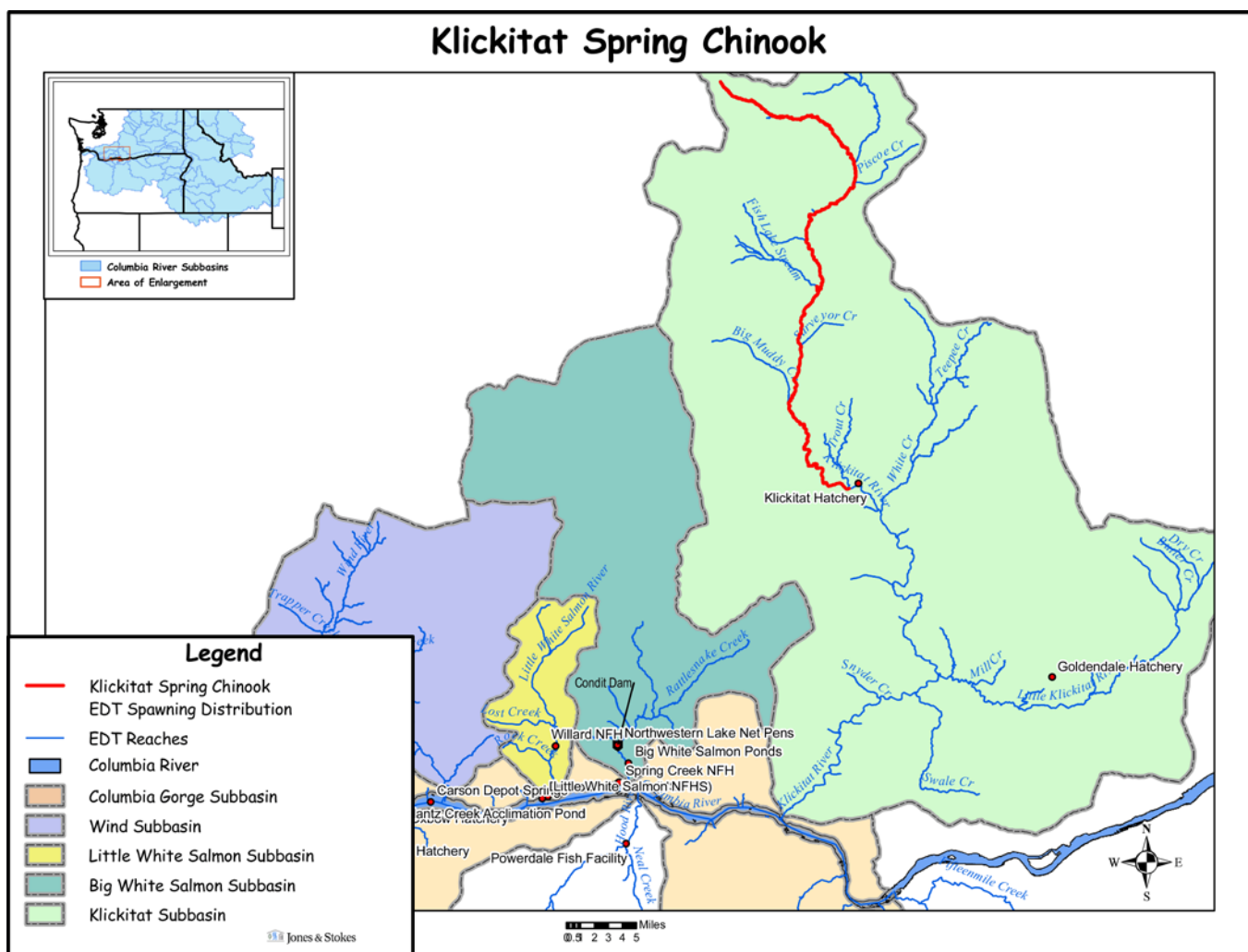


Hatchery Scientific Review Group Review and Recommendations

Klickitat Spring Chinook Population and Related Hatchery Programs

January 31, 2009



1 Klickitat Spring Chinook

Bryant (1949) cited reports of large spring Chinook runs in the Klickitat River and a significant tribal fishery at Lyle Falls (RM 2) prior to 1920, despite difficult passage at the falls. By 1951, the annual spring chinook run varied from 1,000 adults to 5,000 adults (WDFW 1951, Sharp 2000). The Klickitat Hatchery (RM 42.5) and two fishways at Lyle Falls were constructed in 1952, using Mitchell Act funds. Managers trapped spring Chinook broodstock at the upper fishway each year from 1952 through at least 1959. Estimates of spring Chinook run sizes ranged from 1,614 fish to 3,488 fish. Since 1977, estimates of spring Chinook (adults plus jacks) returning to the Klickitat River mouth have ranged from about 500 to 5,300 fish, averaging about 1,900 fish annually. In-basin harvest has ranged from under 100 to nearly 1,800 fish, averaging about 700 fish annually. Tribal fishers account for nearly 75% of the harvest on average since 1977 (Klickitat Subbasin Plan 2004).

Spring Chinook spawning occurs between Leidl Bridge (RM 32) and McCormick Meadows (RM 84). The bulk of spawning (96% in 1998) occurs between the confluence with Big Muddy Creek (RM 54) and Castile Falls (RM 64). Only 3% spawned above the Castile Falls. Spawning is limited in the reach between the confluence with Big Muddy Creek and the Klickitat Hatchery (none in 1998). Spring Chinook spawning generally occurs above the hatchery from mid-August to mid-September and from mid- to late-September in the area downstream from the hatchery. Spring Chinook spawning is not known to occur in tributaries (Klickitat Subbasin Plan 2004).

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: Native Klickitat spring Chinook are part of the Middle Columbia Spring-run Chinook ESU, which NOAA has determined does not warrant listing under the ESA at this time.
- 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 Primary.
- Current Viability Rating: Unknown.
- Recovery Goal for Abundance: Unknown.
- Productivity Improvement Expectation: Unknown.
- Habitat Productivity and Capacity (from EDT): Productivity 6.2; Capacity 607; with improved passage at Castile Falls – Productivity 6.5; Capacity 1,271.

2.2 Current Hatchery Programs Affecting this Population

Spring Chinook are native to the Klickitat; however, there is long history of hatchery releases of non-native stocks such as Carson, Willamette and Cowlitz Chinook (SaSSI 2002). The original spring Chinook program at the Klickitat Hatchery began with adults trapped in the Klickitat River and was supplemented with eggs from the Carson National Fish Hatchery. Currently, an integrated program is producing Spring Chinook at the Klickitat Hatchery for both harvest and conservation measures. Prior to 2006, only adipose-clipped hatchery-origin fish were to be

included in the brood. After 2006 an unknown number of natural-origin fish were to be included in the brood in order to properly integrate the hatchery production with the natural population (HGMP 2004). Each year an average of 999 adults (9-year average including jacks) are collected from adults volunteering to the rack at the Klickitat Hatchery. Adults are diverted into the hatchery by a low head barrier dam (not a total blockage). Some adults are able to pass the barrier dam and spawn in natural production areas above the hatchery.

Two releases are made: 243,000 fingerlings (8-year average) at 61 fish per pound are trucked up-river for release in early May to reduce densities at the hatchery when there is a significant overage of spring Chinook fingerlings; and another 610,000 yearlings at 7.2 fish per pound are volitionally released in early March from the hatchery as required by *US v. Oregon*. The fingerling release is made only occasionally, after approval from the managers. All releases are adipose-clipped and 17% are coded-wire tagged.

Current releases include 600,000 yearlings (15 fish per pound), volitionally released in early March. The YN/YKFP has discontinued fry release in the upper basin. All releases are adipose-clipped and 17% are coded-wire tagged.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from in-basin integrated hatchery program: 195 fish.
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 37 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 1.8 to 3.6. Average abundance of natural-origin spawners (NOS) would increase from 335 to 570. Harvest contribution of the natural and hatchery populations would go from 1,080 to 463.

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

This is a Primary population that is currently not achieving HSRG guidelines for a Primary designation.

The production goal for the program is 800,000 smolts to be reared and released from the Klickitat Hatchery. Current adult collection infrastructure limits the ability to achieve a properly integrated program. The program has experienced poor survival due to water source, infrastructure and disease issues. The main purpose of the current hatchery program is to provide harvest. If operated in a manner consistent with HSRG guidelines, this population could also contribute to conservation goals for the population.

Selective sport harvest was implemented in 2006. Tribal harvest is non-selective.

The habitat above Castile Falls has recently become accessible to spring Chinook and potentially can double the natural production potential for the Klickitat River. The HSRG analysis of this population included this habitat component.

Recommendations

Primary population guidelines could be achieved by increasing the percent natural-origin broodstock in the program. To achieve this objective, a lower river broodstock collection facility is needed. Such a facility is expected to be complete at Lyle Falls by 2010. Additional broodstock will be collected at Klickitat Hatchery and the Castile Falls collection facility. Spawning, rearing and release will occur at Klickitat Hatchery. A program of up to 800,000 smolts with a pNOB of 30% and a pHOS of 14% would have a PNI of 0.69.

There are apparent opportunities to improve survival by reducing rearing densities, exploring alternative water sources during rearing, and addressing disease issues.

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 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	Int Both	831.2	80%	0%	36%	0.10	335	1.8	1,080	305
No Hatchery	None None	-	0%	0%	0%	1.00	570	3.6	463	-
HSRG Solution	Int Both	800.8	95%	0%	14%	0.69	470	3.8	1,940	316
HSRG Solution w/ Improved Habitat	Int Both	800.8	95%	0%	11%	0.73	617	4.5	1,999	316