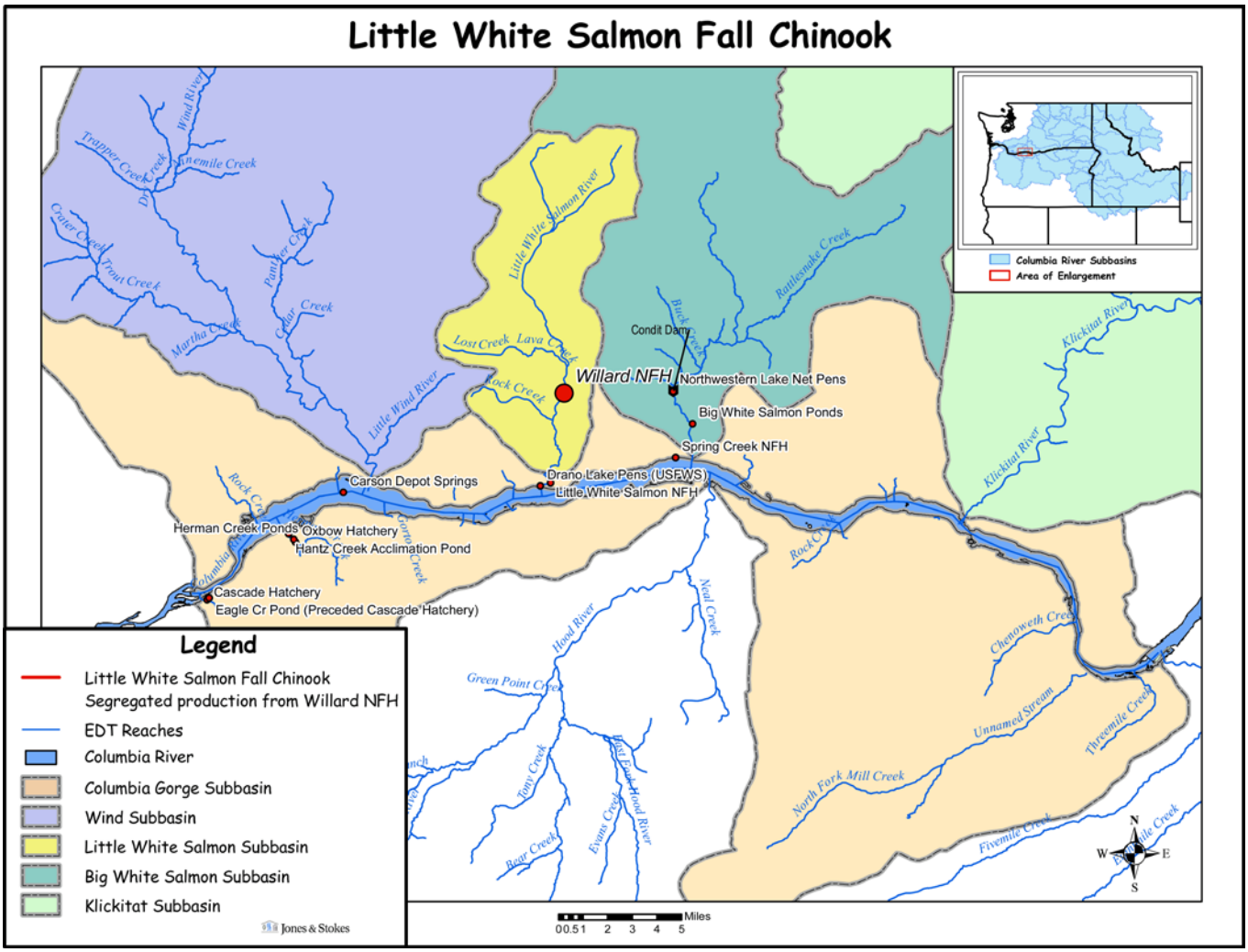
Hatchery Scientific Review Group
Review and Recommendations

Little White Salmon Fall Chinook
Population and Related Hatchery Programs

January 31, 2009



1 Little White Salmon Fall Chinook

The Little White Salmon fall Chinook are combined with Wind River fall Chinook to form the upper Gorge fall Chinook population. The historical Little White Salmon adult tule fall Chinook population is estimated from 4,000 to 5,000 fish. Current natural spawning returns are 100 to 200 fish. The Little White Salmon Hatchery produces upriver bright (URB) fall Chinook which are not part of the lower Columbia ESU. Fall Chinook spawning occurs in a 0.25-mile stretch of river downstream from the Little White Salmon Hatchery and upstream of Drano Lake. Tule fall Chinook spawning occurs from mid-September to mid- October. The URB fall Chinook spawn from late October through November. Juvenile rearing occurs near and downstream of the spawning areas. Juveniles migrate from the Bonneville tributaries in the spring and early summer of their first year (LCFRB 2004).

Historically, fall Chinook were limited to the lower river below a barrier falls at about RM 2; currently, very limited natural production occurs in this area. Completion of Bonneville Dam (1938) inundated the primary fall Chinook spawning areas in the lower river (LCFRB 2004).

Upstream migration of mid-Columbia bright fall Chinook in the Columbia River occurs from August to October; peak counts at Bonneville Dam occur around September 4-9. Bright fall Chinook spawn at the Little White Salmon National Fish Hatchery in November; natural spawning timing in the Little White Salmon River is late October and November. Ages range from 2-year-old jacks to 5-year-old adults, with dominant adults of ages 3 and 4 (averages are 46.1% and 46.1%, respectively). Emergence and emigration timing of naturally produced fry is unknown. Hatchery fry emerge in March and emigration timing is based on hatchery release timing (LCFRB 2004).

This stock is considered a URB stock in the lower Columbia River ESU. Current bright fall Chinook production is a result of hatchery strays (LCFRB 2004).

Historically, the Little White Salmon fall Chinook population was an earlier spawning tule stock and was substantial, but the population has not persisted. Fall Chinook eggs taken from the Little White Salmon River between 1897 and 1920 (as many as 40 million) indicate a very large historical abundance of naturally produced early spawning tule fall Chinook. In the late 1930s, fall Chinook were reported in the Little White Salmon River during escapement surveys. Fall Chinook returns to the Little White Salmon NFH ranged from 238 to 2,653 from 1979-1983 (averaging 981 fish) (LCFRB 2004).

A smolt capacity model estimated that 73,652 fall Chinook fingerlings could be produced in the Little White Salmon River subbasin. The White Salmon River tule fall Chinook stock is currently produced at Spring Creek NFH (LCFRB 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: Little White Salmon River fall Chinook are part of the Lower Columbia Chinook ESU; which was listed as threatened under the ESA in 1999.

- Population Description: The Little White Salmon fall Chinook population is part of the Upper Gorge Tributaries population, which is designated as Stabilizing in the Lower Columbia Salmon Recovery and Subbasin Plan (LCSR&SP, 2004). The LCSR&SP describes current viability as Low with a viability goal of Unknown. The extinction risk was estimated as approximately 50% (LCFRB 2004).
- Recovery Goal for Abundance: Unknown.
- Productivity Improvement Expectation: Unknown.
- Habitat Productivity and Capacity (e.g., from EDT): Unknown.

2.2 Current Hatchery Programs Affecting this Population

The Little White Salmon (RM 1) and the Willard National Fish Hatcheries (RM 5) are located in the basin; hatchery production began in 1896. Annual hatchery egg take of fall Chinook during 1897-1920 was typically 10-30 million and as high as 40 million. Hatchery production shifted from tules to URB late fall Chinook as part of the John Day Dam mitigation and a US v. Oregon Agreement in 1988. The current Little White Salmon Hatchery fall Chinook program includes 3.7 million URB fall Chinook, with 2 million released into the Little White Salmon River and the remainder transferred to the Yakima River as part of John Day Dam mitigation (LCFRB 2004).

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: 2,051 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 Recommendations 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 0.1 to 0.2. Average abundance of natural-origin spawners (NOS) would increase/decrease from 45 to 0. Harvest contribution of the natural and hatchery populations would go from 6,398 to 0.

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 program makes an important contribution to harvest.

The HSRG anticipates that future reliance on imported broodstock from this program would be reduced or eliminated. Eliminating out-of-basin transfers of fish or eggs from this program would do away with the possibility of disease transfers to out-of-basin sites. The water supply at Willard National Fish Hatchery has a rainbow trout population known to be infected with the kidney disease bacterium. Eggs and fish transferred from this hatchery may thus be infected with the bacterium.

Strays from this program to the White Salmon River have been observed. There appears to be a need to improve homing fidelity.

Recommendations

The HSRG recommends continuing this program. In addition, the HSRG supports the USFWS effort to PIT-tag a representative portion of the release for the purpose of developing in-season management information. All fish currently are mass-marked and a portion are coded-wire tagged for monitoring harvest contribution, stray rates and to provide other relevant biological information.

The HSRG recommends that capture efficiency be improved or maintained.

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 Little White Salmon 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%	97%	0.00	45	0.1	268	0
	URB - Hatchery Seg Harv	2,007.2	75%						5,865	1,497
No Hatchery	None None	-	0%	0%	0%	1.00	0	0.2	0	-
HSRG Solution	None None	-	0%	0%	92%	0.00	136	0.3	176	0
	URB - Hatchery Seg Harv	2,007.2	80%						5,321	1,085
HSRG Solution w/ Improved Habitat	None None	-	0%	0%	91%	0.00	149	0.4	194	0
	URB Hatchery Seg Harv	2,007.2	80%						5,321	466