AUC) method (i.e., escapement = (AUC/redd residence time) x observer efficiency). This method relied on weekly counts of live sockeye and assumed a redd residence time of 11 days and an observer efficiency of 100%. Both redd residence time and observer efficiency will be evaluated in the Wenatchee Basin in 2008.

Area-under-the-curve

Based on the AUC approach, the estimated total spawning escapement of sockeye in the Wenatchee basin in 2007 was 1,870 (Table 4.15). About 92% of the escapement spawned in the White River (including the Napeequa River).

Table 4.15. Peak numbers of live spawners and total spawning escapement estimates for sockeye salmon in the Wenatchee Basin, August through October 2007.

Sampling area	Peak number of live fish	Spawning escapement
Little Wenatchee	102	150
White River	1,183	1,720
Total	***1,285***	***1,870***

The spawning escapement of 1,870 Wenatchee sockeye is less than the 1989-2007 average of 15,520 and is one of the lowest on record (Table 4.16).

Table 4.16. Spawning escapements for sockeye salmon in the Wenatchee Basin for return years 1989-2007; NA = not available. Total escapements before 2003 were based on counts at Tumwater Dam.

Return year	Spawning escapement		
	Little Wenatchee	White	Total
1989	NA	NA	**28,778**
1990	NA	NA	**25,177**
1991	NA	NA	**26,565**
1992	NA	NA	**22,628**
1993	NA	NA	**29,952**
1994	NA	NA	**9,447**
1995	NA	NA	**4,272**
1996	NA	NA	**7,534**
1997	NA	NA	**10,808**
1998	NA	NA	**4,047**
1999	NA	NA	**1,025**
2000	NA	NA	**20,751**
2001	NA	NA	**29,134**
2002	NA	NA	**27,565**
2003	NA	NA	**4,704**
2004	NA	NA	**25,834**
2005	NA	NA	**8,582**
2006	574	5,634	**6,208**
2007	150	1,720	**1,870**
Average	***362***	***3,677***	***15,520***

4.6 Carcass Surveys

Carcass surveys were conducted in the Little Wenatchee and White (including the Napeequa River) rivers from 10 September to 23 October 2007.

Number sampled

A total of 383 sockeye carcasses were sampled during August through October, 2007, in the Wenatchee Basin (Table 4.17). This is considerably lower than the 15-year average of 2,256 carcasses. Most of the carcasses sampled in 2007 were collected in the White River basin (96% or 366 carcasses) (Figure 4.2). The remaining 4% were sampled in the Little Wenatchee River (17 carcasses).

Table 4.17. Numbers of sockeye carcasses sampled within different streams/watersheds within the Wenatchee Basin, 1989-2006.

Survey year	Numbers of sockeye carcasses			
	Little Wenatchee	White	Napeequa	Total
1993	90	195	0	**285**
1994	121	165	0	**286**
1995	0	56	0	**56**
1996	43	1,387	3	**1,433**
1997	69	1,425	41	**1,535**
1998	61	524	4	**589**
1999	40	186	0	**226**
2000	821	5,494	0	**6,315**
2001	650	3,127	0	**3,777**
2002	506	7,258	55	**7,819**
2003	86	1,002	14	**1,102**
2004	625	6,960	138	**7,723**
2005	1	7	0	**8**
2006	101	2,158	38	**2,297**
2007	17	363	3	**383**
Average	***215***	***2,020***	***20***	***2,256***

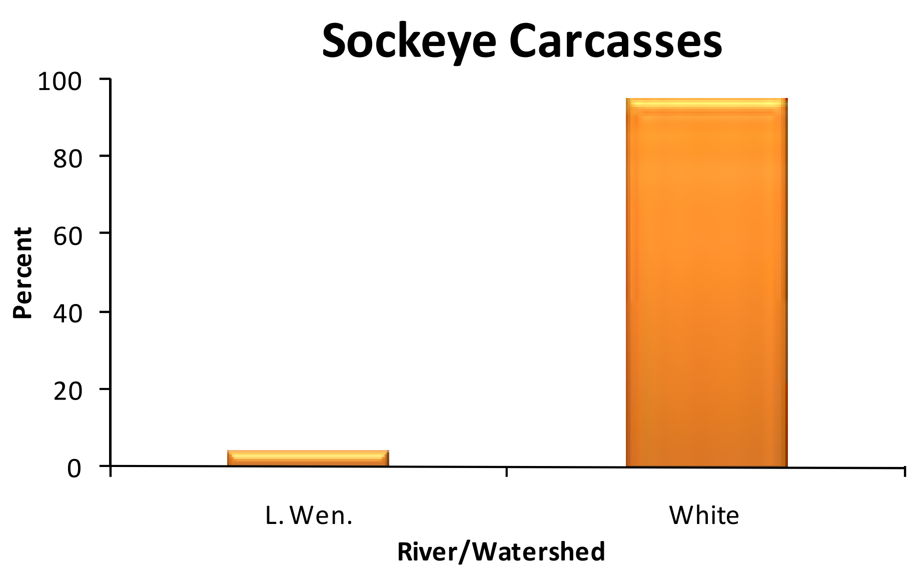


Figure 4.2. Percent of the total number of sockeye carcasses sampled in different streams/watersheds within the Wenatchee Basin during August through October, 2007.

Carcass Distribution and Origin

Sockeye carcasses were not evenly distributed among reaches within survey streams in 2007 (Table 4.18). Carcasses were only found in Reaches 2 (Lost Creek to Rainy Creek) on the Little Wenatchee. Most (99%) of the carcasses sampled in the White River basin were in Reach 2 (Sears Creek Bridge to Napeequa River). About 1% of the carcasses sampled in the White River basin were in the Napeequa River.

Table 4.18. Numbers of carcasses sampled within different streams/watersheds within the Wenatchee Basin during August through September, 2007.

Stream/watershed	Reach	Total carcasses
Little Wenatchee	Little Wen 1	0
	Little Wen 2	17
	Little Wen 3	0
	Total	**17**
White	White 1	0
	White 2	363
	White 3	0
	Napeequa 1	3
	Total	**366**
Grand Total		***383***

Numbers of wild and hatchery origin sockeye carcasses sampled in 2007 will be available after analysis of marks/tags and scales. Based on the available data (1993-2006), the largest percentage of both wild and hatchery sockeye spawned in Reach 2 on the White River (Table 4.19 and Figure 4.3). However, a greater percentage of wild fish were found in Reach 2 than hatchery fish. The opposite occurred in Reach 2 on the Little Wenatchee. A larger percentage of hatchery fish were found there compared to wild fish.

Table 4.19. Numbers of wild and hatchery sockeye carcasses sampled within different reaches in the Wenatchee Basin, 1993-2006. Reach codes are described in Table 2.9.

Survey year	Origin	Numbers of sockeye carcasses					
		Little Wenatchee		White River			Total
		L2	L3	H1	H2	Q1	
1993	Wild	86	0	0	183	0	**269**
	Hatchery	4	0	0	12	0	**16**
1994	Wild	112	0	0	155	0	**267**
	Hatchery	9	0	0	9	0	**18**
1995	Wild	0	0	0	55	0	**55**
	Hatchery	0	0	0	1	0	**1**
1996	Wild	41	0	0	1,299	3	**1,343**
	Hatchery	2	0	0	88	0	**90**
1997	Wild	65	0	0	1,411	40	**1,516**
	Hatchery	4	0	0	11	1	**16**

Survey year	Origin	Numbers of sockeye carcasses					
		Little Wenatchee		White River			Total
		L2	L3	H1	H2	Q1	
1998	Wild	61	0	0	515	4	**580**
	Hatchery	0	0	0	9	0	**9**
1999	Wild	30	0	0	164	0	**194**
	Hatchery	10	0	0	22	0	**32**
2000	Wild	694	0	3	5,239	0	**5,936**
	Hatchery	127	0	0	252	0	**379**
2001	Wild	625	0	0	3,063	0	**3,688**
	Hatchery	25	0	0	64	0	**89**
2002	Wild	504	0	0	7,207	55	**7,766**
	Hatchery	2	0	0	51	0	**53**
2003	Wild	81	0	0	993	14	**1,088**
	Hatchery	5	0	0	9	0	**14**
2004	Wild	606	0	0	6,755	166	**7,527**
	Hatchery	19	0	0	205	22	**246**
2005	Wild	201	0	5	2,966	21	**3,193**
	Hatchery	1	0	0	8	0	**9**
2006	Wild	80	0	0	2,112	36	**2,228**
	Hatchery	21	0	0	46	2	**69**
Average	***Wild***	***228***	***0***	***1***	***2,294***	***24***	***2,546***
	Hatchery	***16***	***0***	***0***	***56***	***2***	***74***

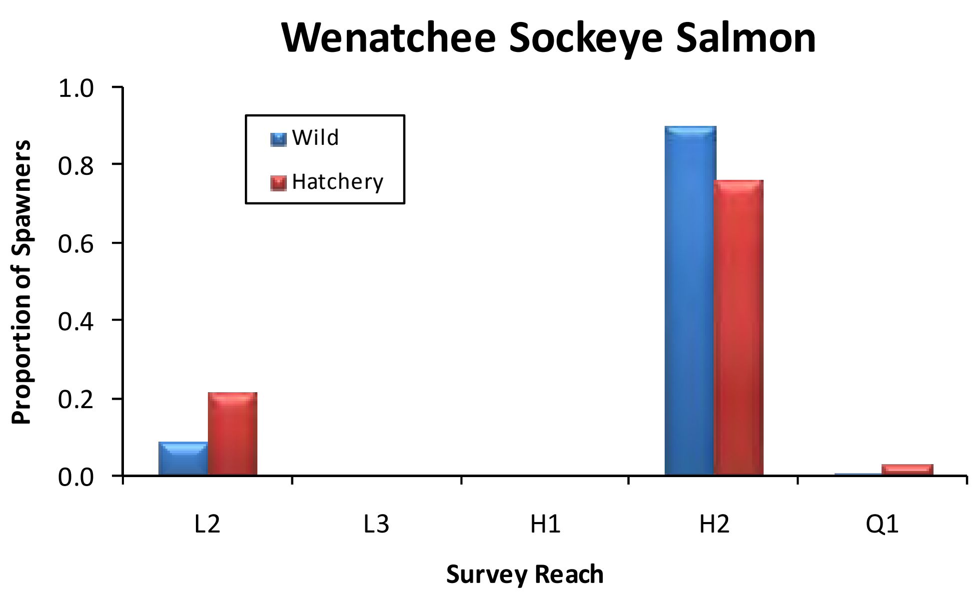


Figure 4.3. Distribution of wild and hatchery produced carcasses in different reaches in the Wenatchee Basin, pooled data from 1993-2005. Reach codes are described in Table 2.9; L = Little Wenatchee, H = White River, and Q = Napeequa River.

Sampling Rate

The sampling rate of sockeye carcasses differed among basins, with a higher sampling rate in the White than in the Little Wenatchee (Table 4.20). Nevertheless, the overall sampling rate for both basins combined equaled the target of 20%.

Table 4.20. Numbers of carcasses, estimated spawning escapements, and sampling rates for sockeye salmon in the Wenatchee Basin, 2007.

Sampling basin	Total number of carcasses	Total spawning escapement	Sampling rate
Little Wenatchee	17	150	0.11
White	366	1,720	0.21
Total	***383***	***1,870***	***0.20***

Length Data

Mean lengths (POH, cm) of male and female sockeye carcasses sampled during surveys in the Wenatchee Basin in 2007 are provided in Table 4.21. On average, males were slightly smaller than females.

Table 4.21. Mean lengths (postorbital-to-hypural length; cm) and standard deviations (in parentheses) of male and female sockeye carcasses sampled in different streams/watersheds in the Wenatchee Basin, 2007; N = number of fish sampled.

Stream/watershed	Male		Female	
	N	Length (cm)	N	Length (cm)
Little Wenatchee River	0	--	0	--
White River	7	39.9 (6.8)	10	42.2 (1.7)
Napeequa River	0	--	0	--
Wenatchee River	0	--	0	--
Total	***7***	***39.9 (6.8)***	***10***	***42.2 (1.7)***

4.7 Life History Monitoring

Life history characteristics of Wenatchee sockeye were assessed by examining carcasses on spawning grounds and fish sampled at broodstock collection sites, and by reviewing tagging data and fisheries statistics.

Migration Timing

There was little difference in migration timing of hatchery and wild sockeye past Tumwater Dam during the 2007 migration period (Table 4.22). When the data were pooled for the 1998-2007 survey period, there was a difference in migration timing of wild and hatchery sockeye (Table 4.22; Figure 4.4). Most hatchery and wild sockeye migrated upstream past Tumwater dam during July through early August; however, on average, hatchery fish tended to migrate earlier than did wild fish. The peak migration time for hatchery sockeye was the second week of July, while the peak for wild sockeye was the fourth week of July (Figure 4.4). It should be noted that the return of hatchery sockeye in 2001 was large compared to other years and this return class skewed the pooled estimate to an earlier migration timing. In most other years, there was little difference in migration timing of hatchery and wild sockeye observed at Tumwater Dam.

Table 4.22. The proportion of wild and hatchery sockeye observed (with video sampling) passing Tumwater Dam each week from late June through early October, 1998-2007. Data for 1998 through 2003 were based on videotapes and broodstock trapping and may not reflect the actual number of hatchery sockeye salmon. All sockeye were visually examined during trapping from 2004 to present.

Survey year	Origin	Proportion of sockeye sampled at Tumwater Dam weekly															Sample size
		Jun	Jul				Aug					Sep				Oct	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1998	Wild	0.000	0.000	0.131	0.613	0.205	0.033	0.015	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	4,173
	Hatch	0.000	0.000	0.129	0.355	0.258	0.097	0.097	0.065	0.000	0.000	0.000	0.000	0.000	0.000	0.000	31
1999	Wild	0.000	0.000	0.000	0.000	0.000	0.007	0.036	0.315	0.405	0.180	0.032	0.020	0.006	0.000	0.000	908
	Hatch	0.000	0.000	0.000	0.000	0.000	0.004	0.019	0.322	0.447	0.152	0.034	0.015	0.008	0.000	0.000	264
2000	Wild	0.001	0.000	0.008	0.292	0.502	0.160	0.030	0.004	0.002	0.001	0.000	0.000	0.000	0.000	0.000	18,390
	Hatch	0.005	0.002	0.029	0.292	0.453	0.178	0.035	0.003	0.003	0.000	0.001	0.000	0.000	0.000	0.000	2,589
2001	Wild	0.000	0.000	0.000	0.321	0.443	0.236	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,047
	Hatch	0.000	0.156	0.426	0.162	0.114	0.084	0.044	0.005	0.005	0.003	0.000	0.000	0.000	0.000	0.000	31,586
2002	Wild	0.000	0.000	0.000	0.063	0.610	0.214	0.076	0.027	0.007	0.002	0.001	0.001	0.000	0.000	0.000	27,241
	Hatch	0.000	0.000	0.000	0.034	0.603	0.188	0.114	0.041	0.007	0.005	0.003	0.003	0.000	0.000	0.000	580
2003	Wild	0.000	0.003	0.223	0.515	0.201	0.032	0.014	0.007	0.002	0.001	0.002	0.000	0.000	0.001	0.000	4,699
	Hatch	0.003	0.000	0.176	0.408	0.288	0.077	0.035	0.011	0.003	0.000	0.000	0.000	0.000	0.000	0.000	375
2004	Wild	0.000	0.063	0.469	0.302	0.112	0.025	0.010	0.011	0.001	0.003	0.002	0.001	0.001	0.000	0.000	31,409
	Hatch	0.000	0.101	0.552	0.251	0.073	0.002	0.002	0.009	0.005	0.002	0.002	0.001	0.000	0.001	0.000	1,758
2005	Wild	0.001	0.057	0.273	0.409	0.108	0.025	0.025	0.008	0.011	0.032	0.030	0.009	0.010	0.001	0.001	14,176
	Hatch	0.000	0.214	0.167	0.190	0.071	0.000	0.071	0.095	0.024	0.024	0.048	0.048	0.000	0.000	0.048	42
2006	Wild	0.000	0.000	0.012	0.423	0.441	0.059	0.042	0.015	0.005	0.001	0.000	0.000	0.000	0.000	0.000	9,151
	Hatch	0.000	0.000	0.012	0.213	0.197	0.049	0.367	0.122	0.030	0.008	0.000	0.002	0.000	0.000	0.000	507
2007	Wild	0.000	0.000	0.026	0.114	0.383	0.280	0.070	0.055	0.033	0.019	0.010	0.002	0.003	0.002	0.002	2,542
	Hatch	0.000	0.000	0.000	0.077	0.308	0.262	0.138	0.123	0.046	0.031	0.000	0.000	0.000	0.015	0.000	65
Ave	***Wild***	***0.000***	***0.025***	***0.181***	***0.280***	***0.335***	***0.103***	***0.035***	***0.016***	***0.008***	***0.007***	***0.005***	***0.002***	***0.001***	***0.000***	***0.000***	***113,736***
	Hatch	***0.000***	***0.136***	***0.386***	***0.175***	***0.145***	***0.088***	***0.047***	***0.010***	***0.008***	***0.004***	***0.001***	***0.001***	***0.000***	***0.000***	***0.000***	***37,797***

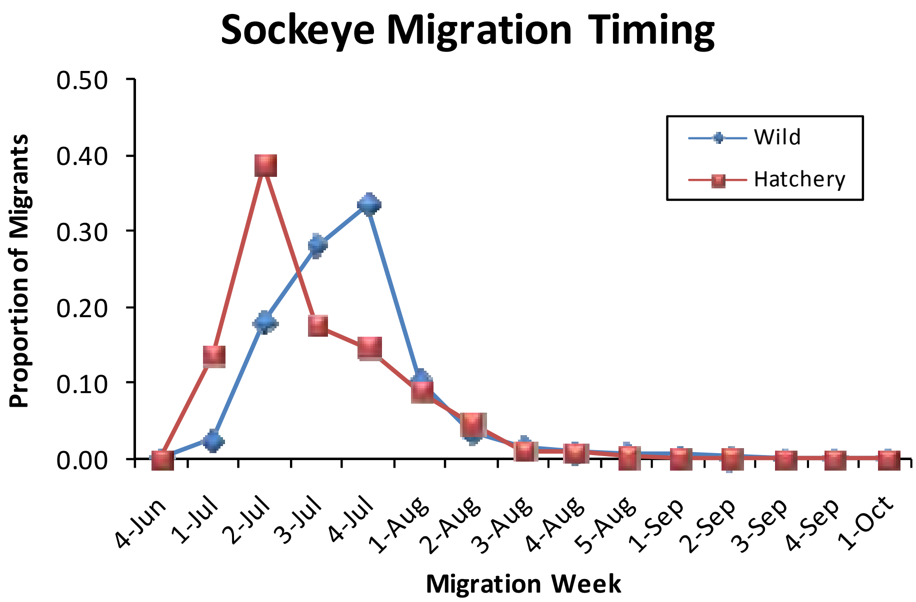


Figure 4.4. Proportion of wild and hatchery sockeye observed (using video) passing Tumwater Dam each week during their migration period late-June through early-October; data were pooled over survey years 1998-2007.

Age at Maturity

Although sample sizes are small, it appears that most wild sockeye returned as age-5 fish, while most hatchery sockeye returned as age-4 fish (Table 4.23; Figure 4.5). Only wild fish have returned at age-6.

Table 4.23. Proportions of wild and hatchery sockeye of different ages (total age) sampled in broodstock and on spawning grounds, 1994-2006.

Survey year	Origin	Total age						Sample size
		2	3	4	5	6	7	
1994	Wild	-	-	-	-	-	-	0
	Hatchery	0.00	0.00	0.88	0.13	0.00	0.00	16
1995	Wild	-	-	-	-	-	-	0
	Hatchery	0.00	0.00	0.00	1.00	0.00	0.00	1
1996	Wild	-	-	-	-	-	-	0
	Hatchery	0.00	0.00	1.00	0.00	0.00	0.00	82
1997	Wild	-	-	-	-	-	-	0
	Hatchery	0.00	0.00	0.77	0.23	0.00	0.00	13
1998	Wild	0.00	0.08	0.85	0.08	0.00	0.00	26
	Hatchery	0.00	0.00	0.64	0.36	0.00	0.00	11
1999	Wild	0.00	0.00	0.18	0.73	0.10	0.00	113
	Hatchery	0.00	0.00	0.65	0.35	0.00	0.00	31

Survey year	Origin	Total age						Sample size
		2	3	4	5	6	7	
2000	Wild	0.00	0.00	0.00	1.00	0.00	0.00	1
	Hatchery	0.00	0.00	0.98	0.02	0.00	0.00	359
2001	Wild	0.00	0.00	0.76	0.24	0.00	0.00	29
	Hatchery	0.00	0.00	0.75	0.25	0.00	0.00	171
2002	Wild	0.00	0.00	0.20	0.80	0.00	0.00	5
	Hatchery	0.00	0.00	0.29	0.71	0.00	0.00	63
2003	Wild	0.00	0.00	0.00	1.00	0.00	0.00	5
	Hatchery	0.00	0.33	0.67	0.00	0.00	0.00	6
2004	Wild	-	-	-	-	-	-	0
	Hatchery	0.00	0.02	0.93	0.05	0.00	0.00	244
2005	Wild	-	-	-	-	-	-	0
	Hatchery	0.00	0.13	0.75	0.13	0.00	0.00	8
2006	Wild	0.00	0.00	0.34	0.65	0.01	0.00	207
	Hatchery	0.00	0.00	1.00	0.00	0.00	0.00	65
Average	***Wild***	***0.00***	***0.01***	***0.35***	***0.61***	***0.03***	***0.00***	***386***
	Hatchery	***0.00***	***0.01***	***0.87***	***0.12***	***0.00***	***0.00***	***1,070***

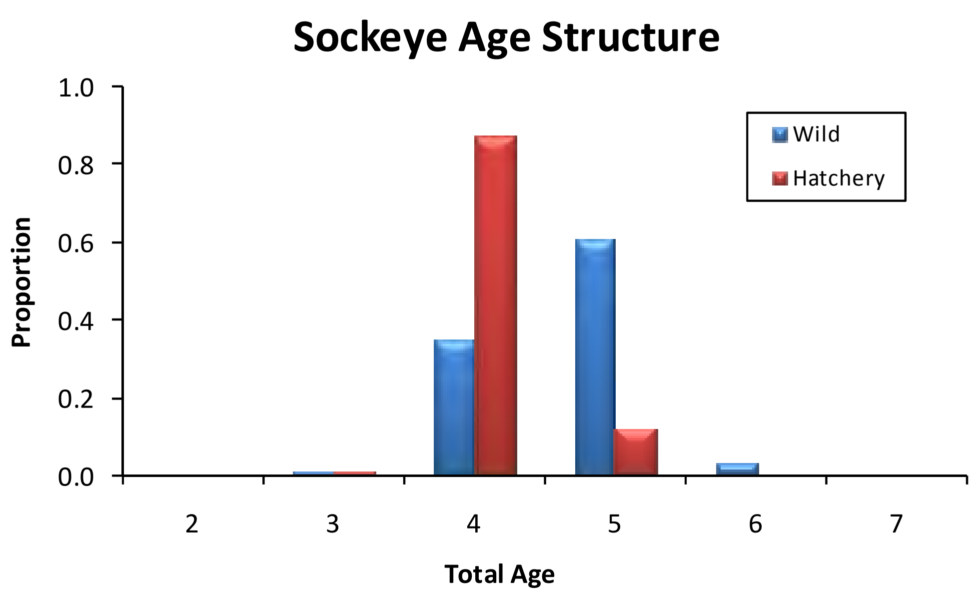


Figure 4.5. Proportions of wild and hatchery sockeye salmon of different total ages sampled at Tumwater Dam and on spawning grounds in the Wenatchee Basin for the combined years 1994-2006.

Size at Maturity

Although sample sizes are small, there was virtually no difference in mean sizes of hatchery and wild sockeye salmon sampled in the Wenatchee Basin (Table 4.24). Future analyses will compare sizes of hatchery and wild fish of the same age groups and gender.

Table 4.24. Mean lengths (POH; cm) and variability statistics for wild and hatchery sockeye salmon sampled at Tumwater Dam (broodstock) and on spawning grounds in the Wenatchee Basin, 1994-2006; SD = 1 standard deviation.

Survey year	Origin	Sample size	Sockeye length (POH; cm)			
			Mean	SD	Minimum	Maximum
1994	Wild	0	-	-	-	-
	Hatchery	14	42	3	37	47
1995	Wild	0	-	-	-	-
	Hatchery	1	53	-	53	53
1996	Wild	0	-	-	-	-
	Hatchery	5	51	3	49	55
1997	Wild	6	40	3	38	45
	Hatchery	17	41	3	37	50
1998	Wild	585	43	3	34	50
	Hatchery	20	43	3	40	51
1999	Wild	99	42	3	36	50
	Hatchery	31	41	3	36	47
2000	Wild	1	48	-	48	48
	Hatchery	377	40	2	30	49
2001	Wild	29	42	2	38	47
	Hatchery	184	43	3	35	51
2002	Wild	5	42	1	40	43
	Hatchery	52	44	3	37	49
2003	Wild	5	44	4	38	47
	Hatchery	13	42	5	30	48
2004	Wild	0	-	-	-	-
	Hatchery	230	40	3	33	49
2005	Wild	0	-	-	-	-
	Hatchery	8	43	9	35	64
2006	Wild	248	45	4	34	52
	Hatchery	17	41	5	31	48
Pooled	***Wild***	***978***	***43***	***3***	***34***	***52***
	Hatchery	***969***	***43***	***4***	***30***	***64***

Contribution to Fisheries

The total number of hatchery and wild sockeye captured in different fisheries is provided in Tables 4.25 and 4.26. Harvest on hatchery sockeye was minimal during brood years 1989-2001. In contrast, harvest on wild sockeye was relatively high for brood years 1989-1993. Thereafter, harvest was low.

Table 4.25. Estimated number and percent (in parentheses) of hatchery Wenatchee sockeye captured in different fisheries.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational[a] (sport)	
1989	0 (0)	0 (0)	0 (0)	0 (0)	0
1990	0 (0)	0 (0)	0 (0)	0 (0)	0
1991	0 (0)	0 (0)	0 (0)	0 (0)	0
1992	0 (0)	0 (0)	0 (0)	0 (0)	0
1993	0 (0)	0 (0)	0 (0)	639 (100)	639
1994	0 (0)	0 (0)	0 (0)	0 (0)	0
1995	0 (0)	0 (0)	0 (0)	0 (0)	0
1996	0 (0)	0 (0)	0 (0)	0 (0)	0
1997	0 (0)	0 (0)	0 (0)	0 (0)	0
1998	0 (0)	0 (0)	0 (0)	0 (0)	0
1999	0 (0)	0 (0)	0 (0)	0 (0)	0
2000	0 (0)	0 (0)	5 (100)	0 (0)	5
2001	0 (0)	0 (0)	3 (100)	0 (0)	3

[a] Includes the Lake Wenatchee fishery.

Table 4.26. Estimated number and percent (in parentheses) of wild Wenatchee sockeye captured in different fisheries.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational[a] (sport)	
1989	0 (0)	1,247 (96)	57 (4)	0 (0)	1,304
1990	0 (0)	1,973 (23)	79 (1)	6,523 (76)	8,575
1991	0 (0)	1,898 (23)	56 (1)	6,311 (76)	8,265
1992	0 (0)	893 (20)	39 (1)	3,565 (79)	4,497
1993	0 (0)	341 (5)	57 (1)	6,400 (94)	6,798
1994	0 (0)	0 (0)	85 (100)	0 (0)	85
1995	0 (0)	0 (0)	0 (0)	0 (0)	0
1996	0 (0)	0 (0)	0 (0)	0 (0)	0
1997	0 (0)	0 (0)	0 (0)	0 (0)	0
1998	0 (0)	0 (0)	0 (0)	0 (0)	0
1999	0 (0)	0 (0)	0 (0)	0 (0)	0

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational[a] (sport)	
2000					
2001					

[a] Includes the Lake Wenatchee fishery.

Straying

Stray rates were determined by examining CWTs recovered on spawning grounds within and outside the Wenatchee Basin. Targets for strays based on return year (recovery year) outside the Wenatchee Basin should be less than 5%. The target for brood year strays should also be less than 5%.

There is no record that Wenatchee sockeye have strayed into other spawning areas outside the Wenatchee Basin. This may be related to the lack of carcass surveys in other locations. Nevertheless, the existing data indicate that Wenatchee sockeye stray at a rates less than the target of 5%.

Based on brood year analysis, virtually no Wenatchee sockeye have strayed into non-target spawning areas or hatchery programs (Table 4.27). These data indicate that Wenatchee sockeye stray at rates less than the target of 5%.

Table 4.27. Number and percent of hatchery Wenatchee sockeye that homed to target spawning areas and the target hatchery program, and number and percent that strayed to non-target spawning areas and hatchery programs, by brood years 1990-2001. Hatchery sockeye from brood years 1995-1998 were not tagged because of columnaris disease. Percent stays should be less than 5%.

Brood year	Homing				Straying			
	Target streams		Target hatchery		Non-target streams		Non-target hatcheries	
	Number	%	Number	%	Number	%	Number	%
1990	402	99.5	2	0.5	0	0.0	0	0.0
1991	1	100.0	0	0.0	0	0.0	0	0.0
1992	92	98.9	0	0.0	0	0.0	1	1.1
1993	29	96.7	1	3.3	0	0.0	0	0.0
1994	66	94.3	4	5.7	0	0.0	0	0.0
1995	-	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-
1999	65	100.0	0	0.0	0	0.0	0	0.0
2000	571	100.0	0	0.0	0	0.0	0	0.0
2001	20	100.0	0	0.0	0	0.0	0	0.0
Total	***1,246***	***99.4***	***7***	***0.6***	***0***	***0.0***	***1***	***0.1***

Genetics

Genetic studies were conducted to determine the potential impacts of the Wenatchee sockeye supplementation program on natural origin sockeye in the upper Wenatchee Basin (Blankenship et al. 2008; the entire report is appended as Appendix H). Specifically, the objective of the study was to determine if the genetic composition of the Lake Wenatchee sockeye population had been altered by the supplementation program, which was based on the artificial propagation of a small subset of the Wenatchee population. Microsatellite DNA allele frequencies were used to differentiate between temporally replicated collections of natural and hatchery-origin sockeye in the Wenatchee Basin. A total of 13 collections of Wenatchee sockeye were analyzed; eight temporally replicated collections of natural-origin sockeye and five temporally replicated collections of hatchery-origin sockeye. Paired natural-hatchery collections were available from return years 2000, 2001, 2004, 2006, and 2007.

Overall, the study showed that allele frequency distributions were consistent over time, regardless of origin, resulting in small, insignificant measures of genetic differentiation among collections. This indicates that there was no year-to-year differences in allele frequencies between natural and hatchery-origin sockeye. In addition, the analyses found no differences between pre- and post-supplementation collections. Thus, it was concluded that the allele frequencies of the broodstock collections equaled the allele frequency of the natural collections.

Proportion of Natural Influence

Another method for assessing the genetic risk of a supplementation program is to determine the influence of the hatchery and natural environments on the adaptation of the composite population. This is estimated by the proportion of natural origin fish in the hatchery broodstock (pNOB) and the proportion of hatchery origin fish in the natural spawning escapement (pHOS). The ratio pNOB/(pHOS+pNOB) is the Proportion of Natural Influence (PNI). The larger the ratio (PNI), the greater the strength of selection in the natural environment relative to that of the hatchery environment. In order for the natural environment to dominate selection, PNI should be greater than 0.5 (HSRG/WDFW/NWIFC 2004).

For brood years 1989-2005, the PNI was equal to or greater than 0.8 (Table 4.28). This indicates that the natural environment has a greater influence on adaptation of Wenatchee sockeye than does the hatchery environment.

Table 4.28. Proportionate natural influence (PNI) of the Wenatchee sockeye supplementation program for brood years 1989-2005. PNI was calculated as the proportion of naturally produced sockeye in the hatchery broodstock (pNOB) divided by the proportion of hatchery sockeye on the spawning grounds (pHOS) plus pNOB. NOS = number of natural origin sockeye on the spawning grounds; HOS = number of hatchery origin sockeye on the spawning grounds; NOB = number of natural origin sockeye collected for broodstock; and HOB = number of hatchery origin sockeye included in hatchery broodstock.

Brood year	Spawners			Broodstock			PNI
	NOS	HOS	pHOS	NOB	HOB	pNOB	
1989	28,778	0	0.00	115	0	1.00	1.0
1990	25,177	0	0.00	302	0	1.00	1.0
1991	26,565	0	0.00	199	0	1.00	1.0
1992	22,628	0	0.00	320	0	1.00	1.0

Brood year	Spawners			Broodstock			PNI
	NOS	HOS	pHOS	NOB	HOB	pNOB	
1993	27,226	2,726	0.09	207	0	1.00	0.9
1994	8,840	607	0.06	236	5	0.98	0.9
1995	4,216	56	0.01	199	3	0.99	1.0
1996	7,067	467	0.06	225	0	1.00	0.9
1997	10,722	86	0.01	192	19	0.91	1.0
1998	4,015	32	0.01	151	6	0.96	1.0
1999	894	131	0.13	68	60	0.53	0.8
2000	19,589	1,162	0.06	170	5	0.97	0.9
2001	28,347	787	0.03	200	7	0.97	1.0
2002	27,378	187	0.01	256	0	1.00	1.0
2003	4,814	51	0.01	198	0	1.00	1.0
2004	26,605	954	0.03	180	0	1.00	1.0
2005	13,995	39	0.00	166	0	1.00	1.0

Natural Replacement Rates

Natural replacement rates (NRR) were calculated as the ratio of natural origin recruits (NOR) to the parent spawning population. For brood years 1989-2000, NRR in the Wenatchee averaged 0.96 (range, 0.12-4.23) if harvested fish were not included in the estimate and 1.00 (range, 0.12-4.51) if harvested fish were included in the estimate (Table 4.29).

Table 4.29. Spawning escapements, natural origin recruits (NOR), and natural replacement rates (NRR; with and without harvest) for wild sockeye salmon in the Wenatchee basin, 1989-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating sockeye NORs, and NRRs.)*

Brood year	Escapement	NOR	NRR	
			Harvest not included	Harvest included
1989	28,778	30,487	1.05	1.06
1990	25,177	6,164	0.24	0.24
1991	26,565	5,908	0.22	0.22
1992	22,628	6,337	0.28	0.28
1993	29,952	13,164	0.44	0.44
1994	9,447	1,188	0.13	0.13
1995	4,272	532	0.12	0.12
1996	7,534	34,009	4.23	4.51
1997	10,808	40,354	3.41	3.73
1998	4,047	16,488	3.87	4.07
1999	1,025	469	0.44	0.46
2000	20,751	35,688	1.65	1.72
Average	***15,915***	***15,899***	***0.96***	***1.00***

Hatchery Replacement Rates

Hatchery replacement rates (HRR) were estimated as hatchery adult-to-adult returns. These rates should be greater than the NRRs and greater than or equal to 5.40 (the value in BAMP; Murdoch and Peven 2005). HRRs exceeded NRRs in 7 of the 12 years of data regardless if harvest was included or not in the estimates (Table 4.30). Hatchery replacement rates for Wenatchee sockeye have equaled or exceeded the BAMP target of 5.40 in only two years if harvest is not included and three years if harvest is included in the estimate (Table 4.30).

Table 4.30. Hatchery replacement rates (HRR), NRR, and BAMP target (5.40) for sockeye salmon in the Wenatchee basin, 1989-2000; NA = not available. *(The numbers in this table may change as the HETT and HC refine the methods for estimating sockeye HRRs and NRRs.)*

Brood year	Harvest not included			Harvest included		
	HRR	NRR	BAMP	HRR	NRR	BAMP
1989	11.3	1.05	5.40	13.9	1.06	5.40
1990	1.6	0.24	5.40	1.6	0.24	5.40
1991	0.1	0.22	5.40	0.1	0.22	5.40
1992	1.5	0.28	5.40	1.5	0.28	5.40
1993	0.3	0.44	5.40	0.3	0.44	5.40
1994	0.2	0.13	5.40	0.2	0.13	5.40
1995	0.5	0.12	5.40	0.5	0.12	5.40
1996	6.0	4.23	5.40	6.3	4.51	5.40
1997	2.9	3.41	5.40	3.4	3.73	5.40
1998	0.8	3.87	5.40	0.9	4.07	5.40
1999	0.4	0.44	5.40	0.4	0.46	5.40
2000	4.8	1.65	5.40	7.2	1.72	5.40
Average	***2.5***	***1.34***	***5.40***	***3.0***	***1.42***	***5.40***

Juvenile-to-Adult Survivals

When possible, both parr-to-adult ratios (PAR) and smolt-to-adult ratios (SAR) were calculated for hatchery sockeye salmon. Ratios were calculated as the number of hatchery adults divided by the number of hatchery parr released or the estimated number of smolts emigrating from Lake Wenatchee. Survival ratios were based on CWT returns, when available, or on the estimated number of hatchery adults recovered on the spawning grounds, in broodstock, and harvested. For the available brood years, PARs have ranged from 0.0002 to 0.0136 for hatchery sockeye salmon and SARs have ranged from 0.0007 to 0.0254 (Table 4.31).

Table 4.31. Parr-to-adult ratios (PAR) and smolt-to-adult ratios (SAR) for Wenatchee hatchery sockeye salmon, brood years 1990-2002.

Brood year	Number of parr released	Number of smolts	Estimated adult recaptures	PAR	SAR
1989	260,400		3,548	0.0136	
1990	372,102		500	0.0013	
1991	167,523		29	0.0002	
1992	340,557		503	0.0015	
1993	190,443		84	0.0004	
1994	252,859		48	0.0002	
1995	150,808	28,828	107	0.0007	0.0037
1996	284,630	55,985	1,421	0.0050	0.0254
1997	197,195	112,524	768	0.0039	0.0068
1998	121,344	24,684	166	0.0014	0.0067
1999	167,955	94,046	66	0.0004	0.0007
2000	190,174	121,511	1,399	0.0074	0.0115
Average	***224,666***	***72,930***	***720***	***0.0032***	***0.0090***

4.8 ESA/HCP Compliance

Broodstock Collection

The 2005 sockeye broodstock collections at Tumwater Dam occurred concurrently with spring Chinook reproductive success monitoring and evaluation activities (BPA Project No. 2003-039-00) and Wenatchee steelhead broodstock collection activities authorized through ESA permits 1196 and 1395, respectively. No ESA-listed spring Chinook or steelhead takes occurred during sockeye broodstock collections at Tumwater Dam that were outside those authorized through ESA Section 10 permits 1196 and 1395.

Hatchery Rearing and Release

The 2004 Wenatchee sockeye program released 225,670 juveniles, representing 111% of the program production objective and 100.3% of the 10% production overage allowance in ESA Section 10 Permit 1347.

Hatchery Effluent Monitoring

Per ESA Permits 1196, 1347, and 1395, permit holders shall monitor and report hatchery effluents in compliance with applicable National Pollution Discharge Elimination Systems (NPDES) (EPA 1999) permit limitations. NPDES monitoring and reporting for Chelan PUD Hatchery Programs during 2007 are provided in Appendix E.

Smolt and Emigrant Trapping

ESA-listed spring Chinook and steelhead were encountered during operation of the upper and lower Wenatchee traps. ESA takes are reported in the steelhead (Section 3.8) and spring Chinook (Section 5.8) sections and will not be repeated here.

Spawning Surveys

Sockeye spawning ground surveys conducted in the Wenatchee Basin during 2007 were consistent with ESA Section 10 Permit No. 1347. Because of the difficulty of quantifying the level of take associated with spawning ground surveys, the Permit does not specify a take level associated with these activities, even though it does authorize implementation of spawning ground surveys. Therefore, no take levels are reported. However, to minimize potential impacts to established redds, wading was restricted to the extent practical, and extreme caution was used to avoid established redds when wading was required.

SECTION 5: WENATCHEE (CHIWAWA) SPRING CHINOOK

Although this section of the report focuses on results from monitoring the Chiwawa spring Chinook program, information on spring Chinook collected throughout the Wenatchee basin is also provided.

5.1 Broodstock Sampling

This section focuses on results from sampling 2005-2007 Chiwawa spring Chinook broodstock, which were collected at the Chiwawa weir and at Tumwater Dam. Some information for the 2007 return is not available at this time (e.g., age structure and final origin determination). This information will be provided in the 2008 annual report.

Origin of Broodstock

Hatchery origin adults made up between 65-76% of the Chiwawa spring Chinook broodstock for return years 2005-2007 (Table 5.1). Hatchery origin adults were collected at both Tumwater Dam and the Chiwawa weir. In an effort to partially address straying of Chiwawa spring Chinook to other tributaries in the basin and secondarily to ensure meeting adult collection quotas, hatchery origin adults were collected to the greatest extent possible at Tumwater Dam. Natural origin fish were collected only at the Chiwawa weir. Broodstock were trapped at Tumwater Dam from late May through August and at the Chiwawa weir from mid June through August.

Table 5.1. Numbers of wild and hatchery Chiwawa spring Chinook collected for broodstock, numbers that died before spawning, and numbers of Chinook spawned, 1989-2007. Unknown origin fish (i.e., undetermined by scale analysis, no CWT or fin clips, and no additional hatchery marks) were considered naturally produced. Mortality includes fish that died of natural causes typically near the end of spawning and were not needed for the program or were surplus fish killed at spawning.

Brood year	Wild spring Chinook					Hatchery spring Chinook					Total number spawned
	Number collected	Prespawn loss	Mortality	Number spawned	Number released	Number collected	Prespawn loss	Mortality	Number spawned	Number released	
1989	28	0	0	28	0	0	0	0	0	0	28
1990	19	1	0	18	0	0	0	0	0	0	18
1991	32	0	5	27	0	0	0	0	0	0	27
1992	113	0	0	78	35	0	0	0	0	0	78
1993	100	3	3	94	0	0	0	0	0	0	94
1994	9	0	1	8	0	4	0	0	4	0	12
1995	No Program										
1996	8	0	0	8	0	10	0	0	10	0	18
1997	37	0	5	32	0	83	1	3	79	0	111
1998	13	0	0	13	0	35	1	0	34	0	47
1999	No Program										
2000	10	0	1	9	0	38	1	16	21	0	30
2001	115	2	0	113	0	267	8	0	259	0	372
2002	21	0	1	20	0	63	1	11	51	0	71
2003	44	1	2	41	0	75	2	20	53	0	94
2004	100	1	16	83	0	196	30	34	132	0	215
2005	98	1	6	91	0	185	3	1	181	0	279

Brood year	Wild spring Chinook					Hatchery spring Chinook					Total number spawned
	Number collected	Prespawn loss	Mortality	Number spawned	Number released	Number collected	Prespawn loss	Mortality	Number spawned	Number released	
2006	95	0	4	91	0	303	0	29	224	50	315
2007	45	1	1	43	0	124	2	18	104	0	147
***Average*[a]**	***52***	***1***	***3***	***47***	***2***	***81***	***3***	***8***	***68***	***3***	***115***

[a] Origin determinations should be considered preliminary pending scale analyses.

Age/Length Data

Ages were determined from scales and/or coded wire tags (CWT) collected from broodstock. For both the 2005 and 2006 returns, most adults, regardless of origin, were age-4 Chinook (Table 5.2). A larger percentage of the age-5 Chinook were natural origin fish, whereas a larger percentage of the age-3 fish were hatchery origin fish.

Table 5.2. Percent of hatchery and wild spring Chinook of different ages (total age) collected from broodstock, 1991-2006.

Return year	Origin	Total age			
		2	3	4	5
1991	Wild	0.0	15.6	59.4	25.0
	Hatchery	0.0	0.0	0.0	0.0
1992	Wild	0.0	0.0	0.0	0.0
	Hatchery	0.0	0.0	0.0	0.0
1993	Wild	0.0	0.0	22.0	78.0
	Hatchery	0.0	0.0	0.0	0.0
1994	Wild	0.0	0.0	28.6	71.4
	Hatchery	0.0	0.0	50.0	50.0
1995	Wild	No program			
	Hatchery				
1996	Wild	0.0	28.6	71.4	0.0
	Hatchery	0.0	50.0	50.0	0.0
1997	Wild	0.0	0.0	87.5	12.5
	Hatchery	0.0	1.2	98.8	0.0
1998	Wild	0.0	0.0	63.6	36.4
	Hatchery	0.0	0.0	62.9	37.1
1999	Wild	No program			
	Hatchery				
2000	Wild	0.0	20.0	70.0	10.0
	Hatchery	0.0	76.3	23.7	0.0
2001	Wild	0.0	2.8	94.4	2.8
	Hatchery	0.0	1.5	98.5	0.0
2002	Wild	0.0	0.0	66.7	33.3

Return year	Origin	Total age			
		2	3	4	5
	Hatchery	0.0	0.0	93.4	6.6
2003	Wild	0.0	27.0	2.7	70.3
	Hatchery	0.0	21.3	5.3	73.3
2004	Wild	1.1	4.3	89.4	5.3
	Hatchery	0.0	36.9	63.1	0.0
2005	Wild	0.0	1.1	84.5	14.4
	Hatchery	0.0	4.3	94.6	1.1
2006	Wild	0.0	1.1	71.1	27.8
	Hatchery	0.0	1.4	81.3	17.3
Average	***Wild***	***0.2***	***4.4***	***67.5***	***28.0***
	Hatchery	***0.0***	***11.2***	***78.7***	***10.2***

There was little difference in mean lengths between hatchery and natural origin broodstock of age-4 and 5 Chinook in 2005 and 2006 (Table 5.3). Additionally, for the 2005 and 2006 returns, there was little difference in mean lengths for age-3 natural origin fish. There was, however, a relatively large difference in mean lengths in age-3 hatchery origin fish (7 cm difference) between 2005 and 2006.

Table 5.3. Mean fork length (cm) at age (total age) of hatchery and wild spring Chinook collected from broodstock, 1991-2006; N = sample size and SD = 1 standard deviation.

Return year	Origin	Spring Chinook fork length (cm)											
		Age-2			Age-3			Age-4			Age-5		
		Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD
1991	Wild	-	0	-	-	5	-	-	19	-	-	8	-
	Hatchery	-	0	-	-	0	-	-	0	-	-	0	-
1992	Wild	-	0	-	-	0	-	-	0	-	-	0	-
	Hatchery	-	0	-	-	0	-	-	0	-	-	0	-
1993	Wild	-	0	-	-	0	-	79	22	3	92	78	4
	Hatchery	-	0	-	-	0	-	-	0	-	-	0	-
1994	Wild	-	0	-	-	0	-	79	2	3	96	5	6
	Hatchery	-	0	-	-	0	-	82	2	11	91	2	3
1995	Wild	No program											
	Hatchery												
1996	Wild	-	0	-	51	2	1	79	5	7	-	0	-
	Hatchery	-	0	-	56	5	4	74	5	6	-	0	-
1997	Wild	-	0	-	-	0	-	80	28	5	99	4	8
	Hatchery	-	0	-	56	1	-	82	82	4	-	0	-
1998	Wild	-	0	-	-	0	-	78	7	13	83	4	18
	Hatchery	-	0	-	-	0	-	77	22	8	93	13	7

Return year	Origin	Spring Chinook fork length (cm)											
		Age-2			Age-3			Age-4			Age-5		
		Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD
1999	Wild	No program											
	Hatchery												
2000	Wild	-	0	-	51	2	3	82	7	4	98	1	-
	Hatchery	-	0	-	58	29	7	79	9	8	-	0	-
2001	Wild	-	0	-	49	3	6	82	101	6	95	3	3
	Hatchery	-	0	-	56	4	7	83	261	5	-	0	-
2002	Wild	-	0	-	-	0	-	79	12	4	96	6	10
	Hatchery	-	0	-	-	0	-	81	57	6	94	4	9
2003	Wild	-	0	-	55	10	5	83	1	-	99	26	6
	Hatchery	-	0	-	59	16	5	86	4	18	96	55	6
2004	Wild	47	1	-	57	4	4	80	84	5	95	5	9
	Hatchery	-	0	-	49	72	6	79	123	6	-	0	-
2005	Wild	-	0	-	49	1	-	80	82	6	96	14	8
	Hatchery	-	0	-	56	8	5	82	175	6	93	2	2
2006	Wild	-	0	-	48	1	-	80	64	7	96	25	5
	Hatchery	-	0	-	49	4	4	80	240	6	95	51	7

Sex Ratios

Male spring Chinook in 2005-2007 return years made up about 52%, 43%, and 51%, respectively, of the adults collected. This resulted in overall male to female ratios of 1.08:1.00, 0.77:1.00, and 1.04:1.00, respectively (Table 5.4). Only returns in 2006 were below the 1:1 ratio target in the broodstock protocol. For the 2005 and 2006 return years, natural origin fish consisted of a slightly higher proportion of males than did hatchery origin fish (Table 5.4.).

Table 5.4. Numbers of male and female wild and hatchery spring Chinook collected for broodstock, 1989-2007. Ratios of males to females are also provided.

Return year	Number of wild spring Chinook			Number of hatchery spring Chinook			Total M/F ratio
	Males (M)	Females (F)	M/F	Males (M)	Females (F)	M/F	
1989	11	17	0.65:1.00	-	-	-	0.65:1.00
1990	7	12	0.58:1.00	-	-	-	0.58:1.00
1991	13	19	0.68:1.00	-	-	-	0.68:1.00
1992	39	39	1.00:1.00	-	-	-	1.00:1.00
1993	50	50	1.00:1.00	-	-	-	1.00:1.00
1994	5	4	1.25:1.00	2	2	1.00:1.00	1.17:1.00
1995	No program						
1996	6	2	3.00:1.00	8	2	4.00:1.00	3.50:1.00
1997	14	23	0.61:1.00	34	49	0.69:1.00	0.67:1.00

Return year	Number of wild spring Chinook			Number of hatchery spring Chinook			Total M/F ratio
	Males (M)	Females (F)	M/F	Males (M)	Females (F)	M/F	
1998	9	4	2.25:1.00	18	17	1.06:1.00	1.29:1.00
1999	No program						
2000	5	5	1.00:1.00	32	6	5.33:1.00	3.36:1.00
2001	45	70	0.64:1.00	90	177	0.51:1.00	0.55:1.00
2002	9	12	0.75:1.00	30	33	0.91:1.00	0.87:1.00
2003	28	16	1.75:1.00	42	33	1.27:1.00	1.43:1.00
2004	58	42	1.38:1.00	102	94	1.09:1.00	1.18:1.00
2005	58	40	1.45:1.00	89	96	0.93:1.00	1.08:1.00
2006	49	46	1.07:1.00	123	179	0.69:1.00	0.77:1.00
2007	20	25	0.80:1.00	66	58	1.14:1.00	1.04:1.00
Total	***426***	***426***	***1.00:1.00***	***636***	***746***	***0.85:1.00***	***0.91:1.00***

Fecundity

Mean fecundities for the 2005-2007 returns of spring Chinook ranged from 4,324-4,387 eggs per female (Table 5.5). These fecundities were less than the overall average of 4,786 eggs per female, but were close to the expected fecundity of 4,400 eggs per female assumed in the broodstock protocol. For the three return years, natural origin Chinook produced more eggs per female than did hatchery origin fish (Table 5.5). This could be attributed to differences in size and age of hatchery and natural origin fish described above.

Table 5.5. Mean fecundity of wild, hatchery, and all female spring Chinook collected for broodstock, 1989-2007; NA = not available.

Return year	Mean fecundity		
	Wild	Hatchery	Total
1989*	NA	NA	2,832
1990*	NA	NA	5,024
1991*	NA	NA	4,600
1992*	NA	NA	5,199[a]
1993*	NA	NA	5,249
1994*	NA	NA	5,923
1995	No program		
1996*	NA	NA	4,645
1997	4,752	4,479	4,570
1998	5,157	5,376	5,325
1999	No program		
2000	5,028	5,019	5,023
2001	4,530	4,663	4,624
2002	5,024	4,506	4,654

Return year	Mean fecundity		
	Wild	Hatchery	Total
2003	6,191	5,651	5,844
2004	4,846	4,775	4,799
2005	4,365	4,312	4,327
2006	4,773	4,151	4,324
2007	4,722	4,240	4,387
Average	***4,939***	***4,717***	***4,785***

* Individual fecundities were not tracked with females until 1997.
[a] Estimated as the mean of fecundities two years before and two years after 1992.

5.2 Hatchery Rearing

Rearing History

Number of eggs taken

Based on the unfertilized egg-to-release survival standard of 81%, a total of 829,630 eggs are required to meet the program release goal of 672,000 smolts. Between 1989 and 2007, the egg take goal was reached in one of those years (Table 5.6). The green egg takes for 2005-2007 brood years were 65%, 90%, and 43% of program goals, respectively.

ESA Permit 1196 sets limits on the percentage of the total run, natural origin run, and a minimum contribution of natural origin fish that must be in the broodstock. Applying these criteria to the low total abundance of spring Chinook salmon to the Chiwawa basin and the low abundance of natural origin fish returning to the basin has resulted in the program not meeting production goals.

Table 5.6. Numbers of eggs taken from spring Chinook broodstock, 1989-2007.

Return year	Number of eggs taken
1989	45,311
1990	60,287
1991	73,601
1992	111,624
1993	257,208
1994	35,539
1995	No program
1996	18,579
1997	312,182
1998	90,521
1999	No program
2000	55,256
2001	1,099,630

Return year	Number of eggs taken
2002	196,186
2003	247,501
2004	538,176
2005	536,490
2006	744,344
2007	359,739
Average	***281,304***

Number of acclimation days

Early rearing of the 2005 brood Chiwawa spring Chinook was similar to previous years with fish being held on well water before being transferred to Chiwawa Ponds for final acclimation. Beginning in 2006 (2005 brood acclimation), modifications were made to the Chiwawa FH intakes so that Wenatchee River water could be applied to the Chiwawa River intakes during severe cold periods to prevent the formation of frazzle ice. During acclimation of the 2005 brood, fish were acclimated for 202-232 days (depending on volitional or forced release) on Chiwawa River water, with 98 of those days containing a small percentage of Wenatchee River water (Table 5.7). Unlike in previous years, at no time was this brood on 100% Wenatchee River water.

Table 5.7. Number of days spring Chinook broods were acclimated and water source, brood years 1989-2005; NA = not available.

Brood year	Release year	Transfer date	Release date	Number of days and water source		
				Total	Chiwawa	Wenatchee
1989	1991	19-Oct	11-May	204	NA	NA
1990	1992	13-Sep	27-Apr	227	NA	NA
1991	1993	24-Sep	24-Apr	212	NA	NA
1992	1994	30-Sep	20-Apr	202	NA	NA
1993	1995	28-Sep	20-Apr	204	NA	NA
1994	1996	1-Oct	25-Apr	207	NA	NA
1995	1997	No Program				
1996	1998	25-Sep	29-Apr	216	NA	NA
1997	1999	28-Sep	22-Apr	206	NA	NA
1998	2000	27-Sep	24-Apr	210	NA	NA
1999	2001	No Program				
2000	2002	26-Sep	25-Apr	211	NA	NA
2001	2003	22-Oct	1-May	191	NA	NA
2002	2004	25-Sep	2-May	220	NA	NA

Brood year	Release year	Transfer date	Release date	Number of days and water source		
				Total	Chiwawa	Wenatchee
2003	2005	30-Sep	3-May	215	NA	NA
2004	2006	3 –Sep	1-May	240	88-104	124
2005	2007	25-Sep	1-May	217	217	98[a]
		26-Sep	16-Apr-15-May	202-232	202-232	98[a]
Average				***213***	***169***	***111***

[a] Represents the number of days Wenatchee River water was applied to the Chiwawa River intake screen to prevent the formation of frazzle ice.

Release Information

Numbers released

The 2005 brood Chiwawa spring Chinook program achieved 73.5% of the 672,000 target goal with about 494,012 fish being released into the Chiwawa River (Table 5.8). Fish were released in two groups; a volitional release for about one month with the mid-point coinciding with a new moon phase and a forced release also coinciding with the new moon phase. The intent of the two releases is to evaluate the efficacy of release methodology on smolt to adult survival as well as decrease the potential for interactions with naturally produced fish. Fish that were allowed to volitionally migrate on their own may have faster emigration rates, higher smolt to smolt survival, and may be less likely to interact with their natural cohorts. This was the last year for this comparison. Future releases will be volitional unless adult return data indicate that forced release is more favorable than volitional release.

Table 5.8. Numbers of spring Chinook smolts released from the hatchery, 1989-2005. The release target for Chiwawa spring Chinook is 672,000 smolts.

Brood year	Release year	Number of smolts
1989	1991	43,000
1990	1992	53,170
1991	1993	62,138
1992	1994	85,113
1993	1995	223,610
1994	1996	27,226
1995	1997	No program
1996	1998	15,176
1997	1999	266,148
1998	2000	75,906
1999	2001	No program
2000	2002	47,104
2001	2003	377,544

Brood year	Release year	Number of smolts
2002	2004	149,668
2003	2005	222,131
2004	2006	494,517
2005	2006	494,012
Average		***175,764***

Numbers tagged

The 2005 brood Chiwawa spring Chinook were 98.6% and 98.8% CWT and adipose fin clipped for the volitional and forced release groups, respectively. In addition, a total of 10,063 juveniles from the 2005 brood were PIT tagged and adipose-fin clipped at Eastbank Hatchery during 28-30 August 2006 (Table 5.9). Of these, 5,032 came from pond 12 and 5,031 from pond 13. Tagged fish from pond 12 were transported to the Chiwawa Hatchery on 25 and 26 September, while those from pond 13 were transported on 27 and 28 September. During spring, 2007, one group of 4,988 tagged Chinook was released volitionally and another group of 4,993 was forced released. Of the total number of spring Chinook PIT tagged (10,063), 74 died and eight others shed their tags (Table 5.9). Some of the mortality was associated with a river otter that was observed moving in and out of the raceways during the winter.[6]

Table 5.9. Summary of PIT tagging activities for spring Chinook (2005 brood) at the Eastbank Hatchery, 2006. Dead fish counted before 15 September likely represent deaths associated with tagging.

Rearing Pond	Number of fish tagged	Number of fish that died		Number of tags shed	Number of tagged fish released
		Before 9/15	After 9/15		
12	5,032	4	32	3	4,993
13	5,031	5	33	5	4,988
Total	***10,063***	***9***	***65***	***8***	***9,981***

In 2007, a total of 10,055 spring Chinook from the 2006 brood were PIT tagged at the Eastbank Hatchery during 24-26 July 2007. These fish were transferred to the Chiwawa raceways on 26-27 September. As of the end of January 2008, a total of 97 tagged fish have died and another 9 fish have shed their tags. This leaves an estimated 9,949 tagged spring Chinook alive. These fish will be released in spring of 2008 with the rest of the 2006 brood.

Fish size and condition at release

Spring Chinook from the 2005 brood were released as yearling smolts between 16 April and 15 May of 2007. Size at release for both groups was below the targets established for the program. However, the coefficient of variation for fork length was below the target indicating fish were released with an acceptable size distribution (Table 5.10).

[6] PIT tags were found in otter scat. These tags were removed from the data files.

Table 5.10. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of spring Chinook smolts released from the hatchery, 1989-2005. Size targets are provided in the last row of the table.

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1989	1991	147	4.4	37.8	12
1990	1992	137	5.0	32.4	14
1991	1993	135	4.2	30.3	15
1992	1994	133	5.0	28.4	16
1993	1995	136	4.5	30.2	15
1994	1996	139	7.1	34.4	13
1995	1997	No Program			
1996	1998	157	5.3	52.1	9
1997	1999	146	7.2	38.7	12
1998	2000	143	9.1	39.5	12
1999	2001	No Program			
2000	2002	150	6.8	46.7	10
2001	2003	142	7.1	37.6	12
2002	2004	146	8.5	40.3	11
2003	2005	161	6.1	50.2	9
2004	2006	143	4.9	36.7	12
2005	2007	136[a]	4.6	30.8	15
		129[b]	5.8	26.6	17
Targets		***176***	***9.0***	***37.8***	***12***

[a] Forced release group.
[b] Volitional release group.

Survival Estimates

Overall survival of Chiwawa spring Chinook from green (unfertilized) egg to release was at or above the standard set for the program in all categories (Table 5.11). Pre-spawn survival of adults was also above the standard set for the program.

Table 5.11. Hatchery life-stage survival rates (%) for spring Chinook, brood years 1989-2005. Survival standards or targets are provided in the last row of the table.

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
1989	100.0	100.0	98.0	99.1	99.1	99.0	96.4	99.3	93.6
1990	100.0	85.7	91.8	98.1	99.5	98.9	97.9	99.2	88.2
1991	100.0	100.0	94.4	96.1	99.6	97.9	93.2	95.0	84.5
1992	100.0	100.0	98.4	96.7	99.9	99.9	80.0	80.6	76.2
1993	96.0	98.0	89.7	98.0	99.7	99.3	98.9	99.7	86.9

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
1994	100.0	100.0	98.6	100.0	99.8	99.4	77.0	78.9	75.9
1995	No program								
1996	100.0	100.0	88.3	100.0	93.8	93.0	89.9	97.7	79.4
1997	98.6	100.0	93.2	95.7	98.3	99.6	95.6	99.3	85.3
1998	95.2	100.0	94.5	99.0	98.5	98.3	89.6	99.1	83.9
1999	No program								
2000	100.0	100.0	91.0	98.1	97.2	96.6	95.4	99.3	85.2
2001	97.6	97.0	88.9	98.1	99.7	99.6	51.3	51.8	44.7
2002	97.8	100.0	82.1	98.0	97.4	96.7	94.8	99.1	76.3
2003	93.9	100.0	93.2	97.7	99.5	99.3	98.5	98.1	89.7
2004	97.8	82.5	93.3	98.4	98.8	94.3	93.9	97.2	86.2
2005	97.1	100.0	95.9	98.0	99.2	99.0	97.9	99.1	92.1
Standard	***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

5.3 Disease Monitoring

Mortality from external fungus within the 2005 brood began to increase in juveniles in late October 2006. A 14-day formalin treatment was effective in controlling the fungus. No additional health issues were encountered.

5.4 Natural Juvenile Productivity

During 2007, juvenile spring Chinook were sampled at the Upper Wenatchee, Lower Wenatchee, and Chiwawa traps and counted during snorkel surveys within the Chiwawa Basin.

Parr Estimates

A total of 60,752 (±12.2%) subyearling and 41 (±48.8%) yearling spring Chinook were estimated in the Chiwawa River basin in August 2007 (Table 5.12 and 5.13). During the survey period 1992-2007, numbers of subyearling and yearling Chinook have ranged from 5,815 to 134,872 and 5 to 563, respectively, in the Chiwawa Basin (Table 5.12 and 5.13; Figure 5.1). Numbers of all fish counted in the Chiwawa basin are reported in Appendix A.

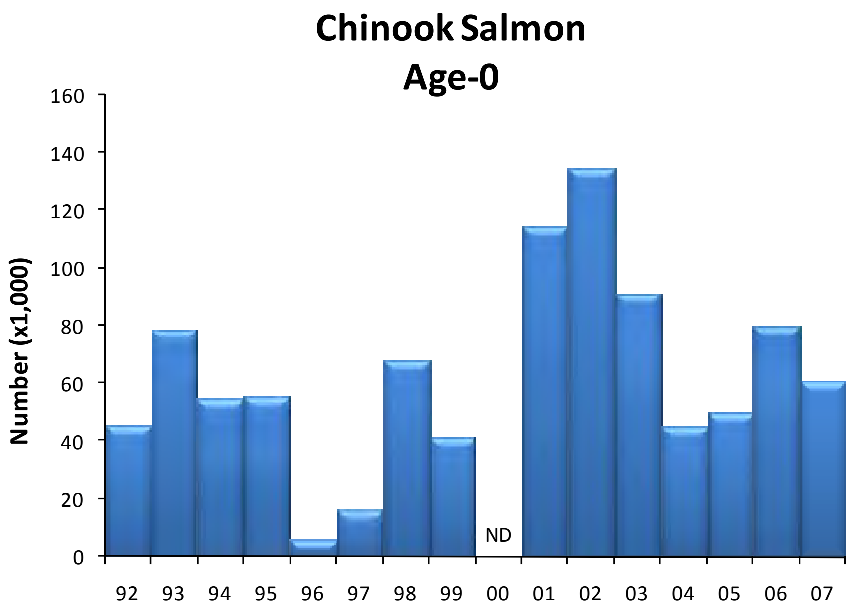
Table 5.12. Total numbers of subyearling spring Chinook estimated in different steams in the Chiwawa Basin during snorkel surveys in August 1992-2007; NS = not sampled.

Sample Year	Number of subyearling spring Chinook									
	Chiwawa River	Phelps Creek	Chikamin Creek	Rock Creek	Peven Creek	Big Meadow Creek	Alder Creek	Brush Creek	Y Creek	Total
1992	45,483	NS	NS	NS	NS	NS	NS	NS	NS	**45,483**
1993	77,269	0	1,258	586	NS	NS	NS	NS	NS	**79,113**
1994	53,492	0	398	474	68	624	0	0	0	**55,056**
1995	52,775	0	1,346	210	0	683	67	160	0	**55,241**
1996	5,500	0	29	10	0	248	28	0	0	**5,815**
1997	15,438	0	56	92	0	480	0	0	0	**16,066**
1998	65,875	0	1,468	496	57	506	0	13	0	**68,415**
1999	40,051	0	366	592	0	598	22	0	0	**41,629**
2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	**NS**
2001	106,753	168	2,077	2,855	354	2,332	78	0	0	**114,617**
2002	117,230	75	8,233	2,953	636	5,021	429	0	297	**134,874**
2003	80,250	4,508	1,570	3,255	118	1,510	22	45	0	**91,278**
2004	43,360	102	717	215	54	637	21	71	0	**45,177**
2005	45,999	71	2,092	660	17	792	0	0	0	**49,631**
2006	73,478	113	2,500	1,681	51	1,890	62	127	0	**79,902**
2007	53,863	125	5,235	870	51	538	20	28	22	**60,752**
Average	***58,454***	***369***	***1,953***	***1,068***	***108***	***1,220***	***58***	***34***	***25***	***62,870***

Table 5.13. Total numbers of yearling spring Chinook estimated in different steams in the Chiwawa Basin during snorkel surveys in August 1992-2007; NS = not sampled.

Sample Year	Number of yearling spring Chinook									
	Chiwawa River	Phelps Creek	Chikamin Creek	Rock Creek	Peven Creek	Big Meadow Creek	Alder Creek	Brush Creek	Y Creek	Total
1992	563	NS	NS	NS	NS	NS	NS	NS	NS	**563**
1993	174	0	0	0	NS	NS	NS	NS	NS	**174**
1994	14	0	0	4	0	0	0	0	0	**18**
1995	13	0	0	0	0	0	0	0	0	**13**
1996	22	0	0	0	0	0	0	0	0	**22**
1997	5	0	0	0	0	0	0	0	0	**5**
1998	63	0	0	0	0	0	0	0	0	**63**
1999	41	0	0	0	0	0	0	0	0	**41**
2000	NS	NS	NS	NS	NS	NS	NS	NS	NS	**NS**
2001	66	0	3	0	0	0	0	0	0	**69**
2002	32	0	0	0	0	0	0	0	0	**32**
2003	134	0	0	0	0	0	0	0	0	**134**
2004	14	0	0	0	0	7	0	0	0	**21**
2005	62	0	17	0	0	0	0	0	0	**79**

Sample Year	Number of yearling spring Chinook									
	Chiwawa River	Phelps Creek	Chikamin Creek	Rock Creek	Peven Creek	Big Meadow Creek	Alder Creek	Brush Creek	Y Creek	Total
2006	345	0	0	43	0	0	0	0	0	**388**
2007	41	0	0	0	0	0	0	0	0	**41**
Average	***106***	***0***	***1***	***3***	***0***	***1***	***0***	***0***	***0***	***111***



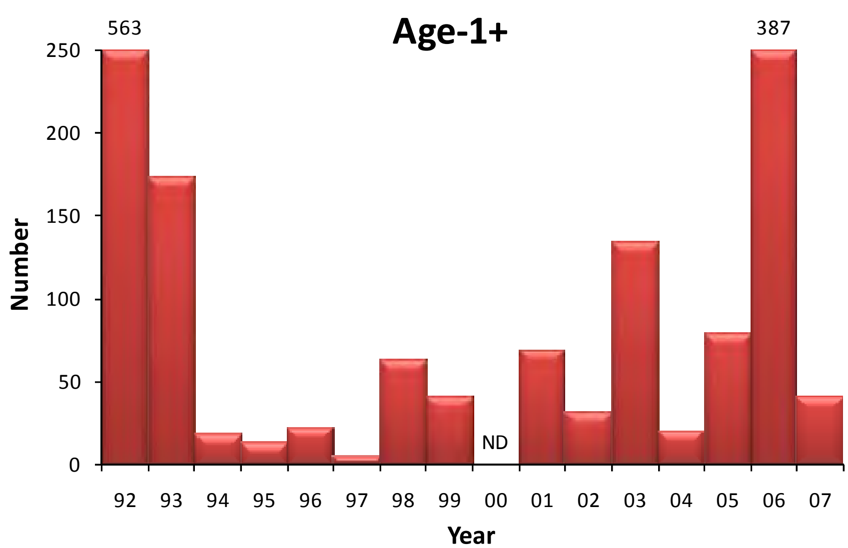


Figure 5.1. Numbers of subyearling and yearling Chinook salmon within the Chiwawa River Basin in August 1992-2007; ND = no data.

Juvenile Chinook were distributed contagiously among reaches in the Chiwawa River. Their densities were highest in the upper portions of the basin; although the highest density occurred in Chikamin Creek (7,387 fish/ha). Juvenile Chinook were most abundant in multiple channels and least abundant in glides. Most Chinook associated closely with woody debris in multiple channels. These sites (multiple channels) made up 29% of the total area of the Chiwawa Basin, but they provided habitat for 40% of all the subyearling Chinook in the basin in 2007. In contrast, riffles made up 47% of the total area, but provided habitat for only 12% of all juvenile Chinook in the Chiwawa Basin. Pools made up 17% of the total area and provided habitat for 46% of all juvenile Chinook in the basin. Virtually no Chinook used glides that lacked woody debris.

Mean densities of juvenile Chinook in two reaches of the Chiwawa River were generally less than those in corresponding reference areas (Nason Creek and the Little Wenatchee River) (Figure 5.2). Within both the Chiwawa River and its reference areas, pools and multiple channels consistently had the highest densities of juvenile Chinook.

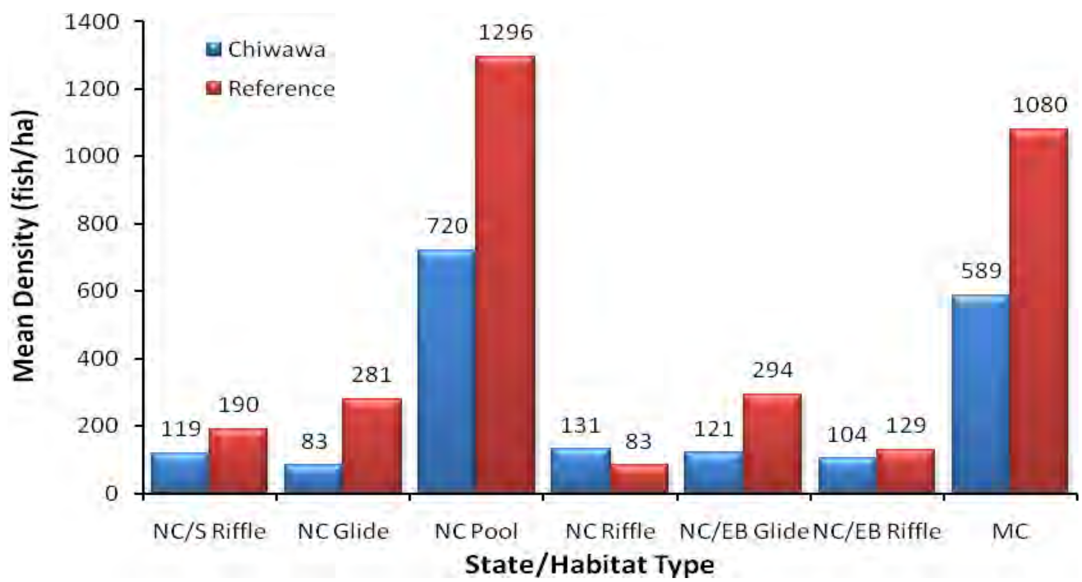


Figure 5.2. Comparison of the 14-year means of subyearling spring Chinook densities within state/habitat types in reaches 3 and 8 of the Chiwawa River and their matched reference areas on Nason Creek and the Little Wenatchee River. NC = natural channel; S = straight channel; EB = eroded banks; MC = multiple channel.

Smolt and Emigrant Estimates

Numbers of spring Chinook smolts and emigrants were estimated at the Upper Wenatchee, Chiwawa, and Lower Wenatchee traps in 2007.

Chiwawa Trap

The Chiwawa Trap operated between 27 February and 27 November 2007. During that time period the trap was inoperable for 23 days because of high river flows, debris, snow/ice, or mechanical failure. The trap operated in two different positions depending on stream flow; lower position at flows greater than 12 m^3/s and an upper position at flows less than 12 m^3/s. Daily trap efficiencies were estimated from two regression models depending on trap position and age class of fish (e.g., subyearling and yearling). The daily number of fish captured was expanded by the estimated trap efficiency to estimate daily total emigration. Monthly captures of all fish and results of mark-recapture efficiency tests at the Chiwawa Trap are reported in Appendix B.

Wild yearling spring Chinook (2005 brood year) were primarily captured from March to June 2007 (Figure 5.3). Based on capture efficiencies estimated from the flow model, the total number of wild yearling Chinook emigrating from the Chiwawa River was 69,064 (±35,747). Combining the total number of subyearling spring Chinook (108,595) that emigrated during the fall of 2006 with the total number of yearling Chinook (69,064) that emigrated during 2007 resulted in a total emigrant estimate of 177,659 (±74,108) spring Chinook for the 2005 brood year (Table 5.14).

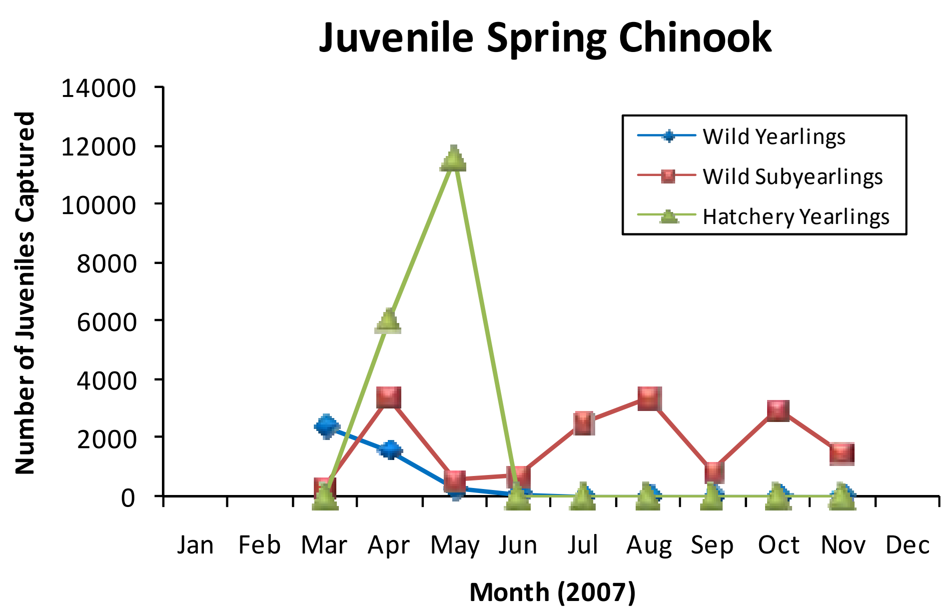


Figure 5.3. Monthly captures of wild subyearling, wild yearling, and hatchery yearling spring Chinook at the Chiwawa Trap, 2007.

Table 5.14. Numbers of juvenile spring Chinook at different life stages in the Chiwawa Basin for brood years 1991-2007; NS = not sampled.

Brood year	Number of redds	Egg deposition	Number of parr	Number of smolts produced within Chiwawa Basin[a]	Total number of smolts[b]	Number of emigrants
1991	104	478,400	45,483[c]	42,525	42,525	NS
1992	302	1,570,098	79,113	39,723	56,763	65,541

Brood year	Number of redds	Egg deposition	Number of parr	Number of smolts produced within Chiwawa Basin[a]	Total number of smolts[b]	Number of emigrants
1993	106	556,394	55,056	8,662	17,926	22,698
1994	82	485,686	55,240	16,472	22,145	25,067
1995	13	66,248	5,815	3,830	5,230	5,951
1996	23	106,835	16,066	15,475	17,922	19,183
1997	82	374,740	68,415	28,334	39,044	44,562
1998	41	218,325	41,629	23,068	24,953	25,923
1999	34	166,090	NS	10,661	13,953	15,649
2000	128	642,944	114,617	40,831	50,634	55,685
2001	1,078	4,984,672	134,874	86,482	389,940	546,266
2002	345	1,605,630	91,278	90,948	152,547	184,279
2003	111	648,684	45,177	16,755	27,897	33,637
2004	241	1,156,559	49,631	72,080	101,172	116,158
2005	332	1,436,564	79,902	69,064	140,737	177,659
2006	297	1,284,228	60,752	-	-	-
2007	283	1,241,521	-	-	-	-
Average	***212***	***1,001,389***	***62,870***	***37,661***	***73,567***	***95,590***

[a] The estimated number of smolts (yearlings) that are produced entirely within the Chiwawa Basin. Smolt estimates for brood years 1992-1996 were calculated with a mark-recapture model; brood years 1997-2005 were calculated with a flow model.
[b] These numbers represent Chiwawa smolts produced within the entire Wenatchee Basin. This assumes that 66% of the subyearling migrants from the Chiwawa basin survive to smolt in the Wenatchee Basin, regardless of the number of subyearling migrants (i.e., no density dependence). Smolt estimates for brood years 1992-1996 were calculated with a mark-recapture model; brood years 1997-2005 were calculated with a flow model.
[c] Estimate only includes numbers of Chinook in the Chiwawa River. Tributaries were not sampled at that time.

Wild subyearling spring Chinook (2006 brood year) were captured between 8 June and 27 November 2007. Based on capture efficiencies estimated from the flow model for both the upper position and lower position, the total number of wild subyearling (fry and parr) Chinook from the Chiwawa River was 70,262 (±19,317). Removing fry from the estimate, a total of 62,922 (±13,424) parr emigrated from the Chiwawa Basin in 2007. Although subyearlings migrated during most months of sampling, the majority (63%) migrated during August, September, and October (Figure 5.3).

Yearling spring Chinook sampled in 2007 averaged 91 mm in length, 8.6 g in weight, and had a mean condition of 1.10 (Table 5.15). These size estimates were similar to the overall mean of yearling spring Chinook sampled in previous years (overall means: 94 mm, 9.4 g, and condition of 1.10). Subyearling spring Chinook sampled in 2007 at the Chiwawa Trap averaged 72 mm in length, averaged 4.5 g, and had a mean condition of 1.13 (Table 5.15). These sizes comport well with the overall mean of subyearling spring Chinook sampled in previous years (overall means, 77 mm, 5.7 g, and condition of 1.10).

Table 5.15. Mean fork length (mm), weight (g), and condition factor of subyearling and yearling spring Chinook collected in the Chiwawa Trap, 1996-2007. Numbers in parentheses indicate 1 standard deviation.

Sample year	Life stage	Sample size[a]	Mean size		
			Length (mm)	Weight (g)	Condition (K)
1996	Subyearling	514	78 (25)	6.9 (4.2)	1.11 (0.11)
	Yearling	1,589	94 (9)	9.5 (3.0)	1.11 (0.08)
1997	Subyearling	840	86 (8)	7.5 (2.1)	1.16 (0.08)
	Yearling	1,114	100 (7)	10.2 (2.6)	1.02 (0.10)
1998	Subyearling	3,743	82 (11)	6.2 (2.2)	1.08 (0.09)
	Yearling	2,663	97 (7)	10.3 (2.8)	1.12 (0.23)
1999	Subyearling	569	89 (9)	8.5 (2.4)	1.15 (0.07)
	Yearling	3,664	95 (8)	9.6 (3.4)	1.09 (0.19)
2000	Subyearling	1,810	85 (10)	7.4 (2.4)	1.15 (0.10)
	Yearling	1,891	97 (8)	10.5 (5.2)	1.13 (0.07)
2001	Subyearling	4,657	82 (11)	6.6 (3.4)	1.14 (0.09)
	Yearling	2,935	97 (7)	10.5 (2.4)	1.15 (0.08)
2002	Subyearling	6,130	64 (12)	3.0 (1.6)	1.06 (0.10)
	Yearling	1,735	94 (8)	9.0 (2.3)	1.09 (0.08)
2003	Subyearling	3,679	64 (12)	3.2 (1.7)	1.08 (0.10)
	Yearling	2,657	87 (9)	7.2 (3.5)	1.07 (0.10)
2004	Subyearling	2,278	75 (16)	4.3 (2.1)	0.92 (0.16)
	Yearling	1,032	91 (9)	8.5 (2.7)	1.09 (0.10)
2005	Subyearling	2,702	73 (12)	4.6 (2.2)	1.08 (0.09)
	Yearling	803	96 (9)	9.9 (2.8)	1.08 (0.08)
2006	Subyearling	3,462	76 (11)	5.1 (2.0)	1.12 (0.21)
	Yearling	4,645	95 (7)	9.4 (2.3)	1.10 (0.13)
2007	Subyearling	1,718	72 (11.5)	4.5 (2.1)	1.13 (0.16)
	Yearling	2,245	91 (7.8)	8.6 (2.5)	1.10 (0.09)
Average	***Subyearling***	***2,675***	***77.2***	***5.7***	***1.10***
	Yearling	***2,248***	***94.4***	***9.4***	***1.10***

[a] Sample size represents the number of fish that were measured for both length and weight.

Upper Wenatchee Trap

The Upper Wenatchee Trap operated nightly between 4 March and 23 July 2007. During the five-month sampling period, a total of 1,597 wild yearling Chinook, 213 wild subyearling Chinook, and 750 hatchery yearling Chinook were captured at the Upper Wenatchee Trap. Monthly captures of all fish collected at the Upper Wenatchee Trap are reported in Appendix B.

Lower Wenatchee Trap

The Lower Wenatchee Trap operated nightly between 1 February and 5 August 2007. During that time period the trap was inoperable for 14 days because of high river flows, debris, snow/ice, or mechanical failure. During the seven-month sampling period, a total of 1,906 wild yearling Chinook, 86,142 wild subyearling Chinook (mostly summer Chinook), and 45,467 hatchery yearling Chinook were captured at the Lower Wenatchee Trap. Based on capture efficiencies estimated from the flow model, the total number of wild yearling Chinook that emigrated past the Lower Wenatchee Trap was 311,699 (±293,886). The majority (53%) of these fish emigrated during March. Monthly captures of all fish collected at the Lower Wenatchee Trap are reported in Appendix B.

PIT Tagging Activities

A total of 13,980 juvenile Chinook (6,239 subyearling and 7,741 yearlings) were PIT tagged and released in 2007 throughout the Wenatchee Basin (Table 5.16). Most of these (77%) were tagged in the Chiwawa Basin (10,796 at the trap and 20 upstream from the trap). Few were tagged and released in Nason Creek or the upper Wenatchee River. A total of 1,641 yearling Chinook were tagged and released at the Lower Wenatchee trap. See Appendix C for a complete list of all fish captured, tagged, lost, and released.

Table 5.16. Numbers of wild Chinook that were captured, tagged, and released at different locations within the Wenatchee Basin, 2007. Numbers of fish that died or shed tags are also given.

Sampling location	Life stage	Number captured for tagging	Number tagged	Number that died	Number of shed tags	Total number of fish released
Chiwawa Trap	Subyearling	6,676	6,155	17	1	6,137
	Yearling	4,798	4,689	30	0	4,659
	Total	**11,474**	**10,844**	**47**	**1**	**10,796**
Chiwawa River	Subyearling	23	21	1	0	20
	Yearling	1	0	0	0	0
	Total	**24**	**21**	**1**	**0**	**20**
Upper Wenatchee Trap	Subyearling	21	20	5	0	15
	Yearling	1,493	1,456	21	1	1,434
	Total	**1,514**	**1,476**	**26**	**1**	**1,449**
Upper Wenatchee River	Subyearling	68	61	0	0	61
	Yearling	0	0	0	0	0
	Total	**68**	**61**	**0**	**0**	**61**
Nason Creek[a]	Subyearling	7	7	1	0	6
	Yearling	7	7	0	0	7
	Total	**14**	**14**	**1**	**0**	**13**
Lower Wenatchee Trap	Subyearling	0	0	0	0	0
	Yearling	1,690	1,646	5	0	1,641
	Total	**1,690**	**1,646**	**5**	**0**	**1,641**
Totals	***Subyearling***	***6,795***	***6,264***	***24***	***1***	***6,239***
	Yearling	***7,989***	***7,798***	***56***	***1***	***7,741***
	Total	***14,784***	***14,062***	***80***	***2***	***13,980***

[a] An additional 489 wild subyearling and 582 wild yearling Chinook were tagged and released by the Yakama Nation at the Nason Creek smolt trap.

Freshwater Productivity

Both productivity and survival estimates for different life stages of spring Chinook in the Chiwawa Basin are provided in Table 5.17. Estimates for brood year 2005 fall within the ranges estimated over the period of brood years 1991-2004. During that period, freshwater productivities ranged from 125-1,015 parr/redd, 169-779 smolts/redd, and 214-834 emigrants/redd. Survivals during the same period ranged from 2.7-19.1% for egg-parr, 3.2-16.8% for egg-smolt, and 4.1-18.0% for egg-emigrants. Overwinter survival rates for juvenile spring Chinook within the Chiwawa Basin have ranged from 15.7-100.0%.

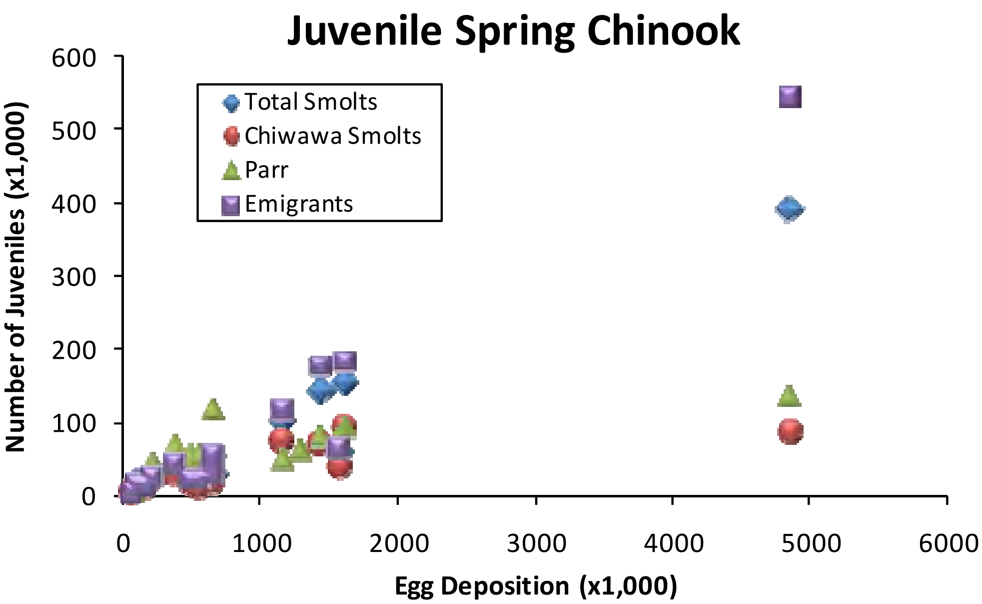
Table 5.17. Productivity (fish/redd) and survival (%) estimates for different juvenile life stages of spring Chinook in the Chiwawa Basin for brood years 1991-2006; ND = no data. These estimates were derived from data in Table 5.14.

Brood year	Parr/Redd	Smolts/Redd[a]	Emigrants/ Redd	Egg-Parr (%)	Parr-Smolt[b] (%)	Egg-Smolt[a] (%)	Egg-Emigrant (%)
1991	437	409	ND	9.5	93.5	8.9	ND
1992	262	188	217	5.0	50.2	3.6	4.2
1993	519	169	214	9.9	15.7	3.2	4.1
1994	674	270	306	11.4	29.8	4.6	5.2
1995	447	402	458	8.8	65.9	7.9	9.0
1996	699	779	834	15.0	96.3	16.8	18.0
1997	834	476	543	18.3	41.4	10.4	11.9
1998	1,015	609	632	19.1	55.4	11.4	11.9
1999	ND	410	460	ND	ND	8.4	9.4
2000	895	396	435	17.8	35.6	7.9	8.7
2001	125	362	507	2.7	64.1	7.8	11.0
2002	265	442	534	5.7	99.6	9.5	11.5
2003	407	251	303	7.0	37.1	4.3	5.2
2004	206	420	482	4.3	100.0	8.7	10.0
2005	241	424	535	5.6	86.4	9.8	12.4
2006	205	-	-	4.7	-	-	-
Average	***287***	***365***	***459***	***6.0***	***62.8***	***7.6***	***9.5***

[a] These estimates include Chiwawa smolts produced within the Wenatchee Basin. This assumes that 66% of the subyearling migrants survive to smolt, regardless of the number of subyearling migrants (i.e., no density dependence). Smolt estimates for brood years 1992-1996 were calculated with a mark-recapture model; brood years 1997-2005 were calculated with a flow model.

[b] These estimates represent overwinter survival within the Chiwawa Basin. It does not include Chiwawa smolts produced outside the Chiwawa Basin. As noted in footnote 1, smolts/redd and egg-smolt survival include Chiwawa smolts produced in the Wenatchee basin.

Seeding level (egg deposition) explained most of the variability in productivity and survival of juvenile spring Chinook in the Chiwawa Basin. That is, for estimates based on "within-Chiwawa-Basin" life stages (e.g., parr and within-Chiwawa-Basin smolts), survival and productivity decreased as seeding levels increased (Figure 5.4). This suggests that density dependence regulates juvenile productivity and survival within the Chiwawa Basin. This form of population regulation is less apparent with total smolts (i.e., Chiwawa smolts produced within the Wenatchee Basin) and total emigrants. However, one would expect the number of emigrants to increases as seeding levels exceed the capacity of the Chiwawa Basin.



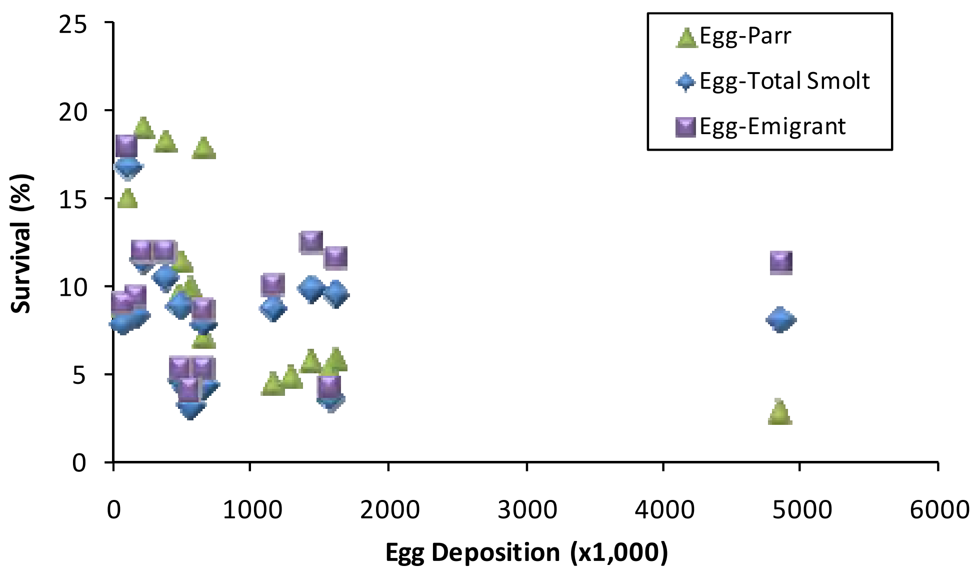


Figure 5.4. Relationships between seeding levels (egg deposition) and juvenile life-stage survivals and productivities for Chiwawa spring Chinook, 1991-2006. Total smolts are Chiwawa smolts produced within and outside the Chiwawa Basin (assumes a 66% survival on subyearling emigrants). Chiwawa smolts are smolts produced only in the Chiwawa Basin.

5.5 Spawning Surveys

Surveys for spring Chinook redds were conducted during August through September, 2007, in the Chiwawa River (including Rock and Chikamin creeks), Nason Creek, Icicle Creek, Peshastin Creek (including Ingalls Creek), Upper Wenatchee River (including Chiwaukum Creek), Little Wenatchee River, and White River (including the Napeequa River and Panther Creek).

Redd Counts

A total of 466 spring Chinook redds were counted in the Wenatchee Basin in 2007 (Table 5.18). This is lower than the average of 503 redds counted during the period 1989-2007 in the Wenatchee Basin. Most spawning occurred in the Chiwawa River (61% or 283 redds) (Table 5.18; Figure 5.5). Nason Creek contained 22% (101 redds), Little Wenatchee contained 5% (22 redds), White River contained 4% (20 redds), Icicle contained 4% (17 redds), and the Upper Wenatchee River and Peshastin Creek each contained 2%.

Table 5.18. Numbers of spring Chinook redds counted within different streams/watersheds within the Wenatchee Basin, 1989-2007. Redd counts in Peshastin Creek in 2001 and 2002 (*) were elevated because the U.S. Fish and Wildlife Service planted 487 and 350 spring Chinook adults, respectively, into the stream. These counts were not included in the total or average calculations.

Sample year	Number of spring Chinook redds							
	Chiwawa	Nason	Little Wenatchee	White	Wenatchee River	Icicle	Peshastin	Total
1989	314	98	45	64	94	24	NS	**639**
1990	255	103	30	22	36	50	4	**500**
1991	104	67	18	21	41	40	1	**292**
1992	302	81	35	35	38	37	0	**528**
1993	106	223	61	66	86	53	5	**600**
1994	82	27	7	3	6	15	0	**140**
1995	13	7	0	2	1	9	0	**32**
1996	23	33	3	12	1	12	1	**85**
1997	82	55	8	15	15	33	1	**209**
1998	41	29	8	5	0	11	0	**94**
1999	34	8	3	1	2	6	0	**54**
2000	128	100	9	8	37	68	0	**350**
2001	1,078	374	74	104	218	88	173*	**2,109**
2002	345	294	42	42	64	245	107*	**1,139**
2003	111	83	12	15	24	18	60	**323**
2004	241	169	13	22	46	30	55	**576**
2005	332	193	64	86	143	8	3	**829**
2006	297	152	21	31	27	50	10	**588**
2007	283	101	22	20	12	17	11	**466**
Average	***220***	***116***	***25***	***30***	***47***	***43***	***9***	***503***

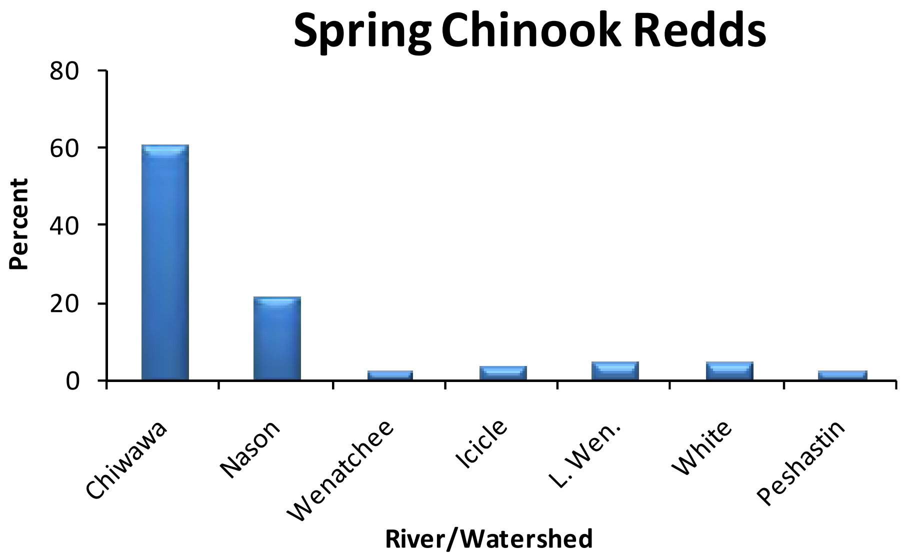


Figure 5.5. Percent of the total number of spring Chinook redds counted in different streams/watersheds within the Wenatchee Basin during August through September, 2007.

Redd Distribution

Spring Chinook redds were not evenly distributed among reaches within survey streams in 2007 (Table 5.19). Most of the spawning in the Chiwawa Basin occurred in Reaches 1, 2, 5, and 6. Over half of all the spawning in the Chiwawa Basin occurred in the lower two reaches (RM 0.0-19.3; from the mouth to Rock Creek). Few fish spawned in Rock and Chikamin creeks. The spatial distribution of redds in Nason Creek was more even than in the Chiwawa basin, with the proportion of redds ranging from 0.22 to 0.29 among the four reaches in Nason Creek. Nearly 82% of all spawning in the Little Wenatchee River occurred in Reach 3 (RM 5.2-9.2; Lost Creek to Rainy Creek). On the White River, 80% occurred in Reach 3 (RM 11.0-12.9; Napeequa River to Grasshopper Meadows). Nearly all the spawning in the Wenatchee River occurred upstream from the mouth of the Chiwawa River. Of the few fish that spawned in the Peshastin Creek watershed, Chinook placed nearly equal numbers of redds in Ingalls Creek and the lower reach of Peshastin Creek.

Table 5.19. Numbers and percentages of spring Chinook redds counted within different streams/watersheds within the Wenatchee Basin during August through September, 2007.

Stream/watershed	Reach	Number of redds	Percent of redds within stream/watershed
Chiwawa	Chiwawa 1	44	15.6
	Chiwawa 2	122	43.1
	Chiwawa 3	9	3.2
	Chiwawa 4	28	9.9
	Chiwawa 5	30	10.6
	Chiwawa 6	44	15.6
	Rock 1	5	1.8
	Chikamin 1	1	0.4
	Total	**283**	**100.0**
Nason	Nason 1	22	21.8
	Nason 2	29	28.7
	Nason 3	28	27.7
	Nason 4	22	21.8
	Total	**101**	**100.0**
Little Wenatchee	Little Wen 2	4	18.2
	Little Wen 3	18	81.8
	Total	**22**	**100.0**
White	White 2	2	10.0
	White 3	16	80.0
	Napeequa 1	0	0.0
	Panther 1	2	10.0
	Total	**20**	**100.0**
Wenatchee River	Wen 9	1 (+1 in Chiwaukum Creek)	16.7
	Wen 10	10	83.3
	Total	**12**	**100.0**
Icicle	Icicle 1	17	100.0
	Total	**17**	**100.0**
Peshastin	Peshastin 1	5	45.5
	Peshastin 2	0	0.0
	Ingalls	6	54.5
	Total	**11**	**100.0**
Grand Total		***466***	

Spawn Timing

Spring Chinook began spawning during the second week of August in the Chiwawa River, White River, and Nason Creek, the third week on the Little Wenatchee River, and the fifth week on the

Upper Wenatchee River (Figure 5.6). Spawning generally peaked the fourth or fifth week of August in all systems except the Upper Wenatchee. Because of warmer water temperatures, peak spawning in the Wenatchee River occurred during the first week of September. All spawning was completed by the end of September.

The temporal distribution of spawning activity in the Chiwawa River in 2007 occurred slightly earlier compared to the 16-year mean spawning distribution (Figure 5.7). The greatest difference in distributions was noted in late August and September. Compared with the 16-year distribution, the 2007 distribution showed a less spiked spawning activity and activity in 2007 ended about one week earlier compared to the mean.

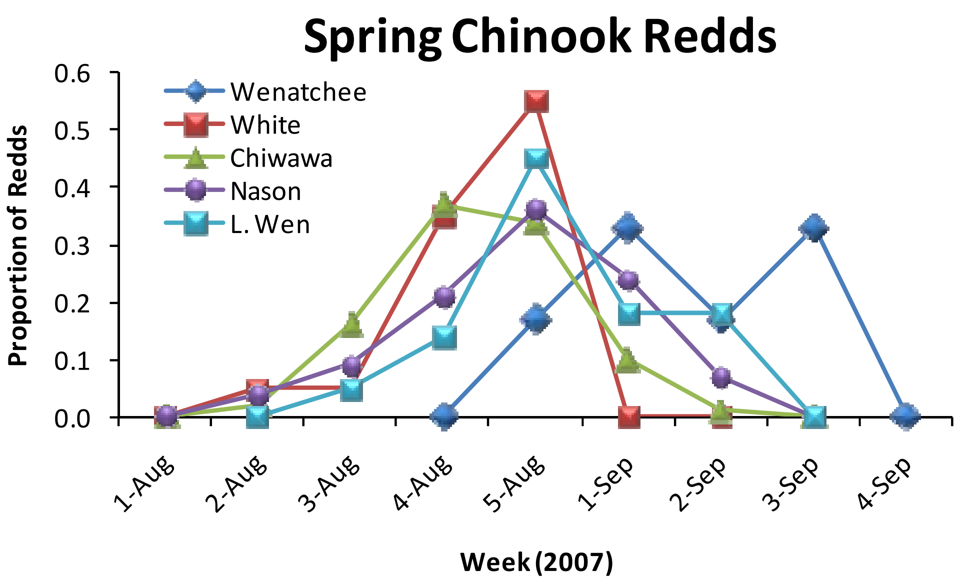


Figure 5.6. Proportion of spring Chinook redds counted during different weeks in different sampling streams within the Wenatchee Basin, August through September 2007.

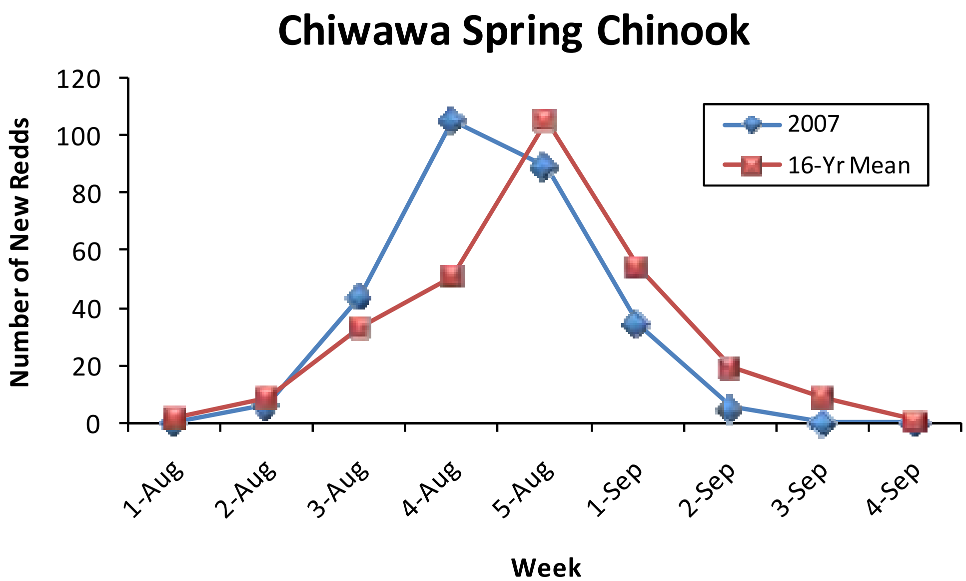


Figure 5.7. Comparison of the number of new spring Chinook redds counted during different weeks in the Chiwawa Basin, August through September, 2007, to the 16-year average.

Spawning Escapement

Spawning escapement for spring Chinook was calculated as the number of redds times the male-to-female ratio (i.e., fish per redd expansion factor) estimated from broodstock and fish sampled at adult trapping sites. The estimated fish per redd ratio for spring Chinook upstream from Tumwater in 2007 was 4.58 (based on sex ratios estimated at Tumwater Dam). The estimated fish per redd ratio for spring Chinook downstream from Tumwater (Icicle and Peshastin creeks) was 1.86 (derived from broodstock collected at the Leavenworth National Fish Hatchery). Multiplying these ratios by the number of redds counted in the Wenatchee Basin resulted in a total spawning escapement of 2,059 spring Chinook (Table 5.20). The Chiwawa Basin had the highest spawning escapement (1,296 Chinook), while Peshastin Creek and the Upper Wenatchee had the lowest.

Table 5.20. Number of redds, fish per redd ratios, and total spawning escapement for spring Chinook in the Wenatchee Basin, 2007. Spawning escapement was estimated as the product of redds times fish per redd.

Sampling area	Total number of redds	Fish/redd	Total spawning escapement
Chiwawa	283	4.58	1,296
Nason	101	4.58	463
Upper Wenatchee River	12	4.58	55
Icicle	17	1.86	32
Little Wenatchee	22	4.58	101
White	20	4.58	92
Peshastin	11	1.86	20
Total	***466***		***2,059***

The estimated total spawning escapement of 2,059 spring Chinook in 2007 was greater than the 1989-2007 average of 1,157 spring Chinook (Table 5.21). The large escapement in the Chiwawa Basin in 2007 was almost three times the escapement in Nason Creek, the second most abundant stream in the Wenatchee Basin (Table 5.21).

Table 5.21. Spawning escapements for spring Chinook in the Wenatchee Basin for return years 1989-2007; NA = not available.

Return year	Upper basin spawning escapement						Lower basin spawning escapement			Total
	Fish/redd	Chiwawa	Nason	Little Wenatchee	White	Wenatchee River	Fish/redd	Icicle	Peshastin	
1989	2.27	713	222	102	145	213	2.27	54	NA	**1,449**
1990	2.24	571	231	67	49	81	2.24	112	9	**1,120**
1991	2.33	242	156	42	49	96	2.33	93	2	**680**
1992	2.24	676	181	78	78	85	2.24	83	0	**1,181**
1993	2.20	233	491	134	145	189	2.20	117	11	**1,320**
1994	2.24	184	60	16	7	13	2.24	34	0	**314**
1995	2.51	33	18	0	5	3	2.51	23	0	**82**
1996	2.53	58	83	8	30	3	2.53	30	3	**215**
1997	2.22	182	122	18	33	33	2.22	73	2	**463**
1998	2.21	91	64	18	11	0	2.21	24	0	**208**
1999	2.77	94	22	8	3	6	2.77	17	0	**150**
2000	2.44	312	244	22	20	90	2.44	166	0	**854**
2001	2.31	2,490	864	171	240	504	2.31	203	365	**4,837**
2002	2.05	707	603	86	86	131	2.05	502	223	**2,338**
2003	2.43	270	202	29	36	58	2.43	44	146	**785**
2004	3.56	858	507	39	66	138	1.79	54	97	**1,759**
2005	1.80	598	347	115	155	257	1.75	14	5	**1,491**
2006	1.78	529	271	37	55	48	1.80	90	18	**1,048**
2007	4.48	1,296	463	101	92	55	1.86	32	20	**2,059**
Average	***2.45***	***534***	***271***	***57***	***69***	***105***	***2.22***	***93***	***50***	***1,176***

5.6 Carcass Surveys

Surveys for spring Chinook carcasses were conducted during August through September in the Chiwawa River (including Rock and Chikamin creeks), Nason Creek, Icicle Creek, Peshastin Creek (including Ingalls Creek), Upper Wenatchee River, Little Wenatchee River, and White River (including the Napeequa River and Panther Creek).

Number sampled

A total of 526 spring Chinook carcasses were sampled during August through September in the Wenatchee Basin (Table 5.22). Most were sampled in the Chiwawa Basin (48% or 250 carcasses) and Nason Creek (38% or 201 carcasses) (Figure 5.8). A total of 25 carcasses were sampled in the upper Wenatchee River, 16 in the Little Wenatchee, 15 in Icicle, 13 in the White River, and 6 in Peshastin Creek.

Table 5.22. Numbers of spring Chinook carcasses sampled within different streams/watersheds within the Wenatchee Basin, 1996-2007.

Survey year	Number of spring Chinook carcasses							
	Chiwawa	**Nason**	**Little Wenatchee**	**White**	**Wenatchee River**	**Icicle**	**Peshastin**	**Total**
1996	22	3	0	2	0	1	0	**28**
1997	13	42	3	8	1	28	1	**96**
1998	24	25	3	2	1	6	0	**61**
1999	15	5	0	0	2	1	0	**23**
2000	122	110	8	1	37	52	0	**330**
2001	751	388	68	74	213	163	63	**1,720**
2002	190	292	30	24	34	91	49	**710**
2003	70	100	8	8	12	37	42	**277**
2004	178	186	1	13	29	16	40	**463**
2005	391	217	48	52	120	2	0	**830**
2006	241	190	13	25	15	7	0	**491**
2007	250	201	16	13	25	15	6	**526**
Average	***189***	***147***	***17***	***19***	***41***	***35***	***17***	***463***

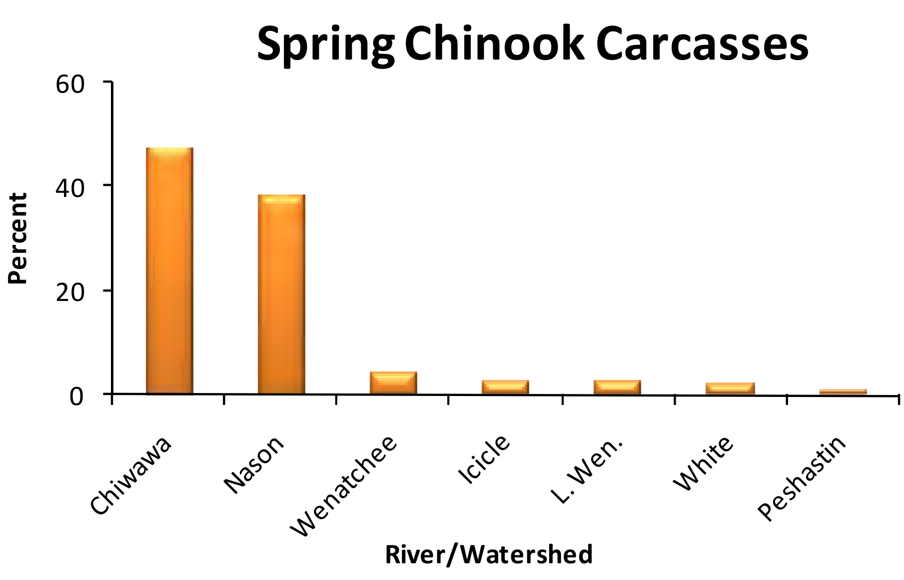


Figure 5.8. Percent of the total number of spring Chinook carcasses sampled in different streams/watersheds within the Wenatchee Basin during August through September, 2007.

Carcass Distribution and Origin

Spring Chinook carcasses were not evenly distributed among reaches within survey streams in 2007 (Table 5.23). Most of the carcasses in the Chiwawa Basin occurred in Reaches 1 and 2 (downstream from Rock Creek). In Nason Creek, most carcasses (45%) were collected in Reach 2 and the fewest (10%) in Reach 4. Nearly 94% of all carcasses sampled in the Little Wenatchee River occurred in Reach 3 (Lost Creek to Rainy Creek). On the White River, about 77% occurred in Reach 3 (Napeequa River to Grasshopper Meadows). Almost all carcasses sampled in the Wenatchee River were found upstream from the mouth of the Chiwawa River. All fish sampled in the Peshastin Creek watershed were in Reach 1 (mouth to Camas Creek).

Table 5.23. Numbers and percentages of carcasses sampled within different streams/watersheds within the Wenatchee Basin during August through September, 2007.

Stream/watershed	Reach	Total carcasses	Percent of carcasses within stream/watershed
Chiwawa	Chiwawa 1	45	18.0
	Chiwawa 2	133	53.2
	Chiwawa 3	18	7.2
	Chiwawa 4	18	7.2
	Chiwawa 5	20	8.0
	Chiwawa 6	14	5.6
	Rock 1	0	0.0
	Chikamin 1	2	0.8
	Total	**250**	**100.0**
Nason	Nason 1	56	27.9
	Nason 2	90	44.8
	Nason 3	34	16.9
	Nason 4	21	10.4
	Total	**201**	**100.0**
Little Wenatchee	Little Wen 2	1	6.3
	Little Wen 3	15	93.7
	Total	**16**	**100.0**
White	White 2	1	7.7
	White 3	10	76.9
	Napeequa 1	0	0.0
	Panther 1	2	15.4
	Total	**13**	**100.0**
Wenatchee River	Wen 9	3	12.0
	Wen 10	22	88.0
	Total	**25**	**100.0**
Icicle	Icicle 1	15	100.0
	Total	**15**	**100.0**
Peshastin	Peshastin 1	6	100.0

Stream/watershed	Reach	Total carcasses	Percent of carcasses within stream/watershed
	Peshastin 2	0	0.0
	Ingalls	0	0.0
	Total	**6**	**100.0**
Grand Total		***526***	

Of the 526 carcasses sampled in 2007, 82% were hatchery fish (Table 5.24; these numbers may change after analysis of CWTs and scales). In the Chiwawa Basin, the spatial distribution of hatchery and wild fish was not equal (Table 5.24). A larger percentage of hatchery fish were found in the lower reaches (C1 and C2; Mouth to Rock Creek) than were wild fish (88% hatchery and 12% naturally produced). This general trend was also apparent in the pooled data (Figure 5.9).

Table 5.24. Numbers of wild and hatchery spring Chinook carcasses sampled within different reaches in the Chiwawa Basin, 1993-2007. See Table 2.8 for description of survey reaches.

Survey year	Origin	Survey Reach								Total
		C-1	C-2	C-3	C-4	C-5	C-6	Chikamin	Rock	
1993	Wild	0	0	0	0	0	0	0	0	**0**
	Hatchery	1	0	0	0	0	0	0	0	**1**
1994	Wild	0	6	0	2	0	1	0	0	**9**
	Hatchery	1	1	0	2	0	0	0	0	**4**
1995	Wild	0	0	0	0	0	0	0	0	**0**
	Hatchery	2	3	0	1	0	0	0	0	**6**
1996	Wild	11	1	1	1	0	0	0	0	**14**
	Hatchery	6	0	0	0	0	0	0	0	**6**
1997	Wild	5	2	0	1	0	0	0	0	**8**
	Hatchery	3	1	0	0	0	1	1	3	**9**
1998	Wild	0	3	5	1	2	4	0	0	**15**
	Hatchery	1	3	2	0	1	1	0	0	**8**
1999	Wild	1	8	0	5	0	0	0	0	**14**
	Hatchery	0	0	0	0	1	0	0	0	**1**
2000	Wild	25	27	1	1	1	1	0	0	**56**
	Hatchery	42	12	0	0	0	2	0	0	**56**
2001	Wild	24	57	15	40	16	20	1	3	**176**
	Hatchery	164	284	19	58	14	21	8	0	**568**
2002	Wild	15	11	9	6	7	5	2	0	**55**
	Hatchery	46	40	12	5	1	15	14	4	**137**
2003	Wild	7	13	0	11	3	2	0	0	**36**
	Hatchery	14	14	0	3	1	0	0	0	**32**
2004	Wild	23	48	2	11	7	3	0	1	**95**
	Hatchery	46	21	1	1	1	3	0	2	**75**
2005	Wild	16	36	3	4	3	2	0	0	**64**
	Hatchery	170	132	7	7	4	3	0	1	**324**

Survey year	Origin	Survey Reach								Total
		C-1	C-2	C-3	C-4	C-5	C-6	Chikamin	Rock	
2006	Wild	10	17	2	8	4	3	1	0	**45**
	Hatchery	84	75	5	7	6	13	3	3	**196**
2007	Wild	3	20	3	4	4	2	0	0	**36**
	Hatchery	42	113	15	14	16	12	2	0	**214**
Average	***Wild***	***9***	***17***	***3***	***6***	***3***	***3***	***0***	***0***	***42***
	Hatchery	***41***	***47***	***4***	***7***	***3***	***5***	***2***	***1***	***109***

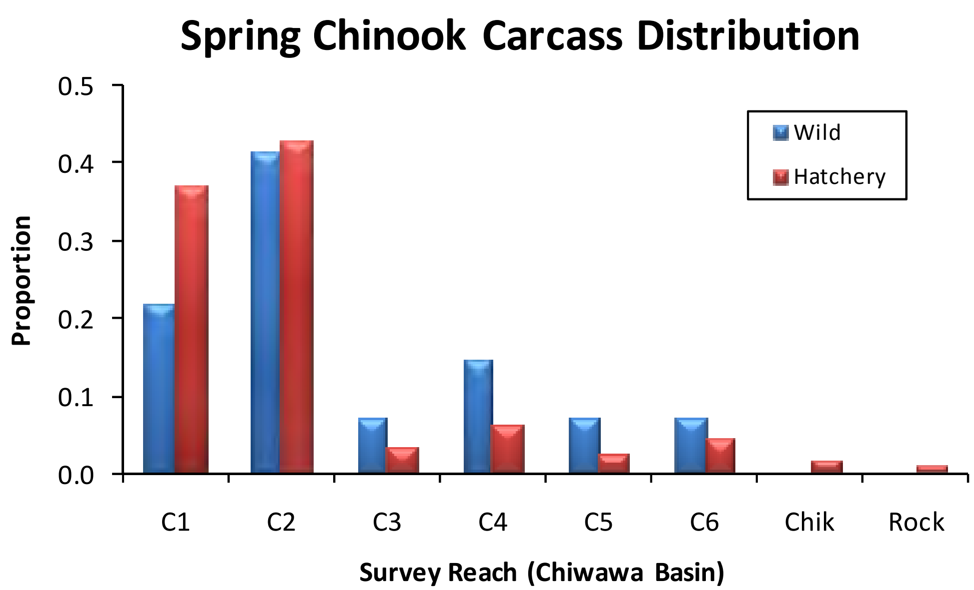


Figure 5.9. Distribution of wild and hatchery produced carcasses in different reaches in the Chiwawa Basin, 1993-2007; Chik = Chikamin Creek. Reach codes are described in Table 2.8.

Sampling Rate

Overall, 26% of the estimated total spawning escapement of spring Chinook in the Wenatchee Basin was sampled in 2007 (Table 5.25). Sampling rates among streams/watershed varied from 14 to 47%.

Table 5.25. Number of redds and carcasses, total spawning escapement, and sampling rates for spring Chinook salmon in the Wenatchee Basin, 2007.

Sampling area	Total number of redds	Total number of carcasses	Total spawning escapement	Sampling rate
Chiwawa	283	250	1,296	0.19
Nason	101	201	463	0.43
Upper Wenatchee	12	25	55	0.46
Icicle	17	15	32	0.47
Little Wenatchee	22	16	101	0.16
White	20	13	92	0.14

Peshastin	11	6	20	0.30
Total	***466***	***526***	***2,059***	***0.26***

Length Data

Mean lengths (POH, cm) of male and female spring Chinook carcasses sampled during surveys in the Wenatchee Basin in 2007 are provided in Table 5.26. The average size of males and females sampled in the Wenatchee Basin were 51 and 63 cm, respectively.

Table 5.26. Mean lengths (postorbital-to-hypural length; cm) and standard deviations (in parentheses) of male and female spring Chinook carcasses sampled in different streams/watersheds in the Wenatchee Basin, 2007.

Stream/watershed	Mean lengths (cm)	
	Male	Female
Chiwawa	55 (14)	63 (5)
Nason	48 (10)	63 (5)
Upper Wenatchee	48 (6)	62 (4)
Icicle	46 (9)	37 (0)
Little Wenatchee	58 (20)	67 (7)
White	64 (15)	70 (7)
Peshastin	56 (11)	65 (0)
Total	***51 (13)***	***63 (6)***

5.7 Life History Monitoring

Life history characteristics of spring Chinook were assessed by examining carcasses on spawning grounds and fish collected at broodstock collection sites, and by reviewing tagging data and fisheries statistics.

Age at Maturity

Most of the wild and hatchery spring Chinook sampled during the period 1994-2007 in the Chiwawa Basin were age-4 fish (total age) (Table 5.27; Figure 5.10). On average, hatchery fish made up a higher percentage of age-3 and 4 Chinook than did wild fish. In contrast, a higher proportion of age-5 wild fish returned than did age-5 hatchery fish. Thus, wild fish tended to return at an older age than hatchery fish.

Table 5.27. Proportions of wild and hatchery spring Chinook of different ages (total age) sampled on spawning grounds in the Chiwawa Basin, 1994-2007.

Sample year	Origin	Total age					Sample size
		2	3	4	5	6	
1994	Wild	0.00	0.00	0.33	0.67	0.00	9
	Hatchery	0.00	0.20	0.00	0.80	0.00	5
1995	Wild	0.00	0.00	0.00	0.00	0.00	0.00
	Hatchery	0.00	0.00	1.00	0.00	0.00	2
1996	Wild	0.00	0.36	0.64	0.00	0.00	14
	Hatchery	0.00	0.83	0.17	0.00	0.00	6
1997	Wild	0.00	0.00	0.75	0.25	0.00	8
	Hatchery	0.00	0.00	1.00	0.00	0.00	9
1998	Wild	0.00	0.00	0.00	1.00	0.00	15
	Hatchery	0.00	0.00	0.13	0.88	0.00	8
1999	Wild	0.00	0.07	0.50	0.43	0.00	14
	Hatchery	0.00	0.00	0.00	1.00	0.00	1
2000	Wild	0.00	0.02	0.95	0.03	0.00	56
	Hatchery	0.00	0.50	0.50	0.00	0.00	52
2001	Wild	0.00	0.01	0.95	0.04	0.00	176
	Hatchery	0.00	0.02	0.98	0.00	0.00	571
2002	Wild	0.00	0.00	0.56	0.44	0.00	55
	Hatchery	0.00	0.00	0.91	0.09	0.00	128
2003	Wild	0.00	0.09	0.00	0.91	0.00	36
	Hatchery	0.00	0.19	0.03	0.78	0.00	32
2004	Wild	0.00	0.02	0.97	0.01	0.00	92
	Hatchery	0.00	0.44	0.56	0.00	0.00	45
2005	Wild	0.00	0.01	0.76	0.24	0.00	131
	Hatchery	0.00	0.02	0.98	0.00	0.00	685
2006	Wild	0.00	0.02	0.80	0.17	0.00	139
	Hatchery	0.01	0.02	0.64	0.33	0.00	303
2007	Wild	0.00	0.14	0.42	0.44	0.00	78
	Hatchery	0.00	0.32	0.60	0.08	0.00	251
Average	***Wild***	***0.00***	***0.04***	***0.74***	***0.22***	***0.00***	***823***
	Hatchery	***0.00***	***0.08***	***0.84***	***0.08***	***0.00***	***2,098***

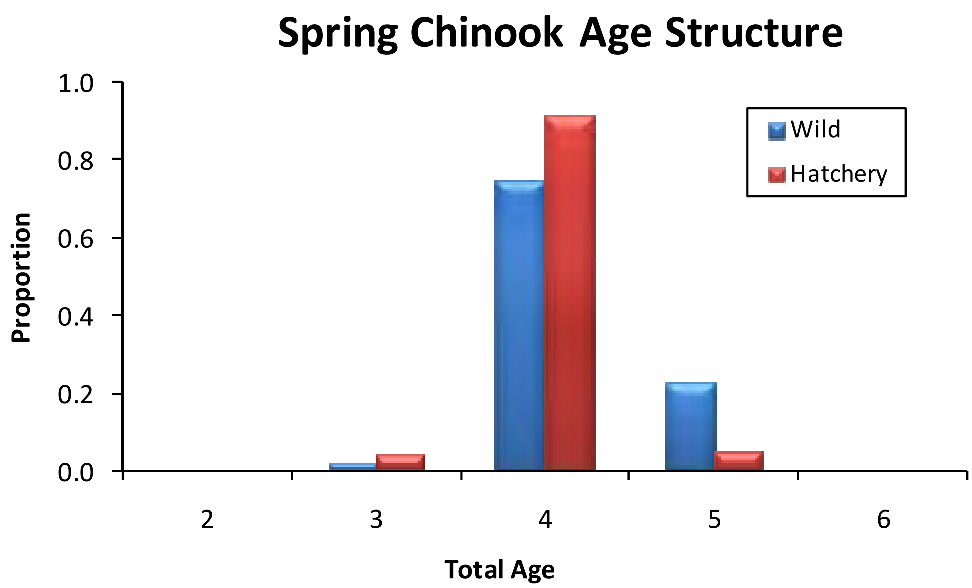


Figure 5.10. Proportions of wild and hatchery spring Chinook of different total ages sampled at the Chiwawa Weir and on spawning grounds in the Chiwawa Basin for the combined years 1994-2006.

Size at Maturity

On average, hatchery and wild spring Chinook of a given age differed slightly in length (Table 5.28). For example, wild age-5 fish were larger on average than the age-5 hatchery fish. In contrast, hatchery age-3 and 4 Chinook were generally larger than age-3 and 4 wild fish.

Table 5.28. Mean lengths (POH in cm; ±1SD) and sample sizes (in parentheses) of different ages (total age) of male and female spring Chinook of wild and hatchery origin sampled in the Chiwawa basin, 1994-2006.

Brood year	Total age	Mean length (cm)			
		Male		Female	
		Wild	Hatchery	Wild	Hatchery
1994	3				43 ±0 (1)
	4			62 ±3 (3)	
	5	76 ±0 (1)		73 ±2 (5)	
	6				
1995	3				
	4		61 ±5 (5)		
	5				
	6				
1996	3	45 ±3 (5)	49 ±7 (54)		
	4	69 ±4 (6)	69 ±0 (1)	67 ±8 (2)	
	5				
	6				
1997	3				
	4	61 ±1 (2)	68 ±0 (1)	67 ±5 (3)	63 ±3 (8)

Brood year	Total age	Mean length (cm)			
		Male		Female	
		Wild	Hatchery	Wild	Hatchery
	5	67 ±5 (2)			
	6				
1998	3				
	4				54 ±0 (1)
	5	77 ±7 (8)	75 ±4 (4)	74 ±4 (7)	76 ±4 (3)
	6				
1999	3	44 ±0 (1)			
	4	61 ±0 (1)		64 ±3 (6)	
	5	76 ±5 (3)		72 ±5 (3)	66 ±0 (1)
	6				
2000	3		46 ±3 (17)		50 ±7 (3)
	4	60 ±8 (23)	62 ±5 (5)	61 ±5 (26)	62 ±3 (20)
	5	77 ±1 (2)			
	6				
2001	3	37 ±0 (1)	42 ±4 (11)	41 ±0 (1)	60 ±0 (1)
	4	63 ±5 (57)	65 ±5 (151)	62 ±34 (110)	63 ±4 (407)
	5	75 ±5 (2)	83 ±0 (1)	76 ±1 (5)	
	6				
2002	3				
	4	64 ±4 (14)	66 ±5 (46)	60 ±4 (15)	63 ±4 (71)
	5	80 ±6 (13)	75 ±5 (4)	72 ±3 (12)	73 ±6 (6)
	6				
2003	3	45 ±2 (3)	45 ±1 (6)		
	4		63 ±0 (1)		
	5	78 ±5 (12)	74 ±8 (11)	75 ±3 (19)	72 ±5 (14)
	6				
2004	3	43 ±3 (2)	43 ±4 (20)		
	4	62 ±7 (44)	67 ±5 (3)	62 ±3 (45)	64 ±5 (22)
	5			74 ±0 (1)	
	6				
2005	3		43 ±5 (11)		
	4	61 ±5 (17)	64 ±6 (101)	61 ±4 (34)	61 ±4 (206)
	5	74 ±5 (4)		71 ±3 (9)	
	6				
2006	3	43 ±0 (1)	43 ±2 (6)		
	4	64 ±3 (6)	61 ±5 (44)	60 ±3 (17)	59 ±4 (105)
	5	74 ±6 (8)	75 ±6 (10)	70 ±4 (12)	70± 4 (23)
	6				
2007	3	39 ±3 (5)	45 ±7 (71)		50 ±3 (4)
	4	60 ±4 (4)	66 ±5 (34)	60 ±4 (6)	62 ±4 (91)

Brood year	Total age	Mean length (cm)			
		Male		Female	
		Wild	Hatchery	Wild	Hatchery
	5	78 ±6 (13)	75 ±5 (7)	71 ±3 (8)	72 ±5 (6)
	6				

Contribution to Fisheries

Nearly all the harvest on Chiwawa spring Chinook occurs within the Columbia Basin. Ocean catch records (Pacific Fishery Management Council) indicate that virtually no Upper Columbia spring Chinook are taken in ocean fisheries. Most of the harvest on Chiwawa spring Chinook occurs in the Lower Columbia River fisheries, which are managed by the states and tribes pursuant to management plans developed in *U.S. v Oregon*. The Lower Columbia River fisheries occur during what is referred to in *U.S. v Oregon* as the winter, spring, and summer seasons, which begin in February and ends July 31 of each year. The treaty fishery occurs exclusively in Zone 6, the area between Bonneville and McNary dams; the non-treaty commercial fisheries occur in Zones 1-5, which are downstream from Bonneville Dam. The non-treaty recreational (sport) fishery occurs in the lower mainstem.

The total number of spring Chinook captured in different fisheries has been relatively low (Table 5.29). Larger numbers of spring Chinook were taken from the 1997 and 1998 brood years because those years produced large escapements.

Table 5.29. Estimated number and percent (in parentheses) of Chiwawa spring Chinook captured in different fisheries; NA = not available.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational[a] (sport)	
1989	3 (13)	5 (21)	0 (0)	16 (67)	24
1990	0 (0)	0 (0)	0 (0)	18 (100)	18
1991	0 (0)	3 (100)	0 (0)	0 (0)	3
1992	0 (0)	1 (100)	0 (0)	0 (0)	1
1993	3 (75)	1 (25)	0 (0)	0 (0)	4
1994	0 (0)	0 (0)	0 (0)	0 (0)	0
1995	NA	NA	NA	NA	NA
1996	0 (0)	2 (100)	0 (0)	0 (0)	2
1997	1 (0)	1 (0)	287 (71)	115 (28)	404
1998	9 (5)	7 (4)	52 (30)	108 (61)	176
1999	NA	NA	NA	NA	NA
2000	0 (0)	0 (0)	17 (63)	10 (37)	27
2001	17 (61)	0 (0)	3 (11)	8 (29)	28

[a] Includes the Wanapum fishery.

Straying

Stray rates were determined by examining CWTs recovered on spawning grounds within and outside the Wenatchee Basin. Targets for strays based on return year (recovery year) within the Wenatchee Basin should be less than 10% and targets for strays outside the Wenatchee Basin should be less than 5%. The target for brood year stray rates should be less than 5%.

Rates of Chiwawa spring Chinook straying into non-target spawning areas within the Wenatchee Basin have been high in some years and exceeded the target of 10% (Table 5.30). They have strayed into spawning areas on Nason Creek, the White River, the Little Wenatchee River, and the Upper Wenatchee River. On average, stray rates are typically highest in Nason Creek and the Upper Wenatchee River. Stray rates of Chiwawa spring Chinook should decrease with the change in source water that was implemented in 2006-2007 for the Chiwawa rearing ponds.

Table 5.30. Number and percent of spawning escapement in other non-target spawning streams within the Wenatchee Basin that consisted of Chiwawa spring Chinook, return years 1992-2005. For example, for return year 2001, 24.9% of the spring Chinook spawning escapement in Nason Creek consisted of Chiwawa spring Chinook. Percent strays should be less than 10%.

Return year	Nason Creek		Icicle Creek		Upper Wenatchee		White River		Little Wenatchee	
	Number	%	Number	%	Number	%	Number	%	Number	%
1992	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1993	61	12.4	0	0.0	34	18.0	7	5.3	0	0.0
1994	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1995	0	0.0	0	0.0	2	66.7	0	0.0	0	0.0
1996	25	30.1	0	0.0	0	0.0	0	0.0	0	0.0
1997	55	45.1	8	11.0	0	0.0	0	0.0	0	0.0
1998	3	4.7	0	0.0	0	0.0	0	0.0	0	0.0
1999	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2000	45	18.4	0	0.0	31	34.4	0	0.0	6	27.3
2001	211	24.9	0	0.0	271	56.5	46	21.4	53	31.0
2002	188	31.2	10	2.0	60	45.8	14	16.3	21	24.4
2003	14	6.9	0	0.0	30	51.7	0	0.0	0	0.0
2004	139	27.4	0	0.0	54	39.1	1	1.5	0	0.0
2005	252	72.6	7	13.0	256	99.6	106	68.4	65	56.5
Total	***993***	***26.2***	***25***	***1.8***	***738***	***49.7***	***174***	***19.7***	***145***	***19.5***

Rates of Chiwawa spring Chinook straying into basins outside the Wenatchee have been low (Table 5.31). Chiwawa spring Chinook have strayed into the Methow and Entiat basins. During return year 2002, their stray rate exceeded the target of 0.05 in the Entiat Basin. Stray rates of Chiwawa spring Chinook should decrease with the change in source water that was implemented in 2006-2007 for the Chiwawa rearing ponds.

Table 5.31. Number and percent of spawning escapements within other non-target basins that consisted of Chiwawa spring Chinook, return years 1992-2005. For example, for return year 2002, 12.6% of the spring Chinook spawning escapement in the Entiat Basin consisted of Chiwawa spring Chinook. Percent strays should be less than 5%. NS = not sampled; NA = not available.

Return year	Methow Basin		Entiat Basin	
	Number	%	Number	%
1992	0	0.0	0	0.0
1993	0	0.0	0	0.0
1994	0	0.0	0	0.0
1995	0	0.0	0	0.0
1996	NS	NS	0	0.0
1997	0	0.0	0	0.0
1998	NS	NS	0	0.0
1999	0	0.0	0	0.0
2000	0	0.0	1	0.6
2001	0	0.0	1	0.2
2002	0	0.0	34	12.6
2003	0	0.0	0	0.0
2004	0	0.0	0	0.0
2005	10	0.7	4	NA
Total	***10***	***0.0***	***36***	***1.9***

On average, about 36% of the returns have strayed into non-target spawning areas, exceeding the target of 5% (Table 5.32). Depending on brood year, percent strays into non-target spawning areas have ranged from 0-81%. Few (<1%) have strayed into non-target hatchery programs. Stray rates of Chiwawa spring Chinook should decrease with the change in source water that was implemented in 2006-2007 for the Chiwawa rearing ponds.

Table 5.32. Number and percent of Chiwawa spring Chinook that homed to target spawning areas and the target hatchery program, and number and percent that strayed to non-target spawning areas and non-target hatchery programs, by brood years 1989-2001. Percent stays should be less than 5%.

Brood year	Homing				Straying			
	Target stream		Target hatchery		Non-target streams		Non-target hatcheries	
	Number	%	Number	%	Number	%	Number	%
1989	58	35.4	1	0.6	102	62.2	3	1.8
1990	0	0.0	1	100.0	0	0.0	0	0.0
1991	29	87.9	0	0.0	2	6.1	2	6.1
1992	2	6.5	4	12.9	25	80.6	0	0.0
1993	134	47.5	82	29.1	63	22.3	3	1.1
1994	4	19.0	14	66.7	3	14.3	0	0.0
1995	No program							

1996	58	75.3	7	9.1	12	15.6	0	0.0
1997	1,242	55.6	298	13.4	687	30.8	5	0.2
1998	553	55.8	109	11.0	329	33.2	0	0.0
1999	No program							
2000	144	42.6	115	34.0	79	23.4	0	0.0
2001	573	35.2	237	14.5	817	50.1	3	0.2
Total	***2,797***	***48.2***	***868***	***15.0***	***2,119***	***36.5***	***16***	***0.3***

Genetics

Genetic studies were conducted to determine the potential impacts of the Chiwawa Supplementation Program on natural origin spring Chinook in the upper Wenatchee Basin (Blankenship et al. 2007; the entire report is appended as Appendix I). Microsatellite DNA allele frequencies collected from temporally replicated natural and hatchery origin spring Chinook were used to statistically assign individual fish to specific demes (locations) within the Wenatchee population. In addition, genetic effects of the hatchery program were assessed by examining relationships between census and effective population sizes (N_e) from samples collected before and after supplementation.

Overall, this work showed that although allele frequencies within and between natural and hatchery origin spring Chinook were significantly different, there was no evidence (i.e., robust signal) that the difference was the result of the hatchery program. Rather, the differences were more likely the result of life history characteristics. However, there was an increasing trend toward homogenization of the allele frequencies of the natural and hatchery origin fish that comprised the broodstock, even though there was consistent year-to-year variation in allele frequencies among hatchery and natural origin fish. In addition, there were no robust signals indicating that hatchery-origin hatchery broodstock, hatchery-origin natural spawners, natural-origin hatchery broodstock, and natural-origin natural spawners were substantially different from each other. Finally, the N_e estimate of 387 was only slightly larger than the pre-hatchery N_e (based on demographic data from 1989-1992), which means that the Chiwawa hatchery program has not reduced the N_e of the Wenatchee spring Chinook population.

Significant differences in allele frequencies were observed within and among major spawning areas in the Upper Wenatchee Basin. However, these differences made up only a very small portion of the overall variation, indicating genetic similarity among the major spawning areas. There was no evidence that the Chiwawa program has changed the genetic structure (allele frequency) of spring Chinook in Nason Creek and the White River, despite the presence of hatchery origin spawners in both systems.

Proportion of Natural Influence

Another method for assessing the genetic risk of a supplementation program is to determine the influence of the hatchery and natural environments on the adaptation of the composite population. This is estimated by the proportion of natural origin fish in the hatchery broodstock (pNOB) and the proportion of hatchery origin fish in the natural spawning escapement (pHOS). The ratio pNOB/(pHOS+pNOB) is the Proportion of Natural Influence (PNI). The larger the ratio (PNI), the greater the strength of selection in the natural environment relative to that of the hatchery environment. In order for the natural environment to dominate selection, PNI should be greater than 0.5 (HSRG/WDFW/NWIFC 2004).

For brood years 1989-1996, the PNI was greater than 0.50, indicating that the natural environment had a greater influence on adaptation of Chiwawa spring Chinook than did the hatchery environment (Table 5.33). For brood years 1997-2006, however, the PNI was generally less than 0.50, indicating that the hatchery environment had a greater influence on adaptation than did the natural environment.

Table 5.33. Proportionate natural influence (PNI) of the Chiwawa spring Chinook supplementation program for brood years 1989-2006. PNI was calculated as the proportion of naturally produced Chinook in the hatchery broodstock (pNOB) divided by the proportion of hatchery Chinook on the spawning grounds (pHOS) plus pNOB. NOS = number of natural origin Chinook on the spawning grounds; HOS = number of hatchery origin Chinook on the spawning grounds; NOB = number of natural origin Chinook collected for broodstock; and HOB = number of hatchery origin Chinook included in hatchery broodstock.

Brood year	Spawners			Broodstock			PNI
	NOS	HOS	pHOS	NOB	HOB	pNOB	
1989	713	0	0.00	28	0	1.00	1.00
1990	571	0	0.00	18	0	1.00	1.00
1991	242	0	0.00	27	0	1.00	1.00
1992	676	0	0.00	78	0	1.00	1.00
1993	76	157	0.67	94	0	1.00	0.60
1994	132	52	0.28	8	4	0.67	0.70
1995	6	26	0.81	No Program			
1996	53	5	0.08	8	10	0.44	0.84
1997	74	108	0.59	32	79	0.29	0.33
1998	52	39	0.43	13	34	0.28	0.39
1999	71	23	0.25	No Program			
2000	203	109	0.35	9	21	0.30	0.46
2001	680	1,810	0.73	113	259	0.30	0.29
2002	220	487	0.69	20	51	0.28	0.29
2003	165	105	0.39	41	53	0.44	0.53
2004	596	305	0.34	83	132	0.39	0.53
2005	134	518	0.79	91	181	0.33	0.30
2006	116	412	0.78	91	224	0.29	0.27

Natural Replacement Rates

Natural replacement rates (NRR) were calculated as the ratio of natural origin recruits (NOR) to the parent spawning population. For brood years 1989-2000, NRR in the Chiwawa averaged 0.68 (range, 0.03-4.48) if harvested fish were not include in the estimate and 0.89 (range, 0.03-6.71) if harvested fish were included in the estimate (Table 5.34). NRRs for more recent brood years will be calculated as soon as all tag recoveries and sampling rates have been loaded into the database.

Table 5.34. Spawning escapements, natural origin recruits (NOR), and natural replacement rates (NRR) for spring Chinook in the Chiwawa Basin, 1989-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating Chiwawa spring Chinook NORs, and NRRs.)*

Brood year	Spawning escapement	Harvest not included		Harvest included	
		NOR	NRR	NOR	NRR
1989	713	175	0.24	220	0.31
1990	571	45	0.08	61	0.11
1991	242	6	0.03	8	0.03
1992	676	51	0.08	54	0.08
1993	233	173	0.74	188	0.81
1994	184	55	0.30	60	0.32
1995	33	46	1.41	51	1.58
1996	58	167	2.88	213	3.66
1997	182	816	4.48	1,222	6.71
1998	91	276	3.05	372	4.10
1999	94	5	0.05	6	0.06
2000	312	505	1.62	573	1.83
Average	***282***	***193***	***0.68***	***252***	***0.89***

Hatchery Replacement Rates

Hatchery replacement rates were estimated as hatchery adult-to-adult returns. These rates should be greater than the NRRs and greater than or equal to 5.30 (the value in BAMP; Murdoch and Peven 2005). In most years, HRRs were greater than NRRs, regardless if harvest was or was not included (Table 5.35). In contrast, HRRs exceeded the BAMP target of 5.3 in only four years (brood years 1989, 1997, 1998, and 2000).

Table 5.35. Hatchery replacement rates (HRR), NRR, and BAMP target (5.30) for spring Chinook in the Chiwawa Basin, 1989-2000; NA = not available. *(The numbers in this table may change as the HETT and HC refine the methods for estimating Chiwawa spring Chinook HRRs and NRRs.)*

Brood year	Harvest not included			Harvest included		
	HRR	NRR	BAMP	HRR	NRR	BAMP
1989	5.86	0.24	5.30	6.71	0.31	5.30
1990	0.05	0.13	5.30	1.00	0.18	5.30
1991	1.03	0.03	5.30	1.13	0.03	5.30
1992	0.40	0.08	5.30	0.41	0.08	5.30
1993	2.50	0.74	5.30	2.53	0.81	5.30
1994	1.75	0.30	5.30	1.75	0.32	5.30
1995	NP	1.41	5.30	NP	1.58	5.30
1996	4.28	2.86	5.30	4.39	3.65	5.30
1997	18.60	4.39	5.30	21.97	6.61	5.30
1998	20.65	3.05	5.30	24.31	4.10	5.30

Brood year	Harvest not included			Harvest included		
	HRR	NRR	BAMP	HRR	NRR	BAMP
1999	NP	0.05	5.30	NP	0.06	5.30
2000	7.04	1.62	5.30	7.60	1.83	5.30
2001	4.27		5.30	4.34		5.30
Average	***6.5***	***0.73***	***5.30***	***7.2***	***0.95***	***5.30***

Smolt-to-Adult Survivals

Smolt-to-adult survival ratios (SARs) were calculated as the number of hatchery adults divided by the number of hatchery smolts released. SARs were based on CWT returns. For the available brood years, SARs have ranged from 0.00036 to 0.01538 for hatchery spring Chinook (Table 5.36).

Table 5.36. Smolt-to-adult ratios (SARs) for Chiwawa hatchery spring Chinook.

Brood year	Number of smolts released	Estimated adult captures	SAR
1989	42,707	188	0.00440
1990	52,798	19	0.00036
1991	61,088	36	0.00059
1992	82,976	31	0.00037
1993	221,316	284	0.00128
1994	27,135	21	0.00077
1995	No hatchery program		
1996	12,767	67	0.00525
1997	259,585	2,576	0.00992
1998	71,571	1,101	0.01538
1999	No hatchery program		
2000	46,726	363	0.00777
2001	374,129	1,644	0.00439
Average	***113,891***	***575***	***0.00505***

5.8 ESA/HCP Compliance

Broodstock Collection

The collection of 2005 Brood Chiwawa River spring Chinook broodstock was consistent with the 2005 Upper Columbia River Salmon and Steelhead Broodstock Objectives and site-based broodstock collection protocols. Specifically, broodstock collection targeted hatchery origin fish at Tumwater Dam and the Chiwawa Weir, while only natural origin spring Chinook were collected at the Chiwawa Weir. In-season adjustments were made to the number of hatchery and natural origin spring Chinook collected for bloodstock and were based on in-season escapement monitoring at Tumwater Dam and estimated Chiwawa run-escapement.

Broodstock collection at Tumwater Dam began 17 May 2005 and concluded on 26 May 2005, and totaled 40 hatchery-origin, coded-wire tagged spring Chinook. Collection was implemented concurrent with trapping, sampling, and tagging associated with the spring Chinook reproductive success study (BPA project No. 2003-039-00). Trapping at the Chiwawa Weir began on 7 June 2005 and concluded on 30 August 2005. Broodstock were collected between 7 June 2005 and 30 August 2005 and totaled 241 spring Chinook, including 96 and 145 natural and hatchery origin Chinook, respectively. Trapping at the Chiwawa Weir generally followed a 4-up and 3-down schedule, and operated only as needed to meet weekly collection objectives, consistent with the 2005 collection protocol or as adjusted based on in-season run escapement monitoring and ESA Section 10 Permit 1196 requirements.

Both passive (low abundance periods) and active (high abundance periods) trapping were used to collect spring Chinook at Tumwater Dam. During passive trapping, the trap was checked and fish processed several times per day. At the Chiwawa Weir, the trap was operated passively, checked several times per day, and fish processed once daily. All spring Chinook, steelhead, and bull trout that were captured were anesthetized with tricaine methanesulfonate (MS-222) and subject to water-to-water transfers during handling. All fish were allowed to fully recover before release.

The estimated escapement of 2005 spring Chinook past Tumwater Dam totaled 3,827 adult and jack spring Chinook (Murdoch et al. 2006). In 2005, the Wenatchee Basin experienced severe drought conditions that adversely affected pre-spawn survival. Murdoch et al. (2006) estimated pre-spawn survival of natural and hatchery origin spring Chinook migrating past Tumwater Dam at 50.4% and 41.7% respectively. Based on 2005 spawning ground data (redd and carcass surveys) an estimated 135 natural-origin spring Chinook spawned in the Chiwawa River Basin (Murdoch et al. 2006). Assuming the pre-spawn survival of Chiwawa River natural-origin spring Chinook was similar to the at-large population upstream from Tumwater Dam (50.4%), combined with the 96 natural-origin Chinook extracted for broodstock, the natural-origin run-escapement to the Chiwawa Basin totaled 364 spring Chinook (i.e., (135/0.504) + 96 = 364). The 2005 broodstock collection of 281 spring Chinook (96 natural origin and 185 hatchery origin) represents 26.4% of the estimated 2005 natural-origin Chiwawa spring Chinook escapement past Tumwater Dam and 7.3% of the run escapement of spring Chinook above Tumwater Dam. The estimated broodstock extraction rate of natural-origin Chiwawa spring Chinook and overall extraction of spring Chinook above Tumwater Dam comply with provisions of ESA Permit 1196.

In addition to spring Chinook collected at the Chiwawa Weir for broodstock, an additional 630 spring Chinook were handled and released as a function of targeting weekly quota collections for natural and hatchery origin spring Chinook, and as a function of maintaining, at minimum, 33% natural-origin spring Chinook in the broodstock. Additionally, 283 bull trout were captured and released. To minimize fallback or impingement on the weir, all spring Chinook and bull trout were released unharmed about 10 kilometers upstream from the weir.

Hatchery Rearing and Release

The rearing and release of 2005 Chiwawa spring Chinook was completed without incident. No mortality events occurred that exceeded 10% of the population. Fish were acclimated on Wenatchee River water and to the extent possible on Chiwawa River water (see Section 5.2).

The release of 2005 brood Chiwawa spring Chinook smolts totaled 494,012 spring Chinook, representing 73.5% of program objective and complied with ESA Section 10 Permit 1196 production level of 672,000 smolts.

Hatchery Effluent Monitoring

Per ESA Permits 1196, 1347, and 1395, permit holders shall monitor and report hatchery effluents in compliance with applicable National Pollution Discharge Elimination Systems (NPDES) (EPA 1999) permit limitations. There were no NPDES violations reported at Chelan PUD Hatchery facilities during the period 1 January 2007 through 31 December 2007. NPDES monitoring and reporting for Chelan PUD Hatchery Programs during 2007 are provided in Appendix E.

Smolt and Emigrant Trapping

Per ESA Section 10 Permit No. 1196, the permit holders are authorized a direct take of 20% of the emigrating spring Chinook population during juvenile emigration monitoring and a lethal take not to exceed 2% of the fish captured (NMFS 2003). Based on the estimated wild spring Chinook population (smolt trap expansion) and hatchery juvenile spring Chinook population estimate (hatchery release data) for the Wenatchee Basin, the reported spring Chinook encounters during 2007 emigration monitoring complied with take provisions in the Section 10 permit, not withstanding sub-yearling spring Chinook encounters at the Chiwawa Weir. Sub-yearling spring Chinook encounters at the Chiwawa Weir reported an encounter rate of 0.2583, representing 129% of Permit 1196 encounter rate of 0.2000. Although the Chiwawa trap encountered greater than 20% of the estimated sub-yearling spring Chinook emigrating past the weir, it is likely that only a portion of the sub-yearling spring Chinook from the 2006 brood emigrated past the weir and out of the Chiwawa River; therefore, the reported encounter rate should be considered a maximum and the true encounter rate of the sub-yearling population was likely less than the 0.2583 reported for 2007. At the conclusion of the 2008 juvenile emigration monitoring, an overall encounter rate for 2006 brood spring Chinook will be assessed and reported in the 2008 annual report. Spring Chinook encounter and mortality rates for each trap site (including PIT tag mortalities) are detailed in Table 5.37. Additionally, juvenile fish captured at the trap locations were handled consistent with provisions in ESA Section 10 Permit 1196, Section B.

Table 5.37. Estimated take of Upper Columbia River spring Chinook resulting from juvenile emigration monitoring in the Wenatchee Basin, 2007.

Trap location	Population estimate			Number trapped			Total	Take allowed under Permit
	Wild[a]	Hatchery[b]	Subyearling	Wild[a]	Hatchery[b]	Subyearling		
Chiwawa Trap								
Population	69,064	494,012	62,922	4,433	17,634	16,250	38,317	
Encounter rate	NA	NA	NA	0.0642	0.0357	0.2583	0.0612	0.20
Mortality[e]	NA	NA	NA	39	0	147	139	
Mortality rate	NA	NA	NA	0.0088	0.0000	0.0090	0.0036	0.02
Upper Wenatchee Trap								
Population	NA	69,102	NA	1,597	750	213	2,560	
Encounter rate	NA	NA	NA	NA	0.0109	NA	NA	0.20
Mortality [e]	NA	NA	NA	35	0	5	40	
Mortality rate	NA	NA	NA	0.0219	0.0000	0.0235	0.0156	0.02
Lower Wenatchee Trap								
Population	311,699	563,114	NA	1,906	10,730[c]	NA[d]	12,636	
Encounter rate	NA	NA	NA	0.0061	0.0191	NA	0.0144	0.20
Mortality[e]	NA	NA	NA	10	0	0	10	
Mortality rate	NA	NA	NA	0.0052	0.0000	0.0000	0.0008	0.02
Wenatchee Basin Total								
Population	311,699	563,114	NA	7,936	29,114	16,463	53,513	
Encounter rate	NA	NA	NA	0.0255	0.0517	NA	NA	0.20
Mortality[e]	NA	NA	NA	84	0	152	236	
Mortality rate	NA	NA	NA	.00106	0.0000	0.0092	0.0044	0.02

[a] Smolt population estimate derived from juvenile emigration trap data.

[b] 2007 smolt release data for the Wenatchee basin.

[c] Derived estimate based on the proportion of ESA-listed hatchery spring Chinook within the total hatchery yearling Chinook released in the Wenatchee basin during 2007.

[d] Based on size, date of capture, and location of capture, subyearling Chinook encountered at the Lower Wenatchee Trap are categorized as summer Chinook.

[e] Combined trapping and PIT tagging mortality.

Spawning Surveys

Spring Chinook spawning ground surveys were conducted in the Wenatchee basin during 2007, as authorized by ESA Section 10 Permit 1196. Because of the difficulty of quantifying the level of take associated with spawning ground surveys, the Permit does not specify a take level associated with these activities, even though it does authorize implementation of spawning ground surveys. Therefore, no take levels are reported. However, to minimize potential impacts to established redds, wading was restricted to the extent practical, and extreme caution was used to avoid established redds when wading was required.

Spring Chinook Reproductive Success Study

ESA Section 10 Permit 1196 specifically provides authorization to capture, anesthetize, biologically sample, PIT tag, and release adult spring Chinook at Tumwater Dam for reproductive success studies and general program monitoring. During 2005, 2006, and 2007, all spring Chinook passing Tumwater Dam were enumerated, anesthetize, biologically sampled, PIT tagged, and released (not including hatchery-origin Chinook retained for broodstock) as a component of the reproductive success study (BPA Project No. 2003-039-00). Please refer the Murdoch et al. (2006) and Murdoch et al. (2007) for complete details of the methods and results of the spring Chinook reproductive success study for 2005 and 2006. Results of the 2007 study year will be available pending completion of the 2007 annual report for this project.

SECTION 6: WENATCHEE SUMMER CHINOOK

6.1 Broodstock Sampling

This section focuses on results from sampling 2005-2006 Wenatchee summer Chinook broodstock, which were collected at Dryden and Tumwater dams. Complete information is not currently available for the 2007 brood (this information will be provided in the 2008 annual report).

Origin of Broodstock

Both the 2005 and 2006 broodstock consisted almost entirely of natural origin (adipose fin present) summer Chinook (Table 6.1). Less than 1% of the fish spawned were hatchery origin fish (hatchery origin was determined by examination of scales and/or CWTs). About 5% of the fish spawned were of unknown origin.

Table 6.1. Numbers of wild and hatchery summer Chinook collected for broodstock, numbers that died before spawning, and numbers of Chinook spawned in the Wenatchee Basin, 1989-2006. Unknown origin fish (i.e., undetermined by scale analysis, no CWT or fin clips, and no additional hatchery marks) were considered naturally produced. Mortality includes fish that died of natural causes typically near the end of spawning and were not needed for the program and surplus fish killed at spawning.

Brood year	Wild summer Chinook					Hatchery summer Chinook					Total number spawned
	Number collected	Prespawn loss	Mortality	Number spawned	Number released	Number collected	Prespawn loss	Mortality	Number spawned	Number released	
1989	346	29	27	290	0	0	0	0	0	0	290
1990	87	6	24	57	0	0	0	0	0	0	57
1991	128	9	14	105	0	0	0	0	0	0	105
1992	341	48	19	274	0	0	0	0	0	0	274
1993	480	28	46	406	0	44	0	0	44	0	450
1994	363	29	1	333	0	55	1	0	54	0	387
1995	382	15	4	363	0	16	0	0	16	0	378
1996	331	34	34	263	0	3	0	0	3	0	266
1997	225	14	6	205	0	15	1	1	13	0	218
1998	378	40	39	299	0	94	4	12	78	0	377
1999	250	7	1	242	0	238	1	1	236	0	478
2000	298	18	5	275	0	194	7	7	180	0	455
2001	311	41	60	210	0	182	8	38	136	0	346
2002	469	28	32	409	0	13	1	2	10	0	419
2003	488	90	61	337	0	8	1	0	7	0	344
2004	494	24	46	424	0	2	0	0	2	0	426
2005	491	29	19	397	46	3	0	0	3	0	400
2006	483	29	21	433	0	5	1	0	4	0	437
Average	***353***	***29***	***26***	***296***	***3***	***48***	***1***	***3***	***44***	***0***	***339***

Age/Length Data

Ages of summer Chinook broodstock were determined from analysis of scales and/or CWTs. Broodstock collected from the 2005 return consisted primarily of age-4 natural origin Chinook (54%). Age-5 natural origin fish made up 35% of the broodstock, while age-3 and 6 fish collectively made up 11% (Table 6.2). Note that according to broodstock protocol, age-3 males are limited to no more than 10% of the total broodstock collection. The three hatchery Chinook included in the broodstock were age-5 fish.

Broodstock collected from the 2006 return consisted primarily of age-5 natural origin Chinook (81%). Age-4 natural origin fish made up 15% of the broodstock, while age-2, 3, and 6 fish collectively made up 3% (Table 6.2). Of the five hatchery Chinook included in the broodstock, 80% were age-5 and 20% were age-6 fish.

Table 6.2. Percent of hatchery and wild Wenatchee summer Chinook of different ages (total age) collected from broodstock in the Wenatchee Basin, 1991-2006.

Return Year	Origin	Total age				
		2	3	4	5	6
1991	Wild	0.0	4.6	36.8	57.5	1.1
	Hatchery	0.0	0.0	0.0	0.0	0.0
1992	Wild	0.0	2.6	40.4	50.9	6.1
	Hatchery	0.0	0.0	0.0	0.0	0.0
1993	Wild	0.0	1.5	36.0	60.3	2.2
	Hatchery	0.0	0.0	93.0	7.0	0.0
1994	Wild	0.0	1.0	33.7	64.3	1.0
	Hatchery	0.0	0.0	1.9	98.1	0.0
1995	Wild	0.0	3.3	18.9	76.6	1.2
	Hatchery	0.0	0.0	0.0	0.0	100.0
1996	Wild	0.0	4.6	40.1	53.3	2.0
	Hatchery	0.0	0.0	33.3	66.7	0.0
1997	Wild	0.0	2.3	42.6	53.2	1.9
	Hatchery	0.0	26.7	66.7	6.6	0.0
1998	Wild	0.0	5.5	34.8	58.6	1.1
	Hatchery	0.0	5.4	68.5	19.6	6.5
1999	Wild	0.5	1.9	39.0	56.3	2.4
	Hatchery	0.0	1.3	23.2	72.1	2.4
2000	Wild	2.6	6.3	24.6	66.5	0.0
	Hatchery	0.0	23.6	15.2	42.9	18.3
2001	Wild	0.3	16.4	53.9	27.7	1.7
	Hatchery	0.0	6.3	80.6	10.0	3.1
2002	Wild	1.6	8.4	61.1	28.3	0.6
	Hatchery	0.0	0.0	41.7	58.3	0.0
2003	Wild	0.9	2.8	31.4	64.9	0.0

Return Year	Origin	Total age				
		2	3	4	5	6
	Hatchery	0.0	12.5	25.0	62.5	0.0
2004	Wild	0.2	3.6	10.1	84.0	2.1
	Hatchery	0.0	0.0	50.0	50.0	0.0
2005	Wild	0.0	4.3	53.5	35.1	7.1
	Hatchery	0.0	0.0	0.0	100.0	0.0
2006	Wild	1.4	0.9	14.9	81.8	1.0
	Hatchery	0.0	0.0	0.0	80.0	20.0
Average	***Wild***	***0.5***	***4.8***	***36.8***	***56.1***	***1.9***
	Hatchery	***0.0***	***8.2***	***40.2***	***43.2***	***8.4***

Mean lengths of natural origin summer Chinook of a given age differed little between return years 2005 and 2006 (Table 6.3). Mean lengths of age-3 to 6 Chinook differed between years by about 5 cm, 2 cm, 4 cm, and 5 cm, respectively. What few hatchery fish that were included in broodstock were similar in size to natural origin fish (Table 6.3).

Table 6.3. Mean fork length (cm) at age (total age) of hatchery and wild Wenatchee summer Chinook collected from broodstock in the Wenatchee Basin, 1991-2006; N = sample size and SD = 1 standard deviation.

Return year	Origin	Summer Chinook fork length (cm)														
		Age-2			Age-3			Age-4			Age-5			Age-6		
		Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD
1991	Wild	-	0	-	-	4	-	-	32	-	-	50	-	-	1	-
	Hatchery	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-
1992	Wild	-	NA	-	-	NA	-	-	NA	-	-	NA	-	-	NA	-
	Hatchery	-	NA	-	-	NA	-	-	NA	-	-	NA	-	-	NA	-
1993	Wild	-	0	-	68	6	10	84	142	9	98	238	6	100	9	6
	Hatchery	-	0	-	-	0	-	79	41	8	101	3	8	-	0	-
1994	Wild	-	0	-	74	3	5	86	101	8	96	193	7	106	3	7
	Hatchery	-	0	-	-	0	-	75	1	-	90	53	8	-	0	-
1995	Wild	-	0	-	66	11	8	85	64	7	97	255	6	106	4	7
	Hatchery	-	0	-	-	0	-	-	0	-	-	0	-	91	16	8
1996	Wild	-	0	-	69	14	5	86	121	6	97	161	6	104	6	5
	Hatchery	-	0	-	-	0	-	63	1	-	96	2	4	-	0	-
1997	Wild	-	0	-	54	5	10	85	92	7	98	115	7	97	4	9
	Hatchery	-	0	-	46	4	2	74	10	4	98	1	-	-	0	-
1998	Wild	-	0	-	66	19	9	85	120	7	99	201	7	106	4	7

Return year	Origin	Summer Chinook fork length (cm)														
		Age-2			Age-3			Age-4			Age-5			Age-6		
		Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD
	Hatchery	-	0	-	53	5	2	77	63	8	95	19	8	98	6	8
1999	Wild	42	1	-	65	4	6	86	83	6	97	120	7	103	5	8
	Hatchery	-	0	-	52	3	6	79	55	7	90	171	6	100	8	6
2000	Wild	43	7	4	60	17	7	84	67	5	98	181	6	-	0	-
	Hatchery	-	0	-	53	47	7	76	29	8	94	83	7	102	35	9
2001	Wild	48	1	-	66	48	7	88	155	7	97	80	6	102	5	3
	Hatchery	-	0	-	51	10	3	75	132	8	91	17	8	100	5	8
2002	Wild	48	7	4	64	37	8	89	270	7	100	125	7	99	3	13
	Hatchery	-	0	-	-	0	-	78	5	8	95	7	5	-	0	-
2003	Wild	41	4	2	58	13	4	87	144	8	100	297	7	-	0	-
	Hatchery	-	0	-	40	1	-	78	2	4	101	5	8	-	0	-
2004	Wild	51	1	-	69	17	5	84	47	8	99	392	6	109	10	7
	Hatchery	-	0	-	-	0	-	84	1	-	108	1	-			
2005	Wild	-	0	-	68	20	7	86	247	8	95	162	6	101	33	6
	Hatchery	-	0	-	-	0	-	-	0	-	90	3	9	-	0	-
2006	Wild	44	6	6	63	4	11	88	66	7	99	363	6	96	5	7
	Hatchery	-	0	-	-	0	-	-	0	-	99	4	7	100	1	-

Sex Ratios

Male summer Chinook in the 2005 broodstock made up about 59% of the adults collected, resulting in an overall male to female ratio of 1.45:1.00 (Table 6.4.). In 2006, males made up about 49% of the adults collected, resulting in an overall male to female ratio of 0.95:1.00 (Table 6.4). The ratio in 2006 was similar to the 1:1 ratio goal in the broodstock protocol.

Table 6.4. Numbers of male and female wild and hatchery summer Chinook collected for broodstock in the Wenatchee Basin, 1989-2006. Ratios of males to females are also provided.

Return year	Number of wild summer Chinook			Number of hatchery summer Chinook			Total M/F ratio
	Males (M)	Females (F)	M/F	Males (M)	Females (F)	M/F	
1989	166	180	0.92:1.00	0	0	-	0.92:1.00
1990	45	39	1.15:1.00	0	0	-	1.15:1.00
1991	60	68	0.88:1.00	0	0	-	0.88:1.00
1992	154	187	0.82:1.00	0	0	-	0.82:1.00
1993	208	228	0.91:1.00	35	9	3.89:1.00	1.03:1.00

Return year	Number of wild summer Chinook			Number of hatchery summer Chinook			Total M/F ratio
	Males (M)	Females (F)	M/F	Males (M)	Females (F)	M/F	
1994	158	179	0.88:1.00	24	31	0.77:1.00	0.87:1.00
1995	169	213	0.79:1.00	1	15	0.07:1.00	0.75:1.00
1996	150	181	0.83:1.00	2	1	2.00:1.00	0.84:1.00
1997	104	121	0.86:1.00	15	0	-	0.98:1.00
1998	211	167	1.26:1.00	64	30	2.13:1.00	1.40:1.00
1999	130	120	1.08:1.00	108	130	0.83:1.00	0.95:1.00
2000	153	145	1.06:1.00	112	82	1.37:1.00	1.17:1.00
2001	187	124	1.51:1.00	132	50	2.64:1.00	1.83:1.00
2002	266	203	1.31:1.00	5	8	0.63:1.00	1.28:1.00
2003	270	218	1.24:1.00	5	3	1.67:1.00	1.24:1.00
2004	230	264	0.87:1.00	1	1	1.00:1.00	0.87:1.00
2005	291	200	1.46:1.00	2	1	2.00:1.00	1.45:1.00
2006	237	246	0.96:1.00	1	4	0.25:1.00	0.95:1.00
Total	***3,189***	***3,083***	***1.03:1.00***	***507***	***365***	***1.39:1.00***	***1.07:1.00***

Fecundity

Fecundities for the 2005 and 2006 returns of summer Chinook averaged 5,050 and 5,133 eggs per female, respectively (Table 6.5). These values are close to the 18-year average of 5,189 eggs per female. Mean observed fecundities for the 2005 and 2006 returns were above the expected fecundity of 5,000 eggs per female assumed in the broodstock protocol.

Table 6.5. Mean fecundity of wild, hatchery, and all female summer Chinook collected for broodstock in the Wenatchee Basin, 1989-2006; NA = not available.

Return year	Mean fecundity		
	Wild	Hatchery	Total
1989*	NA	NA	5,280
1990*	NA	NA	5,436
1991*	NA	NA	4,333
1992*	NA	NA	5,307
1993*	NA	NA	5,177
1994*	NA	NA	5,899
1995*	NA	NA	4,402
1996*	NA	NA	4,941
1997	5,385	5,272	5,390
1998	5,393	4,825	5,297
1999	5,036	4,942	4,987
2000	5,464	5,403	5,441
2001	5,280	4,647	5,097

2002	5,502	5,027	5,484
2003	5,357	5,696	5,361
2004	5,372	6,681	5,377
2005	5,045	6,391	5,053
2006	5,126	5,633	5,133
Average	***5,296***	***5,452***	***5,189***

* Individual fecundities were not tracked with females until 1997.

6.2 Hatchery Rearing

Rearing History

Number of eggs taken

Based on the unfertilized egg-to-release survival standard of 81%, a total of 1,066,667 eggs are required to meet the program release goal of 864,000 smolts. Between 1989 and 2006, the egg take goal was reached in five of those years (Table 6.6).

Table 6.6. Numbers of eggs taken from Wenatchee summer Chinook broodstock, 1989-2006.

Return year	Number of eggs taken
1989	829,012
1990	163,109
1991	247,000
1992	827,911
1993	1,133,852
1994	999,364
1995	949,531
1996	756,000
1997	554,617
1998	854,997
1999	1,182,130
2000	1,113,159
2001	733,882
2002	1,049,255
2003	901,095
2004	1,311,051
2005	883,669
2006	1,190,757
Average	***871,133***

Number of acclimation days

The 2006 brood Wenatchee summer Chinook were transferred to Dryden Pond on 15 March 2007. These fish received 46 days of acclimation on Wenatchee River water before being released on 30 April 2007 (Table 6.7). In recent years, a small proportion of the brood has been reared separately (high ELISA) and has received no acclimated period (i.e., these fish were released directly into the Wenatchee River). These data are not shown in Table 6.7. No such releases occurred in 2007.

Table 6.7. Number of days Wenatchee summer Chinook were acclimated at Dryden Pond, brood years 1989-2005. Numbers in parenthesis represents the number of days fish reared at Chiwawa Ponds.

Brood year	Release year	Transfer date	Release date	Number of days
1989	1991	2-Mar	7-May	66
1990	1992	19-Feb	2-May	73
1991	1993	10-Mar	8-May	59
1992	1994	1-Mar	6-May	66
1993	1995	3-Mar	1-May	59
1994	1996	2-Oct	6-May	217 (154)
		5-Mar	6-May	62
1995	1997	16-Oct	8-May	205 (139)
		27-Feb	8-May	70
1996	1998	6-Oct	28-Apr	204 (142)
		25-Feb	28-Apr	62
1997	1999	23-Feb	27-Apr	63
1998	2000	5-Mar	1-May	57
1999	2001	8-Mar	23-Apr	46
2000	2002	1-Mar	6-May	66
2001	2003	19-Feb	23-Apr	63
2002	2004	5-Mar	23-Apr	49
2003	2005	15-Mar	25-Apr	41
2004	2006	25-Mar	27-Apr	33
2005	2007	15-Mar	30-Apr	46
Average				***80***

Release Information

Numbers released

The 2005 Wenatchee summer Chinook program achieved 74.6% of the 864,000 target goal with about 644,182 fish being released (Table 6.8). The underage was related to lower than expected fertilization rates.

Table 6.8. Numbers of Wenatchee summer Chinook smolts released from the hatchery, 1989-2005. The release target for Wenatchee summer Chinook is 864,000 smolts.

Brood year	Release year	Number of smolts
1989	1991	720,000
1990	1992	124,440
1991	1993	191,179
1992	1994	627,331
1993	1995	900,429
1994	1996	797,350
1995	1997	687,439
1996	1998	600,127
1997	1999	438,223
1998	2000	649,612
1999	2001	1,005,554
2000	2002	929,496
2001	2003	604,668
2002	2004	835,645
2003	2005	653,764
2004	2006	892,926
2005	2007	644,182
Average		***664,845***

Numbers tagged

The 2005 brood Wenatchee summer Chinook were 96.0% CWT and adipose fin-clipped, but were not PIT tagged.

Fish size and condition at release

Summer Chinook from the 2005 brood were released as yearling smolts on 30 April 2007. Size at release of the acclimated population was 86.9% and 89.4% of the target fork length and weight goals, respectively. This brood year exceeded the target CV for length by 81.1% (Table 6.9). Since the program began, Wenatchee summer Chinook have not met the target length and CV values. The target weight (fish/pound or FPP) of juvenile fish has been met occasionally.

Table 6.9. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of Wenatchee summer Chinook smolts released from the hatchery, brood years 1989-2005; NA = not available. Size targets are provided in the last row of the table.

Brood year	Release year	Fork length (cm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1989	1991	158	13.7	45.4	10
1990	1992	155	14.2	45.4	10
1991	1993	156	15.5	42.3	11

Brood year	Release year	Fork length (cm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1992	1994	152	13.1	40.1	10
1993	1995	149	NA	34.9	13
1994	1996	138	NA	21.7	21
1995	1997	149	12.2	42.5	11
1996	1998	151	16.6	43.2	10
1997	1999	154	10.1	42.8	11
1998	2000	166	9.7	53.1	9
1999	2001	137	16.1	29.0	16
2000	2002	148	14.6	37.1	12
2001	2003	148	NA	38.9	12
2002	2004	146	15.1	37.3	14
2003	2005	147	13.2	36.5	12
2004	2006	147	10.7	35.4	13
2005	2007	153	16.3	40.6	11
Targets		***176***	***9.0***	***45.4***	***10***

Survival Estimates

Overall survival of the 2005 brood Wenatchee summer Chinook from green (unfertilized) egg to release was considerably below the standard set for the program primarily because of poor green egg-to-eye survival (Table 6.10).

Table 6.10. Hatchery life-stage survival rates (%) for Wenatchee summer Chinook, brood years 1989-2005. Survival standards or targets are provided in the last row of the table.

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
1989	90.0	93.4	90.9	97.0	99.7	99.3	98.5	99.4	86.9
1990	89.7	95.6	80.9	96.6	99.6	99.2	97.7	98.8	76.3
1991	88.2	98.3	86.9	96.1	99.3	98.5	94.9	98.1	79.2
1992	84.3	92.2	79.8	97.8	99.9	99.9	97.1	98.1	75.7
1993	92.4	95.9	84.2	97.5	99.6	99.3	96.7	98.8	79.4
1994	90.7	95.3	83.7	100	99.2	97.0	95.3	98.4	79.8
1995	94.7	98.2	86.0	100	96.7	96.4	74.9	90.8	64.4
1996	84.6	96.1	84.1	100	97.9	97.7	94.4	97.7	79.4
1997	89.3	98.3	82.6	97.3	97.1	96.9	98.3	98.2	79.0
1998	85.3	94.6	80.9	98.3	99.4	98.6	95.6	99.8	76.0
1999	98.4	98.3	90.4	97.9	98.1	97.9	96.2	99.4	85.1
2000	93.0	96.6	88.3	98.0	99.6	99.3	96.5	98.9	83.5

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
2001	87.4	91.5	90.6	97.7	99.8	99.6	93.1	93.3	82.4
2002	93.8	94.1	85.1	99.8	98.1	97.6	93.7	96.5	79.6
2003	77.4	85.1	80.5	98.1	99.6	99.1	91.9	93.5	72.6
2004	92.8	97.8	85.7	87.8	99.9	99.6	86.6	92.1	65.1
2005	97.3	89.6	83.5	98.0	99.7	99.4	89.1	99.5	72.9
Standard	***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

6.3 Disease Monitoring

Rearing of the 2005 brood Wenatchee summer Chinook was similar to previous years with fish being held on well water before being transferred to Dryden Pond for final acclimation in March 2007. Fish began being transferred to Dryden pond 15 March and ended 23 March. No significant disease issues were encountered during rearing or acclimation.

6.4 Natural Juvenile Productivity

During 2007, juvenile summer Chinook were sampled at the Lower Wenatchee Trap located at the West Monitor Bridge.

Emigrant Estimates

The Lower Wenatchee Trap operated nightly between 1 February and 5 August 2007. During that time period, trap 1 and trap 2 were inoperable for 14 and 68 days, respectively, because of high river flows, debris, snow/ice, or mechanical failure. During the seven-month sampling period, a total of 86,142 wild subyearling Chinook were captured at the Lower Wenatchee Trap. Based on capture efficiencies estimated from the flow model, the total number of wild subyearling Chinook that emigrated past the Lower Wenatchee Trap was 9,590,969 (±1,859,544). Most of these fish emigrated during May and June (Figure 6.1). Monthly captures and mortalities of all fish collected at the Lower Wenatchee Trap are reported in Appendix B.

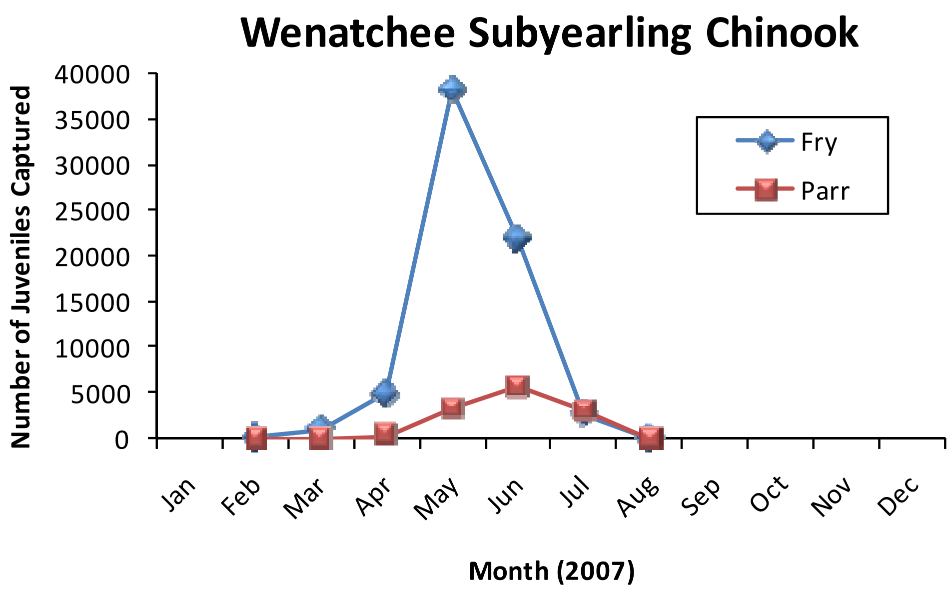


Figure 6.1. Numbers of wild subyearling Chinook captured at the Lower Wenatchee Trap during February through August, 2007.

6.5 Spawning Surveys

Surveys for Wenatchee summer Chinook redds were conducted from late September to mid-November, 2007, in the Wenatchee River and Icicle Creek. Both peak counts and total counts (based on a peak count expansion factor; Murdoch and Peven 2005) were conducted in the river (see Appendix G for more details).

Redd Counts

A peak count of 1,870 summer Chinook redds was estimated in 2007 based on ground surveys conducted in the Wenatchee River and Icicle Creek (Table 6.11). A total redd count of 1,970 redds was estimated in 2007 based on expanded peak counts in the Wenatchee River and Icicle Creek (Table 6.11). The peak count in 2007 was the lowest count since the late 1990s.

Table 6.11. Peak and total numbers of redds counted in the Wenatchee River, 1989-2006; NA = not available.

Survey year	Peak redd count	Total redd count
1989	3,331	NA
1990	2,479	NA
1991	2,180	NA
1992	2,328	NA
1993	2,334	NA
1994	2,426	NA
1995	1,872	NA
1996	1,435	NA
1997	1,388	NA

Survey year	Peak redd count	Total redd count
1998	1,660	NA
1999	2,188	NA
2000	2,022	NA
2001	2,857	NA
2002	5,419	NA
2003	4,328	NA
2004	3,764	5,804
2005	3,327	NA
2006*	7,233	8,896
2007*	1,870	1,970
Average	***2,865***	***5,557***

* Peak and total counts include 68 and 13 redds counted in Icicle Creek in 2006 and 2007, respectively.

Redd Distribution

Summer Chinook redds were not evenly distributed among reaches within the Wenatchee Basin in 2007 (Table 6.12; Figure 6.2). Most of the spawning occurred upstream from the Leavenworth Bridge in Reaches 6, 9, and 10. The highest density of redds occurred in Reach 6 near the confluence of the Icicle River.

Table 6.12. Peak and total numbers of summer Chinook redds counted in different reaches in the Wenatchee Basin during September through mid-November, 2007. Reach codes are described in Table 2.10.

Survey reach	Peak redd count	Total redd count
Wenatchee 1	7	6
Wenatchee 2	61	49
Wenatchee 3	172	138
Wenatchee 4	34	39
Wenatchee 5	45	52
Wenatchee 6	873	933
Wenatchee 7	107	144
Wenatchee 8	61	82
Wenatchee 9	280	306
Wenatchee 10	217	208
Icicle Creek	13	13
Totals	***1,870***	***1,970***

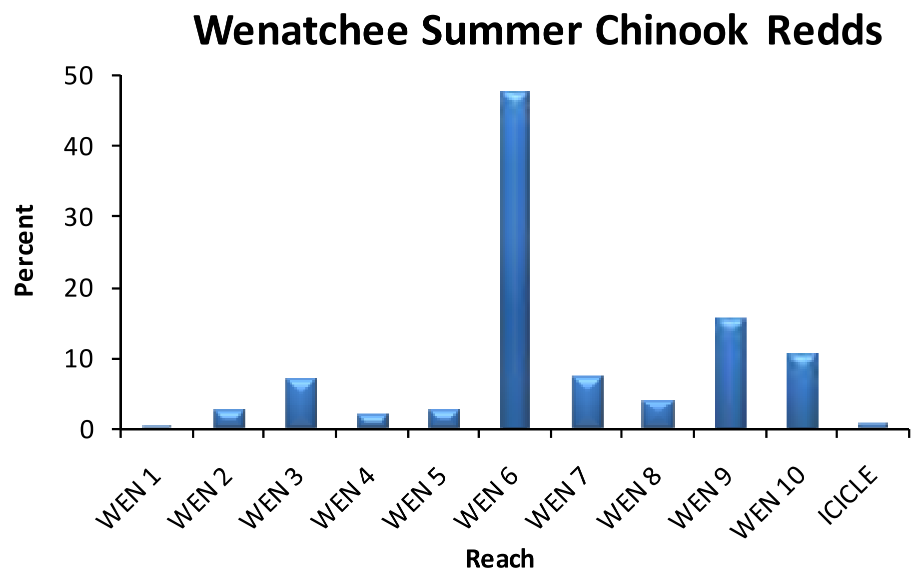


Figure 6.2. Percent of the total number of summer Chinook redds counted in different reaches in the Wenatchee Basin during September through mid-November, 2007. Reach codes are described in Table 2.10.

Spawn Timing

In 2007, spawning in the Wenatchee River began the last week of September, peaked in the middle of October, and ended in early November (Figure 6.3).

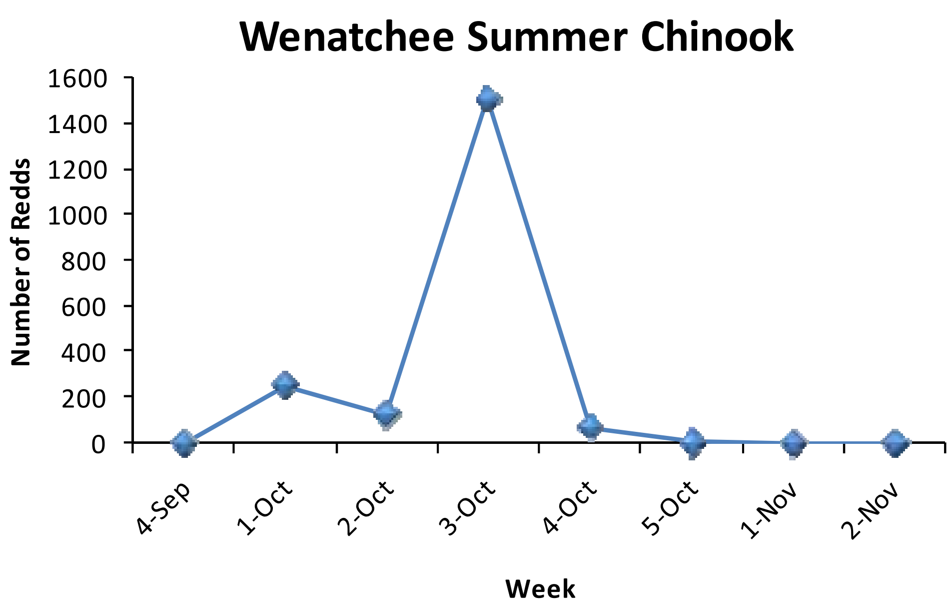


Figure 6.3. Number of summer Chinook redds counted during different weeks in the Wenatchee River, September through mid-November 2007.

Spawning Escapement

Spawning escapement for Wenatchee summer Chinook was calculated as the total (or peak) number of redds times the fish per redd ratio estimated from broodstock and fish sampled at adult trapping sites. The estimated fish per redd ratio for summer Chinook in 2007 was 2.33. Multiplying this ratio by the number of redds counted in the Wenatchee Basin resulted in a total spawning escapement of 4,590 summer Chinook (Table 6.13). This was the fourth lowest escapement since 1989.

Table 6.13. Spawning escapements for summer Chinook in the Wenatchee Basin, return years 1989-2007.

Return year	Fish/Redd	Redds	Total spawning escapement
1989	3.40	3,331	11,325
1990	3.50	2,479	8,677
1991	3.70	2,180	8,066
1992	4.00	2,328	9,312
1993	3.20	2,334	7,469
1994	3.30	2,426	8,006
1995	3.30	1,872	6,178
1996	3.40	1,435	4,879
1997	3.40	1,388	4,719
1998	2.40	1,660	3,984
1999	2.00	2,188	4,376
2000	2.17	2,022	4,388
2001	3.20	2,857	9,142
2002	2.30	5,419	12,464
2003	2.24	4,328	9,695
2004	2.15	3,764	8,093
2005	2.46	3,327	8,184
2006	2.00	8,896	17,792
2007	2.33	1,970	4,590
Average	***2.87***	***2,958***	***7,965***

6.6 Carcass Surveys

Surveys for Wenatchee summer Chinook carcasses were conducted during late September to mid-November, 2007, in the Wenatchee River and Icicle Creek.

Number sampled

A total of 844 summer Chinook carcasses were sampled during September through mid-November in the Wenatchee Basin in 2007 (Table 6.14).

Table 6.14. Numbers of summer Chinook carcasses sampled within each survey reach in the Wenatchee Basin, 1993-2007. Reach codes are described in Table 2.10.

Survey year	Number of summer Chinook carcasses											
	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10	Icicle	Total
1993	61	138	627	12	77	141	202	38	0	0	0	**1,296**
1994	0	6	22	1	17	48	18	47	125	1	0	**285**
1995	0	10	14	0	0	111	49	36	19	0	0	**239**
1996	0	5	67	39	9	190	26	30	41	0	0	**407**
1997	1	44	118	4	28	288	7	71	67	13	0	**641**
1998	6	74	141	3	0	248	28	346	324	59	0	**1,229**
1999	0	160	97	15	31	857	61	133	171	72	0	**1,597**
2000	7	109	165	7	79	651	75	111	159	193	0	**1,556**
2001	0	45	127	26	0	323	33	110	87	81	0	**832**
2002	0	238	170	0	196	809	0	306	520	155	6	**2,400**
2003	6	323	164	61	132	673	56	237	482	47	36	**2,217**
2004	8	141	181	157	158	975	87	312	428	366	5	**2,818**
2005	8	85	106	39	46	707	70	140	353	257	7	**1,818**
2006	22	140	160	64	112	953	435	343	703	658	18	**3,608**
2007	3	15	49	9	26	475	38	39	96	91	3	**844**
Mean	***8***	***102***	***147***	***29***	***61***	***497***	***79***	***153***	***238***	***133***	***5***	***1,452***

Carcass Distribution and Origin

Summer Chinook carcasses were not evenly distributed among reaches within survey streams in the Wenatchee Basin in 2007 (Table 6.14; Figure 6.4). Most of the carcasses in the Wenatchee Basin were found upstream from the Leavenworth Bridge. The highest percentage of carcasses (56%) was sampled in Reach 6 near the confluence of the Icicle River.

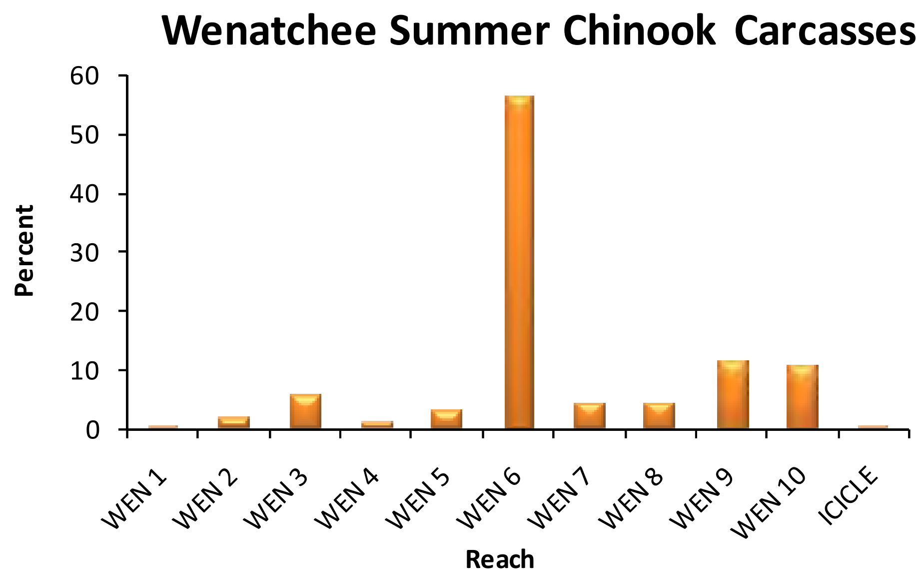


Figure 6.4. Percent of summer Chinook carcasses sampled within different reaches in the Wenatchee Basin during September through mid-November, 2007. Reach codes are described in Table 2.10.

Numbers of wild and hatchery origin summer Chinook carcasses sampled in 2007 will be available after analysis of CWTs and scales. Based on the available data (1993-2006), most fish, regardless of origin, were found in Reach 6 (Leavenworth Bridge to Icicle Road Bridge) (Table 6.15). However, a larger percentage of hatchery fish were found in that reach than were wild fish (Figure 6.5). In contrast, a larger percentage of wild fish were found in reaches upstream from the Icicle Road Bridge.

Table 6.15. Numbers of wild and hatchery summer Chinook carcasses sampled within different reaches in the Wenatchee Basin, 1993-2006.

Survey year	Origin	Survey reach											Total
		W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10	Icicle	
1993	Wild	52	133	591	11	77	124	200	37	0	0	0	**1,225**
	Hatchery	9	5	36	1	0	17	2	1	0	0	0	**71**
1994	Wild	0	2	15	1	15	34	18	47	124	1	0	**257**
	Hatchery	0	4	7	0	2	14	0	0	1	0	0	**28**
1995	Wild	0	4	11	0	0	99	49	34	19	0	0	**216**
	Hatchery	0	6	3	0	0	12	0	2	0	0	0	**23**
1996	Wild	0	5	65	37	8	181	26	30	41	0	0	**393**
	Hatchery	0	0	2	2	1	9	0	0	0	0	0	**14**
1997	Wild	1	35	104	4	21	242	7	71	66	13	0	**564**
	Hatchery	0	9	14	0	7	46	0	0	1	0	0	**77**
1998	Wild	6	55	106	2	0	169	25	325	297	56	0	**1,041**
	Hatchery	0	19	35	1	0	79	3	21	27	3	0	**188**
1999	Wild	0	79	55	7	14	525	51	124	155	68	0	**1,078**

Survey year	Origin	Survey reach											Total
		W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10	Icicle	
	Hatchery	0	81	42	8	17	332	10	9	16	4	0	**519**
2000	Wild	4	68	102	6	51	443	68	100	154	186	0	**1,182**
	Hatchery	3	41	63	1	28	208	7	11	5	7	0	**374**
2001	Wild	0	33	88	4	0	230	29	108	83	78	0	**653**
	Hatchery	0	12	39	22	0	93	4	2	4	3	0	**179**
2002	Wild	0	140	110	0	94	440	0	295	514	150	4	**1,747**
	Hatchery	0	98	60	0	102	369	0	11	6	5	2	**653**
2003	Wild	5	218	118	21	94	425	52	223	445	46	11	**1,658**
	Hatchery	1	105	46	40	38	248	4	14	37	1	25	**559**
2004	Wild	7	108	151	102	97	640	74	282	416	357	0	**2,234**
	Hatchery	1	33	30	55	61	335	13	30	12	9	5	**584**
2005	Wild	4	49	78	24	26	397	66	125	336	243	0	**1,348**
	Hatchery	4	36	28	15	20	310	4	15	17	14	7	**470**
2006	Wild	16	108	133	46	80	753	426	336	700	654	5	**3,257**
	Hatchery	6	32	27	18	32	200	9	7	3	4	13	**351**
Average	***Wild***	***7***	***74***	***123***	***19***	***41***	***336***	***78***	***153***	***239***	***132***	***1***	***1,204***
	Hatchery	***2***	***34***	***31***	***12***	***22***	***162***	***4***	***9***	***9***	***4***	***4***	***292***

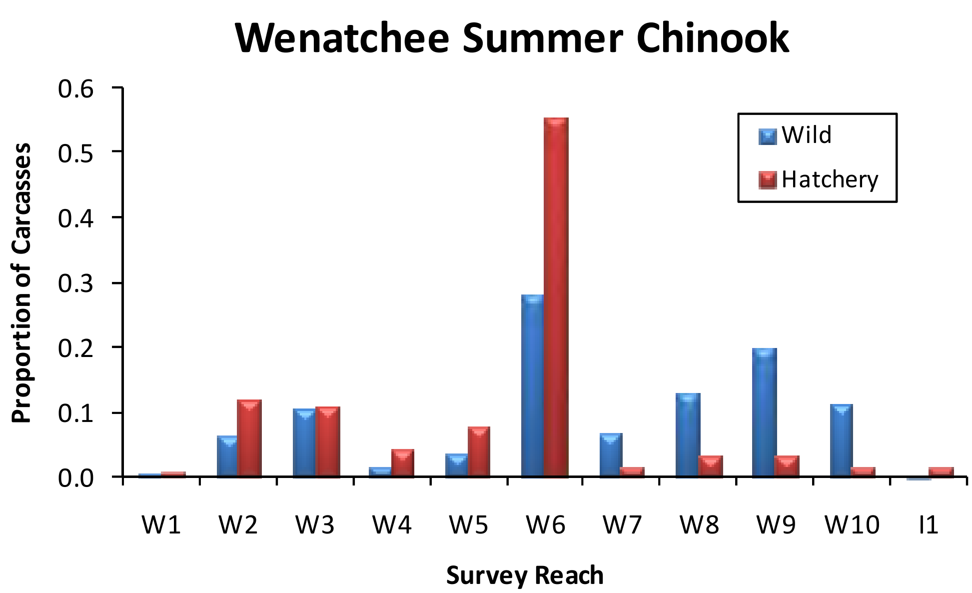


Figure 6.5. Distribution of wild and hatchery produced carcasses in different reaches in the Wenatchee Basin, 1993-2006. Reach codes are described in Table 2.10.

Sampling Rate

If escapement is based on total numbers of redds, then about 18% of the total spawning escapement of summer Chinook in the Wenatchee Basin was sampled in 2007 (Table 6.16). Sampling rates among survey reaches varied from 9 to 27%.

Table 6.16. Number of redds and carcasses, total spawning escapement, and sampling rates for summer Chinook in the Wenatchee Basin, 2007.

Sampling reach	Total number of redds	Total number of carcasses	Total spawning escapement	Sampling rate
Wenatchee 1	6	3	14	0.21
Wenatchee 2	49	15	114	0.13
Wenatchee 3	138	49	322	0.15
Wenatchee 4	39	9	91	0.10
Wenatchee 5	52	26	121	0.21
Wenatchee 6	933	475	2,174	0.22
Wenatchee 7	144	38	336	0.11
Wenatchee 8	82	39	191	0.20
Wenatchee 9	306	96	713	0.13
Wenatchee 10	208	91	485	0.19
Icicle Creek	13	3	30	0.10
Total	***1,970***	***844***	***4,590***	***0.18***

Length Data

Mean lengths (POH, cm) of male and female summer Chinook carcasses sampled during surveys in the Wenatchee Basin in 2007 are provided in Table 6.17. The average size of males and females sampled in the Wenatchee basin were 69 cm and 73 cm, respectively.

Table 6.17. Mean lengths (postorbital-to-hypural length; cm) and standard deviations (in parentheses) of male and female summer Chinook carcasses sampled in different streams/watersheds in the Wenatchee Basin, 2007.

Stream/watershed	Mean length (cm)	
	Male	Female
Wenatchee 1	74 (4)	-
Wenatchee 2	74 (7)	76 (5)
Wenatchee 3	75 (10)	75 (6)
Wenatchee 4	64 (15)	73 (5)
Wenatchee 5	72 (11)	71 (6)
Wenatchee 6	68 (11)	72 (6)
Wenatchee 7	72 (11)	75 (5)
Wenatchee 8	65 (15)	77 (5)
Wenatchee 9	73 (11)	75 (4)

Stream/watershed	Mean length (cm)	
	Male	Female
Wenatchee 10	69 (11)	75 (4)
Icicle Creek	-	-
Total	***69 (11)***	***73 (5)***

6.7 Life History Monitoring

Life history characteristics of Wenatchee summer Chinook were assessed by examining carcasses on spawning grounds and fish collected or examined at broodstock collection sites, and by reviewing tagging data and fisheries statistics.

Age at Maturity

Most of the wild and hatchery summer Chinook sampled during the period 1993-2006 in the Wenatchee Basin were age-5 fish (total age) (Table 6.18; Figure 6.6). A higher percentage of age-4 wild Chinook returned to the basin than did age-4 hatchery Chinook. In contrast, a higher proportion of age-6 hatchery fish returned than did age-6 wild fish. Thus, a higher percentage of hatchery fish returned at an older age than did wild fish.

Table 6.18. Proportions of wild and hatchery summer Chinook of different ages (total age) sampled on spawning grounds in the Wenatchee Basin, 1993-2006.

Sample year	Origin	Total age						Sample size
		2	3	4	5	6	7	
1993	Wild	0.00	0.03	0.42	0.55	0.00	0.00	1,224
	Hatchery	0.00	0.03	0.91	0.06	0.00	0.00	69
1994	Wild	0.01	0.03	0.44	0.52	0.00	0.00	257
	Hatchery	0.00	0.00	0.12	0.88	0.00	0.00	25
1995	Wild	0.00	0.03	0.19	0.74	0.05	0.00	216
	Hatchery	0.00	0.00	0.00	0.05	0.95	0.00	22
1996	Wild	0.00	0.02	0.36	0.60	0.02	0.00	513
	Hatchery	0.00	0.00	0.45	0.18	0.27	0.09	22
1997	Wild	0.00	0.01	0.38	0.57	0.03	0.00	562
	Hatchery	0.00	0.05	0.20	0.66	0.08	0.00	74
1998	Wild	0.00	0.03	0.34	0.62	0.01	0.00	1,041
	Hatchery	0.00	0.03	0.51	0.40	0.06	0.00	187
1999	Wild	0.00	0.01	0.43	0.55	0.01	0.00	1,087
	Hatchery	0.00	0.01	0.16	0.81	0.03	0.00	512
2000	Wild	0.01	0.04	0.27	0.68	0.00	0.00	1,182
	Hatchery	0.00	0.07	0.12	0.65	0.15	0.00	342
2001	Wild	0.00	0.08	0.59	0.32	0.01	0.00	653
	Hatchery	0.00	0.05	0.76	0.15	0.04	0.00	182

Sample year	Origin	Total age						Sample size
		2	3	4	5	6	7	
2002	Wild	0.00	0.03	0.66	0.31	0.00	0.00	1,747
	Hatchery	0.00	0.01	0.19	0.78	0.02	0.00	643
2003	Wild	0.00	0.02	0.34	0.64	0.00	0.00	1,649
	Hatchery	0.00	0.06	0.11	0.75	0.09	0.00	522
2004	Wild	0.00	0.06	0.13	0.80	0.01	0.00	2,234
	Hatchery	0.00	0.09	0.57	0.25	0.09	0.00	561
2005	Wild	0.00	0.04	0.60	0.32	0.04	0.00	1,186
	Hatchery	0.00	0.02	0.10	0.86	0.02	0.00	451
2006	Wild	0.00	0.01	0.15	0.84	0.01	0.00	2,972
	Hatchery	0.00	0.02	0.17	0.26	0.55	0.00	299
Average	***Wild***	***0.00***	***0.03***	***0.38***	***0.58***	***0.01***	***0.00***	***1,180***
	Hatchery	***0.00***	***0.03***	***0.31***	***0.48***	***0.17***	***0.00***	***279***

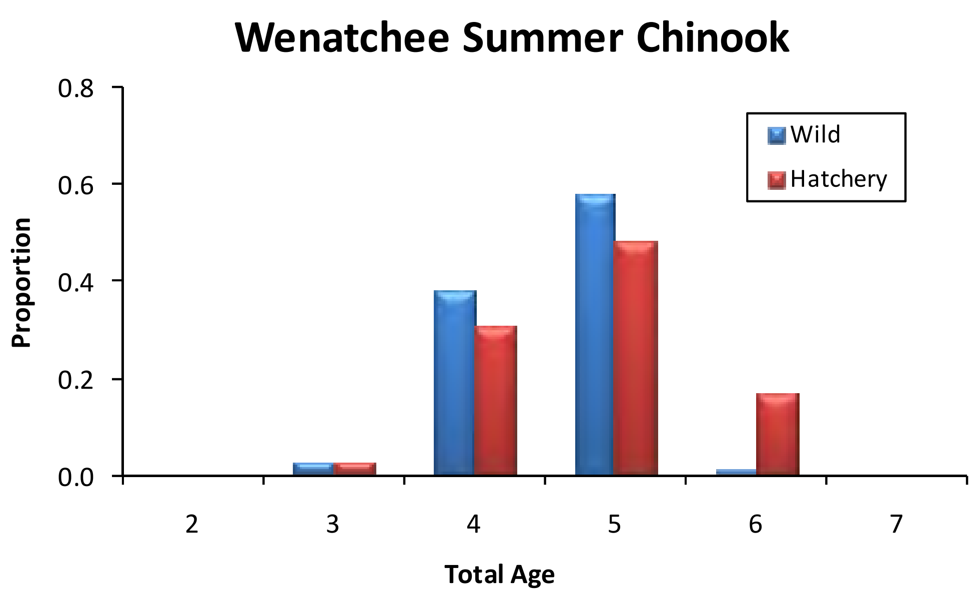


Figure 6.6. Proportions of wild and hatchery summer Chinook of different total ages sampled at broodstock collection sites and on spawning grounds in the Wenatchee Basin for the combined years 1993-2006.

Size at Maturity

On average, hatchery summer Chinook were about 5 cm smaller than wild summer Chinook sampled in the Wenatchee Basin (Table 6.19). This is interesting given that a slightly higher percentage of hatchery fish returned as age-5 and 6 fish than did wild fish. Future analyses will compare sizes of hatchery and wild fish of the same age groups and gender.

Table 6.19. Mean lengths (POH; cm) and variability statistics for wild and hatchery summer Chinook sampled in the Wenatchee Basin, 1993-2006; SD = 1 standard deviation.

Sample year	Origin	Sample size	Summer Chinook length (POH; cm)			
			Mean	SD	Minimum	Maximum
1993	Wild	1,344	73	8	33	94
	Hatchery	68	61	9	37	83
1994	Wild	276	73	8	31	89
	Hatchery	25	70	8	54	85
1995	Wild	225	75	7	48	87
	Hatchery	23	74	7	57	85
1996	Wild	210	74	7	43	92
	Hatchery	9	66	12	52	84
1997	Wild	615	74	8	29	99
	Hatchery	78	69	10	29	83
1998	Wild	1,179	73	8	28	97
	Hatchery	188	67	10	37	87
1999	Wild	1,218	72	8	29	95
	Hatchery	518	71	8	26	94
2000	Wild	1,302	71	10	24	94
	Hatchery	369	69	11	33	91
2001	Wild	730	70	9	30	93
	Hatchery	179	63	10	28	86
2002	Wild	1,914	72	8	39	94
	Hatchery	653	71	8	34	95
2003	Wild	1,950	74	9	24	105
	Hatchery	546	69	10	26	97
2004	Wild	2,571	72	9	32	98
	Hatchery	580	59	11	25	91
2005	Wild	1,352	69	7	41	92
	Hatchery	469	69	8	39	91
2006	Wild	3,249	74	6	29	99
	Hatchery	350	71	9	35	90
Pooled	***Wild***	***18,135***	***73***	***8***	***24***	***105***
	Hatchery	***4,055***	***68***	***10***	***25***	***97***

Contribution to Fisheries

Most of the harvest on Wenatchee summer Chinook occurred in the ocean (Table 6.20). Ocean harvest has made up 50% to 100% of all Wenatchee summer Chinook harvested. Total harvest on early brood years (1990-1993) was much lower than for later brood years (1997-2000).

Table 6.20. Estimated number and percent (in parentheses) of Wenatchee summer Chinook captured in different fisheries.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational (sport)	
1989	1,461 (50)	1,292 (44)	140 (5)	20 (1)	2,913
1990	30 (100)	0 (0)	0 (0)	0 (0)	30
1991	30 (63)	0 (0)	0 (0)	18 (38)	48
1992	144 (79)	39 (21)	0 (0)	0 (0)	183
1993	44 (64)	25 (36)	0 (0)	0 (0)	69
1994	626 (91)	57 (8)	7 (1)	0 (0)	690
1995	507 (97)	3 (1)	11 (2)	0 (0)	521
1996	179 (95)	0 (0)	3 (2)	6 (3)	188
1997	2,913 (94)	37 (1)	31 (1)	106 (3)	3,087
1998	4,947 (93)	5 (0)	96 (2)	280 (5)	5,340
1999	1,606 (86)	5 (0)	158 (8)	100 (5)	1,869
2000	7,869 (79)	10 (0)	976 (10)	1,117 (11)	9,972
2001	993 (71)	1 (0)	160 (11)	251 (18)	1,405

Straying

Stray rates were determined by examining CWTs recovered on spawning grounds within and outside the Wenatchee Basin. Targets for strays based on return year (recovery year) and brood year should be less than 5%.

On average, rates of Wenatchee summer Chinook straying into basins outside the Wenatchee have been low (Table 6.21). Although Wenatchee summer Chinook have strayed into other spawning areas, straying has generally been less than 5%. In three different years, Wenatchee strays have made up more than 5% of the spawning escapement in the Methow Basin and the Chelan tailrace. They made up more than 5% of the spawning escapement in the Entiat Basin in one year.

Table 6.21. Number and percent of spawning escapements within other non-target basins that consisted of Wenatchee summer Chinook, return years 1994-2004. For example, for return year 2000, 3% of the summer Chinook escapement in the Methow Basin consisted of Wenatchee summer Chinook. Percent strays should be less than 5%.

Return year	Methow		Okanogan		Chelan		Entiat		Hanford Reach	
	Number	%	Number	%	Number	%	Number	%	Number	%
1994	0	0.0	75	1.9	-	-	-	-	-	-
1995	0	0.0	0	0.0	-	-	-	-	-	-
1996	0	0.0	0	0.0	-	-	-	-	-	-
1997	0	0.0	0	0.0	-	-	-	-	-	-
1998	35	5.2	0	0.0	0	0.0	0	0.0	0	0.0
1999	23	2.3	3	0.1	0	0.0	0	0.0	23	0.1

Return year	Methow		Okanogan		Chelan		Entiat		Hanford Reach	
	Number	%	Number	%	Number	%	Number	%	Number	%
2000	36	3.0	13	0.4	0	0.0	0	0.0	0	0.0
2001	163	5.9	57	0.5	30	3.0	0	0.0	0	0.0
2002	153	3.3	53	0.4	40	6.9	74	14.8	0	0.0
2003	80	2.0	24	0.7	44	10.5	0	0.0	26	0.0
2004	113	5.1	42	0.6	30	7.1	0	0.0	0	0.0
Total	***603***	***3.0***	***267***	***0.5***	***144***	***4.4***	***74***	***3.2***	***49***	***0.0***

On average, about 9.8% of the returns have strayed into non-target spawning areas, exceeding the target of 5% (Table 6.22). Depending on brood year, percent strays into non-target spawning areas have ranged from 0-23.7%. In addition, on average, about 7% have strayed into non-target hatchery programs.

Table 6.22. Number and percent of Wenatchee summer Chinook that homed to target spawning areas and the target hatchery program, and number and percent that strayed to non-target spawning areas and non-target hatchery programs, by brood years 1989-2001. Percent stays should be less than 5%.

Brood year	Homing				Straying			
	Target stream		Target hatchery		Non-target streams		Non-target hatcheries	
	Number	%	Number	%	Number	%	Number	%
1989	1,352	62.9	60	2.8	75	3.5	662	30.8
1990	74	84.1	1	1.1	0	0.0	13	14.8
1991	14	60.9	1	4.3	0	0.0	8	34.8
1992	375	84.8	7	1.6	0	0.0	60	13.6
1993	67	72.8	9	9.8	4	4.3	12	13.0
1994	890	71.8	205	16.5	56	4.5	88	7.1
1995	748	74.8	139	13.9	42	4.2	71	7.1
1996	261	70.4	42	11.3	53	14.3	15	4.0
1997	3,609	85.8	171	4.1	389	9.2	38	0.9
1998	1,790	82.0	11	0.5	317	14.5	64	2.9
1999	502	81.0	0	0.0	110	17.7	8	1.3
2000	1,898	82.9	0	0.0	357	15.6	35	1.5
2001	184	75.1	0	0.0	58	23.7	3	1.2
Total	***11,764***	***78.7***	***646***	***4.3***	***1,461***	***9.8***	***1,077***	***7.2***

Genetics

Tissue (operculum) samples were collected from 144 wild and 144 hatchery summer Chinook in the Wenatchee basin in 2006. Results from these samples should be available in 2008.

Proportion of Natural Influence

Another method for assessing the genetic risk of a supplementation program is to determine the influence of the hatchery and natural environments on the adaptation of the composite population. This is estimated by the proportion of natural origin fish in the hatchery broodstock (pNOB) and the proportion of hatchery origin fish in the natural spawning escapement (pHOS). The ratio pNOB/(pHOS+pNOB) is the Proportion of Natural Influence (PNI). The larger the ratio (PNI), the greater the strength of selection in the natural environment relative to that of the hatchery environment. In order for the natural environment to dominate selection, PNI should be greater than 0.5 (HSRG/WDFW/NWIFC 2004).

For brood years 1989-2005, the PNI was equal to or greater than 0.6 (Table 6.23). This indicates that the natural environment has a greater influence on adaptation of Wenatchee summer Chinook than does the hatchery environment.

Table 6.23. Proportionate natural influence (PNI) of the Wenatchee summer Chinook supplementation program for brood years 1989-2005. PNI was calculated as the proportion of naturally produced Chinook in the hatchery broodstock (pNOB) divided by the proportion of hatchery Chinook on the spawning grounds (pHOS) plus pNOB. NOS = number of natural origin Chinook on the spawning grounds; HOS = number of hatchery origin Chinook on the spawning grounds; NOB = number of natural origin Chinook collected for broodstock; and HOB = number of hatchery origin Chinook included in hatchery broodstock.

Brood year	Spawners			Broodstock			PNI
	NOS	HOS	pHOS	NOB	HOB	pNOB	
1989	11,325	0	0.00	290	0	1.00	1.00
1990	8,677	0	0.00	61	0	1.00	1.00
1991	8,066	0	0.00	104	0	1.00	1.00
1992	9,312	0	0.00	274	0	1.00	1.00
1993	7,076	393	0.05	406	44	0.90	0.95
1994	7,296	709	0.09	333	54	0.86	0.91
1995	5,607	571	0.09	363	16	0.96	0.91
1996	4,687	192	0.04	263	3	0.99	0.96
1997	4,216	503	0.11	205	13	0.94	0.90
1998	3,451	533	0.13	299	78	0.79	0.86
1999	3,019	1,357	0.31	242	236	0.51	0.62
2000	3,450	998	0.22	275	180	0.60	0.73
2001	7,303	1,839	0.20	210	136	0.61	0.75
2002	9,136	3,328	0.27	409	10	0.98	0.78
2003	7,601	2,094	0.22	337	7	0.98	0.82
2004	6,442	1,651	0.20	424	2	1.00	0.83
2005	6,060	2,125	0.26	397	3	0.99	0.79

Natural Replacement Rates

Natural replacement rates (NRR) were calculated as the ratio of natural origin recruits (NOR) to the parent spawning population. For brood years 1989-2000, NRR for summer Chinook in the

Wenatchee averaged 0.89 (range, 0.39-3.01) if harvested fish were not include in the estimate and 2.15 (range, 0.63-10.65) if harvested fish were included in the estimate (Table 6.24). NRRs for more recent brood years will be calculated as soon as all tag recoveries and sampling rates have been loaded into the database.

Table 6.24. Spawning escapements, natural origin recruits (NOR), and natural replacement rates (NRR; with and without harvest) for wild summer Chinook in the Wenatchee basin, 1989-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating summer Chinook NORs and NRRs.)*

Brood year	Spawning escapement	Harvest not included		Harvest included	
		NOR	NRR	NOR	NRR
1989	11,325	8,995	0.79	15,645	1.38
1990	8,677	8,063	0.93	11,688	1.35
1991	8,066	4,487	0.56	7,112	0.88
1992	9,312	4,601	0.49	6,726	0.72
1993	7,469	4,102	0.55	5,346	0.72
1994	8,006	3,151	0.39	5,051	0.63
1995	6,178	4,025	0.65	8,010	1.30
1996	4,879	3,406	0.70	9,194	1.88
1997	4,719	7,526	1.59	23,626	5.01
1998	3,984	12,009	3.01	42,431	10.65
1999	4,376	8,732	2.00	30,580	6.99
2000	4,388	3,118	0.71	9,593	2.19
Average	***6,782***	***6,018***	***0.89***	***14,584***	***2.15***

Hatchery Replacement Rates

Hatchery replacement rates were estimated as hatchery adult-to-adult returns. These rates should be greater than the NRRs and greater than or equal to 5.30 (the value in BAMP; Murdoch and Peven 2005). HRRs exceeded NRRs in 8 or 9 of the 12 years of data, depending on if harvest was or was not included in the estimate (Table 6.25). Hatchery replacement rates (harvest included in the estimate) for Wenatchee summer Chinook have exceeded the BAMP target of 5.30 in 2 or 5 of the 12 years of data depending on if harvest was or was not included in the estimate (Table 6.25).

Table 6.25. Hatchery replacement rates (HRR), NRR, and BAMP target (5.30) for summer Chinook in the Wenatchee basin, 1989-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating summer Chinook HRRs and NRRs.)*

Brood year	Harvest not included			Harvest included		
	HRR	NRR	BAMP	HRR	NRR	BAMP
1989	6.21	0.79	5.30	14.62	1.38	5.30
1990	1.01	0.93	5.30	1.36	1.35	5.30
1991	0.18	0.56	5.30	0.55	0.88	5.30
1992	1.32	0.49	5.30	1.87	0.72	5.30
1993	0.19	0.55	5.30	0.33	0.72	5.30
1994	3.48	0.39	5.30	5.52	0.63	5.30
1995	2.49	0.65	5.30	3.78	1.30	5.30
1996	1.11	0.70	5.30	1.67	1.88	5.30
1997	17.53	1.59	5.30	30.39	5.01	5.30
1998	4.60	3.01	5.30	15.87	10.65	5.30
1999	1.22	2.00	5.30	4.88	6.99	5.30
2000	4.65	0.71	5.30	24.87	2.19	5.30
Average	***3.51***	***0.89***	***5.30***	***9.41***	***2.15***	***5.30***

Smolt-to-Adult Survivals

Smolt-to-adult survival ratios (SARs) were calculated as the number of hatchery adults divided by the number of hatchery smolts released. SARs were based on CWT returns. For the available brood years, SARs have ranged from 0.00037 to 0.01669 for hatchery summer Chinook in the Wenatchee basin (Table 6.26).

Table 6.26. Smolt-to-adult ratios (SARs) for Wenatchee hatchery summer Chinook.

Brood year	Number of smolts released	Estimated adult captures	SAR
1989	144,905	1,017	0.00702
1990	119,214	115	0.00096
1991	190,371	71	0.00037
1992	605,055	610	0.00101
1993	210,626	161	0.00076
1994	452,340	1,904	0.00421
1995	668,409	1,488	0.00223
1996	585,590	551	0.00094
1997	434,645	7,256	0.01669
1998	641,109	7,449	0.01162
1999	988,328	2,466	0.00250
2000	903,368	11,960	0.01324

Brood year	Number of smolts released	Estimated adult captures	SAR
2001	596,618	1,643	0.00275
Average	***503,121***	***2,822***	***0.00561***

6.8 ESA/HCP Compliance

Broodstock Collection

Per the 2005 broodstock collection protocol, 492 natural origin (adipose fin present) adults were targeted for collection at Dryden and Tumwater dams. Because of inventory errors during collection, the actual 2005 collection totaled 494 summer Chinook. Collection at Dryden Dam began 5 June 2005 and concluded 15 August 2005 and accounted for the entire 2005 BY broodstock collection.

Summer Chinook and steelhead broodstock collections occurred concurrently at Dryden Dam; therefore, steelhead and spring Chinook encounters at Dryden Dam during Wenatchee summer Chinook broodstock collection were attributable to steelhead broodstock collections authorized under ESA Permit 1395 take authorizations. No steelhead or spring Chinook takes were associated with the Wenatchee summer Chinook collection.

Consistent with impact minimization measures in ESA Permit 1347, all ESA-listed species handled during summer Chinook broodstock collection were subject to water-to-water transfers or anesthetized if removed from water during handling.

Hatchery Rearing and Release

The 2005 Wenatchee summer Chinook program released an estimated 664,182 smolts, representing 74.6% of the 864,000 programmed production and was compliant with the maximum production levels identified in ESA Section 10 Permit 1347.

Hatchery Effluent Monitoring

Per ESA Permits 1196, 1347, and 1395, permit holders shall monitor and report hatchery effluents in compliance with applicable National Pollution Discharge Elimination Systems (NPDES) (EPA 1999) permit limitations. There were no NPDES violations reported at Chelan PUD Hatchery facilities during the period 1 January 2007 through 31 December 2007. NPDES monitoring and reporting for Chelan PUD Hatchery Programs during 2007 are provided in Appendix E.

Smolt and Emigrant Trapping

ESA-listed spring Chinook and steelhead were encountered during operation of the Lower Wenatchee Trap. ESA takes are reported in the steelhead (Section 3.8) and spring Chinook (Section 5.8) sections and are not repeated here.

Spawning Surveys

Summer Chinook spawning ground surveys conducted in the Wenatchee Basin during 2007 were consistent with ESA Section 10 Permit No. 1347. Because of the difficulty of quantifying the level of take associated with spawning ground surveys, the Permit does not specify a take level associated with these activities, even though it does authorize implementation of spawning ground surveys. Therefore, no take levels are reported. However, to minimize potential impacts to established redds, wading was restricted to the extent practical, and extreme caution was used to avoid established redds when wading was required.

SECTION 7: METHOW SUMMER CHINOOK

7.1 Broodstock Sampling

This section focuses on results from sampling 2005-2006 Methow summer Chinook broodstock, which were collected in the East Ladder of Wells Dam. Summer Chinook adults collected at Wells Dam are also used in the Okanogan/Similkameen supplementation program. Complete information is not currently available for the 2007 return (this information will be provided in the 2008 annual report).

Origin of Broodstock

Both 2005 and 2006 broodstock consisted almost entirely of natural origin (adipose fin present) summer Chinook (Table 7.1). These fish were used for both the Methow and Okanogan supplementation programs. Less than 2% of the fish spawned were hatchery origin fish (hatchery origin was determined by examination of scales and CWTs).

Table 7.1. Numbers of wild and hatchery summer Chinook collected for broodstock, numbers that died before spawning, and numbers of Chinook spawned for the Methow/Okanogan programs, 1989-2006. Unknown origin fish (i.e., undetermined by scale analysis, no CWT or fin clips, and no additional hatchery marks) were considered naturally produced. Mortality includes fish that died of natural causes typically near the end of spawning and were not needed for the program and surplus fish killed at spawning.

Brood year	Wild summer Chinook					Hatchery summer Chinook					Total number spawned
	Number collected	Prespawn loss	Mortality	Number spawned	Number released	Number collected	Prespawn loss	Mortality	Number spawned	Number released	
1989[a]	1,419	72	-	1,297	-	341	17	-	312	-	1,609
1990[a]	864	34	-	828	-	214	8	-	206	-	1,034
1991[a]	1,003	59	-	924	-	341	20	-	314	-	1,238
1992[a]	312	6	-	297	-	428	9	-	406	-	703
1993[a]	813	48	-	681	-	464	28	-	388	-	1,069
1994	385	33	11	341	12	266	15	7	244	1	585
1995	254	13	10	173	58	351	28	9	240	74	413
1996	316	15	11	290	0	234	2	9	223	0	513
1997	214	11	5	198	0	308	24	20	264	0	462
1998	239	28	58	153	0	348	18	119	211	0	364
1999	248	5	19	224	0	307	2	16	289	0	513
2000	184	15	5	164	0	373	17	17	339	0	503
2001	135	8	36	91	0	423	29	128	266	0	357
2002	270	2	21	247	0	285	11	33	241	0	488
2003	449	14	53	381	0	112	2	9	101	0	482
2004	541	23	12	506	0	17	0	1	16	0	522
2005	551	29	76	391	55	12	2	0	9	1	400
2006	579	50	10	500	19	12	2	0	10	0	510
Average[b]	***336***	***19***	***25***	***281***	***11***	***234***	***12***	***28***	***189***	***6***	***470***

[a] Number of fish spawned and collected during these years included fish retained from the right- and left-bank ladder traps at Wells Dam and fish collected from the volunteer channel. There was no distinction made between fish collected at trap locations and program (i.e., aggregated population used for Wells, Methow, and Okanogan summer Chinook programs).

[b] Because of bias from aggregating the spawning population from 1989-1993, averages are based on adult numbers collected from 1994-2006.

Age/Length Data

Ages of summer Chinook broodstock were determined from analysis of scales and/or CWTs. Broodstock collected from the 2005 return consisted primarily of age-4 natural origin Chinook (70%). Age-4 natural origin fish made up 17% of the broodstock, while age-5 and 6 fish collectively made up 13% (Table 7.2). The three hatchery Chinook included in the broodstock were age-5 fish. Note that according to broodstock protocol, age-3 males are limited to no more than 10% of the total broodstock collection.

Broodstock collected from the 2006 return consisted primarily of age-4 and age-5 natural origin Chinook (92%). Age-2, 3, and 6 natural origin fish collectively made up 6% of the broodstock (Table 7.2). The six hatchery Chinook included in the broodstock were age-5 fish.

Table 7.2. Percent of hatchery and wild summer Chinook of different ages (total age) collected from broodstock for the Methow/Okanogan programs, 1991-2006.

Return Year	Origin	Total age				
		2	3	4	5	6
1991	Wild	0.5	6.8	35.1	55.4	2.2
	Hatchery	0.5	5.1	36.2	49.0	9.2
1992	Wild	0.0	13.1	36.2	50.7	0.0
	Hatchery	0.0	0.0	0.0	0.0	0.0
1993	Wild	0.0	3.9	75.3	20.8	0.0
	Hatchery	0.0	1.0	85.9	13.1	0.0
1994	Wild	3.1	9.7	26.3	60.3	0.6
	Hatchery	0.0	14.7	11.3	74.0	0.0
1995	Wild	0.0	4.6	15.2	75.6	4.6
	Hatchery	0.0	0.4	13.0	25.6	61.0
1996	Wild	0.0	8.4	56.6	30.4	4.6
	Hatchery	0.0	3.0	31.0	47.0	19.0
1997	Wild	1.0	9.3	52.9	34.8	2.0
	Hatchery	0.0	20.7	10.8	62.0	6.5
1998	Wild	2.0	14.1	54.8	29.1	0.0
	Hatchery	2.3	18.5	56.6	15.9	6.7
1999	Wild	4.7	5.1	53.7	36.0	0.5
	Hatchery	0.3	3.6	28.0	66.1	2.0
2000	Wild	0.6	14.0	28.7	56.1	0.6
	Hatchery	0.0	27.0	14.3	54.3	4.3
2001	Wild	7.1	26.0	52.0	11.8	3.1
	Hatchery	0.3	19.8	68.1	9.5	2.3
2002	Wild	0.4	17.4	66.0	16.2	0.0
	Hatchery	0.0	2.4	39.4	58.2	0.0

Return Year	Origin	Total age				
		2	3	4	5	6
2003	Wild	0.7	3.9	65.9	29.5	0.0
	Hatchery	0.9	5.6	18.5	69.4	5.6
2004	Wild	0.8	15.3	11.6	72.1	0.2
	Hatchery	0.0	6.7	53.3	33.3	6.7
2005	Wild	0.0	17.2	69.9	11.0	1.9
	Hatchery	0.0	1.0	40.0	50.0	0.0
2006	Wild	1.6	3.0	41.0	52.9	1.5
	Hatchery	0.0	16.7	25.0	50.0	8.3
Average	***Wild***	***1.4***	***10.7***	***46.3***	***40.2***	***1.4***
	Hatchery	***0.3***	***9.7***	***35.4***	***45.2***	***8.8***

Mean lengths of natural origin summer Chinook of a given age differed little between 2005 and 2006 (Table 7.3). For all age groups, mean lengths of natural origin adults were larger than hatchery origin fish of the same age (Table 7.3). These differences may be related to the small sample size of hatchery origin fish (i.e., few hatchery fish were included in the broodstock).

Table 7.3. Mean fork length (cm) at age (total age) of hatchery and wild Methow/Okanogan summer Chinook collected from broodstock for the Methow/Okanogan programs, 1991-2006; N = sample size and SD = 1 standard deviation.

Return year	Origin	Summer Chinook fork length (cm)														
		Age-2			Age-3			Age-4			Age-5			Age-6		
		Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD
1991	Wild	47	1	-	68	15	6	82	78	10	94	123	8	97	5	5
	Hatchery	47	1	-	49	10	6	78	71	5	91	96	8	96	18	6
1992	Wild	-	0	-	55	9	5	69	25	6	78	35	6	-	0	-
	Hatchery	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-
1993	Wild	-	0	-	72	3	4	86	58	7	98	16	5	-	0	-
	Hatchery	-	0	-	42	1	-	76	85	8	88	13	6	-	0	-
1994	Wild	42	10	6	51	31	7	80	84	9	93	193	8	104	2	13
	Hatchery	-	0	-	49	38	5	76	29	7	88	191	7	-	0	-
1995	Wild	-	0	-	67	6	8	79	20	9	96	99	5	94	6	5
	Hatchery	-	0	-	52	1	-	73	32	9	89	63	9	95	150	8
1996	Wild	-	0	-	68	22	9	83	149	8	95	80	7	101	12	5
	Hatchery	-	0	-	52	7	10	77	72	7	90	109	8	100	44	7
1997	Wild	36	2	6	60	19	7	85	108	8	96	71	7	98	4	11
	Hatchery	-	0	-	45	63	5	71	33	9	92	189	7	97	20	7

Return year	Origin	Summer Chinook fork length (cm)														
		Age-2			Age-3			Age-4			Age-5			Age-6		
		Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD
1998	Wild	43	4	6	59	23	6	83	107	7	96	58	7	-	0	-
	Hatchery	42	8	7	50	64	6	74	190	8	92	54	8	98	23	5
1999	Wild	38	10	3	64	11	8	82	115	8	96	77	6	104	1	-
	Hatchery	37	1	-	53	11	9	75	92	7	91	204	6	98	6	5
2000	Wild	39	1	-	66	23	7	83	47	6	96	92	5	95	1	-
	Hatchery	-	0	-	54	100	7	78	53	8	93	201	6	99	16	6
2001	Wild	40	9	3	65	33	8	87	66	8	93	15	5	97	4	16
	Hatchery	44	1	-	51	79	7	78	271	8	93	38	7	102	9	5
2002	Wild	56	1	-	65	44	7	88	167	6	100	41	7	-	0	-
	Hatchery	-	0	-	45	6	5	76	100	7	95	148	5	-	0	-
2003	Wild	43	3	6	61	16	6	87	268	7	99	120	6	-	0	-
	Hatchery	49	1	-	55	6	9	73	20	8	91	75	7	102	6	9
2004	Wild	51	4	4	67	78	6	81	59	6	97	368	7	99	1	-
	Hatchery	-	0	-	52	1	-	70	8	5	97	5	8	109	1	-
2005	Wild	-	0	-	68	89	6	83	363	8	94	57	6	101	10	7
	Hatchery	-	0	-	55	1	-	70	4	4	89	5	4	-	0	-
2006	Wild	48	9	3	69	16	4	88	222	7	97	286	6	97	8	6
	Hatchery	-	0	-	52	2	0	80	3	3	88	6	7	94	1	-

Sex Ratios

Male summer Chinook in the 2005 broodstock made up about 66% of the adults collected, resulting in an overall male to female ratio of 1.93:1.00 (Table 7.4.). In 2006, males made up about 50% of the adults collected, resulting in an overall male to female ratio of 1.00:1.00 (Table 7.4). The ratio for the 2005 broodstock was larger than the assumed 1:1 ratio goal in the broodstock protocol; the ratio for the 2006 broodstock equaled the assumed 1:1 ratio.

Table 7.4. Numbers of male and female wild and hatchery summer Chinook collected for broodstock at Wells Dam for the Methow/Okanogan programs, 1991-2006. Ratios of males to females are also provided.

Return year	Number of wild summer Chinook			Number of hatchery summer Chinook			Total M/F ratio
	Males (M)	Females (F)	M/F	Males (M)	Females (F)	M/F	
1989[a]	752	667	1.13:1.00	181	160	1.13:1.00	1.13:1.00
1990[a]	381	482	0.79:1.00	95	120	0.79:1.00	0.79:1.00
1991[a]	443	559	0.79:1.00	151	191	0.79:1.00	0.79:1.00
1992[a]	349	318	1.10:1.00	38	35	1.09:1.00	1.10:1.00
1993[a]	513	300	1.71:1.00	293	171	1.71:1.00	1.71:1.00

Return year	Number of wild summer Chinook			Number of hatchery summer Chinook			Total M/F ratio
	Males (M)	Females (F)	M/F	Males (M)	Females (F)	M/F	
1994	205	180	1.14:1.00	165	101	1.63:1.00	1.32:1.00
1995	103	149	0.69:1.00	158	197	0.80:1.00	0.75:1.00
1996	178	138	1.29:1.00	132	102	1.29:1.00	1.29:1.00
1997	102	112	0.91:1.00	174	134	1.30:1.00	1.12:1.00
1998	130	109	1.19:1.00	263	85	3.09:1.00	2.03:1.00
1999	138	110	1.25:1.00	161	146	1.10:1.00	1.17:1.00
2000	82	102	0.80:1.00	243	130	1.87:1.00	1.40:1.00
2001	89	46	1.93:1.00	311	112	2.78:1.00	2.53:1.00
2002	166	104	1.60:1.00	149	136	1.10:1.00	1.31:1.00
2003	255	194	1.31:1.00	61	51	1.20:1.00	1.29:1.00
2004	263	278	0.95:1.00	12	5	2.40:1.00	0.97:1.00
2005	365	186	1.96:1.00	6	6	1.00:1.00	1.93:1.00
2006	287	292	0.98:1.00	9	3	3.00:1.00	1.00:1.00
Total[b]	***2,363***	***2,000***	***1.18:1.00***	***1,844***	***1,208***	***1.52:1.00***	***1.31:1.00***

[a] Numbers and male to female ratios were derived from the aggregate population collected at Wells Fish Hatchery volunteer channel and left- and right-ladder traps at Wells Dam.

[b] Total values were derived from 1994-2006 data to exclude aggregate population bias from 1989-1993 returns.

Fecundity

Fecundities for the 2005 and 2006 summer Chinook broodstock averaged 4,553 and 4,854 eggs per female, respectively (Table 7.5). These values are close to the overall average of 4,976 eggs per female. Mean observed fecundity for the 2005 and 2006 returns fell short of the expected fecundity of 5,000 eggs per female assumed in the broodstock protocol.

Table 7.5. Mean fecundity of wild, hatchery, and all female summer Chinook collected for broodstock at Wells Dam for the Methow/Okanogan programs, 1989-2006; NA = not available.

Return year	Mean fecundity		
	Wild	Hatchery	Total
1989*	NA	NA	4,750
1990*	NA	NA	4,838
1991*	NA	NA	4,819
1992*	NA	NA	4,804
1993*	NA	NA	4,849
1994*	NA	NA	5,907
1995*	NA	NA	4,930
1996*	NA	NA	4,870
1997	5,166	5,296	5,237
1998	5,043	4,595	4,833
1999	4,897	4,923	4,912

Return year	Mean fecundity		
	Wild	Hatchery	Total
2000	5,122	5,206	5,170
2001	5,040	4,608	4,735
2002	5,306	5,258	5,279
2003	5,090	4,941	5,059
2004	5,130	5,118	5,130
2005	4,545	4,889	4,553
2006	4,854	4,824	4,854
Average	***5,019***	***4,966***	***4,976***

* Individual fecundities were not assigned to females until 1997 brood.

7.2 Hatchery Rearing

Rearing History

Number of eggs taken

Based on the unfertilized egg-to-release survival standard of 81%, a total of 493,827 eggs are needed to meet the program release goal of 400,000 smolts. Between 1989 and 2006, the egg take goal was reached in five of those years (Table 7.6).

Table 7.6. Numbers of eggs taken from summer Chinook broodstock collected at Wells Dam for the Methow/Okanogan programs, 1989-2006.

Return year	Number of eggs taken
1989	482,800
1990	464,097
1991	586,594
1992	486,260
1993	531,490
1994	595,390
1995	491,000
1996	448,000
1997	401,162
1998	389,346
1999	483,726
2000	403,268
2001	279,272
2002	466,530
2003	473,681
2004	537,210
2005	305,826

Return year	Number of eggs taken
2006	509,334
Average	***463,378***

Number of acclimation days

Rearing of the 2005 brood Methow summer Chinook was similar to previous years with fish being held on well water before being transferred to Carlton Pond for final acclimation on Methow River water in March 2007 (Table 7.7). Groups of the 1994 and 1995 broods were reared for longer durations at Methow FH on Methow River water.

Table 7.7. Number of days Methow summer Chinook were acclimated at Carlton Pond, brood years 1989-2005.

Brood year	Release year	Transfer date	Release date	Number of days
1989	1991	15-Mar	6-May	52
1990	1992	26-Feb	28-Apr	61
1991	1993	10-Mar	23-Apr	44
1992	1994	4-Mar	21-Apr	48
1993	1995	18-Mar	2-May	45
1994	1996	25-Sep	28-Apr	215
		19-Mar	28-Apr	40
1995	1997	22-Oct	8-Apr	168
		19-Mar	22-Apr	34
1996	1998	9-Mar	14-Apr	36
1997	1999	10-Mar	20-Apr	41
1998	2000	19-Mar	2-May	44
1999	2001	18-Mar	18-Apr	31
2000	2002	28-Mar	1-May	34
2001	2003	27-Mar	24-Apr	28
2002	2004	16-Mar	24-Apr	39
2003	2005	18-Mar	21-Apr	34
2004	2006	12-Mar	22-Apr	41
2005	2007	12-Mar	15-Apr – 8-May	34-57
Average				***57***

Release Information

Numbers released

The 2005 Methow summer Chinook program achieved 65.8% of the 400,000 target goal with about 263,273 fish being volitionally released between 15 April and 8 May 2007 (Table 7.8). The volitional release was terminated seven days short of the scheduled volitional release period and remaining fish were forced out of the acclimation site because of inundation of the acclimation site with flood waters, which backed-up into the facility through the out-fall channel.

Table 7.8. Numbers of Methow summer Chinook smolts released from the hatchery, brood years 1989-2005. The release target for Methow summer Chinook is 400,000 smolts.

Brood year	Release year	Number of smolts
1989	1991	420,000
1990	1992	391,650
1991	1993	540,900
1992	1994	402,641
1993	1995	433,375
1994	1996	406,560
1995	1997	353,182
1996	1998	298,844
1997	1999	384,909
1998	2000	205,269
1999	2001	424,363
2000	2002	336,762
2001	2003	248,595
2002	2004	399,975
2003	2005	354,699
2004	2006	400,579
2005	2007	263,723
Average		***368,590***

Numbers tagged

The 2005 brood Methow summer Chinook were 98.9% CWT and adipose fin-clipped, but were not PIT tagged.

Fish size and condition at release

Fish were volitionally released as yearling smolts in April 2007. Size at release of the acclimated population was 89.8% and 93.0% of the target fork length and weight goals, respectively (Table 7.9). This brood year exceeded the CV of length goal by 67%.

Table 7.9. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of Methow summer Chinook smolts released from the hatchery, brood years 1991-2005. Size targets are provided in the last row of the table.

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1991	1993	152	13.6	40.3	11
1992	1994	145	16.0	37.2	12
1993	1995	154	8.6	37.1	12
1994	1996	163	8.2	48.2	9
1995	1997	141	9.6	37.0	12

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1996	1998	199	13.1	105.1	4
1997	1999	153	7.6	39.5	12
1998	2000	164	8.7	51.7	9
1999	2001	153	9.3	41.5	11
2000	2002	170	10.2	54.2	8
2001	2003	167	7.4	52.7	9
2002	2004	148	13.1	35.7	13
2003	2005	148	10.1	35.5	13
2004	2006	142	9.8	31.1	15
2005	2007	158	15	42.2	11
Targets		***176***	***9.0***	***45.4***	***10***

Survival Estimates

Overall survival of the Methow summer Chinook from green (unfertilized) egg to release was above the standard set for the program (Table 7.10). Lower than anticipated survival at the fertilized to eyed-egg and eyed-egg to ponding stage prevented the program from exceeding those respective target survival rates. Currently it is unknown if gamete viability is gender biased or is uniform between sexes and more influenced by between-year environmental variations.

It is important to note that the Methow summer Chinook program typically receives progeny from the highest ELISA females, while the lowest titer progeny are reserved for the Okanogan program. The inability to effectively manage BKD at Similkameen Pond during the winter months precludes an even mix of progeny for a given brood year between the two programs.

Table 7.10. Hatchery life-stage survival rates (%) for Methow summer Chinook, brood years 1989-2005. Survival standards or targets are provided in the last row of the table.

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
1989[a]	89.8	99.5	89.9	96.7	99.7	99.4	73.3	98.5	63.7
1990[a]	93.9	99.0	84.9	97.1	81.2	80.6	97.7	99.5	80.5
1991[a]	93.1	95.5	88.2	98.0	99.4	99.1	97.5	99.6	84.2
1992[a]	96.9	99.0	87.8	98.0	99.9	99.9	90.9	98.3	78.2
1993[a]	82.2	99.4	85.4	97.6	99.8	99.5	92.0	99.4	76.7
1994	96.1	90.0	86.6	100.0	98.1	97.4	73.1	99.1	63.3
1995	91.9	96.2	98.2	84.1	96.5	96.2	92.7	89.6	76.6
1996	95.4	98.1	83.2	100.0	97.7	96.9	86.5	89.0	72.0
1997	91.9	94.6	86.1	98.4	98.7	98.3	98.8	99.7	83.7
1998	84.0	96.2	54.1	98.0	99.4	98.9	96.6	99.9	51.2
1999	98.8	98.7	92.9	96.9	98.0	97.6	96.9	99.9	87.2

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
2000	90.5	96.9	89.2	98.1	98.5	98.3	94.6	94.4	82.6
2001	96.2	92.3	89.1	97.6	97.2	97.1	97.5	99.8	84.8
2002	97.1	98.1	88.3	99.9	97.7	97.5	96.7	99.9	85.3
2003	96.7	97.5	82.8	98.2	99.7	99.2	93.7	99.9	76.2
2004	93.6	98.2	84.0	97.8	99.6	99.2	98.3	98.5	80.8
2005	97.0	89.6	88.0	95.5	99.6	98.9	96.6	99.9	84.6
Standard	***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

[a] Survival rates were calculated from aggregate population collected at Wells Fish Hatchery volunteer channel and left- and right-ladder traps at Wells Dam.

7.3 Disease Monitoring

No disease concerns were detected or observed in the 2004 brood. Progeny did receive a 4.5% Aqua-100 prophylactic treatment for BKD in July 2006. No Erythromycin toxicity was detected.

7.4 Spawning Surveys

Surveys for Methow summer Chinook redds were conducted from late September to mid-November, 2007, in the Methow River. Total redd counts (not peak counts) were conducted in the river (see Appendix J for more details).

Redd Counts

A total of 620 summer Chinook redds were counted in the Methow River in 2007 (Table 7.11). This was higher than the 19-year average of 586 redds.

Table 7.11. Total number of redds counted in the Methow River, 1989-2007.

Survey year	Total redd count
1989	167*
1990	409*
1991	153
1992	107
1993	154
1994	310
1995	357
1996	181
1997	205
1998	225
1999	448
2000	500
2001	675

Survey year	Total redd count
2002	2,013
2003	1,624
2004	973
2005	874
2006	1,353
2007	620
Average	***597***

* Total counts based on expanded aerial counts.

Redd Distribution

Summer Chinook redds were not evenly distributed among the seven reaches in the Methow River. Most redds (73%) were located in reaches downstream from the town of Twisp and in Reach 5 between Methow Valley Irrigation Diversion (MVID) and the Winthrop Bridge (Table 7.12; Figure 7.1). Few summer Chinook spawned upstream from the Winthrop Bridge in Reaches 6 and 7.

Table 7.12. Total number of summer Chinook redds counted in different reaches on the Methow River during September through early November, 2006. Reach codes are described in Table 2.11.

Survey reach	Total redd count	Percent
Methow 1	170	27
Methow 2	132	21
Methow 3	155	25
Methow 4	52	8
Methow 5	108	17
Methow 6	3	1
Methow 7	0	0
Totals	***620***	***100***

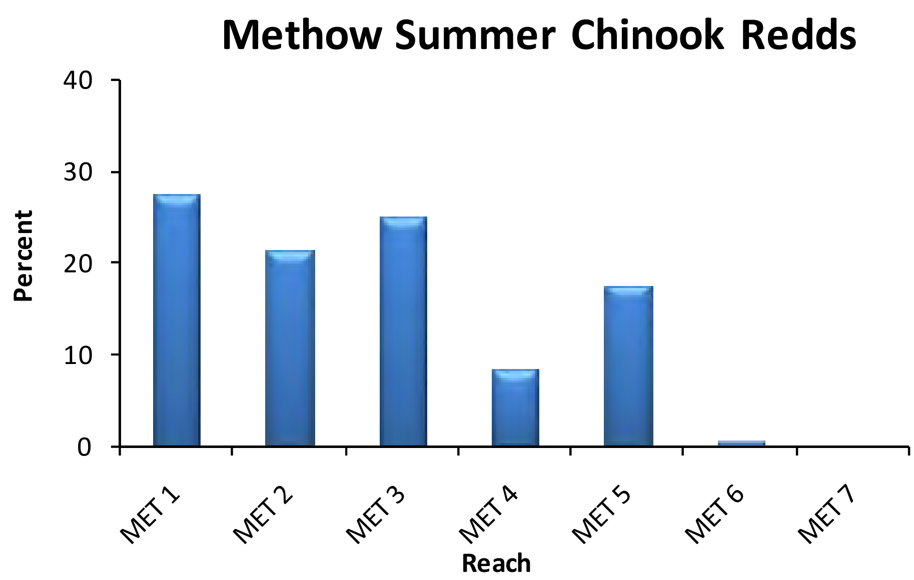


Figure 7.1. Percent of the total number of summer Chinook redds counted in different reaches on the Methow River during September through mid-November, 2007. Reach codes are described in Table 2.11.

Spawn Timing

Spawning in 2007 began the first week of October, peaked the second week of October, and ended after the first week of November (Figure 7.2). Stream temperatures in the Methow River, when spawning began, varied from 7-10°C. Peak spawning occurred in the upper reaches of the Methow River during the second week of October and in the lower reaches the following week. The temporal distribution of spawning activity in 2007 comported well with the 16-year average (Figure 7.2).

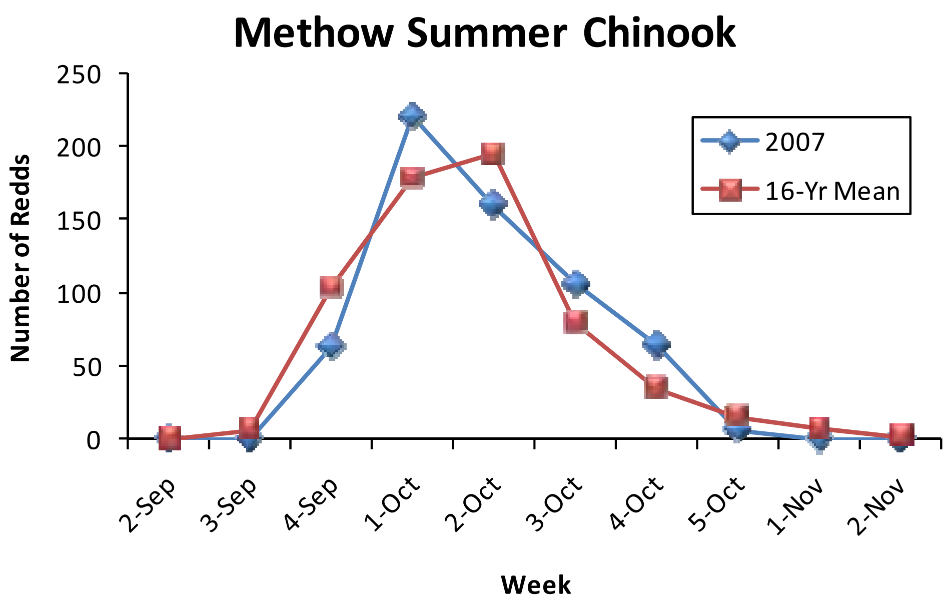


Figure 7.2. Comparison of the number of new summer Chinook redds counted during different weeks in the Methow River, September through mid-November 2007, to the 16-year average.

Spawning Escapement

Spawning escapement for Methow summer Chinook was calculated as the total number of redds times the fish per redd ratio estimated from fish sampled at Wells Dam. The estimated fish per redd ratio for Methow summer Chinook in 2007 was 2.20. Multiplying this ratio by the number of redds counted in the Methow River resulted in a total spawning escapement of 1,364 summer Chinook (Table 7.13).

Table 7.13. Spawning escapements for summer Chinook in the Methow River for return years 1989-2007.

Return year	Fish/Redd	Redds	Total spawning escapement
1989*	3.30	167	552
1990*	3.40	409	1,391
1991*	3.70	153	566
1992*	4.30	107	460
1993*	3.30	154	508
1994*	3.50	310	1,085
1995*	3.40	357	1,214
1996*	3.40	181	615
1997*	3.40	205	697
1998	3.00	225	675
1999	2.20	448	986
2000	2.40	500	1,200
2001	4.10	675	2,768

Return year	Fish/Redd	Redds	Total spawning escapement
2002	2.30	2,013	4,630
2003	2.42	1,624	3,930
2004	2.25	973	2,189
2005	2.93	874	2,561
2006	2.02	1,353	2,733
2007	2.20	620	1,364
Average	***3.03***	***597***	***1,585***

* Spawning escapement was calculated using the "Modified Meekin Method" (i.e., 3.1 x jack multiplier).

7.5 Carcass Surveys

Surveys for Methow summer Chinook carcasses were conducted during late September to mid-November, 2007, in the Methow River (see Appendix J for more details).

Number sampled

A total of 456 summer Chinook carcasses were sampled during September through mid-November in the Methow River (Table 7.14).

Table 7.14. Numbers of summer Chinook carcasses sampled within each survey reach on the Methow River, 1991-2007. Reach codes are described in Table 2.11.

Survey year	Number of summer Chinook carcasses							
	M-1	M-2	M-3	M-4	M-5	M-6	M-7	Total
1991	0	12	8	4	2	0	0	**26**
1992	8	8	19	0	17	1	0	**53**
1993	19	25	14	2	5	0	0	**65**
1994[a]	43	33	20	5	13	0	0	**114**
1995	14	33	58	7	7	0	0	**119**
1996	6	30	46	5	2	0	0	**89**
1997	6	12	38	2	19	1	0	**78**
1998	90	84	99	17	30	0	0	**320**
1999	47	144	232	32	37	12	2	**506**
2000	62	118	105	9	99	5	0	**398**
2001	392	275	88	14	76	11	1	**857**
2002	551	318	518	164	219	34	10	**1,814**
2003	115	383	317	115	128	5	0	**1,063**
2004	40	173	187	82	92	2	1	**577**
2005	154	173	182	42	112	3	0	**666**
2006	121	149	111	56	146	3	1	**587**
2007	135	131	108	27	55	0	0	**456**
Average	***106***	***124***	***126***	***34***	***62***	***5***	***1***	***346***

[a] An additional 113 carcasses were sampled, but reach was not identified.

Carcass Distribution and Origin

Summer Chinook carcasses were not evenly distributed among reaches within the Methow River in 2007 (Table 7.14; Figure 7.3). Most of the carcasses in the Methow River were found downstream from Twisp. The highest percentage of carcasses (30%) was sampled in Reach 1 downstream from the town of Methow.

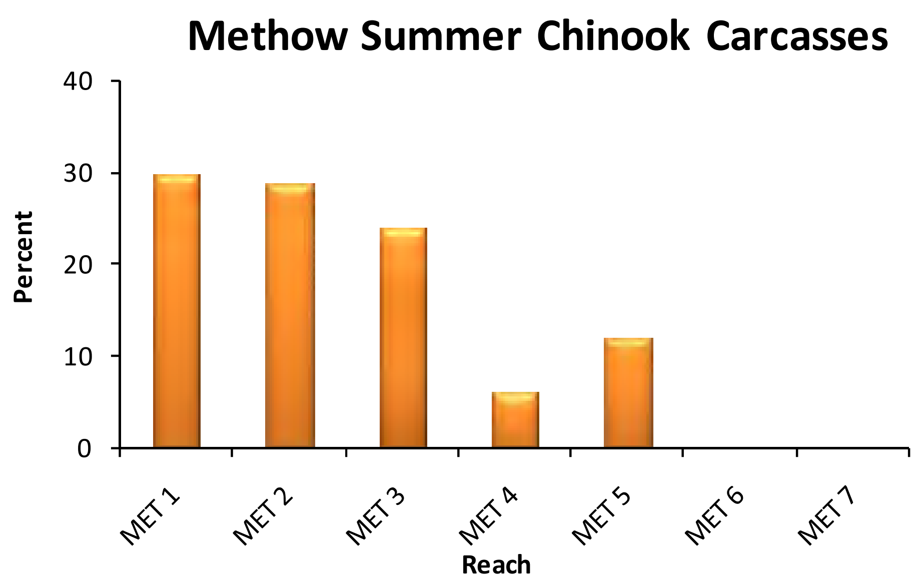


Figure 7.3. Percent of summer Chinook carcasses sampled within different reaches on the Methow River during September through mid-November, 2007. Reach codes are described in Table 2.11.

Numbers of wild and hatchery origin summer Chinook carcasses sampled in 2007 will be available after analysis of CWTs and scales. Based on the available data (1991-2006), hatchery and wild summer Chinook carcasses were not distributed equally among the reaches in the Methow River (Table 7.15). A larger percentage of hatchery carcasses occurred in the lower reaches, while a larger percentage of wild summer Chinook carcasses occurred in upstream reaches (Figure 7.4).

Table 7.15. Numbers of wild and hatchery summer Chinook carcasses sampled within different reaches on the Methow River, 1991-2006.

Survey year	Origin	Survey reach							Total
		M-1	M-2	M-3	M-4	M-5	M-6	M-7	
1991	Wild	0	12	8	4	2	0	0	**26**
	Hatchery	0	0	0	0	0	0	0	**0**
1992	Wild	8	8	19	0	17	1	0	**53**
	Hatchery	0	0	0	0	0	0	0	**0**
1993	Wild	11	15	9	0	3	0	0	**38**

Survey year	Origin	Survey reach							Total
		M-1	M-2	M-3	M-4	M-5	M-6	M-7	
	Hatchery	8	7	5	2	2	0	0	**24**
1994	Wild	21	17	8	4	9	0	0	**59**
	Hatchery	20	15	11	0	3	0	0	**49**
1995	Wild	6	9	27	7	5	0	0	**54**
	Hatchery	7	24	25	0	1	0	0	**57**
1996	Wild	1	20	29	4	2	0	0	**56**
	Hatchery	5	7	11	1	0	0	0	**24**
1997	Wild	5	5	28	1	17	0	0	**56**
	Hatchery	1	4	7	1	2	1	0	**16**
1998	Wild	41	46	70	9	23	0	0	**189**
	Hatchery	48	36	28	6	5	0	0	**123**
1999	Wild	27	79	110	14	17	4	2	**253**
	Hatchery	15	57	102	17	13	7	0	**211**
2000	Wild	23	78	74	7	72	3	0	**257**
	Hatchery	37	33	20	1	16	2	0	**109**
2001	Wild	49	102	54	9	66	11	1	**292**
	Hatchery	330	157	32	4	6	0	0	**529**
2002	Wild	124	163	362	129	183	34	9	**1,004**
	Hatchery	412	141	138	24	22	0	1	**738**
2003	Wild	33	123	176	63	85	3	0	**483**
	Hatchery	80	122	127	38	36	2	0	**405**
2004	Wild	14	108	144	61	73	1	0	**401**
	Hatchery	24	52	28	17	12	1	1	**135**
2005	Wild	62	99	133	33	107	3	0	**437**
	Hatchery	92	74	49	9	5	0	0	**229**
2006	Wild	68	103	83	49	131	3	1	**438**
	Hatchery	53	46	28	7	15	0	0	**149**
Average	***Wild***	***31***	***62***	***83***	***25***	***51***	***4***	***1***	***256***
	Hatchery	***71***	***48***	***38***	***8***	***9***	***1***	***0***	***175***

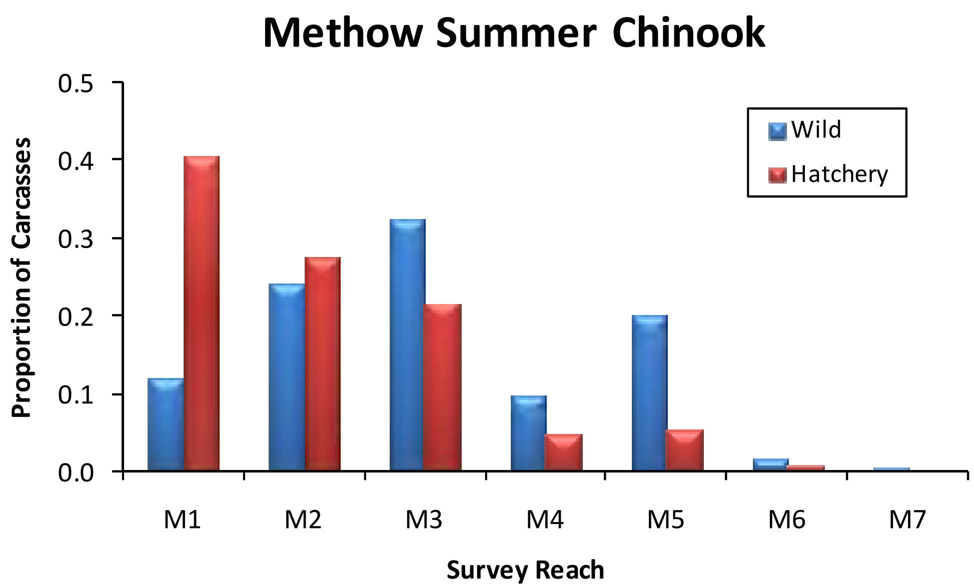


Figure 7.4. Distribution of wild and hatchery produced carcasses in different reaches on the Methow River, 1993-2006. Reach codes are described in Table 2.11.

Sampling Rate

Overall, 33% of the total spawning escapement of summer Chinook in the Methow Basin was sampled in 2007 (Table 7.16). Sampling rates among survey reaches varied from 0 to 45%.

Table 7.16. Number of redds and carcasses, total spawning escapement, and sampling rates for summer Chinook in the Methow Basin, 2007. Reach codes are described in Table 2.11.

Survey reach	Total number of redds	Total number of carcasses	Total spawning escapement	Sampling rate
Methow 1	170	135	374	0.36
Methow 2	132	131	290	0.45
Methow 3	155	108	341	0.32
Methow 4	52	27	114	0.24
Methow 5	108	55	238	0.23
Methow 6	3	0	7	0.00
Methow 7	0	0	0	-
Total	***620***	***456***	***1,364***	***0.33***

Length Data

Mean lengths (POH, cm) of male and female summer Chinook carcasses sampled during surveys on the Methow River in 2007 are provided in Table 7.17. The average size of males and females sampled in the Methow River were 67 cm and 72 cm, respectively.

Table 7.17. Mean lengths (postorbital-to-hypural length; cm) and standard deviations (in parentheses) of male and female summer Chinook carcasses sampled in different reaches on the Methow River, 2007. Reach codes are described in Table 2.11.

Stream/watershed	Mean length (cm)	
	Male	Female
Methow 1	66.7 (11.2)	70.1 (7.9)
Methow 2	66.7 (12.7)	72.4 (6.0)
Methow 3	68.0 (14.2)	73.2 (6.8)
Methow 4	66.5 (10.4)	73.1 (8.5)
Methow 5	71.9 (12.1)	74.0 (6.0)
Methow 6	-	-
Methow 7	-	-
Total	***67.4 (12.5)***	***72.1 (7.1)***

7.6 Life History Monitoring

Life history characteristics of Methow summer Chinook were assessed by examining carcasses on spawning grounds and fish collected or examined at broodstock collection sites, and by reviewing tagging data and fisheries statistics.

Age at Maturity

Most of the wild and hatchery summer Chinook sampled during the period 1993-2006 in the Methow River were age-4 and 5 fish (total age) (Table 7.18; Figure 7.5). A higher percentage of age-4 wild Chinook returned to the basin than did age-4 hatchery Chinook. In contrast, a higher proportion of age-5 and 6 hatchery fish returned than did age-5 and 6 wild fish. Thus, a higher percentage of hatchery fish returned at an older age than did wild fish.

Table 7.18. Proportions of wild and hatchery summer Chinook of different ages (total age) sampled on spawning grounds in the Methow River, 1993-2006.

Survey year	Origin	Total age						Sample size
		2	3	4	5	6	7	
1993	Wild	0.00	0.05	0.34	0.58	0.03	0.00	38
	Hatchery	0.00	0.00	1.00	0.00	0.00	0.00	20
1994	Wild	0.01	0.02	0.53	0.44	0.00	0.00	101
	Hatchery	0.00	0.00	0.07	0.93	0.00	0.00	111
1995	Wild	0.00	0.02	0.07	0.89	0.02	0.00	54
	Hatchery	0.00	0.02	0.04	0.43	0.52	0.00	56
1996	Wild	0.00	0.04	0.46	0.41	0.09	0.00	56
	Hatchery	0.00	0.00	0.04	0.48	0.43	0.04	23
1997	Wild	0.00	0.00	0.36	0.63	0.02	0.00	56
	Hatchery	0.00	0.13	0.06	0.56	0.25	0.00	16

Survey year	Origin	Total age						Sample size
		2	3	4	5	6	7	
1998	Wild	0.00	0.13	0.52	0.34	0.00	0.00	188
	Hatchery	0.00	0.02	0.52	0.42	0.03	0.00	123
1999	Wild	0.00	0.02	0.59	0.39	0.01	0.00	253
	Hatchery	0.00	0.00	0.07	0.90	0.03	0.00	209
2000	Wild	0.00	0.05	0.15	0.80	0.00	0.00	257
	Hatchery	0.00	0.10	0.22	0.57	0.11	0.00	97
2001	Wild	0.01	0.15	0.59	0.24	0.02	0.00	292
	Hatchery	0.00	0.11	0.60	0.26	0.04	0.00	528
2002	Wild	0.00	0.04	0.66	0.29	0.00	0.00	1,004
	Hatchery	0.00	0.01	0.41	0.57	0.01	0.00	733
2003	Wild	0.00	0.01	0.43	0.55	0.00	0.00	483
	Hatchery	0.00	0.02	0.07	0.88	0.03	0.00	394
2004	Wild	0.00	0.04	0.08	0.86	0.01	0.00	401
	Hatchery	0.00	0.08	0.29	0.30	0.33	0.00	134
2005	Wild	0.00	0.03	0.58	0.34	0.05	0.00	410
	Hatchery	0.00	0.08	0.30	0.61	0.01	0.00	220
2006	Wild	0.00	0.02	0.18	0.78	0.02	0.00	379
	Hatchery	0.00	0.00	0.22	0.48	0.29	0.00	129
Average	***Wild***	***0.00***	***0.04***	***0.45***	***0.49***	***0.01***	***0.00***	***3,972***
	Hatchery	***0.00***	***0.04***	***0.33***	***0.57***	***0.07***	***0.00***	***2,793***

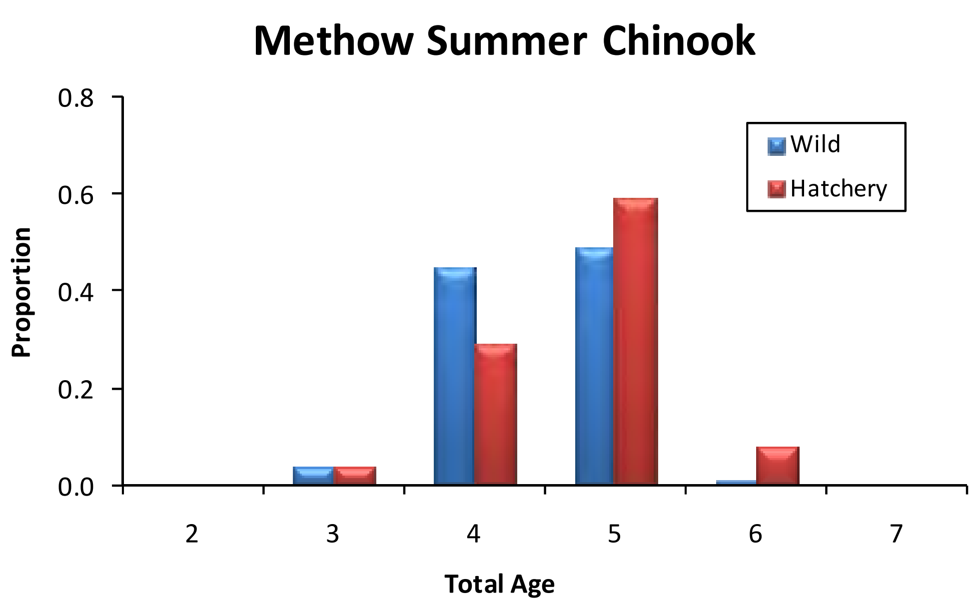


Figure 7.5. Proportions of wild and hatchery summer Chinook of different total ages sampled at broodstock collection sites and on spawning grounds in the Methow River for the combined years 1993-2006.

Size at Maturity

On average, hatchery summer Chinook were about 4 cm smaller than wild summer Chinook sampled in the Methow Basin (Table 7.19). This is interesting given that a slightly higher percentage of hatchery fish returned as age-5 and 6 fish than did wild fish. Future analyses will compare sizes of hatchery and wild fish of the same age groups and gender.

Table 7.19. Mean lengths (POH; cm) and variability statistics for wild and hatchery summer Chinook sampled in the Methow Basin, 1993-2006; SD = 1 standard deviation.

Survey year	Origin	Sample size	Summer Chinook length (POH; cm)			
			Mean	SD	Minimum	Maximum
1993	Wild	41	74	9	51	89
	Hatchery	24	62	8	36	80
1994	Wild	112	69	8	35	87
	Hatchery	114	67	5	43	77
1995	Wild	62	74	6	52	88
	Hatchery	57	73	7	46	85
1996	Wild	64	70	11	34	91
	Hatchery	23	72	7	58	85
1997	Wild	62	76	9	35	90
	Hatchery	16	68	15	33	87
1998	Wild	196	67	10	38	97
	Hatchery	123	63	10	37	87
1999	Wild	293	66	8	43	99
	Hatchery	211	66	7	26	89
2000	Wild	288	74	8	37	89
	Hatchery	109	68	12	24	87
2001	Wild	328	67	10	29	86
	Hatchery	529	63	10	31	87
2002	Wild	1,076	70	8	37	94
	Hatchery	738	67	9	33	87
2003	Wild	543	71	8	35	88
	Hatchery	405	69	8	35	89
2004	Wild	442	73	7	38	89
	Hatchery	135	65	12	34	85
2005	Wild	437	69	8	45	86
	Hatchery	229	64	9	36	79
2006	Wild	438	73	7	35	92
	Hatchery	149	69	8	38	91
Pooled	***Wild***	***4,382***	***71***	***8***	***29***	***99***
	Hatchery	***2,862***	***67***	***9***	***24***	***91***

Contribution to Fisheries

Most of the harvest on Methow summer Chinook occurred in the Ocean (Table 7.20). Ocean harvest has made up 13% to 98% of all Methow summer Chinook harvested. Brood years 1998 and 1998 provided the largest harvests, while brood year 1996 provided the lowest.

Table 7.20. Estimated number and percent (in parentheses) of Methow summer Chinook captured in different fisheries.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational (sport)	
1989	1,056 (53)	805 (40)	79 (4)	66 (3)	2,006
1990	60 (59)	37 (37)	4 (4)	0 (0)	101
1991	12 (20)	49 (80)	0 (0)	0 (0)	61
1992	17 (55)	14 (45)	0 (0)	0 (0)	31
1993	14 (58)	8 (33)	2 (8)	0 (0)	24
1994	139 (79)	32 (18)	3 (2)	1 (1)	175
1995	58 (98)	0 (0)	1 (2)	0 (0)	59
1996	11 (92)	1 (8)	0 (0)	0 (0)	12
1997	213 (88)	4 (2)	3 (1)	21 (9)	241
1998	1,773 (84)	0 (0)	102 (5)	234 (11)	2,118
1999	2 (13)	0 (0)	13 (87)	0 (0)	15
2000	375 (80)	0 (0)	65 (14)	27 (6)	467
2001	328 (62)	0 (0)	68 (13)	129 (25)	525

Straying

Stray rates were determined by examining CWTs recovered on spawning grounds within and outside the Methow Basin. Targets for strays based on return year (recovery year) and brood year should be less than 5%.

Rates of Methow summer Chinook straying into basins outside the Methow have been very low (Table 7.21). Although a few Methow summer Chinook have strayed into the Okanogan Basin, Chelan tailrace, and Hanford Reach, staying has consistently been less than 5%.

Table 7.21. Number and percent of spawning escapements within other non-target basins that consisted of Methow summer Chinook, return years 1994-2004. For example, for return year 2002, 0.4% of the summer Chinook escapement in the Okanogan Basin consisted of Methow summer Chinook. Percent strays should be less than 5%.

Return year	Wenatchee		Okanogan		Chelan		Entiat		Hanford Reach	
	Number	%	Number	%	Number	%	Number	%	Number	%
1994	0	0.0	72	1.8	-	-	-	-	-	-
1995	0	0.0	9	0.3	-	-	-	-	-	-
1996	0	0.0	0	0.0	-	-	-	-	-	-
1997	0	0.0	0	0.0	-	-	-	-	-	-

Return year	Wenatchee		Okanogan		Chelan		Entiat		Hanford Reach	
	Number	%	Number	%	Number	%	Number	%	Number	%
1998	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1999	0	0.0	6	0.2	0	0.0	0	0.0	7	0.0
2000	0	0.0	3	0.1	0	0.0	0	0.0	0	0.0
2001	0	0.0	0	0.0	0	0.0	0	0.0	7	0.0
2002	0	0.0	54	0.4	0	0.0	0	0.0	0	0.0
2003	0	0.0	1	0.0	6	1.4	0	0.0	0	0.0
2004	0	0.0	7	0.1	3	0.7	0	0.0	0	0.0
Total	***0***	***0.0***	***152***	***0.3***	***9***	***0.3***	***0***	***0.0***	***14***	***0.0***

On average, about 3.9% of the returns have strayed into non-target spawning areas, falling below the target of 5% (Table 7.22). Depending on brood year, percent strays into non-target spawning areas have ranged from 0-10.8%. Few (<2% on average) have strayed into non-target hatchery programs.

Table 7.22. Number and percent of Methow summer Chinook that homed to target spawning areas and the target hatchery program, and number and percent that strayed to non-target spawning areas and non-target hatchery programs, by brood years 1989-2001. Percent stays should be less than 5%.

Brood year	Homing				Straying			
	Target stream		Target hatchery		Non-target streams		Non-target hatcheries	
	Number	%	Number	%	Number	%	Number	%
1989	773	55.7	459	33.0	81	5.8	76	5.5
1990	199	70.6	81	28.7	0	0.0	2	0.7
1991	82	65.6	43	34.4	0	0.0	0	0.0
1992	68	63.0	40	37.0	0	0.0	0	0.0
1993	25	65.8	10	26.3	3	7.9	0	0.0
1994	419	79.7	94	17.9	13	2.5	0	0.0
1995	126	81.8	28	18.2	0	0.0	0	0.0
1996	57	93.4	4	6.6	0	0.0	0	0.0
1997	379	93.8	7	1.7	18	4.5	0	0.0
1998	1,653	94.7	32	1.8	60	3.4	0	0.0
1999	18	100.0	0	0.0	0	0.0	0	0.0
2000	167	90.3	4	2.2	14	7.6	0	0.0
2001	78	83.9	4	4.3	10	10.8	1	1.1
Total	***4,044***	***78.9***	***806***	***15.7***	***199***	***3.9***	***79***	***1.5***

Genetics

Tissue (operculum) samples were collected from 144 wild and 144 hatchery summer Chinook in the Methow basin in 2006. Results from these samples should be available in 2009.

Proportion of Natural Influence

Another method for assessing the genetic risk of a supplementation program is to determine the influence of the hatchery and natural environments on the adaptation of the composite population. This is estimated by the proportion of natural origin fish in the hatchery broodstock (pNOB) and the proportion of hatchery origin fish in the natural spawning escapement (pHOS). The ratio pNOB/(pHOS+pNOB) is the Proportion of Natural Influence (PNI). The larger the ratio (PNI), the greater the strength of selection in the natural environment relative to that of the hatchery environment. In order for the natural environment to dominate selection, PNI should be greater than 0.5 (HSRG/WDFW/NWIFC 2004).

For brood years 1989-2005, the PNI was equal to or greater than 0.5 in all but three years (Table 7.23). This indicates that the natural environment has a greater influence on adaptation of Methow summer Chinook than does the hatchery environment.

Table 7.23. Proportionate natural influence (PNI) of the Methow summer Chinook supplementation program for brood years 1989-2005. PNI was calculated as the proportion of naturally produced Chinook in the hatchery broodstock (pNOB) divided by the proportion of hatchery Chinook on the spawning grounds (pHOS) plus pNOB. NOS = number of natural origin Chinook on the spawning grounds; HOS = number of hatchery origin Chinook on the spawning grounds; NOB = number of natural origin Chinook collected for broodstock; and HOB = number of hatchery origin Chinook included in hatchery broodstock.

Brood year	Spawners			Broodstock			PNI
	NOS	HOS	pHOS	NOB	HOB	pNOB	
1989	620	0	0.00	1,297	312	0.81	1.00
1990	1,391	0	0.00	828	206	0.80	1.00
1991	566	0	0.00	924	314	0.75	1.00
1992	460	0	0.00	297	406	0.42	1.00
1993	310	198	0.39	681	388	0.64	0.62
1994	574	511	0.47	341	244	0.58	0.55
1995	565	649	0.53	173	240	0.42	0.44
1996	424	192	0.31	290	223	0.57	0.64
1997	513	184	0.26	198	264	0.43	0.62
1998	432	243	0.36	153	211	0.42	0.54
1999	536	449	0.46	224	289	0.44	0.49
2000	838	362	0.30	164	339	0.33	0.52
2001	1,051	1,712	0.62	91	266	0.25	0.29
2002	2,512	2,118	0.46	247	241	0.51	0.53
2003	2,232	1,698	0.43	381	101	0.79	0.65
2004	1,632	577	0.26	506	16	0.97	0.79
2005	1,675	886	0.35	391	9	0.98	0.74

Natural Replacement Rates

Natural replacement rates (NRR) were calculated as the ratio of natural origin recruits (NOR) to the parent spawning population. For brood years 1989-2000, NRR for summer Chinook in the Methow averaged 1.60 (range, 0.54-6.08) if harvested fish were not include in the estimate and 4.51 (range, 0.77-21.25) if harvested fish were included in the estimate (Table 7.24). NRRs for more recent brood years will be calculated as soon as all tag recoveries and sampling rates have been loaded into the database.

Table 7.24. Spawning escapements, natural origin recruits (NOR), and natural replacement rates (NRR; with and without harvest) for wild summer Chinook in the Methow Basin, 1989-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating summer Chinook NORs and NRRs.)*

Brood year	Spawning escapement	Harvest not included		Harvest included	
		NOR	NRR	NOR	NRR
1989	552	754	1.36	1,286	2.33
1990	1,391	776	0.56	1,070	0.77
1991	566	342	0.60	541	0.96
1992	460	649	1.41	985	2.14
1993	508	575	1.13	763	1.50
1994	1,085	632	0.58	956	0.88
1995	1,214	1,226	1.01	2,420	1.99
1996	615	785	1.28	2,078	3.38
1997	697	2,282	3.27	7,143	10.25
1998	675	4,101	6.08	14,344	21.25
1999	986	3,180	3.23	11,295	11.46
2000	1,200	649	0.54	2,005	1.67
Average	***829***	***1,329***	***1.60***	***3,741***	***4.51***

Hatchery Replacement Rates

Hatchery replacement rates were estimated as hatchery adult-to-adult returns. These rates should be greater than the NRRs and greater than or equal to 5.30 (the value in BAMP; Murdoch and Peven 2005). HRRs exceeded NRRs in four or five of the 12 years of data depending on if harvest was or was not included in the estimate (Table 7.25). Hatchery replacement rates for Methow summer Chinook have exceeded the BAMP target of 5.30 in two of the 12 years of data, regardless if harvest is or is not included in the estimate.

Table 7.25. Hatchery replacement rates (HRR), NRR, and BAMP target (5.30) for summer Chinook in the Methow Basin, 1989-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating summer Chinook HRRs and NRRs.)*

Brood year	Harvest not included			Harvest included		
	HRR	NRR	BAMP	HRR	NRR	BAMP
1989	6.88	1.36	5.30	16.81	2.33	5.30
1990	1.40	0.56	5.30	1.90	0.77	5.30
1991	0.47	0.60	5.30	0.70	0.96	5.30
1992	0.50	1.41	5.30	0.65	2.14	5.30
1993	0.16	1.13	5.30	0.26	1.50	5.30
1994	1.95	0.58	5.30	2.60	0.88	5.30
1995	0.61	1.01	5.30	0.84	1.99	5.30
1996	0.30	1.28	5.30	0.35	3.38	5.30
1997	1.98	3.27	5.30	3.14	10.25	5.30
1998	7.43	6.08	5.30	16.45	21.25	5.30
1999	0.10	3.23	5.30	0.17	11.46	5.30
2000	0.84	0.54	5.30	2.94	1.67	5.30
Average	***1.84***	***1.60***	***5.30***	***3.76***	***4.51***	***5.30***

Smolt-to-Adult Survivals

Smolt-to-adult survival ratios (SARs) were calculated as the number of hatchery adults divided by the number of hatchery smolts released. SARs were based on CWT returns. For the available brood years, SARs have ranged from 0.00008 to 0.01890 for hatchery summer Chinook in the Methow Basin (Table 7.26).

Table 7.26. Smolt-to-adult ratios (SARs) for Methow summer Chinook; NA = not available.

Brood year	Number of smolts released	Estimated adult captures	SAR
1989	358,237	2,881	0.00804
1990	371,483	366	0.00099
1991	377,097	130	0.00034
1992	392,636	138	0.00035
1993	200,345	62	0.00031
1994	400,488	696	0.00174
1995	344,974	211	0.00061
1996	289,880	72	0.00025
1997	380,430	641	0.00168
1998	202,559	3,829	0.01890
1999	422,473	33	0.00008
2000	334,337	651	0.00195

Brood year	Number of smolts released	Estimated adult captures	SAR
2001	246,159	616	0.00250
Average	***332,392***	***794***	***0.00239***

7.7 ESA/HCP Compliance

Broodstock Collection

Summer Chinook adults collected at Wells Dam are used for both the Methow and Okanogan supplementation programs. Per the 2005 broodstock collection protocol, 556 natural origin (adipose fin present) adults were targeted for collection between 5 July and 14 September at the East Ladder of Wells Dam. Actual collections occurred between 5 July and 12 September and totaled 563 summer Chinook. The overage in adult broodstock collection was attributable to errors in enumeration during collection. ESA Permit 1347 provides authorization to collect Methow and Okanogan summer Chinook at Wells Dam three days per week and up to 16 hours per day from July through November. During 2005, broodstock collection activities encompassed a total of 15 days, representing 23% of the allowable trapping days allowed under ESA Permit 1347.

Collection of Methow and Okanogan summer Chinook broodstock at Wells Dam occurred concurrently with collection of summer steelhead for the Wells steelhead program authorized under ESA Section 10 Permit 1395. Encounters with steelhead and spring Chinook during Methow and Okanogan summer Chinook broodstock collections did not result in takes that were outside those authorized in Permit 1347 and in Permit 1395 for the Wells Steelhead program. Steelhead encountered during summer Chinook collections that were not required for steelhead broodstock were passed at the trap site and were not physically handled. Any spring Chinook encountered during summer Chinook broodstock activities were also passed without handling.

Hatchery Rearing and Release

The 2005 brood Okanogan/Similkameen summer Chinook reared throughout their juvenile life-stages at Eastbank Fish Hatchery and the Carlton Acclimation pond without incident (see section 7.2). The 2005 brood smolt release totaled 263,723 summer Chinook, representing 65.8% of the production objective and complied with the maximum production levels identified in ESA Section 10 Permit 1347. The 2005 brood smolt production level was less than the program production level primarily because of a male-skewed sex ratio in the broodstock (Table 7.4).

Hatchery Effluent Monitoring

Per ESA Permits 1196, 1347, and 1395, permit holders shall monitor and report hatchery effluents in compliance with applicable National Pollution Discharge Elimination Systems (NPDES) (EPA 1999) permit limitations. There were no NPDES violations reported at Chelan PUD Hatchery facilities during the period 1 January 2007 through 31 December 2007. NPDES monitoring and reporting for Chelan PUD Hatchery Programs during 2007 are provided in Appendix E.

Spawning Surveys

Summer Chinook spawning ground surveys conducted in the Methow Basin during 2007 were consistent with ESA Section 10 Permit No. 1347. Because of the difficulty of quantifying the level of take associated with spawning ground surveys, the Permit does not specify a take level associated with these activities, even though it does authorize implementation of spawning ground surveys. Therefore, no take levels are reported. However, to minimize potential impacts to established redds, wading was restricted to the extent practical, and extreme caution was used to avoid established redds when wading was required.

SECTION 8: OKANOGAN/SIMILKAMEEN SUMMER CHINOOK

8.1 Broodstock Sampling

Summer Chinook broodstock for the Okanogan/Similkameen and Methow programs is collected in the East Ladder of Wells Dam. Refer to Section 7.1 for information on the origin, age and length, sex ratios, and fecundity of summer Chinook broodstock collected at Wells Dam.

8.2 Hatchery Rearing

Rearing History

Number of eggs taken

Based on the unfertilized egg-to-release survival standard of 81%, a total of 711,111 eggs are required to meet the program release goal of 576,000 smolts. Between 1989 and 2006, the egg take goal was reached in ten of those years (Table 8.1).

Table 8.1. Numbers of eggs taken from summer Chinook broodstock collected at Wells Dam for the Okanogan program, 1989-2006.

Return year	Number of eggs taken
1989	724,200
1990	696,144
1991	879,892
1992	729,389
1993	797,234
1994	893,086
1995	736,500
1996	672,000
1997	601,744
1998	584,018
1999	725,589
2000	645,403
2001	418,907
2002	718,599
2003	710,521
2004	805,814
2005	452,928
2006	757,350
Average	***697,507***

Number of acclimation days

Fish were volitionally released from Similkameen Pond as yearling smolts beginning in April 2007. Fish acclimated at Similkameen were held for 179 to 200 days (Table 8.2). Any fish that may have survived over the winter at Bonaparte Pond reared for about 156 days on Okanogan River water.

Table 8.2. Number of days Okanogan summer Chinook broods were acclimated at Similkameen and Bonaparte ponds, brood years 1989-2005.

Brood year	Release year	Rearing facility	Transfer date	Release date	Number of days
1989	1991	Similkameen	29-Oct	7-May	190
1990	1992	Similkameen	5-Nov	25-Apr	171
1991	1993	Similkameen	1-Nov	9-Apr	159
1992	1994	Similkameen	2-Nov	1-Apr	150
			26-Feb	1-Apr	34
1993	1995	Similkameen	24-Oct	1-Apr	159
			24-Feb	1-Apr	36
1994	1996	Similkameen	30-Oct	6-Apr	158
			14-Mar	6-Apr	23
1995	1997	Similkameen	1-Oct	1-Apr	182
1996	1998	Similkameen	10-Oct	15-Mar	156
1997	1999	Similkameen	7-Oct	19-Apr	194
1998	2000	Similkameen	5-Oct	19-Apr	196
1999	2001	Similkameen	5-Oct	18-Apr	195
2000	2002	Similkameen	10-Oct	8-Apr	180
2001	2003	Similkameen	1-Oct	29-Apr	210
2002	2004	Similkameen	9-Nov	23-Apr	165
2003	2005	Similkameen	19-Oct	28-Apr	191
2004	2006	Similkameen	26-Oct	23-Apr	179
2005	2007	Bonaparte	6-Nov	11-Apr	156
		Similkameen	25-Oct	18-Apr – 9-May	179-200
Average					***157***

Release Information

Numbers released

The 2005 Okanogan summer Chinook program achieved 47.9% of the 576,000 target goal with about 275,919 fish being released volitionally between 18 April and 9 May (Table 8.3) in the Similkameen River. Of the estimated 100,146 fish transferred to Bonaparte Pond, some unknown number may have survived; although, based on observations by fish health personnel, it is assumed that no fish survived. With damage to the water screens by ice, which could have allowed some fish to escape undetected, and a significant die off resulting from bacterial gill disease (BGD; treatment was also compounded by surface ice), it is unlikely that many fish survived over the winter at Bonaparte Pond.

Table 8.3. Numbers of Okanogan summer Chinook smolts released from the Similkameen and Bonaparte ponds, brood years 1989-2005. The release target for Okanogan summer Chinook is 576,000 smolts.

Brood year	Release year	Rearing facility	Number of smolts
1989	1991	Similkameen	352,600
1990	1992	Similkameen	540,000
1991	1993	Similkameen	675,500
1992	1994	Similkameen	548,182
1993	1995	Similkameen	586,000
1994	1996	Similkameen	536,299
1995	1997	Similkameen	587,000
1996	1998	Similkameen	507,913
1997	1999	Similkameen	589,591
1998	2000	Similkameen	293,191
1999	2001	Similkameen	630,463
2000	2002	Similkameen	532,453
2001	2003	Similkameen	26,642
2002	2004	Similkameen	388,589
2003	2005	Similkameen	579,019
2004	2006	Similkameen	703,359
2005	2007	Bonaparte	0 (assumed)
		Similkameen	275,919
Average			***491,336***

Numbers tagged

The 2005 brood Okanogan summer Chinook from the Bonaparte and Similkameen facilities were 96.0% and 98.6% CWT and adipose fin-clipped, respectively. Neither group was PIT tagged.

Fish size and condition at release

Size at release of the Similkameen population was 75.0% and 57.0% of the target fork length and weight, respectively. The target CV for fork length was exceeded by 7% (Table 8.4). Size-at-release data were not collected for the Bonaparte fish.

Table 8.4. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of Okanogan summer Chinook smolts released from the hatchery, brood years 1989-2005. Size targets are provided in the last row of the table.

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1989	1991	-	-	41.3	11
1990	1992	143	9.5	37.8	12
1991	1993	125	15.5	22.4	20
1992	1994	120	15.4	20.7	22
1993	1995	132	-	23.2	20
1994	1996	136	16.0	29.6	15
1995	1997	137	8.2	32.8	14
1996	1998	127	12.8	26.2	17
1997	1999	144	9.9	36.0	13
1998	2000	148	5.9	41.0	11
1999	2001	141	15.7	35.4	13
2000	2002	121	13.4	20.4	22
2001	2003	132	8.2	25.7	18
2002	2004	119	13.4	20.8	22
2003	2005	133	10.6	28.9	16
2004	2006	132	9.9	29.8	15
2005	2007	132	9.6	25.9	18
Targets		***176***	***9.0***	***45.4***	***10***

Survival Estimates

Overall survival of Okanogan summer Chinook (not including the Bonaparte component) from green (unfertilized) egg to release was slightly above the standard set for the program (Table 8.5). Lower than expected green egg-to-eye survival further reduced the overall survival performance. Currently, it is unknown if gamete viability is gender biased or is uniform between sexes and more influenced by between-year environmental variations.

Post transfer survival of the Bonaparte group was considerably lower than expected (Table 8.5). Disease (BGD primarily), the inability to treat BGD because of extended presence of surface ice, and damage to water screens by ice suggests that few if any fish survived.

Table 8.5. Hatchery life-stage survival rates (%) for Okanogan summer Chinook, brood years 1989-2005. Survival standards or targets are provided in the last row of the table.

Brood year	Rearing facility	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
		Female	Male							
1989[a]	Similkameen	89.8	99.5	89.9	96.7	99.7	99.4	73.3	57.4	63.7
1990[a]	Similkameen	93.9	99.0	84.9	97.1	81.2	80.6	97.7	98.6	80.5
1991[a]	Similkameen	93.1	95.5	88.2	97.1	99.4	99.1	98.4	97.1	84.2
1992[a]	Similkameen	96.9	99.0	87.0	98.0	99.9	99.9	91.7	92.6	78.2
1993[a]	Similkameen	82.2	99.4	85.4	97.6	99.8	99.5	92.0	90.2	76.7
1994	Similkameen	96.1	90.0	86.6	100.0	98.1	97.4	73.1	89.8	63.3
1995	Similkameen	91.9	96.2	98.2	84.1	96.5	96.2	92.7	98.2	76.6
1996	Similkameen	95.4	98.1	83.2	100.0	97.7	96.9	86.5	92.5	72.0
1997	Similkameen	91.9	94.6	86.1	98.4	98.7	98.3	98.8	99.4	83.7
1998	Similkameen	84.0	96.2	54.1	98.0	99.4	98.9	96.6	99.6	51.2
1999	Similkameen	98.8	98.7	92.9	96.9	98.0	97.6	96.9	99.0	87.2
2000	Similkameen	90.5	96.9	89.2	98.5	98.2	98.0	93.6	97.2	82.6
2001	Similkameen	96.2	92.3	89.1	97.6	99.7	99.5	7.4	11.9	6.4
2002	Similkameen	97.1	98.1	89.8	98.0	99.7	99.5	51.6	52.2	45.4
2003	Similkameen	96.7	97.5	86.8	97.6	99.3	98.5	98.0	98.8	83.0
2004	Similkameen	93.6	98.2	84.0	97.6	99.6	99.3	97.8	98.8	80.2
	Bonaparte	93.6	98.2	84.0	97.6	99.6	99.3	97.9	98.9	80.3
2005	Similkameen	97.0	89.6	88.0	99.5	99.5	99.0	93.5	94.6	81.8
	Bonaparte	97.0	89.6	88.0	99.5	99.5	99.0	0.0	0.0	0.0
Standard		***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

[a] Survival rates were calculated from the aggregate population collected at Wells Fish Hatchery volunteer channel and left- and right-ladder traps at Wells Dam.

8.3 Disease Monitoring

Rearing of the 2005 brood Okanogan summer Chinook was similar to previous years with fish being held on well water before being transferred for final acclimation on Similkameen or Okanogan river water. The Similkameen population was transferred in late October 2006. Fish were prophylactically treated upon transfer with formalin to control external parasites (*Ich* and *Dermocystidium*) and fungus, which in recent years has led to significant losses in this program. In mid January 2007, the spicule-shaped bacteria responsible for bacterial gill disease (BGD) began to increase in the Similkameen. The use of Chloramine-T was recommended for control of BGD. This group continued to experience exposure to BGD; however, losses continued to remain low. This group was treated with $KMnO_4$ for two days when the river water began to clear up in late March. No additional disease-related problems were noted before release.

The Bonaparte Pond population was transferred and reared on Okanogan River water from early November 2007 until release. Ice formed over the pond in early December and fish were not available for inspection until early February. Given the Similkameen population began breaking with BGD in mid January, it is likely that the Bonaparte population did as well. Upon ice breakup (late

February), BGD was confirmed in all dead fish sampled (significant mortalities were observed). Although no live fish were observed, $KMnO_4$ treatments were applied for three days to ensure that any unseen live fish would not die from BGD.

8.4 Spawning Surveys

Surveys for Okanogan/Similkameen summer Chinook redds were conducted from late September to mid-November, 2007, in the Okanogan and Similkameen rivers. Total redd counts (not peak counts) were conducted in the rivers (see Appendix J for more details).

Redd Counts

A total of 2,008 summer Chinook redds were counted in the Okanogan Basin in 2007 (Table 8.6). This was greater than the 19-year average of 1,608 redds.

Table 8.6. Total number of redds counted in the Okanogan Basin, 1989-2007.

Survey year	Number of summer Chinook redds		
	Okanogan River	Similkameen River	Total count
1989	134*	370	504
1990	47	147	194
1991	64	91	155
1992	53	57	110
1993	162	288	450
1994	375	777	1,152
1995	267	616	883
1996	116	419	535
1997	158	486	644
1998	88	276	364
1999	369	1,275	1,644
2000	549	993	1,542
2001	1,108	1,540	2,648
2002	2,667	3,358	6,025
2003	1,035	378	1,413
2004	1,327	1,660	2,987
2005	1,611	1,423	3,034
2006	2,592	1,666	4,258
2007	1,301	707	2,008
Average	***738***	***870***	***1,608***

* Peak count based on an aerial survey.

Redd Distribution

Summer Chinook redds were not evenly distributed among the survey reaches in the Okanogan Basin. Most redds (87%) were located in the upper Okanogan and lower Similkameen reaches

(reaches upstream of the Riverside Bridge) (Table 8.7; Figure 8.1). Relatively few summer Chinook spawned downstream of the Riverside Bridge on the Okanogan River (Reaches 1-4).

Table 8.7. Total number of summer Chinook redds counted in different reaches in the Okanogan Basin during September through mid-November, 2007. Reach codes are described in Table 2.11.

Survey reach	Total redd count	Percent
Okanogan 1	3	0.1
Okanogan 2	16	0.8
Okanogan 3	116	5.8
Okanogan 4	63	3.1
Okanogan 5	549	27.3
Okanogan 6	554	27.6
Similkameen 1	652	32.5
Similkameen 2	55	2.7
Totals	***2,008***	***100.0***

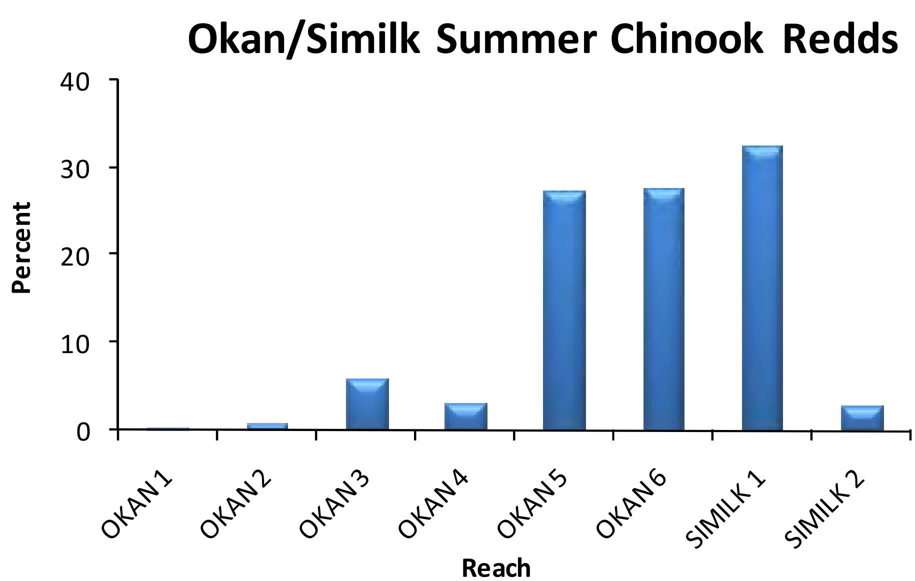


Figure 8.1. Percent of the total number of summer Chinook redds counted in different reaches in the Okanogan Basin during September through mid-November, 2007. Reach codes are described in Table 2.11.

Spawn Timing

Spawning in 2007 began the last week in September in the Similkameen and the first week of October in the Okanogan, and peaked during the second week of October in both rivers (Figure 8.2). Spawning began when stream temperature varied from 12-15°C. The temporal distribution of spawning activity in 2007 was similar to the 16-year average, with the exception of peak spawning in 2007 occurring a week later than the average.

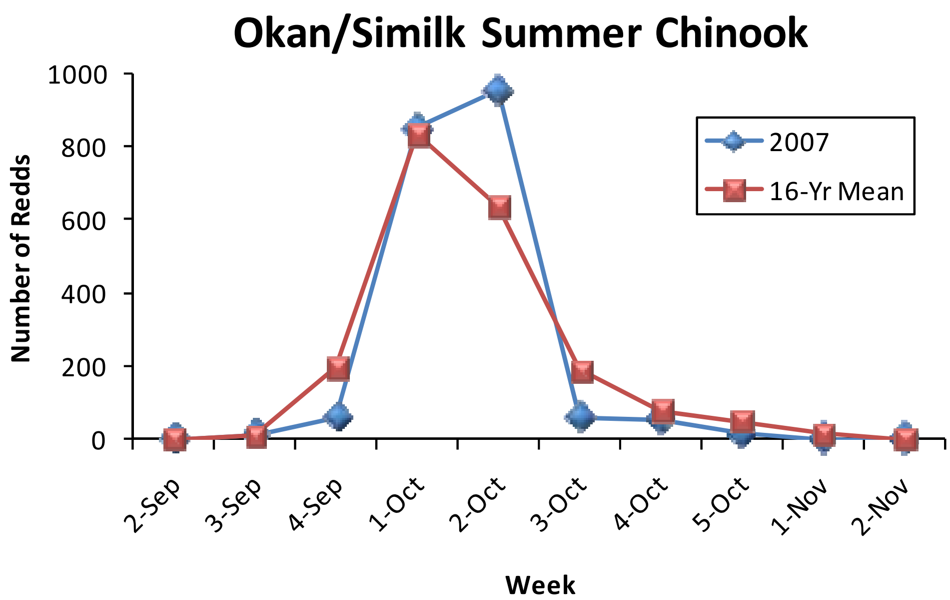


Figure 8.2. Comparison of the number of new summer Chinook redds counted during different weeks in the Okanogan Basin, September through mid-November, 2007, to the 16-year average.

Spawning Escapement

Spawning escapement for Okanogan/Similkameen summer Chinook was calculated as the total number of redds times the fish per redd ratio estimated from fish sampled at Wells Dam. The estimated fish per redd ratio for Okanogan/Similkameen summer Chinook in 2007 was 2.20. Multiplying this ratio by the number of redds counted in the Okanogan and Similkameen rivers resulted in a total spawning escapement of 4,417 summer Chinook (Table 8.8).

Table 8.8. Spawning escapements for summer Chinook in the Okanogan and Similkameen rivers for return years 1989-2007.

Return year	Fish/Redd	Spawning escapement		
		Okanogan	Similkameen	Total
1989*	3.30	561	1,221	1,782
1990*	3.40	381	500	881
1991*	3.70	237	337	574
1992*	4.30	228	245	473
1993*	3.30	535	950	1,485
1994*	3.50	1,313	2,720	4,033
1995*	3.40	908	2,094	3,002
1996*	3.40	394	1,425	1,819
1997*	3.40	537	1,652	2,189
1998	3.00	264	828	1,092
1999	2.20	812	2,805	3,617

Return year	Fish/Redd	Spawning escapement		
		Okanogan	Similkameen	Total
2000	2.40	1,318	2,383	3,701
2001	4.10	4,543	6,314	10,857
2002	2.30	6,134	7,723	13,857
2003	2.42	2,505	915	3,420
2004	2.25	2,986	3,735	6,721
2005	2.93	4,720	4,169	8,889
2006	2.02	5,236	3,365	8,601
2007	2.20	2,862	1,555	4,417
Average	***3.03***	***1,920***	***2,365***	***4,285***

* Spawning escapement was calculated using the "Modified Meekin Method" (i.e., 3.1 x jack multiplier).

8.5 Carcass Surveys

Surveys for summer Chinook carcasses were conducted during late September to mid-November, 2007, in the Okanogan and Similkameen rivers (see Appendix J for more details).

Number sampled

A total of 1,716 summer Chinook carcasses were sampled during September through mid-November in the Okanogan Basin (Table 8.9). A total of 1,030 were sampled in the Okanogan River and 686 in the Similkameen River.

Table 8.9. Numbers of summer Chinook carcasses sampled within each survey reach in the Okanogan Basin, 1993-2007. Reach codes are described in Table 2.11.

Survey year	Number of summer Chinook carcasses								
	Okanogan						Similkameen		Total
	O-1	O-2	O-3	O-4	O-5	O-6	S-1	S-2	
1993[a]	0	2	3	0	23	13	73	1	**115**
1994[b]	0	4	4	0	27	5	318	60	**418**
1995	0	0	2	0	30	0	239	15	**286**
1996	0	0	0	2	5	2	226	0	**235**
1997	0	0	2	0	9	3	225	1	**240**
1998	0	1	8	1	7	7	340	4	**368**
1999	0	0	3	2	23	53	766	48	**895**
2000	0	2	20	15	47	16	727	41	**868**
2001	0	26	75	10	127	112	1,141	105	**1,596**
2002	10	32	83	35	204	573	1,265	259	**2,461**
2003[c]	0	0	26	0	15	208	180	8	**437**
2004	0	4	31	24	146	283	1,392	298	**2,178**
2005	0	8	93	37	371	431	731	276	**1,947**

Survey year	Number of summer Chinook carcasses								
	Okanogan						Similkameen		Total
	O-1	O-2	O-3	O-4	O-5	O-6	S-1	S-2	
2006	4	3	31	16	120	291	513	100	**1,078**
2007	2	1	48	1	459	519	657	29	**1,716**
Average	***1***	***6***	***29***	***10***	***108***	***168***	***586***	***83***	***989***

[a] 25 additional carcasses were sampled on the Similkameen and 46 on the Okanogan without any reach designation.
[b] One additional carcasses was sampled on the Similkameen without any reach designation.
[c] 793 carcasses were sampled on the Similkameen before initiation of spawning (pre-spawn mortality) and an additional 40 carcasses were sampled on the Okanogan. The cause of the high mortality (*Ichthyophthirius multifilis* and *Flavobacterium columnarae*) was exacerbated by high river temperatures.

Carcass Distribution and Origin

Summer Chinook carcasses were not evenly distributed among reaches within the Okanogan Basin in 2007 (Table 8.9; Figure 8.3). Most of the carcasses in the basin were found in the upper Okanogan River and lower Similkameen River. The highest percentage of carcasses (38%) was sampled in Reach 1 on the Similkameen River between the Driscoll Channel and Oroville Bridge.

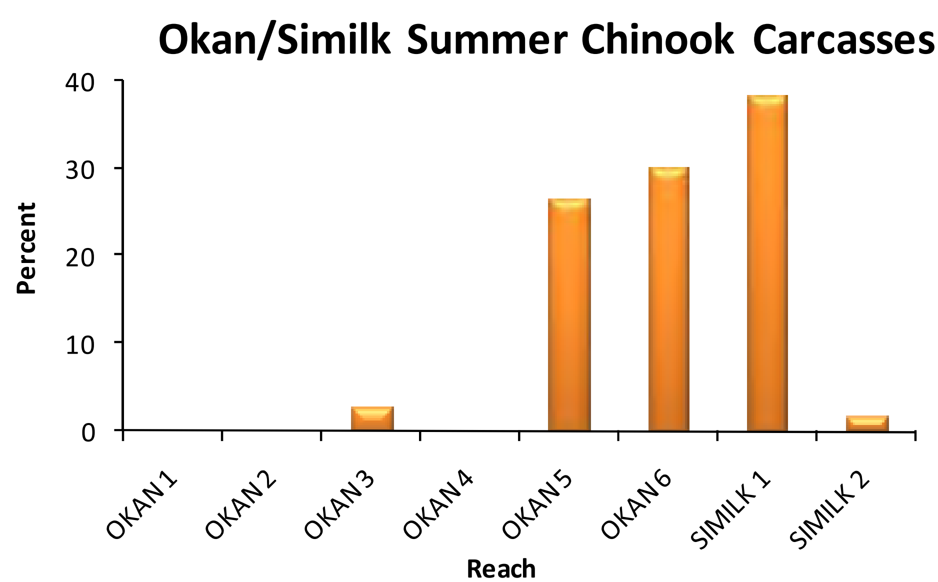


Figure 8.3. Percent of summer Chinook carcasses sampled within different reaches in the Okanogan Basin during September through mid-November, 2007. Reach codes are described in Table 2.11.

Numbers of wild and hatchery origin summer Chinook carcasses sampled in 2007 will be available after analysis of CWTs and scales. Based on the available data (1991-2006), most fish, regardless of origin, were found in Reach 1 on the Similkameen River (Driscoll Channel to Oroville Bridge) (Table 8.10). However, a slightly larger percentage of hatchery fish were found in reaches on the Similkameen River than were wild fish (Figure 8.4). In contrast, a larger percentage of wild fish were found in reaches on the Okanogan River.

Table 8.10. Numbers of wild and hatchery summer Chinook carcasses sampled within different reaches in the Okanogan Basin, 1993-2006.

Survey year	Origin	Survey reach								Total
		O-1	O-2	O-3	O-4	O-5	O-6	S-1	S-2	
1993	Wild	0	0	3	0	13	4	48	1	**69**
	Hatchery	0	2	0	0	10	9	25	0	**46**
1994	Wild	0	0	1	0	8	1	113	22	**145**
	Hatchery	0	4	3	0	19	4	205	38	**273**
1995	Wild	0	0	1	0	10	0	66	4	**81**
	Hatchery	0	0	1	0	20	0	173	11	**205**
1996	Wild	0	0	0	1	3	1	53	0	**58**
	Hatchery	0	0	0	1	2	1	173	0	**177**
1997	Wild	0	0	1	0	0	2	83	0	**86**
	Hatchery	0	0	1	0	9	0	142	1	**153**
1998	Wild	0	1	3	1	6	5	162	4	**182**
	Hatchery	0	0	5	0	1	2	178	0	**186**
1999	Wild	0	0	0	0	9	24	298	10	**341**
	Hatchery	0	0	3	2	14	29	468	38	**554**
2000	Wild	0	0	8	8	24	11	189	4	**244**
	Hatchery	0	2	12	7	23	5	538	37	**624**
2001	Wild	0	10	23	5	67	42	390	54	**591**
	Hatchery	0	16	52	5	60	70	751	51	**1,005**
2002	Wild	6	14	20	10	81	212	340	72	**755**
	Hatchery	4	18	63	25	123	360	925	187	**1,705**
2003	Wild	0	0	13	0	12	149	221	116	**511**
	Hatchery	0	0	15	0	5	91	364	257	**732**
2004	Wild	0	2	19	19	108	225	1,126	260	**1,759**
	Hatchery	0	2	12	5	38	58	266	38	**419**
2005	Wild	0	5	51	21	256	364	532	176	**1,405**
	Hatchery	0	3	42	16	115	67	199	100	**542**
2006	Wild	2	2	23	11	110	271	70	78	**567**
	Hatchery	2	1	8	5	10	20	443	22	**511**
Average	***Wild***	***1***	***2***	***12***	***5***	***51***	***94***	***264***	***57***	***485***
	Hatchery	***0***	***3***	***16***	***5***	***32***	***51***	***346***	***56***	***509***

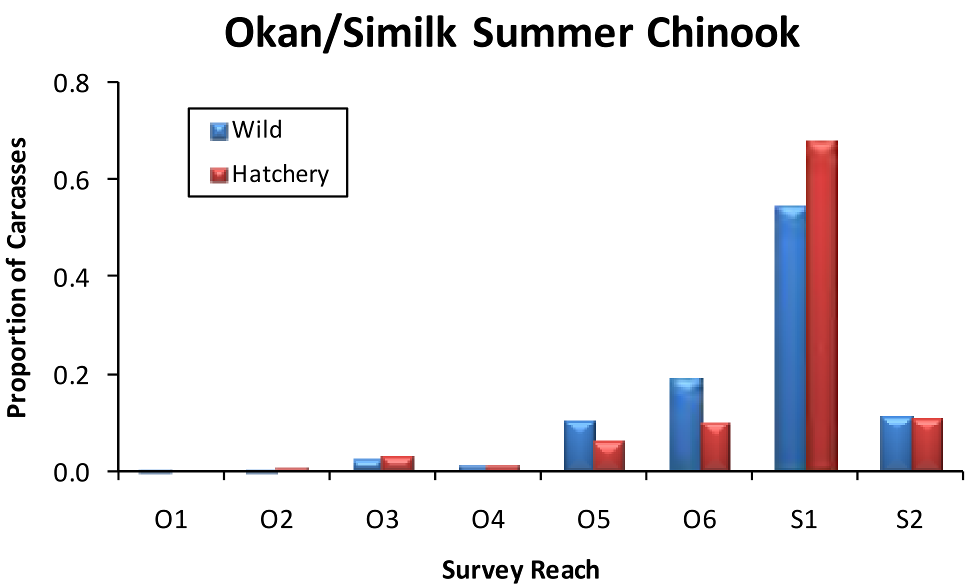


Figure 8.4. Distribution of wild and hatchery produced carcasses in different reaches in the Okanogan Basin, 1993-2006. Reach codes are described in Table 2.11.

Sampling Rate

Overall, 39% of the total spawning escapement of summer Chinook in the Okanogan Basin was sampled in 2007 (Table 8.11). This was above the target of 20%. Sampling rates among survey reaches varied from 1 to 46%.

Table 8.11. Number of redds and carcasses, total spawning escapement, and sampling rates for summer Chinook in the Okanogan Basin, 2007.

Sampling reach	Total number of redds	Total number of carcasses	Total spawning escapement	Sampling rate
Okanogan 1	3	2	7	0.30
Okanogan 2	16	1	35	0.03
Okanogan 3	116	48	255	0.19
Okanogan 4	63	1	139	0.01
Okanogan 5	549	459	1,208	0.38
Okanogan 6	554	519	1,219	0.43
Similkameen 1	652	657	1,434	0.46
Similkameen 2	55	29	121	0.24
Total	***2,008***	***1,716***	***4,417***	***0.39***

Length Data

Mean lengths (POH, cm) of male and female summer Chinook carcasses sampled during surveys on the Okanogan and Similkameen rives in 2007 are provided in Table 8.12. The average size of males and females sampled in the Okanogan basin were 64 cm and 76 cm, respectively.

Table 8.12. Mean lengths (postorbital-to-hypural length; cm) and standard deviations (in parentheses) of male and female summer Chinook carcasses sampled in different reaches in the Okanogan Basin, 2007.

Stream/watershed	Mean length (cm)	
	Male	Female
Okanogan 1	41.5 (0)	82.5 (0)
Okanogan 2	41.0 (0)	-
Okanogan 3	62.6 (15.6)	74.1 (3.8)
Okanogan 4	-	78.5 (0)
Okanogan 5	64.8 (15.6)	75.5 (5.4)
Okanogan 6	62.8 (14.8)	74.0 (7.1)
Similkameen 1	66.4 (14.0)	76.9 (36.7)
Similkameen 2	78.0 (4.6)	74.2 (6.0)
Total	***64.3 (14.9)***	***75.8 (25.7)***

8.6 Life History Monitoring

Life history characteristics of Okanogan/Similkameen summer Chinook were assessed by examining carcasses on spawning grounds and fish collected or examined at broodstock collection sites, and by reviewing tagging data and fisheries statistics.

Age at Maturity

Most of the wild and hatchery summer Chinook sampled during the period 1993-2006 in the Okanogan Basin were age-4 and 5 fish (total age) (Table 8.13; Figure 8.5). A higher percentage of age-3 and 4 wild Chinook returned to the basin than did age-3 and 4 hatchery Chinook. In contrast, a higher proportion of age-5 and 6 hatchery fish returned than did age-5 and 6 wild fish. Thus, a higher percentage of hatchery fish returned at an older age than did wild fish.

Table 8.13. Proportions of wild and hatchery summer Chinook of different ages (total age) sampled on spawning grounds in the Okanogan Basin, 1993-2006.

Sample year	Origin	Total age						Sample size
		2	3	4	5	6	7	
1993	Wild	0.00	0.00	0.76	0.24	0.00	0.00	63
	Hatchery	0.00	0.02	0.97	0.02	0.00	0.00	61
1994	Wild	0.00	0.03	0.42	0.55	0.00	0.00	135
	Hatchery	0.00	0.02	0.09	0.89	0.00	0.00	292
1995	Wild	0.00	0.01	0.26	0.72	0.00	0.00	68
	Hatchery	0.00	0.01	0.16	0.35	0.48	0.00	204
1996	Wild	0.00	0.14	0.50	0.36	0.00	0.00	36
	Hatchery	0.00	0.02	0.21	0.55	0.20	0.01	177
1997	Wild	0.00	0.00	0.05	0.66	0.29	0.00	73
	Hatchery	0.00	0.00	0.03	0.86	0.12	0.00	153
1998	Wild	0.00	0.03	0.64	0.34	0.00	0.00	151
	Hatchery	0.01	0.05	0.50	0.23	0.22	0.00	185
1999	Wild	0.00	0.00	0.33	0.66	0.00	0.00	275
	Hatchery	0.00	0.00	0.12	0.86	0.01	0.00	545
2000	Wild	0.01	0.07	0.28	0.63	0.02	0.00	216
	Hatchery	0.00	0.12	0.03	0.75	0.10	0.00	545
2001	Wild	0.02	0.15	0.75	0.07	0.00	0.00	531
	Hatchery	0.00	0.05	0.88	0.02	0.05	0.00	1,005
2002	Wild	0.01	0.11	0.65	0.23	0.00	0.00	692
	Hatchery	0.00	0.01	0.15	0.55	0.00	0.00	1,681
2003	Wild	0.01	0.02	0.76	0.21	0.00	0.00	478
	Hatchery	0.00	0.03	0.06	0.79	0.12	0.00	653
2004	Wild	0.00	0.12	0.11	0.76	0.01	0.00	1,529
	Hatchery	0.00	0.01	0.32	0.46	0.21	0.00	381
2005	Wild	0.00	0.08	0.76	0.14	0.02	0.00	1,282
	Hatchery	0.00	0.03	0.13	0.69	0.14	0.00	526
2006	Wild	0.00	0.01	0.41	0.45	0.01	0.00	839
	Hatchery	0.01	0.06	0.26	0.27	0.40	0.00	112
Average	***Wild***	***0.00***	***0.08***	***0.49***	***0.42***	***0.01***	***0.00***	***6,368***
	Hatchery	***0.00***	***0.03***	***0.27***	***0.61***	***0.09***	***0.00***	***6,520***

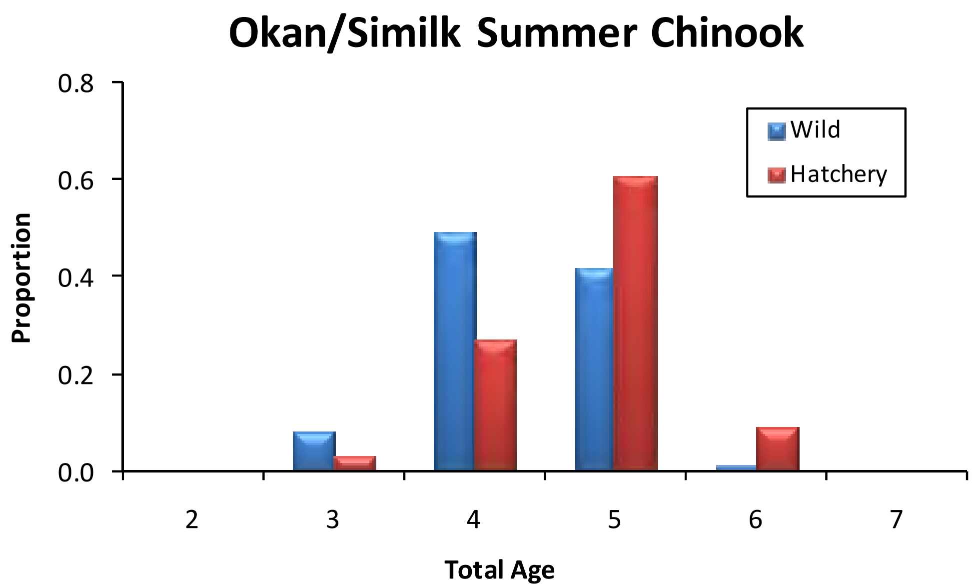


Figure 8.5. Proportions of wild and hatchery summer Chinook of different total ages sampled at broodstock collection sites and on spawning grounds in the Okanogan Basin for the combined years 1993-2006.

Size at Maturity

On average, hatchery summer Chinook were about 1 cm smaller than wild summer Chinook sampled in the Okanogan Basin (Table 8.14). This is interesting given that a slightly higher percentage of hatchery fish returned as age-5 and 6 fish than did wild fish. Future analyses will compare sizes of hatchery and wild fish of the same age groups and gender.

Table 8.14. Mean lengths (POH; cm) and variability statistics for wild and hatchery summer Chinook sampled in the Okanogan Basin, 1993-2006; SD = 1 standard deviation.

Sample year	Origin	Sample size	Summer Chinook length (POH; cm)			
			Mean	SD	Minimum	Maximum
1993	Wild	69	73	7	52	90
	Hatchery	59	62	6	47	75
1994	Wild	164	71	7	40	86
	Hatchery	300	69	8	30	84
1995	Wild	81	75	6	54	87
	Hatchery	201	73	8	39	87
1996	Wild	22	68	14	22	85
	Hatchery	26	75	8	60	88
1997	Wild	87	71	7	44	85
	Hatchery	148	74	6	48	88
1998	Wild	182	70	8	45	94
	Hatchery	186	65	12	30	87
1999	Wild	340	73	7	56	91

Sample year	Origin	Sample size	Summer Chinook length (POH; cm)			
			Mean	SD	Minimum	Maximum
	Hatchery	554	71	7	23	84
2000	Wild	241	70	10	32	86
	Hatchery	624	69	12	24	92
2001	Wild	579	67	9	26	90
	Hatchery	997	61	8	32	90
2002	Wild	755	69	9	28	91
	Hatchery	1,705	70	8	33	87
2003	Wild	533	68	9	30	93
	Hatchery	732	69	10	26	90
2004	Wild	1,757	71	10	33	94
	Hatchery	416	66	9	41	92
2005	Wild	1,407	66	7	41	99
	Hatchery	542	68	8	31	85
2006	Wild	940	72	6	31	91
	Hatchery	138	70	10	33	86
Pooled	***Wild***	***7,157***	***70***	***8***	***22***	***99***
	Hatchery	***6,628***	***69***	***9***	***23***	***92***

Contribution to Fisheries

Most of the harvest on Okanogan/Similkameen summer Chinook occurred in the Ocean (Table 8.15). Ocean harvest has made up 69% to 100% of all Okanogan/Similkameen summer Chinook harvested. Brood years 1989 and 1997-2000 provided the largest harvests, while brood year 1996 provided the lowest.

Table 8.15. Estimated number and percent (in parentheses) of Okanogan/Similkameen summer Chinook captured in different fisheries, 1989-2000.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational (sport)	
1989	2,325 (79)	351 (12)	200 (7)	79 (3)	2,955
1990	334 (88)	27 (7)	7 (2)	12 (3)	380
1991	215 (85)	37 (15)	0 (0)	0 (0)	252
1992	434 (92)	24 (5)	6 (1)	10 (2)	474
1993	37 (79)	10 (21)	0 (0)	0 (0)	47
1994	884 (92)	41 (4)	18 (2)	17 (2)	960
1995	614 (93)	3 (0)	18 (3)	24 (4)	659
1996	4 (100)	0 (0)	0 (0)	0 (0)	4
1997	6,371 (92)	89 (1)	80 (1)	416 (6)	2,956

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational (sport)	
1998	4,343 (89)	8 (0)	299 (6)	117 (4)	4,897
1999	1,322 (69)	8 (0)	227 (12)	371 (19)	1,928
2000	3,261 (75)	3 (0)	443 (10)	613 (14)	4,320
2001	178 (72)	0 (0)	48 (19)	21 (9)	247

Straying

Stray rates were determined by examining CWTs recovered on spawning grounds within and outside the Okanogan Basin. Targets for strays based on return year (recovery year) and brood year should be less than 5%.

Rates of Okanogan summer Chinook straying into basins outside the Okanogan have been very low (Table 8.16). Although a few Okanogan summer Chinook have strayed into other spawning areas, straying, on average, has been less than 5%. The Chelan tailrace has received the largest number of Okanogan strays.

Table 8.16. Number and percent of spawning escapements within other non-target basins that consisted of Okanogan summer Chinook, return years 1994-2004. For example, for return year 2002, 1% of the summer Chinook spawning escapement in the Entiat Basin consisted of Okanogan summer Chinook. Percent strays should be less than 5%.

Return year	Wenatchee		Methow		Chelan		Entiat		Hanford Reach	
	Number	%	Number	%	Number	%	Number	%	Number	%
1994	0	0.0	0	0.0	-	-	-	-	-	-
1995	0	0.0	0	0.0	-	-	-	-	-	-
1996	0	0.0	0	0.0	-	-	-	-	-	-
1997	0	0.0	0	0.0	-	-	-	-	-	-
1998	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1999	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2000	0	0.0	6	0.5	30	4.5	0	0.0	3	0.0
2001	12	0.1	0	0.0	10	1.0	0	0.0	0	0.0
2002	0	0.0	3	0.1	4	0.7	5	1.0	0	0.0
2003	0	0.0	8	0.2	22	5.3	0	0.0	0	0.0
2004	0	0.0	27	1.2	36	8.6	0	0.0	8	0.0
Total	***12***	***0.0***	***44***	***0.2***	***102***	***3.1***	***5***	***0.2***	***11***	***0.0***

On average, less than 1% of the returns have strayed into non-target spawning areas, falling below the target of 5% (Table 8.17). Depending on brood year, percent strays into non-target spawning areas have ranged from 0-4.4%. Few (<2% on average) have strayed into non-target hatchery programs.

Table 8.17. Number and percent of Okanogan summer Chinook that homed to target spawning areas and the target hatchery, and number and percent that strayed to non-target spawning areas and non-target hatchery programs, by brood years 1989-2001. Percent stays should be less than 5%.

Brood year	Homing				Straying			
	Target stream		Target hatchery		Non-target streams		Non-target hatcheries	
	Number	%	Number	%	Number	%	Number	%
1989	3,132	69.7	1,328	29.6	2	0.0	31	0.7
1990	729	71.4	291	28.5	0	0.0	1	0.1
1991	1,125	71.3	453	28.7	0	0.0	0	0.0
1992	1,264	68.5	572	31.0	8	0.4	1	0.1
1993	84	61.3	51	37.2	0	0.0	2	1.5
1994	2,174	80.8	478	17.8	38	1.4	2	0.1
1995	1,883	85.4	271	12.3	50	2.3	0	0.0
1996	27	100.0	0	0.0	0	0.0	0	0.0
1997	11,629	97.2	309	2.6	27	0.2	3	0.0
1998	2,727	95.6	99	3.5	24	0.8	2	0.1
1999	828	96.7	18	2.1	10	1.2	0	0.0
2000	1,590	93.5	20	1.2	75	4.4	15	0.9
2001	28	100.0	0	0.0	0	0.0	0	0.0
Total	***27,220***	***86.7***	***3,890***	***12.4***	***234***	***0.7***	***57***	***0.2***

Genetics

Tissue (operculum) samples were collected from 144 wild and 144 hatchery summer Chinook in the Okanogan basin in 2006. Results from these samples should be available in 2008.

Proportion of Natural Influence

Another method for assessing the genetic risk of a supplementation program is to determine the influence of the hatchery and natural environments on the adaptation of the composite population. This is estimated by the proportion of natural origin fish in the hatchery broodstock (pNOB) and the proportion of hatchery origin fish in the natural spawning escapement (pHOS). The ratio pNOB/(pHOS+pNOB) is the Proportion of Natural Influence (PNI). The larger the ratio (PNI), the greater the strength of selection in the natural environment relative to that of the hatchery environment. In order for the natural environment to dominate selection, PNI should be greater than 0.5 (HSRG/WDFW/NWIFC 2004).

For brood years 1989-2005, the PNI was equal to or greater than 0.5 in 8 out of the 17 years (Table 8.18). This indicates that in those years the hatchery environment has had a relatively greater influence on adaptation of Okanogan/Similkameen summer Chinook than has the natural environment.

Table 8.18. Proportionate natural influence (PNI) of the Okanogan/Similkameen summer Chinook supplementation program for brood years 1989-2005. PNI was calculated as the proportion of naturally produced Chinook in the hatchery broodstock (pNOB) divided by the proportion of hatchery Chinook on the spawning grounds (pHOS) plus pNOB. NOS = number of natural origin Chinook on the spawning grounds; HOS = number of hatchery origin Chinook on the spawning grounds; NOB = number of natural origin Chinook collected for broodstock; and HOB = number of hatchery origin Chinook included in hatchery broodstock.

Brood year	Spawners			Broodstock			PNI
	NOS	HOS	pHOS	NOB	HOB	pNOB	
1989	1,782	0	0.00	1,297	312	0.81	1.00
1990	881	0	0.00	828	206	0.80	1.00
1991	574	0	0.00	924	314	0.75	1.00
1992	473	0	0.00	297	406	0.42	1.00
1993	731	754	0.51	681	388	0.64	0.56
1994	1,409	2,623	0.65	341	244	0.58	0.47
1995	889	2,113	0.70	173	240	0.42	0.38
1996	579	1,240	0.68	290	223	0.57	0.46
1997	760	1,429	0.65	198	264	0.43	0.40
1998	576	516	0.47	153	211	0.42	0.47
1999	1,426	2,190	0.61	224	289	0.44	0.42
2000	1,273	2,428	0.66	164	339	0.33	0.33
2001	4,614	6,242	0.57	91	266	0.25	0.30
2002	4,149	9,709	0.70	247	241	0.51	0.42
2003	1,971	1,449	0.42	381	101	0.79	0.65
2004	5,262	1,518	0.22	506	16	0.97	0.82
2005	6,464	2,426	0.27	391	9	0.98	0.78

Natural Replacement Rates

Natural replacement rates (NRR) were calculated as the ratio of natural origin recruits (NOR) to the parent spawning population. For brood years 1989-2000, NRR for summer Chinook in the Okanogan Basin averaged 1.08 (range, 0.32-4.00) if harvested fish were not include in the estimate and 2.91 (range, 0.52-13.59) if harvested fish were included in the estimate (Table 8.19). NRRs for more recent brood years will be calculated as soon as all tag recoveries and sampling rates have been loaded into the database.

Table 8.19. Spawning escapements, natural origin recruits (NOR), and natural replacement rates (NRR; with and without harvest) for wild summer Chinook in the Okanogan Basin, 1989-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating summer Chinook NORs and NRRs.)*

Brood year	Spawning escapement	Harvest not included		Harvest included	
		NOR	NRR	NOR	NRR
1989	1,763	2,150	1.22	3,658	2.08
1990	660	1,599	2.42	2,255	3.42
1991	574	578	1.01	887	1.55
1992	473	759	1.61	1,142	2.41
1993	1,485	779	0.52	1,031	0.69
1994	4,032	1,295	0.32	2,087	0.52
1995	3,002	1,993	0.66	3,861	1.29
1996	1,819	930	0.51	2,412	1.33
1997	2,190	3,822	1.75	11,565	5.28
1998	1,092	4,368	4.00	14,841	13.59
1999	3,617	6,312	1.75	21,826	6.03
2000	3,701	1,746	0.47	5,575	1.51
Average	***2,034***	***2,194***	***1.08***	***5,928***	***2.91***

Hatchery Replacement Rates

Hatchery replacement rates were estimated as hatchery adult-to-adult returns. These rates should be greater than the NRRs and greater than or equal to 5.30 (the value in BAMP; Murdoch and Peven 2005). HRRs exceeded NRRs in 10 of the 12 years of data, regardless if harvest was or was not included in the estimate (Table 8.20). Hatchery replacement rates (harvest included in the estimate) for Okanogan/Similkameen summer Chinook have exceeded the BAMP target of 5.30 in 8 of the 12 years of data.

Table 8.20. Hatchery replacement rates (HRR), NRR, and BAMP target (5.30) for summer Chinook in the Okanogan Basin, 1989-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating summer Chinook HRRs and NRRs.)*

Brood year	Harvest not included			Harvest included		
	HRR	NRR	BAMP	HRR	NRR	BAMP
1989	14.78	1.22	5.30	24.50	2.08	5.30
1990	3.55	2.42	5.30	4.86	3.42	5.30
1991	4.34	1.01	5.30	5.03	1.55	5.30
1992	6.07	1.61	5.30	7.63	2.41	5.30
1993	0.42	0.52	5.30	0.56	0.69	5.30
1994	8.91	0.32	5.30	12.09	0.52	5.30
1995	5.72	0.66	5.30	7.44	1.29	5.30
1996	0.08	0.51	5.30	0.09	1.33	5.30
1997	38.24	1.75	5.30	60.46	5.28	5.30

Brood year	Harvest not included			Harvest included		
	HRR	NRR	BAMP	HRR	NRR	BAMP
1998	8.10	4.00	5.30	22.01	13.59	5.30
1999	2.57	1.75	5.30	8.36	6.03	5.30
2000	5.09	0.47	5.30	18.02	1.51	5.30
Average	***7.97***	***1.08***	***5.30***	***14.02***	***2.91***	***5.30***

Smolt-to-Adult Survivals

Smolt-to-adult survival ratios (SARs) were calculated as the number of hatchery adults divided by the number of hatchery smolts released. SARs were based on CWT returns. For the available brood years, SARs have ranged from 0.00006 to 0.03216 for hatchery summer Chinook in the Okanogan Basin (Table 8.21).

Table 8.21. Smolt-to-adult ratios (SARs) for Okanogan/Similkameen summer Chinook; NA = not available.

Brood year	Number of smolts released	Estimated adult captures	SAR
1989	202,125	4,287	0.02121
1990	367,207	958	0.00261
1991	360,380	975	0.00271
1992	537,190	2,294	0.00427
1993	379,139	117	0.00031
1994	217,818	1,528	0.00702
1995	574,197	2,813	0.00490
1996	487,776	30	0.00006
1997	572,531	18,415	0.03216
1998	287,948	7,646	0.02655
1999	610,868	2,715	0.00444
2000	528,639	5,998	0.01135
2001	26,315	275	0.01045
Average	***396,318***	***3,696***	***0.009326***

8.7 ESA/HCP Compliance

Broodstock Collection

Because summer Chinook adults collected at Wells Dam are used for both the Methow and Okanogan supplementation programs, please refer to Section 7.7 for information on ESA compliance during broodstock collection.

Hatchery Rearing and Release

The 2005 brood Okanogan/Similkameen summer Chinook reared throughout their juvenile life-stages at Eastbank Fish Hatchery and Similkameen Acclimation ponds without incident; although there was minor mortality associated with bacterial gill disease (see Sections 8.2 and 8.3). The 2005 brood Okanogan/Similkameen summer Chinook transferred and reared at the Bonaparte pond suffered near complete loss because of bacterial gill disease (see Section 8.3).

The 2005 brood smolt release from the Similkameen pond totaled 275,919 summer Chinook, representing 47.9% of the production objective for the Okanogan/Similkameen program and was within the maximum production levels authorized in ESA Section 10 Permit 1347. The shortfall in production was primarily associated with a shortfall in the number a females collected for brood because of a male-skewed sex ratio in the broodstock (Table 7.4). The 2005 brood smolt release from Bonaparte Pond was estimated to be zero and was influenced by sever mortality associated with bacterial gill disease (see Section 8.3).

Hatchery Effluent Monitoring

Per ESA Permits 1196, 1347, and 1395, permit holders shall monitor and report hatchery effluents in compliance with applicable National Pollution Discharge Elimination Systems (NPDES) (EPA 1999) permit limitations. There were no NPDES violations reported at Chelan PUD Hatchery facilities during the period 1 January 2007 through 31 December 2007. NPDES monitoring and reporting for Chelan PUD Hatchery Programs during 2007 are provided in Appendix E.

Spawning Surveys

Summer Chinook spawning ground surveys conducted in the Okanogan Basin during 2007 were consistent with ESA Section 10 Permit No. 1347. Because of the difficulty of quantifying the level of take associated with spawning ground surveys, the Permit does not specify a take level associated with these activities, even though it does authorize implementation of spawning ground surveys. Therefore, no take levels are reported. However, to minimize potential impacts to established redds, wading was restricted to the extent practical, and extreme caution was used to avoid established redds when wading was required.

SECTION 9: TURTLE ROCK SUMMER CHINOOK

9.1 Broodstock Sampling

Broodstock for the Turtle Rock programs (yearling and sub-yearling) are collected as part of the Wells summer Chinook volunteer program. Refer to Snow et al. (2003) for information related to adults collected for these programs.

9.2 Hatchery Rearing

Rearing History

Number of eggs taken

Broodstock for the Turtle Rock summer Chinook are collected at Wells Dam and consist of volunteers to the hatchery. In recent years some naturally produced fish have been incorporated into the brood. Eyed eggs are transferred from Wells FH to Eastbank FH for rearing. As such, the number of green (unfertilized) eggs collected for this program is reported as part of the Wells summer Chinook program.

Disease

Within the normal and accelerated subyearling program, the primary cause of mortality in the early life stages (swim-up to early ponding) continues to be coagulated yolk as a result of elevated incubation water temperature. Both subyearling groups began exhibiting signs of *Columnaris* shortly before release. As a result of a two week delay in availability of medicated feed, the only solution was to release as soon as possible. The yearling program had no significant health concerns during rearing and no treatments were recommended.

Number of acclimation days

Rearing of the 2005-brood normal and accelerated subyearling Turtle Rock summer Chinook was similar to previous years with fish being held on well water before being transferred to Turtle Rock for final acclimation in May 2006. Fish were released on 3 and 5 July 2006 after 35 days of acclimation on Columbia River water. One group of yearling Turtle Rock summer Chinook was released on 27 April 2007, after 179 days of acclimation on Columbia River water. The Chelan River net pen group was released on 12 May, after 73 days of acclimation on Chelan River water.

Release Information

Numbers released

The 2005 subyearling Turtle Rock summer Chinook program achieved 60.5% of the 810,000 target goal with about 490,074 fish being released (Table 9.1). The 2005 accelerated subyearling summer Chinook program achieved 56.5% of the 810,000 target goal with about 457,340 fish being released (Table 9.2). The 2005 yearling summer Chinook program achieved 102.3% of the 200,000 target goal with about 204,644 fish being released (104,984 from Turtle Rock and 99,660 from the Chelan River net pens) (Table 9.3).

Table 9.1. Numbers of Turtle Rock summer Chinook subyearlings released from the hatchery, 1995-2005. The release target for Turtle Rock summer Chinook subyearlings is 810,000 fish.

Brood year	Release year	Number of smolts
1995	1996	1,074,600
1996	1997	385,215
1997	1998	508,060
1998	1999	301,777
1999	2000	369,026
2000	2001	604,892
2001	2002	214,059
2002	2003	656,399
2003	2004	491,480
2004	2005	411,707
2005	2006	490,074
Average		***500,663***

Table 9.2. Numbers of Turtle Rock summer Chinook accelerated subyearlings released from the hatchery, 1995-2005. The release target for Turtle Rock summer Chinook accelerated subyearlings is 810,000 fish.

Brood year	Release year	Number of smolts
1995	1996	169,000
1996	1997	477,300
1997	1998	521,480
1998	1999	307,571
1999	2000	347,946
2000	2001	449,329
2001	2002	480,584
2002	2003	364,461
2003	2004	289,696
2004	2005	364,453
2005	2006	457,340
Average		***384,469***

Table 9.3. Numbers of Turtle Rock summer Chinook yearling smolts released from the hatchery, 1995-2005. The release target for Turtle Rock summer Chinook is 200,000 smolts.

Brood year	Release year	Number of smolts
1995	1997	150,00
1996	1998	202,727
1997	1999	202,989
1998	2000	217,797

Brood year	Release year	Number of smolts
1999	2001	285,707
2000	2002	165,935
2001	2003	203,279
2002	2004	195,851
2003	2005	215,366
2004	2006	206,734
2005	2007	204,644
Average		***210,103***

Numbers tagged

About 97.8% of the Turtle Rock accelerated subyearling Chinook and 43.4% of the normal subyearling Chinook were adipose fin-clipped and CWT. The remaining fish were released untagged and unmarked. The yearling Chinook were 98.1% CWT and adipose fin-clipped. No 2005 brood Turtle Rock summer Chinook were PIT tagged.

Fish size and condition at release

Size at release of the normal subyearling Turtle Rock summer Chinook was 89.3% and 109.6% of the target fork length and weight, respectively. This brood year was below the target CV for length by 28% (Table 9.4).

Table 9.4. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of Turtle Rock summer Chinook subyearlings released from the hatchery, 1995-2005. Size targets are provided in the last row of the table.

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1995	1996	102	6.3	12.6	36
1996	1997	87	8.0	7.4	62
1997	1998	98	6.2	10.2	45
1998	1999	96	6.3	10.7	43
1999	2000	90	9.0	9.8	46
2000	2001	100	7.1	11.3	40
2001	2002	104	7.2	13.4	34
2002	2003	97	7.3	11.8	39
2003	2004	101	8.0	12.0	43
2004	2005	100	7.8	11.4	40
2005	2006	100	6.5	12.5	36
Targets		***112***	***9.0***	***11.4***	***40***

Size at release of the accelerated subyearling Turtle Rock Chinook was 106.3% and 194.7% of the target fork length and weight, respectively. This brood year exceeded the target CV for length by 1% (Table 9.5).

Table 9.5. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of Turtle Rock summer Chinook accelerated subyearlings released from the hatchery, 1995-2005. Size targets are provided in the last row of the table.

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1995	1996	129	7.1	27.3	17
1996	1997	107	6.5	15.6	29
1997	1998	117	6.0	18.9	24
1998	1999	119	8.0	18.9	24
1999	2000	114	6.7	19.0	24
2000	2001	111	7.0	16.8	27
2001	2002	117	8.4	19.5	23
2002	2003	116	11.3	21.2	21
2003	2004	113	14.9	17.0	30
2004	2005	117	11.3	20.1	23
2005	2006	119	9.1	22.2	21
Targets		***112***	***9.0***	***11.4***	***40***

Size at release of the yearling Turtle Rock summer Chinook was 89.8% and 95.8% of the target fork length and weight, respectively. This brood year exceeded the target CV for length by 122% (Table 9.6).

Table 9.6. Mean lengths (FL, mm), weight (g and fish/pound), and coefficient of variation (CV) of Turtle Rock summer Chinook yearlings released from the hatchery, 1995-2005. Size targets are provided in the last row of the table.

Brood year	Release year	Fork length (mm)		Mean weight	
		Mean	CV	Grams (g)	Fish/pound
1995	1997	-	-	-	-
1996	1998	166	14.2	60.9	7
1997	1999	198	4.6	91.3	5
1998	2000	161	11.9	53.9	8
1999	2001	164	18.6	59.0	8
2000	2002	170	15.3	59.0	8
2001	2003	154	22.3	48.6	9
2002	2004	157	16.7	44.0	12
2003	2005	173	13.8	54.7	8
2004	2006	176	20.6	45.3	7
2005	2007	158	11.0	43.5	10

Targets	***176.0***	***9.0***	***45.4***	***10.0***

Survival Estimates

Normal subyearling releases

Overall survival of the normal subyearling Turtle Rock summer Chinook program from green egg to release was below the standard set for the program (Table 9.7). Lower than expected survival at ponding and post-ponding (because of coagulated yolk) reduced the overall program performance.

Table 9.7. Hatchery life-stage survival rates (%) for Turtle Rock subyearling (zero program) summer Chinook, brood years 2004-2005. Survival standards or targets are provided in the last row of the table.

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
2004	NA	NA	93.5	74.4	93.9	91.4	90.8	99.7	63.1
2005	NA	NA	94.4	87.9	85	84.8	84.2	99.4	69.8
Standard	***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

Accelerated subyearling releases

Overall survival of the accelerated subyearling Turtle Rock summer Chinook program from green egg to release was below the standard set for the program (Table 9.8). Lower than expected survival at ponding and post-ponding (because of coagulated yolk) reduced the overall program performance.

Table 9.8. Hatchery life-stage survival rates (%) for Turtle Rock subyearling (accelerated program) summer Chinook, brood years 2004-2005. Survival standards or targets are provided in the last row of the table.

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
2004	NA	NA	92.5	98.3	93.4	92.4	90.0	97.8	81.8
2005	NA	NA	93.8	94.6	83.7	83.4	81.7	98.8	72.5
Standard	***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

Yearling releases

Overall survival of the yearling Turtle Rock summer Chinook program from green egg to release was above the standard set for the program (Table 9.9). However, lower than expected survival between fertilization and ponding reduced the overall program performance.

Table 9.9. Hatchery life-stage survival rates (%) for Turtle Rock yearling summer Chinook, brood years 2004-2005. Survival standards or targets are provided in the last row of the table.

Brood year	Collection to spawning		Unfertilized egg-eyed	Eyed egg-ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg-release
	Female	Male							
2004	NA	NA	92.9	97.7	96.8	96.4	95.5	99.6	86.7
2005	NA	NA	89.1	97.5	98.1	97.8	96.6	99.1	83.9
Standard	***90.0***	***85.0***	***92.0***	***98.0***	***97.0***	***93.0***	***90.0***	***95.0***	***81.0***

9.3 Life History Monitoring

Life history characteristics of Turtle Rock summer Chinook were assessed by examining carcasses on spawning grounds and by reviewing tagging data and fisheries statistics.

Contribution to Fisheries

Normal subyearling releases

Most of the harvest on Turtle Rock summer Chinook (normal subyearling releases) occurred in the Ocean (Table 9.10). Ocean harvest has made up 59% to 100% of all Turtle Rock summer Chinook harvested. Brood year 1995 provided the largest harvest, while brood year 1997 provided the lowest.

Table 9.10. Estimated number and percent (in parentheses) of Turtle Rock summer Chinook (normal subyearling releases) captured in different fisheries.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational (sport)	
1995	682 (84)	5 (1)	112 (14)	16 (2)	815
1996	72 (80)	0 (0)	5 (6)	13 (14)	90
1997	9 (100)	0 (0)	0 (0)	0 (0)	9
1998	24 (100)	0 (0)	0 (0)	0 (0)	24
1999	583 (76)	7 (1)	75 (10)	100 (13)	765
2000	36 (59)	0 (0)	11 (18)	14 (23)	61
2001	165 (73)	0 (0)	29 (13)	31 (14)	225

Accelerated subyearling releases

Most of the harvest on Turtle Rock summer Chinook (accelerated subyearling releases) occurred in the Ocean (Table 9.11). Ocean harvest has made up 62% to 100% of all Turtle Rock summer Chinook harvested. Brood year 2001 provided the largest harvest, while brood years 1995 and 1997 provided the lowest.

Table 9.11. Estimated number and percent (in parentheses) of Turtle Rock summer Chinook (accelerated subyearling releases) captured in different fisheries.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational (sport)	
1995	3 (100)	0 (0)	0 (0)	0 (0)	3
1996	72 (88)	0 (0)	10 (12)	0 (0)	82
1997	3 (100)	0 (0)	0 (0)	0 (0)	3
1998	93 (95)	2 (2)	3 (3)	0 (0)	98
1999	93 (62)	2 (1)	14 (9)	41 (27)	150
2000	136 (100)	0 (0)	0 (0)	0 (0)	136
2001	196 (65)	0 (0)	32 (11)	73 (24)	301

Yearling releases

Most of the harvest on Turtle Rock summer Chinook (yearling releases) occurred in the Ocean (Table 9.12). Ocean harvest has made up 71% to 95% of all Turtle Rock summer Chinook harvested. Brood year 1998 provided the largest harvest, while brood year 1995 provided the lowest.

Table 9.12. Estimated number and percent (in parentheses) of Turtle Rock summer Chinook (yearling releases) captured in different fisheries.

Brood year	Ocean fisheries	Columbia River Fisheries			Total
		Tribal (Zone 6)	Commercial (Zones 1-5)	Recreational (sport)	
1995	428 (74)	6 (1)	77 (13)	70 (12)	581
1996	725 (95)	1 (0)	15 (2)	21 (3)	762
1997	2,742 (90)	29 (1)	99 (3)	176 (6)	3,046
1998	4,251 (90)	22 (0)	212 (4)	229 (5)	4,714
1999	1,656 (74)	12 (1)	207 (9)	365 (16)	2,240
2000	1,163 (75)	1 (0)	136 (9)	242 (16)	1,542
2001	2,456 (71)	0 (0)	325 (9)	694 (20)	3,475

Straying

Normal subyearling releases

Rates of Turtle Rock summer Chinook (normal subyearling releases) straying into spawning areas in the upper basin have been low (Table 9.13). Although a few Turtle Rock summer Chinook have strayed into other spawning areas, straying, on average, has been less than 5%. The Chelan tailrace has received the largest number of Turtle Rock strays.

Table 9.13. Number (No.) and percent of spawning escapements within other non-target basins that consisted of Turtle Rock summer Chinook (normal subyearling releases), return years 1998-2004. For example, for return year 2003, 0.7% of the summer Chinook spawning escapement in the Methow Basin consisted of Turtle Rock summer Chinook. Percent strays should be less than 5%.

Return year	Wenatchee		Methow		Okanogan		Chelan		Entiat		Hanford Reach	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1998	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1999	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2000	8	0.2	3	0.3	13	0.4	63	9.5	0	0.0	0	0.0
2001	0	0.0	5	0.2	13	0.1	0	0.0	0	0.0	0	0.0
2002	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2003	0	0.0	26	0.7	19	0.6	13	3.1	0	0.0	9	0.0
2004	5	0.1	8	0.4	0	0.0	8	1.9	0	0.0	0	0.0
Total	***13***	***0.0***	***42***	***0.3***	***45***	***0.1***	***84***	***2.6***	***0***	***0.0***	***9***	***0.0***

On average, about 37% of the returns have strayed into spawning areas in the upper basin (Table 9.14). Depending on brood year, percent strays into spawning areas have ranged from 24-100%. Few (1% on average) have strayed into non-target hatchery programs.

Table 9.14. Number and percent of Turtle Rock summer Chinook (normal subyearling releases) that homed to the target hatchery and strayed to non-target spawning areas and non-target hatchery programs, by brood years 1995-2001.

Brood year	Homing				Straying			
	Target stream		Target hatchery		Non-target streams		Non-target hatcheries	
	Number	%	Number	%	Number	%	Number	%
1995	-	-	197	74.1	64	24.1	5	1.9
1996	-	-	54	54.5	44	44.4	1	1.0
1997	-	-	2	28.6	5	71.4	0	0.0
1998	-	-	0	0.0	24	100.0	0	0.0
1999	-	-	79	56.8	60	43.2	0	0.0
2000	-	-	5	50.0	5	50.0	0	0.0
2001	-	-	28	63.6	16	36.4	0	0.0
Total	**-**	**-**	***365***	***62.0***	***218***	***37.0***	***6***	***1.0***

Accelerated subyearling releases

Rates of Turtle Rock summer Chinook (accelerated subyearling releases) straying into spawning areas in the upper basin have been very low (Table 9.15). Although a few Turtle Rock summer Chinook have strayed into other spawning areas, straying, on average, has been less than 1%. The Chelan tailrace, Okanogan Basin, and Methow Basin have received the largest number of Turtle Rock strays.

Table 9.15. Number (No.) and percent of spawning escapements within other non-target basins that consisted of Turtle Rock summer Chinook (accelerated subyearling releases), return years 1998-2004. For example, for return year 2001, 0.4% of the summer Chinook spawning escapement in the Methow Basin consisted of Turtle Rock summer Chinook. Percent strays should be less than 5%.

Return year	Wenatchee		Methow		Okanogan		Chelan		Entiat		Hanford Reach	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1998	3	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1999	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2000	7	0.2	0	0.0	0	0.0	24	3.6	0	0.0	0	0.0
2001	0	0.0	12	0.4	31	0.3	0	0.0	0	0.0	0	0.0
2002	0	0.0	5	0.1	7	0.1	0	0.0	0	0.0	0	0.0
2003	4	0.0	4	0.1	0	0.0	3	0.7	0	0.0	0	0.0
2004	0	0.0	0	0.0	7	0.1	3	0.7	0	0.0	18	0.0
Total	***14***	***0.0***	***21***	***0.1***	***45***	***0.1***	***30***	***0.9***	***0***	***0.0***	***18***	***0.0***

On average, about 51% of the returns have strayed into spawning areas in the upper basin (Table 9.16). Depending on brood year, percent strays into spawning areas have ranged from 0-83%. None of these fish have strayed into non-target hatchery programs.

Table 9.16. Number and percent of Turtle Rock summer Chinook (accelerated subyearling releases) that homed to the target hatchery and strayed to non-target spawning areas and non-target hatchery programs, by brood years 1995-2001.

Brood year	Homing				Straying			
	Target stream		Target hatchery		Non-target streams		Non-target hatcheries	
	Number	%	Number	%	Number	%	Number	%
1995	-	-	7	70.0	3	30.0	0	0.0
1996	-	-	33	32.4	69	67.6	0	0.0
1997	-	-	6	100.0	0	0.0	0	0.0
1998	-	-	2	16.7	10	83.3	0	0.0
1999	-	-	21	42.9	28	57.1	0	0.0
2000	-	-	12	40.0	18	60.0	0	0.0
2001	-	-	42	100.0	0	0.0	0	0.0
Total	**-**	**-**	***123***	***49.0***	***128***	***51.0***	***0***	***0.0***

Yearling releases

Rates of Turtle Rock summer Chinook (yearling releases) straying into spawning areas in the upper basin have varied widely depending on spawning area (Table 9.17). Most of these fish strayed to spawning areas within the Chelan tailrace, Methow Basin, and Entiat Basin. Relatively few, on average, have strayed to spawning areas in the Okanogan Basin, Wenatchee Basin, and Hanford Reach.

Table 9.17. Number (No.) and percent of spawning escapements within other non-target basins that consisted of Turtle Rock summer Chinook (yearling releases), return years 1998-2004. For example, for return year 2003, 4.3% of the summer Chinook spawning escapement in the Methow Basin consisted of Turtle Rock summer Chinook. Percent strays should be less than 5%.

Return year	Wenatchee		Methow		Okanogan		Chelan		Entiat		Hanford Reach	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1998	0	0.0	2	0.3	0	0.0	0	0.0	0	0.0	0	0.0
1999	3	0.1	2	0.2	0	0.0	0	0.0	0	0.0	0	0.0
2000	18	0.4	57	4.8	167	4.5	73	11.0	0	0.0	10	0.0
2001	109	1.2	523	18.9	334	3.1	316	32.1	0	0.0	7	0.0
2002	92	0.7	437	9.4	194	1.4	191	32.8	136	27.1	0	0.0
2003	64	0.7	170	4.3	14	0.4	165	39.4	0	0.0	9	0.0
2004	10	0.1	55	2.5	118	1.7	78	18.6	0	0.0	0	0.0
Total	***296***	***0.6***	***1,246***	***7.6***	***827***	***1.9***	***823***	***24.9***	***136***	***5.9***	***26***	***0.0***

On average, about 75% of the returns have strayed into spawning areas in the upper basin (Table 9.18). Depending on brood year, percent strays into spawning areas have ranged from 46-86%. Few (<1% on average) have strayed into non-target hatchery programs.

Table 9.18. Number and percent of Turtle Rock summer Chinook (yearling releases) that homed to the target hatchery and strayed to non-target spawning areas and non-target hatchery programs, by brood years 1995-2001.

Brood year	Homing				Straying			
	Target stream		Target hatchery		Non-target streams		Non-target hatcheries	
	Number	%	Number	%	Number	%	Number	%
1995	-	-	180	39.3	278	60.7	0	0.0
1996	-	-	218	27.2	583	72.8	0	0.0
1997	-	-	254	14.3	1,524	85.6	3	0.2
1998	-	-	166	19.2	698	80.7	1	0.1
1999	-	-	181	43.4	236	56.6	0	0.0
2000	-	-	96	29.4	231	70.6	0	0.0
2001	-	-	161	54.2	136	45.8	0	0.0
Total	**-**	**-**	***1,256***	***25.4***	***3,686***	***74.5***	***4***	***0.1***

Hatchery Replacement Rates

Hatchery replacement rates were estimated as hatchery adult-to-adult returns. In all years, HRRs for summer Chinook released as yearlings were greater than HRRs for Chinook released as subyearlings (Table 9.19). HRRs based on subyearling releases were consistently less than 5.3, whereas those for yearling releases were consistently greater than 5.3.

Table 9.19. Hatchery replacement rates (HRR) for Turtle Rock summer Chinook released as subyearlings or yearlings, 1995-2000. *(The numbers in this table may change as the HETT and HC refine the methods for estimating summer Chinook HRRs.)*

Brood year	Subyearling releases		Yearling releases	
	HRR (harvest not included)	HRR (harvest included)	HRR (harvest not included)	HRR (harvest included)
1995	0.79	2.11	7.31	12.27
1996	0.66	1.03	8.14	14.98
1997	0.03	0.08	24.79	56.48
1998	0.09	0.17	17.31	71.00
1999	0.97	3.72	1.72	9.02
Average	***0.51***	***1.42***	***11.85***	***32.75***

Smolt-to-Adult Survivals

Smolt-to-adult survival ratios (SARs) were calculated as the number of hatchery adults divided by the number of hatchery subyearling or yearling Chinook released. SARs were based on CWT returns.

Normal subyearling releases

For the available brood years, SARs for normal subyearling-released Chinook have ranged from 0.000031 to 0.004340 (Table 9.20).

Table 9.20. Smolt-to-adult ratios (SARs) for Turtle Rock normal subyearling-released summer Chinook.

Brood year	Number released	Estimated adult captures	SAR
1995	1,074,600	203	0.000189
1996	385,215	188	0.000488
1997	508,060	16	0.000031
1998	301,777	30	0.000099
1999	201,615	875	0.004340
2000	604,892	26	0.000043
2001	214,059	269	0.001257
Average	***470,031***	***230***	***0.000488***

Accelerated subyearling releases

For the available brood years, SARs for accelerated subyearling-released Chinook have ranged from 0.000006 to 0.000971 (Table 9.21).

Table 9.21. Smolt-to-adult ratios (SARs) for Turtle Rock accelerated subyearling-released summer Chinook.

Brood year	Number released	Estimated adult captures	SAR
1995	169,000	13	0.000077
1996	477,300	77	0.000161
1997	521,480	3	0.000006
1998	307,571	66	0.000215
1999	202,916	197	0.000971
2000	449,302	71	0.000158
2001	480,584	141	0.000293
Average	***372,593***	***81***	***0.000218***

Yearling releases

For the available brood years, SARs for yearling-released Chinook have ranged from 0.006813 to 0.025580 (Table 9.22).

Table 9.22. Smolt-to-adult ratios (SARs) for Turtle Rock yearling-released summer Chinook.

Brood year	Number released	Estimated adult captures	SAR
1995	150,000	1,022	0.006813
1996	202,727	1,514	0.007468
1997	202,989	4,757	0.023435
1998	217,319	5,559	0.025580
1999	285,707	2,626	0.009191
2000	279,969	1,868	0.006672
2001	314,584	3,730	0.011857
Average	***236,185***	***3,011***	***0.012748***

9.4 ESA/HCP Compliance

Broodstock Collection

The 2005 brood Turtle Rock summer Chinook program is supported through adult collections at the volunteer trap at Wells Fish Hatchery and in conjunction with the Wells summer Chinook collections. During 2005, broodstock collections at the volunteer trap were consistent with the 2005 Upper Columbia River Salmon and Steelhead Broodstock Objectives and site-based broodstock collection protocols as required in ESA permit 1347. The 2005 collection totaled ?? summer Chinook (combined Wells Fish Hatchery and Turtle Rock Fish Hatchery programs).

Hatchery Rearing and Release

Brood year 2005 releases totaled 1,152,058 fish, including yearling, regular subyearling, and accelerated subyearling releases (204,644; 490,074 and 457,340 juveniles, respectively). These releases represented ??% and ??% of the Rocky Reach HCP and ESA Section 10 Permit 1347 production for Turtle Rock yearling and subyearling production, respectively.

Consistent with ESA Permit 1347, a total of ?? normal and accelerated subyearling Chinook were adipose fin clipped and coded-wire tagged. The remainder of the subyearling production was released untagged and unmarked. The yearling Chinook were 100% CWT and adipose fin-clipped. No 2005 brood Turtle Rock summer Chinook were PIT tagged. See Section 9.2 for specific rearing, tagging, and release information related to the 2005 brood Turtle Rock summer Chinook program.

SECTION 10: REFERENCES

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SECTION 11: APPENDICES

Appendix A: **Abundance and Total Numbers of Chinook Salmon and Trout in the Chiwawa River Basin, Washington, 2007.**

Appendix B: **Fish Trapping at the Chiwawa, Upper Wenatchee, and Lower Wenatchee Smolt Traps during 2007.**

Appendix C: **Summary of ISEMP PIT Tagging Activities in the Wenatchee Basin, 2007.**

Appendix D: **Wenatchee Steelhead Spawning Ground Surveys, 2007.**

Appendix E: **NPDES Hatchery Effluent Monitoring, 2007.**

Appendix F: **Steelhead Stock Assessment at Priest Rapids Dam, 2007.**

Appendix G: **Wenatchee Sockeye and Summer Chinook Spawning Ground Surveys, 2007.**

Appendix H: **Genetic Diversity of Wenatchee Sockeye Salmon, 2007.**

Appendix I: **Genetic Diversity of Natural Chiwawa River Spring Chinook Salmon, 2007.**

Appendix J: **Summer Chinook Spawning Ground Surveys in the Methow and Okanogan Basin, 2007.**