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**Subject: HSRG Review North Fork Nooksack River Fall Chum HGMP**

A subcommittee of the Hatchery Scientific Review Group (HSRG) has reviewed the Kendall Creek Hatchery (Nooksack River) Fall Chum Hatchery and Genetic Management Plan (HGMP), dated January 16, 2012. The principles and recommendations developed by the HSRG during their review of the Columbia River Basin hatcheries (HSRG 2009) were used as a template to organize information from review of this HGMP. The HSRG reviewers were asked to compare the consistency of the Kendall Creek Hatchery (Nooksack River) Fall Chum HGMP with the principles and recommendations developed by the HSRG for hatchery operations for the Columbia River Basin. The results are as follows:

**Principles and System-Wide Recommendations**

*The HSRG's three principles for hatchery management are presented below, with each of 17 system-wide recommendations (applicable to programs across the Columbia River Basin hatchery system) listed under the principle from which it is derived. These principles and system-wide recommendations represent the key findings of the HSRG during its review of Columbia River Basin hatcheries, but are applicable to all hatchery programs. Hatchery programs that adhere to these principles and recommendations are more likely to contribute to the managers' harvest and conservation goals.*

**Principle: Develop Clear, Specific, Quantifiable Harvest and Conservation Goals for Natural and Hatchery Populations within an “All H” Context.**

*“During its reviews, the HSRG observed that goals for fish populations were not always explicitly communicated and/or fully understood by the managers and operators of hatchery programs. These goals should be quantified, where possible, and expressed in terms of values to the community (harvest, conservation, education, research, etc.). At times, goals have been expressed in terms of the numbers of smolts to be released without specifying whether or how this hatchery production contributes to harvest and/or conservation. Hatchery production numbers may be the means of contributing to harvest and/or conservation values, but they are not endpoints. When population goals are clearly defined in terms of conservation and harvest, hatcheries can be managed as tools to help meet those goals.”*

*“To be successful, hatcheries should be used as part of a comprehensive strategy where habitat, hatchery management and harvest are coordinated to best meet resource management goals that are defined for each population in the watershed. Hatcheries are by their very nature a compromise—a balancing of benefits and risks to the target population, other populations, and the natural and human environment affected by the hatchery program. Use of a hatchery program is appropriate when the benefits significantly outweigh the risks and when the benefit/risk mix from the program is more favorable than the benefits/risks associated with non-hatchery strategies for meeting the same goals.”*

**Recommendation 1:** *Express conservation goals in terms of a population’s biological significance (Primary, Contributing, Stabilizing) and viability (natural-origin spawning abundance and productivity).*

**Comment:** The biological significance (Primary, Contributing, Stabilizing) of the Nooksack chum population is not stated in the HGMP, perhaps explaining why goals for conservation of the population are lacking. Mention is made that the population is not ESA-listed (Section 7, Item 7.9). It is stated, however, that the population has declined in numbers because of habitat degradation due to development in the watershed and associated shorelines (Section 1, Item 1.8) and that harvests to satisfy tribal needs are not possible without augmentation of the population using a hatchery program (Section 1, Items 1.7 and 1.8).

No statements are given regarding population viability but, as stated above, mention is made that the population is not ESA-listed.

**Recommendation 2:** *Express harvest goals in terms of a population’s contribution to specific fisheries.*

**Comment:** Quantifiable harvest goals are not stated and they should be. The goals should be stated in terms of the number of fish expected to be harvested in various fisheries or, at the very least, in terms of the total number of adults needed for harvest. The proposed program is a re-initiation of a previous program that “existed in the past” and was terminated in 2004 (Section 1, Item 1.13). No reason is given for the termination in the HGMP, but WDFW terminated the program in response to HSRG recommendations in 2003 (HSRG, March 2003). At that time the HSRG recommended the program be terminated or converted into a properly integrated program with the recommendation that a new broodstock be established using natural origin adults. Table

1.12.1 lists hatchery returns of the program for 2002 to 2011 but no information is provided on smolt- to- adult survivals or on adult production levels even though these values may have been available from the original program that was terminated in 2004. However, the main purpose of this “harvest augmentation” program is to provide fish for tribal harvest. It should be noted that based on Table 3.3.1.1, the terminal run was highly variable during the period 2003-2011 with the largest run recorded in 2011 for the years provided.

**Recommendation 3:** *Ensure goals for individual populations are coordinated and compatible with those for other populations in the Region.*

**Comment:** The program will abide by directives of the US v Washington court decision which, among other things, provides the legal basis for coordinating hatchery programs. It will also follow the guidelines for hatchery reform formulated by the Hatchery Scientific Review Group and will carry out the actions mandated by the Hatchery Action Implementation Plan for the watershed (Section 3, Item 3.1). The program will form part of The Salmon Recovery Plan for the Nooksack Basin which is integrated into the Regional Salmon Recovery Plan (Section 3, Item 3.4).

**Principle: Design and Operate Hatchery Programs in a Scientifically Defensible Manner.**

*“Once a set of well-defined population goals has been identified, the scientific rationale for a hatchery program (in terms of benefits and risks) must be formulated, explaining how the program expects to achieve its goals. The purpose, operation and management of each hatchery program must be scientifically defensible. The strategy chosen must be consistent with current scientific knowledge. Where there is uncertainty, hypotheses and assumptions should be articulated.”*

*“Scientific defensibility should be a central consideration throughout all phases of a hatchery program—when determining whether a hatchery should be built or a program initiated; during the hatchery or program planning and design phase; and during the operations phase. This ensures a scientific foundation for hatchery programs, a means for addressing uncertainty, and a method for demonstrating accountability. Documentation for each program should include a description of analytical methods and should be accompanied with citations from the scientific literature.”*

**Recommendation 4:** *Identify the purpose of the hatchery program (i.e., conservation, harvest or both).*

**Comment:** The purpose of this “integrated harvest” program (Section 1, Item 1.6) is “harvest augmentation” (Section 1, Item 1.7). Precautions are being taken to avoid adverse effects on the natural chum population serving as the source of the hatchery broodstock. Initially, all broodstock (1,100 adults sufficient to satisfy the 1.2 million egg-take goal) will be comprised of natural-origin adults collected in the river (Section 1, Item 1.11; Section 6, Item 6.2.2) using

weirs and seine nets which are non-lethal and selective (Section 1, Item 1.10.2, page 8). Eventually, adults returning to the hatchery are expected to make the program self-sustaining (Section 1, Item 1.11). At this stage, additional NORS will be taken from the river and incorporated into the hatchery broodstock only to maintain the “integrated” nature of the program but a specific HOR/NOR target for this purpose is not stated in the HGMP (Section 6, Item 6.1). Although monitoring the number of spawners in the North Fork Nooksack River is listed as a Performance Indicator (Table 1.20.2; Performance Standard 3.3.1), the number of spawners in recent years is not provided. Without this information, evaluating the performance of the hatchery program relative to natural-origin fish cannot be determined.

***Recommendation 5:*** *Explicitly state the scientific assumptions under which a program contributes to meeting the stated goals.*

**Comment:** The rationale for operating this program is given in Section 1, Item 1.8 and the scientific assumptions under which the program can be expected to meet its goals are the same as those used successfully by other past and current programs of this nature (see for example Table 3.3.1.1 detailing the results of a successful Tribal chum program fishery which would not be allowed to proceed were it to unduly threaten the natural chum population from which the adults for the program were originally derived).

***Recommendation 6:*** *Select an integrated or segregated broodstock management strategy based on population goals and hatchery program purpose.*

**Comment:** The program selected is an integrated one but no statements are made about the proportion of NORS to be used in the broodstock to maintain integration with the native stock.

***Recommendation 7:*** *Size hatchery programs based on population goals and as part of an “all H” strategy.*

**Comment:** The basis for choosing to start the program using 1.2 million eggs, equivalent to 550 females and 550 males, is unclear (Section 7, Item 7.4.1). In addition, no goal statement is given about of the number of adults to be produced to satisfy the harvest needs. If data on egg-to-smolt and smolt-to-adult survival rates exist from the program terminated in 2004, and if the desired goal for the number of adults to be made available for harvest were stated, this would be a better basis for selecting the number of eggs required for the program (see also Recommendation 4 above).

***Recommendation 8:*** *Manage harvest, hatchery broodstock and natural spawning escapement to meet HSRG standards appropriate to the affected natural population’s designation.*

**Comment:** Only if the biological significance of the affected population is established can the appropriate standards relevant to the three factors mentioned in the recommendation above be managed appropriately. It would seem likely that the population would be classified as Primary.

If so, the Co-Managers should consult the hatchery reform document cited in the HGMP. The biological significance of the population should be given earlier in the HGMP (under Recommendation 1).

***Recommendation 9: Manage the harvest to achieve full use of hatchery-origin fish.***

**Comment:** Harvests from this new program are still in the future (assuming the program gets its funding to proceed). However, if harvests (including selective harvest) of the program's adults fail to utilize all of the production, the program size should be reduced to correct this situation.

***Recommendation 10: Ensure all hatchery programs have self-sustaining broodstocks.***

**Comment:** The intention for the program is to eventually have a self-sustaining broodstock, at which point NORs will only be used to ensure that the broodstock is integrated with the natural population (Section 6, Item 6.1).

***Recommendation 11: Coordinate hatchery programs within the Regions ecosystem to account for the effects of all hatchery programs on each natural population and each hatchery program on all natural populations.***

**Comment:** The program will abide by directives of the US v Washington court decision which, among other things, provides the legal basis for coordinating hatchery programs. It will also follow the guidelines for hatchery reform formulated by the Hatchery Scientific Review Group and will carry out the actions mandated by the Hatchery Action Implementation Plan for the watershed (Section 3, Item 3.1). The program will form part of The Salmon Recovery Plan for the Nooksack Basin which is integrated into the Regional Salmon Recovery Plan (Section 3, Item 3.4).

***Recommendation 12: Assure that facilities are constructed and operated in compliance with environmental laws and regulations.***

**Comment:** Kendall Creek Hatchery water intake screens are not in compliance with the State and NMFS criteria established in 2011. The screens are identified for replacement but replacement is not considered of high priority because Chinook do not spawn above the Kendall Creek rack and because Kendall Creek is not thought to support spawning and rearing of bull trout (Section 1, Item 1.8.1). The facility complies well with the NPDES requirements (Section 4, Table 4.2.1)

***Recommendation 13: Maximize survival of hatchery fish consistent with conservation goals.***

**Comment:** Fish are forced-released as fed fry (smolts) at a time, size, and life history stage likely to result in rapid migration to sea and to favor increased survival (Section 1, Item 1.8.1; Section 9, Item 9.2.8, and Section 10, Item 10.3). The goal is to raise fish to 400 fpp at the time

of release; however in the single year of operation (2011), fish were released at a smaller size (600 ffp).

**Principle: Monitor, Evaluate and Adaptively Manage Hatchery Programs.**

*“In addition to establishing resource goals and a defensible scientific rationale for a hatchery program, the HSRG recommends that the managers’ decisions be informed and modified by continuous evaluation of existing programs, changing circumstances and new scientific information. Decisions about hatcheries must also be made in a broader, integrated context and hatchery solutions must meet the test of being better, in a benefit/risk sense, than alternative available means to meet similar goals. Systems affected by hatchery programs are dynamic and complex; therefore, uncertainty is unavoidable. The only thing certain is that the unexpected will occur.”*

**Recommendation 14:** *Regularly review goals and performance of hatchery programs in a transparent, regional, “all-H” context.*

**Comment:** The HGMP describes monitoring activities for obtaining information on survival, contributions to fisheries, and impacts on natural spawners (Section 1, Item 1.10.1 and 3.3.1) and for modifying the program if it is necessary to do so (see for example Section 1, Table 1.11.2.1). However, due to the lack of specific harvest goals, it is unclear how this information would be used to modify the hatchery program. Also, the harvest will be conducted in terminal Tribal gillnet fisheries and in mixed-stock areas (Area 7, 7A, and Strait of Juan de Fuca) (Section 3.3.1), complicating monitoring.

**Recommendation 15:** *Place a priority on research that develops solutions to potential problems and quantifies factors affecting relative reproductive success and long-term fitness of populations influenced by hatcheries.*

**Comment:** If funding can be obtained, the HGMP mentions the intention to do genetic studies on genetic variation within the basin (Section 1, Item 1.10.2, page 7).

**Recommendation 16:** *Design and operate hatcheries and hatchery programs with the flexibility to respond to changing conditions.*

**Comment:** A reading of the HGMP leaves the strong impression that the program will be open to modifications to accommodate changing conditions.

**Recommendation 17:** *Discontinue or modify programs if risks outweigh the benefits.*

**Comment:** The Kendall Creek chum hatchery program utilizing the current population of Nooksack fall chum was discontinued (for unstated reasons) in 2004 but was re-initiated using adults collected in 2011 primarily because of the need to provide for tribal harvest. It seems

unlikely that the program would again be terminated. It seems more likely that, if necessary, it would be modified to significantly reduce any risks posed by the program. Currently, risk averse measures include collecting NORs for broodstock only when the risks to listed Chinook and steelhead are minimal (Section 1, Item 1.10.2, page 5) and conducting harvest when listed Chinook and steelhead are not present in significant numbers (Section 1, Table 1.8.1, page 4). In addition, HORs on the spawning ground will be monitored to ensure that they do not exceed the “appropriate portion of the total spawning population” (Section 1, Item 1.10.2, page 7).