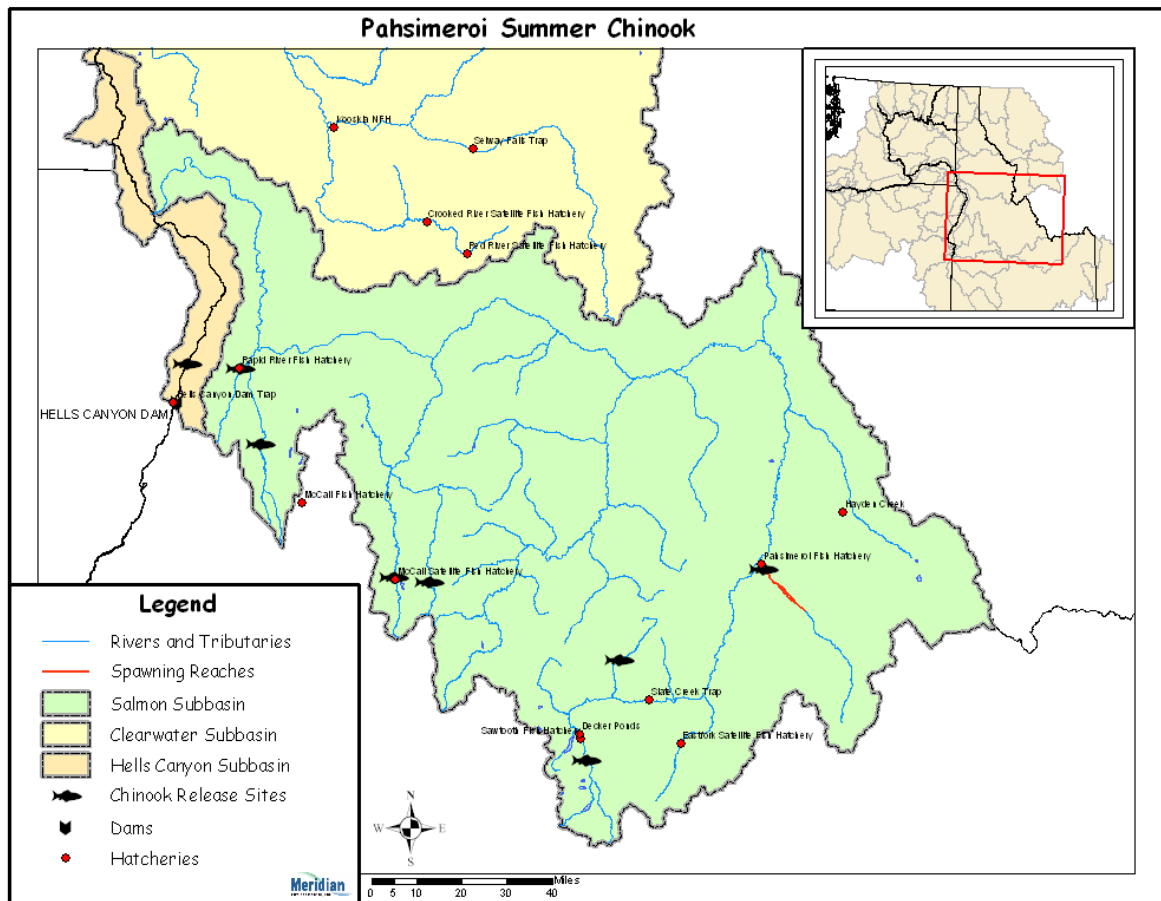


Hatchery Scientific Review Group Review and Recommendations

Pahsimeroi River Summer Chinook Population and Related Hatchery Programs

January 31, 2009



1 Pahsimeroi Summer Chinook

The Pahsimeroi River Chinook population is part of the Snake River Spring/Summer Chinook ESU. This population is a summer run and is classified as threatened under the Endangered Species Act. The Interior Columbia Technical Recovery Team (ICTRT) identifies this population as “Large” based on its historic habitat potential. A “Large” population is one that requires a minimum abundance of 1,000 natural spawners and an intrinsic productivity greater than 1.56 recruits per spawner (R/S) to be viable.

Historically, it is estimated that from 2-3 million spring/summer Chinook returned to the entire Snake River each year (NPCC 2004).

2 Current Conditions

The Pahsimeroi Chinook population is primarily a summer run. Adult returns to the subbasin consist of both hatchery- and natural-origin fish, as there is a segregated hatchery program present. With the exception of Rapid River stock, natural- and hatchery-origin Chinook in the Salmon River drainage are listed as Threatened. Spawning occurs from mid-August through late October in the lower portion of the river. Upstream habitat is fragmented or partially blocked. Juveniles leave the system as both sub-yearlings and yearlings starting in early March and continuing through the fall.

Abundance in recent years has been highly variable. The most recent 10-year geometric mean number of natural spawners in the Pahsimeroi River was 112 fish. Current (1986 to 2005) population abundance (number of adults spawning in natural production areas) has ranged from 27 fish in 1995 to 763 fish in 2003 (NOAA Draft Recovery Plan). From 1992 to 2003, index area redd counts have ranged from less than 50 to 350 (StreamNet).

AHA modeling data submitted by IDFG estimates current adult escapement and adjusted productivity for the natural-origin population at 130 and 0.72, respectively. The model also estimates that 50 hatchery-origin spring and summer Chinook stray into this population each year. The low number of hatchery fish present in the basin is due to the presence of a weir that removes 95% of the hatchery fish.

2.1 Current Population Status and Goals

This section describes the current population, status, and goals for the natural population.

- **ESA Status:** Snake River Spring/Summer Chinook are listed as threatened under ESA.
- **Population Description:** For the purpose of this review, the HSRG assigned this population as Primary. The population currently meets the broodstock criteria for a Stabilizing population designation.
- **Recovery Goal for Abundance:** The ICTRT defined the Pahsimeroi River summer Chinook population as “Large” and identified a minimum abundance threshold of 1,000 natural-origin adults.
- **Productivity Improvement Expectation:** The ICTRT productivity standard associated with a population defined as “Large” is 1.56.
- **Habitat Productivity and Capacity:** Productivity: 1.70; Capacity: 3,200

2.2 Current Hatchery Programs Affecting this Population

The Pahsimeroi Fish Hatchery was constructed in 1968 by the Idaho Power Company (IPC) as part of its program to mitigate for losses of anadromous fish associated with the construction and operation of the Hells Canyon Complex. Originally it was a trapping and spawning facility for summer steelhead and an acclimation facility for steelhead smolts reared at IPC's Niagara Springs Fish Hatchery. Following implementation of the Hells Canyon Settlement Agreement in 1980, the role of Pahsimeroi Fish Hatchery was expanded to include the production of one million summer Chinook salmon smolts annually. The Pahsimeroi Fish Hatchery is comprised of upper and lower hatchery components. The lower component is located on the Pahsimeroi River approximately 1.6 kilometers above its confluence with the main Salmon River near Ellis, Idaho. The upper component is located approximately 11.3 kilometers further upstream from the lower facility on the Pahsimeroi River. This facility was completely renovated by Idaho Power in 2006-07 to reduce the impacts of whirling disease on hatchery reared fish.

The current program goal is to volitionally release approximately 1,000,000 yearling Chinook salmon smolts to the Pahsimeroi River directly from the upper facility rearing ponds. Actual release numbers have varied; the average has been less than the planning target. Due to the presence of whirling disease in the Pahsimeroi River and the higher incidence of infection in juvenile fish at early life stages, early rearing of Pahsimeroi summer Chinook salmon has occurred at IDFG's Sawtooth Fish Hatchery. In 1991, IDFG began shipping a portion of summer Chinook salmon eyed- eggs produced at Pahsimeroi to the Sawtooth Fish Hatchery to compare whirling disease infection rates between the hatcheries. These studies continued until 1996, when IDFG began shipping all Pahsimeroi summer Chinook salmon eyed-eggs to Sawtooth for incubation and early rearing. At eye-up, eggs were transferred to Sawtooth for hatching and early rearing on pathogen-free well water. Pahsimeroi Fish Hatchery summer Chinook salmon were reared on well water at Sawtooth until they reached a minimum size of 70 mm (or until such time that well water became unavailable, whichever occurred first) before transferring them back to Pahsimeroi for final rearing. Beginning with brood year 2008 incubation and rearing of all Pahsimeroi Hatchery summer Chinook will occur on station in new facilities constructed by IPC at the upper hatchery site. All fish are adipose fin-clipped and a portion coded wire and PIT-tagged for evaluation purposes. The average SAR R/S for the hatchery program is 0.3% and 6.0, respectively.

IDFG's involvement with the culture of summer Chinook at Pahsimeroi dates back to 1969, with eggs collected from summer Chinook salmon at the lower hatchery site, shipped to IDFG's Mackay Hatchery for rearing, and then returned to Pahsimeroi Fish Hatchery for acclimation and release as sub-yearlings or yearling smolts. Indigenous Pahsimeroi River summer Chinook salmon were solely used for propagation from 1969 until 1981. The Pahsimeroi Fish Hatchery summer Chinook salmon mitigation program began in 1981 with the collection of eggs from four indigenous Pahsimeroi River female summer Chinook and the receipt of 616,823 spring Chinook salmon eggs from IPC's Rapid River Fish Hatchery. From brood year 1981 through 1984, Rapid River spring Chinook salmon stock and IDFG's Hayden Creek Hatchery (Lemhi River) spring Chinook salmon stock were used in an effort to achieve smolt production goals and expedite the return of harvestable numbers of Chinook salmon to the Salmon and Pahsimeroi rivers. Summer Chinook salmon production also continued during this period. The Chinook salmon program at Pahsimeroi Fish Hatchery converted back solely to a summer Chinook salmon program, with the last adult spring Chinook salmon returning in 1989. In the 1980s, IDFG transferred eggs from the South Fork Salmon

River summer Chinook program to the Pahsimeroi Hatchery to meet broodstock needs. Since 1989, broodstock have been taken exclusively from returns to the Pahsimeroi Fish Hatchery.

The Pahsimeroi Fish Hatchery has been part of The Idaho Supplementation Study (ISS). In 1991, IDFG, the Nez Perce Tribe, the Shoshone-Bannock Tribes, and the USFWS initiated a large-scale Chinook salmon supplementation study designed to continue through 2012. The study incorporates treatment and control streams in the Clearwater and Salmon subbasins. The Pahsimeroi River is a treatment stream for this program. “Treatments” include the development and release of “supplementation” smolts (hatchery x natural parents) and the release of “supplementation” adults to treatment spawning streams (50:50 hatchery: natural-origin release design). In 2004, juvenile treatments ended in all but three study streams. In 2007, adult treatments ended. The study will conclude in 2014 following a five-year period of “no treatment.”

Managers have agreed to plan and implement an integrated Chinook salmon supplementation program in the Pahsimeroi River beginning no earlier than spawn year 2009.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from integrated in-basin programs: 0 fish.
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 50 fish. Projected strays are produced primarily (47 fish) from the segregated program operating at the Pahsimeroi Fish Hatchery.

3 HSRG Review

The HSRG has developed guidelines for minimal conditions that must be met for each type of program as a function of the biological significance of the natural populations they affect. For populations of the highest biological significance, referred to as Primary, the proportion of effective hatchery-origin spawners (pHOS) should be less than 5% of the naturally spawning population, unless the hatchery population is integrated with the natural population. For integrated populations, the proportion of natural-origin adults in the broodstock should exceed pHOS by at least a factor of two, corresponding to a proportionate natural influence (PNI) value of 0.67 or greater. For Contributing populations, the corresponding guidelines are: pHOS less than 10% or PNI greater than 0.5. It is important to note that these represent minimal conditions, not targets. For example, the potential for fitness loss when effective pHOS is 5% is significantly greater than it would be at 3%. For Stabilizing populations, we assume the current pHOS or PNI would be maintained.

The HSRG analyzed the current condition and a range of hatchery management options for this population, including the effect of removing all hatchery influence, and arrived at one or more proposed solutions intended to address the manager’s goals consistent with the HSRG guidelines for Primary, Contributing, and Stabilizing populations. The solution included in the cumulative analysis is the last option described in the Observations and Recommendation box below.

In order to highlight the importance of the environmental context, two habitat scenarios were considered: current conditions and a hypothetical 10% habitat quality improvement.

See HSRG Observations and Recommendations in the box below for more information.

3.1 Effect on Population of Removing Hatchery

The No Hatchery scenario is intended to look at the potential of the natural population absent all hatchery effects with projected improved fish passage survival in the Snake and Columbia mainstem (FCRPS Biological Opinion May 5, 2008).

Our analysis estimated that Adjusted Productivity (with harvest and fitness factor effects from AHA) would increase from 0.7 to 1.5. Average abundance of natural-origin spawners (NOS) would increase from approximately 130 fish to approximately 1,026 fish. The harvest contribution of the natural and hatchery populations would go from approximately 1,017 fish to 205 fish.

3.2 HSRG Observations/Recommendations

In the Observation and Recommendation box below we describe elements of the current situation (Observations) that were important to evaluate the natural population and where applicable, the hatchery program(s) affecting that population. We also describe a solution (Recommendations) that appeared to be consistent with manager's goals; however, this is not the only solution. In some cases more than one solution is described.

Summary of this analysis are presented in Table 1. The adjusted productivity values reported for each alternative incorporates all factors affecting productivity (i.e., habitat quality, hatchery fitness effects, and harvest rates).

Observations

Managers have identified a strategy for Pahsimeroi River summer Chinook that emphasizes maintaining existing natural spawning populations as well as maintaining the current hatchery mitigation program. Currently this population is not consistent with the HSRG-defined standards of either a Primary or Contributing population (pHOS greater than 0.10). Based on the information provided, it appears that there is significant habitat capacity that is not used. Managers have also identified the potential to improve habitat connectivity within this subbasin.

The mitigation goal for the Idaho Power Company-funded mitigation program that operates in the Pahsimeroi River is to produce 1 million smolts for release annually.

The current segregated harvest program collects broodstock from rack returns at the Pahsimeroi Fish Hatchery. Beginning with brood year 2008, all adult holding, spawning, incubation and rearing will occur at this location. The current production target for the program is 1.0 million yearling smolts; however, due to insufficient adult returns, this target is not consistently met. Average SAR and R/S values for hatchery-produced fish are 0.3% and 6.0, respectively.

The ongoing Idaho Supplementation Study is ending in 2012. Adult returns from this program ended in 2007. The current phase of the study monitors production and productivity in the absence of adult supplementation. Following 2012, managers will have greater flexibility to pursue other management options.

IDFG's implementation of BKD risk management strategies, including culling, has been very successful.

Recommendations

The HSRG recommends that managers implement a two-stage stepping stone program to support the natural population and to provide harvest. The program consists of an integrated conservation component producing approximately 285,000 smolts (PNI = 0.74, pHOS = 0.31, pNOB = 75%). Initially, this component would be produced from 100% NOB but subsequent generations would be maintained by collecting 75% natural-origin broodstock and 25% hatchery-origin returns from this integrated component. Integrated adult returns not needed to maintain the integrated broodstock would be used as broodstock for the second stage harvest component to produce approximately 1 million smolts. This maintains some genetic continuity between the harvest component and natural fish returning to the system. Smolts produced through the integrated program could be adipose fin-clipped if sufficient numbers returned to meet escapement needs, integrated broodstock needs, as well as second stage stepping stone broodstock needs. Managers should monitor this closely and revert to code wire only if insufficient adults return to meet all needs. Smolts produced for harvest would be adipose fin-clipped. Unharvested “harvest component” fish would not be used for broodstock, released upstream of the weir, or returned to population downstream of the weir. Unharvest adults could be used for stream nitrification as appropriate.

The HSRG acknowledges that managing for the recommended PNI values may not be possible or appropriate in the near term when abundance levels are low and demographic risks to the population increase. To address this concern, managers should develop a variable sliding scale for managing abundance so that in low abundance years, more hatchery-origin fish of the appropriate population component are allowed to reach the spawning grounds to reduce demographic risk to the respective populations.

An example of such a sliding scale would look like this:

Each year, depending on NOR run size, pNOB and pHOS are allowed to “float” or slide. The HSRG assumes managers will establish an acceptable level of removal of NORs for use in the hatchery brood. This will be a fixed percentage of the total NOR return (say 40%) and will not change, regardless of NOR return. In years of high NOR abundance, this 40% could make up 100% of the needed hatchery brood (pNOB= 100%). In that case, no HORs would be used in the hatchery brood. Hatchery fish can be allowed to reach the spawning ground (pHOS) if needed to achieve an appropriate number of fish spawning naturally (demographic benefit and use of available habitat). This however, would not be required during years of very high NOR returns as both objectives (pNOB and natural spawning) may be met with NORs.

In years of low NOR abundance, the same 40% of the NOR return would be removed for use in the hatchery brood (pNOB). However, in these years, that 40% may make up only a small part of the needed brood (i.e. pNOB 10%). In these years, enough HORs should be used to achieve needed hatchery brood and additional HORs should be allowed to spawn naturally (pHOS) to achieve the minimum acceptable level of naturally spawning.

The goal of this sliding scale is to achieve an “average” PNI over time of the desired level (0.67 or 0.5) depending on the population designation even though it may not be achieved in an one year. A good way to determine the level of NORs that should be removed each year (see above) is to review the return of NORs over a long time frame and iterate what level (30, 40, 50%) are needed, on average, to achieve the desired PNI.

The HSRG also recommends that the managers continue to implement their apparently successful BKD strategies, which include culling.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Pahsimeroi River Summer Chinook. The light green row indicates the natural population and yellow indicates the segregated hatchery population, if applicable. A 10% habitat improvement is applied to the HSRG Solution to evaluate the additional effect of improved habitat towards conservation objectives.

Alternative	Type and Purpose	Prog Size (/1000)	HOR Recapture	Additional Weir Efficiency	Effective pHOS	PNI	NOS Esc	Adj Prod	Harvest	Hatchery Surplus
Current	None None	-	95%	0%	23%	0.00	130	0.7	26	0
	Seg Harv	999.4	95%						991	1,998
No Hatchery	None None	-	0%	0%	0%	1.00	1,026	1.5	205	-
HSRG Solution	Int Cons	285.0	50%	0%	28%	0.73	1,007	1.3	402	58
	Stepping Stone/Seg Harv	1,045.0	95%						2,390	1,543
HSRG Solution w/ Improved Habitat	Int Cons	285.0	50%	0%	23%	0.77	1,299	1.5	461	58
	Stepping Stone/Seg Harv	1,045.0	95%						2,390	1,543