

FY 2008 Tribal Hatchery Reform Project Proposals

Type I Projects – Projects Involving Data Collection to Improve, Evaluate or Monitor Hatchery Practices

Project Title: Umbrella Creek Sockeye Adult Escapement Monitoring

Sponsor: Makah Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Continue program as designed.*

HSRG Guidelines:

- Fish should be released at life stages and locations that maximize homing fidelity.
- Marking/tagging techniques should be used to distinguish among segments of the hatchery population and between the hatchery and natural populations.
- Fish should be identified with nonlethal detectable identification marks or tags.
- Straying of hatchery fish into the wild should be controlled.

Summary of Relevance:

The Lake Ozette sockeye Hatchery Genetic Management Plan (HGMP) (MFM 2000) section 10.4 includes monitoring adult sockeye returns in all spawning areas to distinguish between hatchery-origin (HOR) and natural-origin (NOR) fish; and to precisely estimate the proportions of these two populations both in the hatchery and on the spawning grounds to assure that brood stock removals are representative of the overall population. The HSRG recommends that the Lake Ozette sockeye program “continue the program as designed”. To successfully monitor the proportion of the HOR and NOR adult returns, the first step is to accurately estimate the total number of adults in the population. This project provides the data crucial to determining the maximum allowable brood stock removal rate based upon stipulations set forth in the RMP/HGMP. Specifically, the program is limited to the lesser of 15% or 40 spawning pairs that are representative of the Umbrella Creek escapement, for releases into Umbrella Creek. The program is also allowed to retain the lesser of 15% or 60 additional spawning pairs, when escapement exceeds 534 adults, for the Big River release program. These rates were established to protect the naturally spawning population from excessive brood stock removals and to ensure that brood stock were representative of the natural spawner HOR and NOR composition.

The in-season escapement estimate will determine the allowable brood stock removals per the HGMP brood stock guidelines. The ratios of adipose fin clip adults captured in this trap will be used to provide preliminary abundance estimates and trends of natural and hatchery-origin adults during the brood stock collection period; and to detect any tributary entry timing anomalies between hatchery and natural-origin recruits. The analysis and identification of the thermal otolith marks applied to 100% of the hatchery production allows differentiation between the various hatchery release treatments and the naturally produced sockeye smolts. Information gained by more complete evaluation of freshwater survival rates from the various rearing and

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release strategies will be incorporated into future plans to maximize the effectiveness of hatchery effort and minimize risks to naturally spawning populations. The overall goal of hatchery supplementation is to increase the recovery rate of the Lake Ozette sockeye without compromising the genetic integrity of the natural spawning population. The results of the different release treatment comparisons provided by the otolith analysis will be utilized to further refine the program release goals including; total release numbers, release location, and size and time of release.

Project Title: Lake Ozette Sockeye Smolt Calcein Marking & Monitoring

Sponsor: Makah Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Continue program as designed.*

HSRG Guidelines:

- Fish should be released at life stages and locations that maximize homing fidelity.
- Marking/tagging techniques should be used to distinguish among segments of the hatchery population and between the hatchery and natural populations.
- Fish should be released within the size range of naturally produced fish from which the hatchery population is derived.

Summary of Relevance:

The overall goal of the hatchery supplementation is to increase the recovery rate of the Lake Ozette sockeye without compromising the genetic integrity of the natural spawning population. The HSRG recommends that the Lake Ozette sockeye program “continue the program as designed”. The Lake Ozette sockeye HGMP (MFM 2000) section 10.1 includes installation and operation of a screw trap in the Ozette river to estimate overall fresh water and marine survival and productivity. Monitoring of hatchery-produced smolts is done through relative counts of ad-marked and unmarked fish and analyses of otolith thermal marks from incidental mortality. The addition of calcein as a mass mark allows differentiation between hatchery fed fry releases and naturally produced sockeye smolts and increases the amount and detail of information available. It also allows more timely evaluation of the effects of different hatchery rearing and release strategies and facilitates adaptive management of hatchery operations.

Information gained by more complete evaluation of freshwater survival rates from the various rearing and release strategies will be incorporated into future plans to maximize the effectiveness of hatchery effort and minimize risks to naturally spawning populations. Pending the results of the differential mark detection, we may also be able to eliminate ad-marking of fingerling groups, which will reduce both costs and fish stress.

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Project Title: Stillaguamish Chinook Smolt Production Estimation-Characteristics of Hatchery & Wild Interactions.

Sponsor: Stillaguamish Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Monitor juvenile growth, distribution, post-release survival, and the length-frequency/age-class distribution of hatchery- and natural-origin constituting adult recruits.*

HSRG Guidelines:

- Fish should be released within the size range of naturally produced fish from which the hatchery population is derived.

Summary of Relevance:

This project is a component of monitoring the Stillaguamish Chinook Natural Stock Restoration program. The February 2002 HSRG regional review document states a recommendation for the Stillaguamish is to monitor growth and post-release survival of hatchery-origin Chinook juveniles. A mainstem smolt trap low in the river system is the best way to measure how many hatchery fish survive release to reach the estuary, and serves as an excellent platform from which to monitor growth trajectories of both hatchery and wild-origin Chinook smolts. Feeding rates and the hatchery release strategy have been altered based on data collected over the past several years. This monitoring effort is critical in evaluating whether the integrated recovery hatchery program is meeting its goals. It is also necessary for evaluating the effectiveness of attempts to improve conditions in the watershed for the threatened Stillaguamish Chinook. Therefore, the Stillaguamish smolt trapping program directly addresses this recommendation from the HSRG regional review.

Project Title: Monitoring the Contribution of Tulalip Hatchery Chinook to Terminal Fisheries & Local Natural Spawning Populations Using Otoliths, Coded-wire Tags & Scales

Sponsor: Tulalip Tribes

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Design studies that evaluate different approaches to manage potential straying problems, while proceeding with the evaluation of the summer chinook program.*
- *Implement a Skykomish brood stock program consistent with the goals of the Snohomish summer chinook population.*
- *Implement adipose fin clip mass marking to maximize targeted harvest rates and to assess straying.*

Summary of Relevance:

The HSRG review of the Stillaguamish/Snohomish region recommended marking 100% of the Tulalip Chinook and coho production to understand the factors that result in observed rates of contribution of hatchery fish to local wild spawning populations. The HSRG states: “*Design studies that evaluate different approaches to manage potential straying problems, while proceeding with the evaluation of the*

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summer Chinook program...” This stock assessment program continues to enable the co-managers to distinguish hatchery-origin Chinook from natural fish returning to spawn in natural spawning areas and at hatcheries in the Snohomish basin. Through the use of thermal mass marking of otoliths, coded-wire tagging, fin-clipping, and mark/tag recoveries under this program, we have produced accurate estimates of stray rates because of the ability to differentially mark individual hatchery groups. HGMP and HSRG operational guidelines have been implemented under this program as well; developing new policies for integrating Snohomish summer Chinook and developing an upstream passage and broodstocking policy that implements and exceeds HSRG guidelines.

Otoliths, scales, adipose fin clip and coded-wire tag status, recorded for Chinook caught in fisheries and on the spawning grounds have provided important information on the following: relative survival rates for summer and fall Chinook stocks, contribution rates of both stocks to fisheries, relative straying rates, natural and hatchery escapements to Snohomish region hatchery and natural spawning areas, incidental impacts on wild Chinook while targeting a particular stock in fisheries, comparisons of relative timing, distribution, size at age, and ex-vessel value among the two stocks. These analyses have already been used in adaptive management, in improving fishery data and management, and incorporated in the 2005 Co-managers’ Hatchery management Plan for the Snohomish Basin (see also Rawson, Kraemer, and Volk 2001).

Project Title: Monitor Survival, Timing, Distribution and Contribution Rates of Tulalip Hatchery Chinook to Fisheries, Hatcheries and Natural Populations Using Coded-wire Tags.

Sponsor: Tulalip Tribes

HSRG Recommendations:

- *Consider summer Chinook as a substitute for out-of-basin-origin fall chin as a broodstock choice for this program.*
- *Reduce or suspend the program pending the outcome of the ongoing straying study to avoid impacts on the Snoqualmie fall Chinook population.*
- *Design studies that evaluate different approaches to manage potential Chinook straying problems (see HSRG text for full recommendation – Hatchery Reform Recommendations February 2002. Page 138).*

Summary of Relevance:

The main concern about the Tulalip Chinook programs (from both the Hatchery Scientific Review Group and NOAA Fisheries) was to change broodstock source from fall to summer Chinook and to continue to monitor their contributions to fisheries and escapements. The HSRG recommendations mentioned above necessitated this study, which enabled us to make the change to the locally adapted summer stock in 2003. The HSRG and NOAA Fisheries also recommended continuing marking and tagging under this program in order to continue to assess the

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contribution of hatchery and natural Chinook to fisheries and escapements, and assess straying. Indeed the entire Snohomish escapement estimate of natural and hatchery Chinook depends on this study getting funded annually, and the lack of 2006 funding jeopardized this essential assessment. Tagging under this study is essential to implement broodstock integration, which requires identification of hatchery- and natural-origins. Coded-wire tagging is the only way to determine survival, fishery exploitation, and all of the other objectives stated previously.

Coded-wire tag recoveries for Tulalip summer Chinook caught in fisheries, returning to hatcheries, and recovered on natural spawning grounds continue to provide important information on the following: survival rate, contribution rates to fisheries, straying rates, natural and hatchery escapements to Snohomish region hatchery and natural spawning areas, incidental impacts on wild Chinook while targeting this particular stock in fisheries, comparisons of relative timing, distribution, size at age, and ex-vessel value among the two stocks. These analyses have already been used in adaptive management, in improving fishery data and management, and incorporated in the Co-managers' Hatchery Management Plan for the Snohomish Basin (see also Rawson, Kraemer, and Volk 2001).

Project Title: Assessment of the Composition of the Coho Salmon Population in the Elwha River: Hatchery Origin vs. Natural Origin, Fish Wheel Construction & Operation.

Sponsor: Elwha Klallam Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Estimate the proportion of hatchery-origin fish among the natural spawners.*

Summary of Relevance:

The project will quantify total estimated returns of coho salmon to the Elwha River basin. Currently no accurate assessment of returns exists. The HSRG in their review of the Eastern Straits Region (2002) called for managers to use appropriate measures of success to help guide managers in the evaluation of the success and impact of hatchery programs on natural populations. Accurate quantification of hatchery returns will provide a more appropriate measure of the success of existing hatchery production programs.

The HSRG review of the Eastern Straits recommended that managers develop techniques that *estimate the proportion of hatchery-origin fish among natural spawners* (HSRG 2002). The proposed fish wheel project will permit managers to accurately make this estimation and implement the recommendation.

Project Title: Determine if the Allozyme Genetic Mark in Tulalip Hatchery Chum Salmon is Detectable with DNA Analysis.

Sponsor: Tulalip Tribes

Specific HSRG Recommendations and HSRG Guidelines Addressed:

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HSRG Recommendations:

- *Resume allozyme genetic analysis for this program for the purpose of monitoring contribution of hatchery fish to harvest and naturally spawning populations.*

Summary of Relevance:

The HSRG review of the Stillaguamish/ Snohomish region recommended that we continue allozyme genetic analysis of Tulalip chum salmon for the purpose of monitoring contribution of hatchery fish to harvest and naturally spawning populations. Tulalip has continued to monitor adult hatchery chum contribution rates to fisheries, hatcheries, and natural escapements annually. We also monitor out-migrant fry each year from naturally-spawning populations to confirm that hatchery chum are not spawning in the wild. This fry monitoring is also conducted from our own hatchery to confirm that the unique genetic mark continues to be expressed in 100% of the offspring.

If Tulalip Hatchery chum are suitably distinct at microsatellite loci then they will continue to be able to be assayed at any relatively up-to-date genetics laboratory using DNA. At this time, there are no laboratories in western Washington, and only a couple on the west coast (one at UC Davis) that can conduct the allozyme assay. The Tulalip lab will fill this need, once final equipment and supplies are obtained. While we have nearly all of the materials to establish an allozyme laboratory, we are lacking this remaining supplies and equipment that could finally be covered under this proposal. If this pilot study determines that microsatellite DNA can successfully differentiate Tulalip chum salmon, then we could contract out our GSI to a variety of labs in the area and contribute to the development of chum salmon databases using current techniques. If the microsatellite loci examined do not differentiate Tulalip chum, then we will still be able to conduct our own GSI using protein electrophoresis, at only the cost of supplies, which is very low, once the lab is complete. If we do develop a new DNA assay, protein electrophoresis (or allozyme analysis) is more cost-effective and will still be used at Tulalip as the main genetic diagnostic tool for routine Hatchery Reform monitoring in the future. However, DNA is also being used in US-Canadian mixed stock fishery analysis and is a much more common tool used in many laboratories.

Project Title: Acquire Scale Reading & CWT Extraction Capabilities, & Use to Identify Components of Terminal Return

Sponsor: Skagit River System Cooperative

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Evaluate the benefits of this hatchery stock as an “index” stock for spring chinook in the Skagit River relative to the economic costs and biological risks of maintaining this program.*
- *Implement monitoring and evaluation as a basic component, of both wild steelhead management zones and hatchery harvest streams.*

HSRG Guidelines:

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- The annual contribution of hatchery fish to natural spawning should be directly or indirectly estimated.

Summary of Relevance:

This project addresses multiple HSRG regional review recommendations. Besides those listed above, the HSRG also comments on managing for success (April 2005 HSRG Report to Congress): *“It is likely that additional spawning surveys and biosampling will be needed in this region, as in others, in order for adequate accuracy and precision to be achieved”*. Also from this document: *“...the potential need to expand spawning ground surveys and stock identification sampling programs, in particular, should be reviewed as a part of the development of a comprehensive monitoring plan for the region. The monitoring of hatchery contributions to harvest and natural spawning escapement is critical for tracking the success of both integrated and segregated programs.Stable funding is needed for long-term monitoring of stock composition on the spawning grounds.”* This stock assessment program continues to enable the co-managers to distinguish hatchery-origin steelhead and Chinook from natural fish returning to natural spawning areas and hatcheries in the Skagit basin, and in the fisheries composition. Through the use of coded-wire tagging, fin-clipping, and scale examination, we can produce estimates of stray rates and fisheries contribution.

Scales, adipose fin clip, and coded-wire tag status recorded for Chinook and steelhead caught in fisheries and on the spawning grounds have provided important information on: relative return rates for spring, summer, and fall Chinook stocks and steelhead, contribution rates of both stocks to fisheries, relative straying rates, natural and hatchery escapements to Skagit region hatchery and natural spawning areas, incidental impacts on wild Chinook while targeting a particular stock in fisheries, comparisons of relative timing, and distribution. However, because scales and snouts are presently shipped to WDFW for processing, we have little control over when these samples will be processed. Frequently, due to backlogs or other priorities at WDFW, the aging and CWT reading is provided too late for use in sibling forecasts. Survival rate estimates, which are also needed for preseason forecasts, may be a couple years out of date. By doing these analyses in-house, according to tribal priorities, we will improve fishery data and management.

Project Title: Kalama Creek Fall Chinook CWT

Sponsor: Nisqually Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Guidelines:

- Marking/tagging techniques should be used to distinguish among segments of the hatchery population and between the hatchery and natural populations.
- Fish should be identified with nonlethal detectable identification marks or tags.

Summary of Relevance:

The HSRG recommends annual coded-wire tagging (CWT) in order to reconstruct recruitment and estimate productivity (HSRG Principles and Recommendations April

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2004). It is necessary to annually monitor and evaluate this program to verify that it's benefits, in terms of fishing contributions, outweigh the risk to the naturally produced fish within this system. The HSRG also states that hatchery programs need to be "*Scientifically Defensible*", and this requires annual CWT.

Project Title: Impacts of Hatchery Steelhead Smolt Release Levels on Wild & Hatchery Steelhead Survival Rates.

Sponsor: Skagit River System Cooperative

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Investigate the reasons for the recent decline in adult winter steelhead returns, formulate a working hypothesis for the decline, and take appropriate actions.*

Summary of Relevance:

Investigating the reasons for steelhead declines is a large topic, and this project is intended to address only a sub-question of that topic: "***To what extent have hatchery steelhead plants, at current levels, contributed to this decline?***" Hatchery steelhead can reduce survival rates of wild (and hatchery) steelhead through four mechanisms: 1) Competition; 2) Predation; 3) Genetic interactions; and 4) Disease. This project addresses the predation question by examining stomach contents of hatchery smolts. It investigates the genetic interactions question by estimating the percentage of the wild smolt outmigration and wild adult return that had hatchery ancestry. And it approaches the overall question of whether current levels of steelhead plants have indeed had a deleterious effect by examining statistically whether there is a difference in survival rate trends between systems that have hatchery steelhead and those that don't, and between those systems that have increased their hatchery steelhead planting levels and those that haven't.

Led by Seattle City Light biologists, the Skagit Non-Flow Coordinating Committee is forming a group of "experts" (academics, agency people, co-managers, consultants, and other derelicts) to develop a plan to systematically investigate the reasons for declining returns of Skagit steelhead. Their research recommendations will likely guide funding proposals for FY 2009. In the interim, results of this project will help guide their recommendations. For example, if it appears that few returning wild adults have hatchery ancestry, then pollution of the gene pool from hatchery fish is probably not the cause of the decline, and we can study competition (or predation) more closely (if the converse occurred, we would probably have to change the release size and locations to reduce the genetic interactions). Then, if statistical analysis indicates that rivers with hatchery plants fared relatively worse than rivers without hatchery fish, we might explore the competition/predation impacts by alternating between high and low planting levels in the Skagit (or between paired tributaries or nearby rivers). If there was no difference in trends between rivers with hatchery plants, and rivers without, then we could hypothesize that marine factors may have caused the decline. One of those marine factors, however, could be the number of hatchery steelhead released region-wide. That could be tested by alternating between

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high and low planting levels region-wide. Eventually, this will result in a scientifically-defensible hatchery steelhead program that is consistent with tribal goals.

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Type II Projects – Construction Projects to Retrofit, Modify, or Build Facilities to Improve Hatchery Practices

Project Title: Install Bird Net & Fencing at Lower Tulalip Creek Pond.

Sponsor: Tulalip Tribes

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Determine whether returns from the summer chinook program are sufficient to meet the ceremonial purposes. If not, facilities at Tulalip Bay must be upgraded to provide appropriate rearing conditions for spring chinook. .*

HSRG Guidelines:

- Fish should be reared under conditions that maximize the probability that all segments of the population contribute equally to the release population.
- Predators should be excluded from ponds to prevent the spread of pathogens between containers.

Summary of Relevance:

The measure is to prevent predation and concurrently increase survival and numbers released. It will be measured by assessing the survival rate, which should be closer to 95% during this period of early rearing. We will be able to see if birds are getting under the net or if otters are getting through the fencing, and if they are, the operational changes will be that we will repair it until they can't get in, which will undoubtedly result in measuring increases in survival. This will result in increased returns, increased income to the terminal area Tribal fishery and non-Treaty fishery as well as to both Tribal and non-Treaty pre-terminal fisheries as well.

Project Title: Oxygen Generator with Low Head Oxygenator.

Sponsor: Suquamish Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Develop on-site incubation capability to eliminate the need for transfers. In the short term, Minter Creek-bound eggs should be eyed at a Suquamish Tribal facility, to reduce disease risk.*

Summary of Relevance:

The HSRG recommended that the eye up of all Suquamish Chinook production should occur at Grover's Creek Hatchery. This amounts to approximately three million eggs. Of these, 2.2 million are for the Gorst Pond facility and 500,000 are for Grover's Creek Hatchery. Two million chum eggs are also eyed up at the hatchery. The ability to have water of good quality, even if it is limited quantity, will help us meet those goals.

The Grover's Creek salmon hatchery water supply has three major difficulties: The first problem is a lack of good quality well water (this is the basis of another proposal). The second problem is iron bacteria and the slime it produces. This is a

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problem for incubation, primarily for chum which take longer to eye up than Chinook. The third problem is low levels of dissolved oxygen (DO). Adding oxygen will directly address this problem, and will also partially address the other issues by improving the water quality. Having 300 to 500 gpm of oxygenated well / surface water, for both incubation and to supplement the creek water for rearing, will improve both phases of operations.

Project Title: Nisqually River Floating Weir Construction & Installation.

Sponsor: Nisqually Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Introduce an average of 10% naturally spawning fish into the hatchery broodstock each year for on-station releases.*

HSRG Guidelines:

- Straying of hatchery fish into the wild should be controlled.

Summary of Relevance:

The HSRG supported phase 2 of this project with a grant in 2006 to conduct the field testing. This weir will allow the tribe to continue a large and successful Chinook hatchery program. In 2006 this program contributed 21,000 to the fishery and had a rack return of 18,000. It will provide management capabilities to increase naturally produced fish (2006 est. 3,000 or 60% HORs) by providing real-time accurate escapement numbers, rather than an escapement estimate based on index area surveys totaled after the season. It will enable a transition to an integrated program at the 10-20% level as well as control straying of hatchery fish onto the spawning grounds, both HSRG recommendations. The AHA model developed by the HSRG clearly shows that given the large hatchery program (4M smolts), the relatively small NOR population (1,200 est. adults) and the high stray rate of HORs, that the weir is the most likely tool to allow the Tribe to continue to fish and recover Chinook at the same time. The weir/trap and sorting station will also provide a variety of opportunities to monitor and evaluate NORs and conduct additional research as deemed appropriate.

The results of this project will be used for permitting and acquiring funding for the building and operation of this ambitious project. It is believed that this floating weir can be successfully operated during Chinook returns (July-October) to harvest HORs, above the hatcheries and below the significant spawning grounds, and enumerate NORs.

Project Title: Evaluate & Correct Problems in Water Intake System to Eliminate Supersaturation of Gases at Lonesome Creek Hatchery.

Sponsor: Quileute Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

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HSRG Guidelines:

- Eggs should be incubated under environmental conditions that tend to maximize survival of all segments of the population.
- All fish should be reared under environmental conditions that tend to maximize survival of all segments of the population.
- Species-specific incubation recommendations should be followed for water quality, flows, temperature, substrate and density parameters to prevent syndromes such as “gas bubble disease”, “cold water disease”, blue sac”, etc.

Summary of Relevance:

This project will allow Lonesome Creek Hatchery to achieve many of HSRG’s Operational Guidelines, for both incubation and rearing. The proposed de-gassing system (packed column) will maximize the survival of fish, from the egg stage up until they are released or moved to a different facility.

For hatcheries with a working head of 50 feet like Lonesome Creek, a packed column will take care of most concerns regarding supersaturation and is recommended by hatchery engineers. Operationally, we will add the packed column and a satumeter, and ensure that gas in the water supply is at equilibrium before being supplied to the hatchery fish. Reducing supersaturation will also improve fish health and control of bacteria-caused diseases. Not only is gas bubble disease eliminated, but the overall reduced stress reduces bacterial ailments. Steelhead held at Lonesome Creek seem to be highly susceptible to bacterial coldwater disease, caused by *Flavobacterium psychrophilum*. Last year this disease also affected the summer Chinook, causing elevated mortality and requiring the need for antimicrobial treatment. It is likely that sublethal tissue damage in developing embryos, alevins, and fry, caused by gas supersaturation, increases the susceptibility of the fish to bacterial infection. Bacterial coldwater disease causes mortality in the populations and also has its own set of non-lethal consequences. For example, fish may lose appetite and fail to grow properly. In addition, sequelae of infection include malformations such as scoliosis and central nervous system damage that often result in irregular swimming behavior. The overall impacts of supersaturation include not only losses in the hatchery from acute mortality and increased susceptibility to disease; but also; significant reduction in the long-term survival of sub-lethally affected fish.

Project Title: Adult Pond Picket Installation.

Sponsor: Nisqually Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Guidelines:

- Prespawning mortality should not exceed 10%.

Summary of Relevance:

At Kalama Creek Hatchery the current method for holding the adult population during sorting involves a seine net system. This incurs mortality rates that exceed the HSRG operational guidelines. It is suspected that the primary cause of mortality is

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from fish being injured (scraped) while escaping under the lead line during the 2-3 hour spawning process. These fish die before spawning again the following week.

Based on experience gained from use of the sorting fence at Clear Creek Hatchery, it is believed that this project will drastically reduce pre-spawning mortality. Operationally, this will also greatly improve efficiency in this 40,000 cu.ft. cement pond.

Project Title: Establishing an Effective Red Creek Hatchery Educational Program.

Sponsor: Upper Skagit Tribe

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Recommendations:

- *Enhance the educational and cultural values provided by this program. Consult HSRG operational guidelines for ways to improve the educational benefits.*

Summary of Relevance:

The Red Creek Hatchery program at the Upper Skagit Indian Tribe currently strives to provide short and long term cultural and educational benefits for all three Skagit Basin Tribes. The educational goals of the hatchery include teaching tribal youths and their families about tribal fishing culture and their environmental stewardship. Implanting these concepts into the minds of the youth is critical at this time. Fishing opportunities are currently so reduced that many tribal youth cannot see the value of this resource.

The objective of this project is to improve the educational outreach program. An efficient Red Creek Hatchery educational program would address the specific recommendation from the HSRG. These guidelines include creation of a web page describing the hatchery program and provide employment or natural resource management experience for community college and high school student interns. This project would also include the purchase of new educational supplies, touch tanks, and production of a professional brochure and video. The results of this program would be implemented as new educational material and events for Kid's Day, a program for school children. This program provides a fun hands-on experience to expose children and families to issues from salmon ecology and tribal fishing culture to natural resource stewardship.

Project Title: Lake Quinault Breakwater- Engineering Feasibility Study.

Sponsor: Quinault Nation

Specific HSRG Recommendations and HSRG Guidelines Addressed:

HSRG Guidelines:

- Fish should be reared under conditions that maximize the probability that all segments of the population contribute equally to the release population.

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- Fish should be released in areas or at life history stages where they are unlikely to encounter or prey upon natural fish of the same or other species.
- Fish should be released in a manner so they are unlikely to encounter or prey upon natural fish of the same or other species.

Summary of Relevance:

The purpose of this feasibility study is to determine costs for replacement of a protective log boom by technologically advanced wave barriers. Modern wave barriers will insure protection of the Lake Quinault floating net pens. The current log boom system has broken into pieces in the past and offers little protection during large storm events. This project is an attempt to insure that Quinault juvenile fish are not lost or released early into Lake Quinault. Any release of these young fish during the wrong time periods could result in loss of that stock or unnecessary predation on existing stocks in the Lake or Quinault River, including Lake Quinault Sockeye. It is hoped that this feasibility project will lead to submission of a proposal to fully protect the Lake Quinault net-pens.