



January 31, 2017

Ms. Rosemary Furfey
National Marine Fisheries Service
1201 NE Lloyd Boulevard, Suite 1100
Portland, Oregon 97232

Re: Hatchery Scientific Review Group, Comments on the Proposed ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon and Snake River Steelhead

Dear Ms. Furfey,

The Hatchery Scientific Review Group (HSRG) has reviewed the Proposed ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon and Snake River Steelhead (Plan) and offers comments and recommendations to assist the National Marine Fisheries Service and its federal, state and tribal fishery co-managers in management and recovery of these species. The HSRG is an independent scientific review panel established and funded by Congress to promote use of the best available scientific information in management of anadromous fish hatcheries in the Pacific Northwest.

GENERAL COMMENTS:

Since the listings of Snake River Spring/Summer Chinook Salmon in 1992 and Snake River Steelhead in 1997, the Pacific Northwest Region has taken substantial actions throughout these species' life cycles to improve their status. These actions appear to be making significant improvements in the status of steelhead, but positive results for recovery of spring/summer Chinook salmon are less apparent. For these Chinook, additional measures to monitor and improve their viability are warranted.

Fishery managers have made significant strides in reforming their hatchery programs to support species conservation, when needed, and to minimize adverse effects to listed species from those propagation programs operated to support harvest. That said, the HSRG believes the Plan can and should be improved to better address hatchery activities and related harvests. The HSRG recommends that the Plan expand its management framework and monitoring activities to better determine how hatchery and harvest activities are affecting species viability.

As earlier recommended in our comments on the draft Snake River Fall Chinook Recovery Plan, the HSRG encourages NMFS to include in this additional Plan the HSRG's 4-phase management framework for conservation of Primary populations of salmon: Preservation Phase, Re-Colonization Phase, Local Adaptation Phase, and the Full Restoration Phase (HSRG 2014, 2015). With appropriate biological triggers to guide management through these phases, fishery

agencies and tribes can better understand how their own cumulative actions are contributing to recovery or, alternatively, delaying local adaptation for other management purposes, such as harvest. We believe application of this structure, with hatchery and harvest management for population Proportionate Natural Influence (PNI), will help ensure that the features characteristic of Viable Salmonid Populations (VSP) are re-established.

The Plan clearly recognizes the potential benefits and risks of hatchery programs and the threats of related harvests associated with these hatchery programs. How these benefits and risks are specifically addressed is left to the three Management Unit Plans, Hatchery and Genetic Management Plans, and the *U.S. v Oregon* Management Agreement. However, the Plan should provide a unifying framework for monitoring and objectively assessing the progress in hatchery and harvest reforms that are the subject of these three more detailed sub-plans.

Most of the species' populations which have been designated as Primary and requiring a Viable or Highly Viable status for recovery purposes appear to be in the Local Adaptation Phase. Salmon management during the Local Adaptation Phase often requires balancing local adaptation to improve population fitness for recovery purposes with accommodating harvest needs. Local adaptation is delayed and recovery placed at risk when pHOS is allowed to remain high (PNI low) in order to accommodate harvest. Excessive delay in achieving VSP parameters and local adaptation is of particular concern when accounting for expected effects of climate change. Salmon populations need to be well-adapted to their current habitats to be sufficiently fit and capable of further adapting as environmental variables change with climate.

Current hatchery programs for Chinook and steelhead appear to be mostly successful in re-colonizing habitats. This success should, however, not be confused with re-establishing locally-adapted, productive and self-sustaining populations. Monitoring and evaluation should emphasize determining the productivity and sustainability of natural-origin Chinook and steelhead over time, in the wild. Monitoring and increasing an individual population's PNI are now recognized as the approach most likely to improve the benefits of hatchery and harvest programs. PNI is an actionable performance measure.

Actions which can increase PNI as a management measure of local adaptation and population fitness include:

1. Increasing the proportion of natural-origin spawners in hatchery broodstocks,
2. Increasing selective harvest or removal of hatchery-origin fish prior to spawning,
3. Reprogramming hatchery releases away from critical spawning habitats, and/or
4. Reducing hatchery production.

For actions that can increase population PNI, the HSRG refers NMFS and its co-managers to our previous, January 21, 2016 comments on the Proposed ESA Recovery Plan for Snake River Fall Chinook Salmon and our report, "Annual report to Congress on the Science of Hatcheries, 2015, A report on the application of up-to-date science in the management of salmon and steelhead hatcheries in the Pacific Northwest" (HSRG 2015).

SPECIFIC COMMENTS:

Page 68, par. 4: The measurement of productivity should be clarified to indicate that spawner-to-spawner ratios, recruits-per-spawner, etc. should be calculated for natural-origin fish producing natural-origin offspring. Productivity measurements for recovery purposes should not be masked by the spawning of hatchery-origin fish in the wild producing natural-origin recruits as this would not measure population fitness and self-sustainability in the wild. As stated on page 69, "...viability is independent of hatchery subsidy...".

Page 70, Diversity Guidelines: The Plan indicates that harvest pressures "...should not substantially alter variation in traits, such as run timing, age structure, fecundity, morphology, behavior and molecular genetic characteristics". Because the scientific literature is replete with examples of harvest adversely affecting the above traits, the HSRG recommends that the Plan include regular and transparent reporting of potential harvest effects on VSP parameters. Given the isolated nature of the *U.S. v Oregon* process in which NMFS participates, such assessments and reporting of potential harvest impacts would best be conducted by an independent, scientific body.

Page 73, MPG-Level Viability Criteria: The HSRG recommends that hatchery and related harvest activities be managed, monitored and reported for effects on MPG-Level Viability Criteria to improve understanding of variables that can affect the potential for species' sustainability and rate of recovery. We note that Table 6-4, page 177, includes "Coordinate harvest among all co-managers to ensure that the collective impacts to each population are consistent with recovery goals...". The HSRG is unaware of any comprehensive monitoring and reporting of harvest impacts on individual ESA-listed populations. We recommend this Plan include such reporting, that it be conducted on a regular basis, and that it be available for public and scientific review.

We also note that Table 6-5, page 179, includes several important actions and monitoring to ensure hatchery programs are operated consistent with individual population recovery. Again, we recommend this Plan include regular, comprehensive reporting of the monitoring results of these actions in a public forum.

Page 84, par. 1: The Plan indicates NMFS' support for "...broad sense recovery goals..." "...while maintaining robust natural populations." Achieving the proper management balance between recovery actions to reestablish viable natural populations and providing sustainable harvests will be critical to both Plan success and implementation of legal mandates for harvests. To assist NMFS and its co-managers in this endeavor, the HSRG recommends that NMFS include in its Plan the HSRG's 4-phase management framework for conservation of Primary populations of salmon (HSRG 2015). This framework and associated monitoring and management of population PHOS and PNI, would provide an effective and actionable means for objectively assessing the progress fishery managers are achieving towards species recovery in their combined hatchery and harvest activities. As mentioned earlier, achieving the proper balance between recovery and fisheries management during the Local Adaptation Phase is of critical

importance and warrants monitoring and reporting activities that demonstrate trends in pHOS and PNI for Primary populations.

To better integrate and display the potential benefits and risks of hatchery programs, The HSRG recommends the Plan include comprehensive tables for each species that combine the location and size of hatchery programs from Tables 1-2 and 1-3 with the current status information in Tables 4-1 and 4-2 (including population abundance and productivity estimates), with the desired population thresholds in Tables 2-2 and 2-3. This new mega-table should then also include estimates of pHOS and PNI for each population. Such a mega-table would provide a good overview to assess recovery progress and highlight possible additional hatchery and harvest adjustments that may be needed.

Tables 4-1 and 4-2, pages 106 and 113: The HSRG commends NMFS and co-managers on the clear prioritization of populations (Primary and Supporting) required for species recovery. This type of designation is important to guide readjustments of hatchery programs for conservation and harvest purposes. The HSRG encourages siting hatchery programs or juvenile releases for harvest purposes to habitats of Supporting populations to minimize conflicts with conservation needs for Primary populations.

Page 89, Table 3.3.1: The HSRG recommends this table include information linking the populations to hatchery and harvest effects. For populations managed as Viable or Highly Viable information should be included on that population's current pHOS, PNI and harvest exploitation.

Page 92, Table 3.3.2: The HSRG recommends this table include information linking the populations to hatchery and harvest effects. For populations managed as Viable or Highly Viable information should be included on that population's current pHOS, PNI and harvest exploitation.

Page 94, par. 2: The Plan states that the ESA requires recovery plans to have "...objective and measurable criteria...". To meet this requirement, the HSRG recommends the Plan include measurement of pHOS and PNI for populations designated as Viable and Highly Viable. Such practical criteria would provide the necessary means to monitor progress in population recovery and whether the proper balance is being achieved with broad sense recovery goals. Quantitative monitoring criteria are needed to assess progress with reforms in hatchery and harvest management. An increasing trend in PNI and decreasing trend in pHOS for Primary populations are important to ensure that local adaptation is not prolonged, causing greater risk to species' existence. This is particularly important as the natural-origin spawning abundances of most Chinook populations are below minimum thresholds and progress in ESU recovery has not been established (per the Current Status Assessment). With 31 of 32 populations of Snake River Spring/Summer Chinook Salmon assessed as either extirpated, functionally extirpated or at high risk of extinction (Table 4-1), adoption of pHOS and PNI metrics are of paramount importance in informing on the effectiveness of conservation management.

Page 99, E.1: The Plan recognizes the potential threats that hatchery programs pose to maintaining species' viability and the need for "...appropriate criteria for integration of hatchery populations". Again, use of pHOS and PNI metrics is recommended for this purpose at this time.

Page 141: The review of recent harvest of Snake River Spring/Summer Chinook Salmon is confusing. In paragraph 2, the Plan indicates that harvest impacts have "...remained relatively constant in recent years". Then in paragraph 5, the Plan states that exploitation rates "...have increased in recent years due to the continued large returns of hatchery spring Chinook salmon to the Columbia River basin". Then, Figure 5-4 indicates an approximate 3-fold increase in total exploitation rate in recent years.

In paragraph 3, the Plan states that mainstem Columbia River fisheries target harvestable hatchery stocks migrating through Zones 1-6. Yet, not all lower Columbia River fisheries are selective, thereby targeting hatchery and natural-origin stocks equally. The Plan states that, "Consequently, mortality rates on natural-origin Snake River spring/summer Chinook salmon and steelhead are influenced by a combination of laws, policies, and guidelines."

Given the above confusion, increasing harvest rates based on increasing numbers of hatchery-origin salmon, and the difficulty in balancing conservation and harvest mandates, the HSRG recommends that the Plan include quantitative criteria to assess the effects of hatchery and harvest practices on species' extinction risk and recovery. Specific monitoring of fisheries' mortalities of natural-origin fish of each Primary population, and of pHOS and PNI trends appear necessary.

Page 145, par. 2: The proper management of hatchery programs and their resulting effects on harvest rates does remain a concern. As the Plan states, "The situation is complex...". The balancing of conservation and harvest mandates and policies is very difficult. The HSRG believes these management issues would be better informed and adapted as needed, with integration into the Plan of the 4-phase management framework, and pHOS and PNI monitoring.

While, "Additional research will help managers assess demographic risk versus conservation benefit of hatchery supplementation...", the HSRG believes the ongoing high risk of extinction argues for the immediate adoption into the Plan of the 4-phase management framework as well as regular pHOS and PNI monitoring. Available scientific information strongly suggests that this would be the best Plan to adopt.

Page 175: The Plan states that the harvest limits in the *U.S. v Oregon* Management Agreement "...are thought to be sufficiently protective to allow for the recovery of ESA-listed species". The Plan states that "...ESA mortality rates may increase or decrease in proportion to the abundance of natural-origin fish..." and that, "...harvest rates have remained relatively constant in the aggregate of fisheries for Snake River spring/summer Chinook salmon...". The HSRG recommends that NMFS and co-managers review the appropriateness of these protective regulations (for both Chinook and steelhead) for their efficacy in recovery of ESA listed fish.

Sliding scale harvest rates based on the abundance of natural-origin fish might be appropriate when the pHOS levels of the Primary natural-spawning populations are at or near HSRG standards for supplemented populations (<30% for integrated hatchery programs and <5% for segregated hatchery programs). However, when escapements to the habitat consist excessively of hatchery-origin fish, then many of the natural-origin progeny (upon which the sliding scale harvest schedules are based) are the result of hatchery-origin parents. These progeny of hatchery-origin parents do not represent the fitness and viability of the natural population; and would therefore not be an indicator that natural populations can sustain additional harvest mortality. Increasing exploitation on natural-origin fish (per Figure 5-4) when many or most are the offspring of hatchery-origin parents can be expected to reduce the fitness and productivity of the natural populations, thereby continuing risks to their survival and recovery.

The management of salmon and steelhead must fully integrate hatchery and harvest programs to ensure the desired result of self-sustaining natural populations and truly sustainable fisheries. Effects of size, type (integrated or segregated) and location of hatchery programs on the receiving natural populations must be fully coordinated with ocean and freshwater fisheries. Adoption into the Plan of the HSRG's recommended 4-phase management framework and the pHOS and PNI standards would significantly enhance the science behind the hatchery and harvest management decisions necessary under the ESA. The needed increases in local adaptation of the listed species can only be enhanced if the individual populations are allowed to increase their fitness with minimal adverse effects of artificial propagation programs and harvest effects.

To be consistent with recovery, NMFS and the co-managers should also consider effects to natural-origin fish from specific Primary populations and not just the aggregate of the populations when evaluating harvest management effects.

Page 177, Table 6-4: As stated above, the HSRG encourages fisheries managers to promptly assess and report on the effects of all fisheries, cumulatively, on the impacts to individual populations of listed fish. The HSRG is not aware of any reporting of these cumulative impacts at this time.

The development of population specific sliding scales for harvest management based on natural-origin returns would also be a significant management advancement. As indicated above, the HSRG recommends these sliding scales also account for trends in pHOS for each population to ensure the exploitation rates do not slide higher based on the progeny of hatchery-origin fish.

Page 177, par. 1: The Plan states that, "The "central challenge of recovery planning with respect to hatchery programs is finding a balance between the risks and benefits of hatchery production in working to achieve recovery goals." To better inform this challenge, the HSRG recommends that:

- The assessment of hatchery risks and benefits include the resulting effects on harvest related mortalities to natural-origin fish; and the effects of harvest on the quality of escapement (pHOS) to the natural habitat.
- The Plan adopt metrics such as pHOS and PNI that will better inform the inter-related and combined effects of hatchery and harvest management.

Page 177, par. 3: The evolution of hatchery programs and sliding-scale harvest management regimes should not be left to a vague qualitative or theoretical construct. The HSRG recommends integration of its 4-phase management structure with appropriate biological triggers to inform and guide the evolution of each hatchery program as well as cumulative harvest management as ESA-listed populations increase or decrease through time (HSRG 2015). The HSRG believes these tools are necessary at this time, are actionable, and are based on the best available scientific information. These tools will also provide measurable progress benchmarks in recovery and will balance conservation with sustainable fisheries mandates.

With adoption into the Plan of the 4-phase management framework and the monitoring of the pHOS and PNI metrics, quantitative values, such as biological triggers and population-specific objectives, can then be developed consistently within individual Management Unit Plans, HGMPs, and *U.S. v Oregon* harvest schedules.

Sincerely,



Peter Paquet, Ph.D.
HSRG Co-Chair



Andy Appleby
HSRG Co-Chair