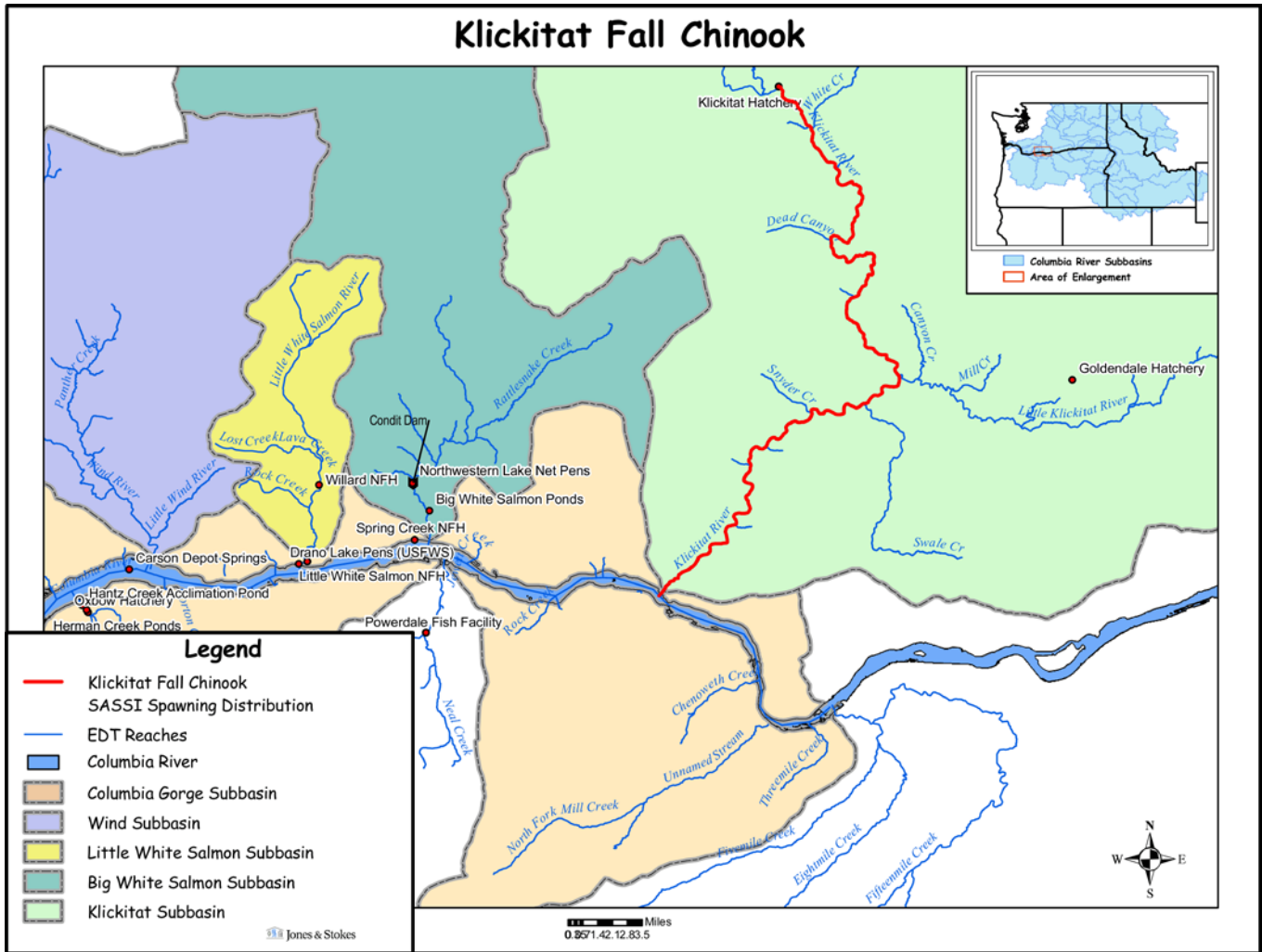


# Hatchery Scientific Review Group Review and Recommendations

## Klickitat Fall Chinook Population and Related Hatchery Programs

January 31, 2009



# 1 Klickitat Fall Chinook

Fall Chinook are not native to the Klickitat subbasin upstream of Lyle Falls, but natural escapement of fall Chinook has been observed from previous tule fall Chinook releases and the more recent URB releases. Also, a summer returning Chinook component has been observed in both terminal fisheries and during spawner surveys. Preliminary genetic data from the summer-run component suggests a close relationship to the up-river Columbia Basin summer-run Chinook populations.

Lower Columbia tules were first released in the Klickitat in 1971. Releases were terminated in 1986 in favor of an upriver bright (URB) Fall Chinook program. Spawner surveys conducted by WDFW show an average fall Chinook escapement range of 400 to over 10,000 from 1986-2002. Spawning is concentrated upstream of the Twin Bridges at the Klickitat's confluence with the Columbia River up to the Klickitat Hatchery at RM 42. Spawning occurs primarily in November.

Genetic analysis of naturally spawning Klickitat fall Chinook sampled from 1991 to 1994 showed them to be very similar genetically to URB Chinook at Priest Rapids Hatchery and in the Hanford Reach. They were also closely associated with URB populations at Bonneville and Little White Salmon hatcheries and in the Yakima River (Marshall 2000; Klickitat Fall Chinook HGMP 2005).

Low flows over Lyle Falls (RM 2) are believed to have acted as a barrier to migration of fall Chinook in the past. In 1952 two fishways were constructed at the Falls to improve fish passage, giving fall Chinook returning to the Klickitat Hatchery, as well as out-of-basin strays, access to historically unavailable spawning grounds.

## 2 Current Conditions

### 2.1 Current Population Status and Goals

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

- ESA Status: Naturally spawning fall Chinook in the Klickitat system are not included as part of any ESU and so are not listed under the ESA.
- Population Designation: Using a rating system similar to that used by the recovery planners for the Lower Columbia and Willamette results in a designation of Stabilizing.
- Current Viability Rating: Unknown.
- Recovery Goal for Abundance: Unknown.
- Productivity Improvement Expectation: Unknown.
- Habitat Productivity and Capacity (from EDT): Productivity 5.4; Capacity 5,356.

### 2.2 Current Hatchery Programs Affecting this Population

After its construction in 1952, the Klickitat Hatchery produced tule stock fall Chinook until 1986, when production was switched to URB stock. Currently, broodstock are collected and spawned at the Priest Rapids Hatchery. Up to 4,500,000 eyed eggs are transferred to the Klickitat Hatchery for an intended release of 4,000,000 fingerlings. Yearly releases from 1996 to 2004 averaged 3,353,000 fish (ranging from 520,000 to 4,387,000), at an average size of 67 fish per pound (ranging from 79 to 55 fish per pound).

After the closing of the east bank ladder at Priest Rapids, the number of natural fish included in the broodstock is reported to have dropped dramatically. It is believed that more natural fish swim the eastern shore near the Priest Rapids Hatchery and that by collecting fish from the western shore, fewer naturally produced fish will be included in the collection. The number of naturally produced fish included in the broodstock is currently unknown, because so much of the fall Chinook production in the Columbia Basin is unmarked and broodstock are collected from the run-at-large volunteering to the Priest Rapids Hatchery (Klickitat Fall Chinook HGMP 2005).

Straying to the Snake River has been a major concern and 16.25% (approximately 650,000) of the Klickitat release is coded-wire tagged (per US v. Oregon) in order to better determine the source of Chinook passing Ice Harbor Dam on the Snake River. Beginning in brood year 2007, the URB brood source is from the Little White Salmon River.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from in-basin integrated hatchery program: NA.
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 5,897 fish.

### 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 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 decrease from 910 to 491. Harvest contribution of the natural and hatchery populations would go from 19,960 to 1,351.

## 3.2 HSRG Observations/Recommendations

In the Observations and Recommendations 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 incorporate all factors affecting productivity (i.e., habitat quality, hatchery fitness effects, and harvest rates).

### **Observations**

Fall Chinook are not native to the Klickitat subbasin upstream of Lyle Falls and there are no natural production objectives. The purpose of the URB fall Chinook program is to produce fish for harvest. The current goal is to maintain recent harvest levels across all fisheries. Broodstock for this program is from out-of-basin hatchery programs (previously from Priest Rapids, and beginning in 2007, using Little White Salmon URBs). The infrastructure does not exist to collect broodstock returning to the Klickitat River.

This program has potential ecological effects, because fall Chinook are non- native and because of the current release location and the size of program. This stock also has been known to stray outside the basin. There may be opportunities to reduce these ecological risks, reduce straying, and improve contribution to fisheries.

The presence of naturally spawning summer-run Chinook may provide managers a future opportunity to convert a portion of the URB fall Chinook hatchery production to a summer Chinook program.

### **Recommendations**

To reduce the ecological effects of this program, managers could consider moving towards broodstock collection from returns to the basin and developing in-basin infrastructure in the lower river to acclimate all fall Chinook prior to release. All hatchery fall Chinook should be externally marked and a portion of the release coded-wire tagged to monitor performance of the program and evaluate stray rates. Together, these measures should result in improved survival, reduced ecological effects, better homing, and improved contribution to fisheries. Managers may be able to reduce the size of the program and still achieve harvest objectives, if survival increases as expected.

The HSRG recommends that managers implement a BKD control strategy for their spring and summer/fall Chinook hatchery programs where BKD has proved a recurring problem. Ideally, the strategy should include culling (destroying) eggs/progeny from hatchery- and natural-origin brood that are found to be infected with the BKD agent. However, because brood fish with high levels of the BKD agent are more likely to transmit the agent to their progeny than brood with lesser levels of the agent, the culling of eggs/progeny from infected brood fish, should, at the very least, be applied to those with high levels of the BKD agent (e.g., ELISA OD value of 0.4 and above when broodstock are not in short supply and ELISA OD value of 0.6 and above when broodstock are in short supply). In addition, in programs using ESA-listed natural-origin brood fish, the culling of their eggs/progeny may, at the managers' discretion, be dispensed with. However, the ESA-listed broodstock should be injected, pre-spawning, with an appropriate antibiotic (preferably, azithromycin at 40 mg/kg fish), and the resulting eggs should be surface-

disinfected with an iodophor. All pre-spawning brood injections may be limited to females, ESA-listed or otherwise.

Finally, eggs and hatchlings derived from broodstock found to be heavily infected with the BKD agent should be incubated/reared in isolation from those obtained from broodstock with no or lesser levels of the BKD agent. In addition, the hatchlings should be reared at the lowest possible densities (below current standards), and, at the first signs of infection with the BKD agent, they should be treated with orally administered erythromycin (100 mg/kg fish) for 28 days. The treatment should be repeated if there is evidence that the BKD agent has persisted in the hatchlings.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Klickitat Fall 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%	77%	0.00	910	0.7	2,507	0
	URB Hatchery Seg Harv	3,867.2	0%						17,453	1
No Hatchery	None None	-	0%	0%	0%	1.00	491	1.5	1,351	-
HSRG Solution	None None	-	0%	0%	55%	0.00	629	0.7	1,731	0
	URB Hatchery Seg Harv	3,436.0	80%						18,341	3,329
HSRG Solution w/ Improved Habitat	None None	-	0%	0%	53%	0.00	703	0.8	1,937	0
	URB Hatchery Seg Harv	3,436.0	80%						18,341	3,329