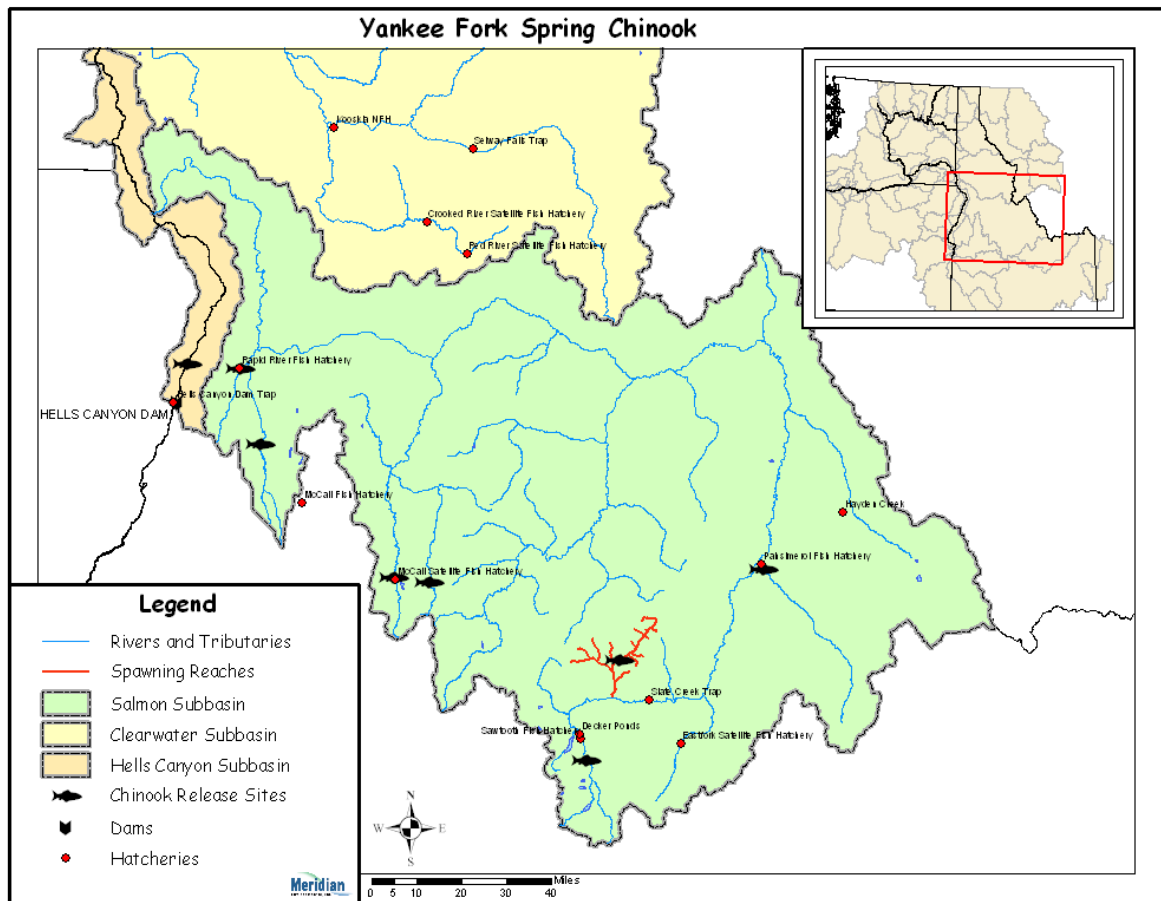


Hatchery Scientific Review Group Review and Recommendations

Salmon - Yankee Fork Spring Chinook Population and Related Hatchery Programs

January 31, 2009



1 Salmon Yankee Fork Spring Chinook

The Yankee Fork Chinook population is part of the Snake River Spring/Summer Chinook ESU. This spring run population is listed as threatened under the Endangered Species Act. The Interior Columbia Technical Recovery Team (ICTRT) has classified this population as “Basic” based on its historic habitat potential. A “Basic” population is one that requires a minimum abundance of 500 natural spawners and an intrinsic productivity greater than 2.21 recruits per spawner (R/S) to be viable.

Historically, it is estimated that anywhere from 2-3 million spring/summer Chinook returned to the entire Snake River each year (NPCC 2004). The portion returning to the Yankee Fork is unknown, but was probably in the thousands.

2 Current Conditions

Adult spring/summer Chinook returns to the subbasin consist of both natural- and hatchery-origin fish. With the exception of Rapid River stock, natural- and hatchery-origin Chinook in the Salmon River drainage are listed as Threatened. Currently, the Yankee Fork receives periodic introductions of juvenile and adult Chinook salmon of Sawtooth Hatchery origin. Discussions are underway between the State, NOAA, and the Shoshone-Bannock Tribes to initiate an integrated local broodstock program. Natural spawning takes place from mid-July through late September. Juveniles leave the system as yearlings starting in early March and continuing into the spring.

Since 1997, an experimental conservation hatchery program has operated in the West Fork Yankee Fork of the Salmon River, a tributary to the main Yankee Fork. This program releases maturing adult Chinook salmon to the West Fork to spawn volitionally. Adults are developed from eggs sourced from natural redds using hydraulic extraction methods. The program is currently assessing the contribution to the next generation from captive adult outplants.

Current (1961 to 2003) natural population abundance (number of adults spawning in mainstem and West Fork natural production areas) has ranged from 0 in 1995 to 1,488 fish in 1968. Abundance in recent years has been variable. The most recent 10-year geomean number of natural spawners in the mainstem and West Fork was 13 fish (NOAA Draft Recovery Plan). Redd counts collected for the West Fork Yankee Fork and mainstem Yankee Fork (1995 through 2006) have averaged 6 and 12 redds, respectively (StreamNet). AHA modeling data submitted by IDFG estimates current adult escapement and adjusted productivity for the natural-origin population at 26 and 0.66, respectively. The model also estimates that 15 hatchery-origin Chinook stray into this population each year.

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 Stabilizing. The population currently meets the broodstock criteria for this population designation.

- Recovery Goal for Abundance: The ICTRT defined the Yankee Fork spring Chinook population as “Basic”, and identified a minimum abundance threshold of 500 natural-origin spawners.
- Productivity Improvement Expectation: The ICTRT productivity standard associated with a population defined as “Basic” is 2.21.
- Habitat Productivity and Capacity: Productivity: 1.45; Capacity: 600

2.2 Current Hatchery Programs Affecting this Population

While a long-term supplementation program has not been developed, releases of juvenile and/or pre-spawn adult Chinook salmon have occurred in the mainstem Yankee Fork as well as the West Fork Yankee Fork of the Salmon River. The IDFG, NOAA, and Shoshone-Bannock Tribes are discussing plans to implement a local Chinook broodstock program in the mainstem Yankee Fork Salmon River with adult trapping to experimentally begin in 2008 and spawning to begin in 2009 or after. Broodstock would be collected at a new weir in the Yankee Fork. Adults would be held streamside or at a different location. Spawning, incubation and rearing would occur at a location(s) to be named. Streamside acclimation is being discussed, but does not currently exist.

The IDFG also operates a conservation broodstock program in the West Fork Yankee Fork of the Salmon River. This program returns approximately 100 hatchery-reared Chinook salmon to natal spawning areas annually (ongoing since 1997). Fish are reared at the IDFG Eagle Fish Hatchery through smoltification then transferred to NOAA’s Manchester Marine Lab for rearing on seawater through maturation. The IDFG is currently assessing whether successful next generation production occurs from the release of pre-spawn adults.

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 West Fork Yankee Fork of the Salmon 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 and natural-origin release design). In 2004, juvenile treatments ended in all but three ISS study streams. In 2007, adult treatments ended. The study will conclude in 2014 following a five-year period of “no treatment.”

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: 15 fish. Potential strays are produced primarily from the segregated program operating at the Sawtooth 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 1.4. Average abundance of natural-origin spawners (NOS) would increase from approximately 26 fish to approximately 171 fish. The harvest contribution of the natural and hatchery populations would go from approximately three fish to 19 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 results 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 Yankee Fork Spring Chinook that emphasizes maintaining existing natural spawning populations as well as using hatchery-origin Chinook salmon in an attempt to augment natural production. Currently this population

is not consistent with the HSRG-defined standards for either a Primary or Contributing population (pHOS greater than 0.1).

Currently, no hatchery program operates in the mainstem Yankee Fork Salmon River; however, occasional releases of pre-spawn adults as well as smolts have occurred. Beginning in 2009, the IDFG, NOAA, and Shoshone-Bannock Tribes anticipate the start-up of a localized broodstock program in the mainstem Yankee Fork. Adults would be collected at a new weir site on the mainstem. Broodstock management plans have not been finalized but the intent is to maintain as high a pNOB value as possible. Natural- and hatchery-origin adults would comprise the natural spawning component (composition to be determined). All spawning, incubation and juvenile rearing would occur at a location(s) to be named. Full-term smolts would be released directly to the Yankee Fork or acclimated in yet to be constructed stream side ponds. Program size is under discussion.

The IDFG also operates a conservation hatchery program in the West Fork Yankee Fork Salmon River. Ongoing since 1997, this program sources eggs from natural redds. Fish are reared at the IDFG Eagle Fish Hatchery through smoltification, then transferred to NOAA's Manchester Research Station for rearing on seawater through maturation. Adults are trucked back to natal waters and released for natural spawning. The last release of adults in the Yankee Fork will be in 2009. IDFG is currently assessing the production potential of this conservation strategy.

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.

Recommendations

The HSRG recommends that managers continue to monitor status and trend information for this natural population as well as the proportion of hatchery fish in natural production areas.

As planning progresses on developing a locally adapted, integrated Yankee Fork Chinook salmon program, managers should consider adopting a sliding scale broodstock/escapement management strategy.

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 recommends that 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 Yankee Fork Spring 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	-	0%	0%	31%	0.00	26	0.7	3	0
No Hatchery	None None	-	0%	0%	0%	1.00	171	1.4	19	-
HSRG Solution	None None	-	0%	0%	29%	0.00	32	0.7	4	0
HSRG Solution w/ Improved Habitat	None None	-	0%	0%	22%	0.00	45	0.8	5	0