1 **Okanogan River Spring Chinook**

Okanogan Spring Chinook are considered part of the Upper Columbia River ESU that contains three extant populations- Wenatchee, Entiat and Methow river spring Chinook, and one extinct population - Okanogan River spring Chinook (ICTRT 2004). Upper Columbia River spring Chinook are classified as endangered under the Endangered Species Act.

Data provided in the upper Columbia River recovery plan indicate that spring Chinook likely spawned in Salmon Creek, Omak Creek and in portions of the subbasin in Canada (UCSRB 2007). There is no evidence that spring Chinook used the Similkameen River upstream of the falls (near Enloe Dam). There are no estimates of historical spring Chinook abundance for the Okanogan River.

2 **Current Conditions**

Currently, there are no naturally-produced spring Chinook in the Okanogan River subbasin. The Colville Tribes, through the Chief Joseph Master Plan, propose to reintroduce spring Chinook to the Okanogan River (see Chief Joseph Hatchery discussion below).

2.1 **Current Population Status and Goals**

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

- **ESA Status:** Upper Columbia River Spring Chinook are listed as endangered. The Okanogan population is considered extinct.
- **Population Description:** Extinct
- **Recovery Goal for Abundance:** Not Applicable
- **Productivity Improvement Expectation:** Increase over time as habitat actions designed to improve the abundance and productivity of ESA listed steelhead are implemented in the subbasin.
- **Habitat Productivity and Capacity:** Productivity: 0.9; Capacity: 259

2.2 **Current Hatchery Programs Affecting this Population**

Currently there are no hatchery programs for spring Chinook in the Okanogan River. The Chief Joseph Hatchery Master Plan calls for the development of two spring Chinook programs (an integrated conservation program and a segregated harvest program) in the Okanogan subbasin that would be operated simultaneously. To achieve this objective, the Colville Tribe proposes to construct Chief Joseph Hatchery at Chief Joseph Dam on the Columbia River. The program would produce 900,000 spring Chinook for both harvest and conservation purposes. Initially, this program proposes to use Carson stock for broodstock.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from integrated in-basin programs: 0
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 0
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 0.8 to 0.9. Average abundance of natural-origin spawners (NOS) would be unchanged. The harvest contribution of the natural and hatchery populations would be zero.

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

Okanogan spring Chinook have been extirpated; however, there are plans to reintroduce the species into the subbasin. There is no current spring Chinook program in the Okanogan River. Since 2001, there have been intermittent releases into the Okanogan subbasin when there are surplus juveniles from Winthrop National Fish Hatchery (NFH) or Entiat NFH. From these releases managers have documented that spring Chinook can return to spawn in Omak Creek and successfully produce juveniles. SARs for these hatchery releases have been very low.

The Colville Tribes are initiating a significant habitat improvement program. Without habitat improvements, it is unlikely that a spring Chinook population in the Okanogan River tributaries or Canadian Okanagan River would be self-sustaining.

The Colville Tribes have management goals to reintroduce spring Chinook into historical Canadian and U.S. habitats to provide conservation benefits and terminal harvest opportunities. The Tribes also seek to release spring Chinook in the mainstem Columbia River (below Chief Joseph Dam) for tribal and recreational fisheries.

Recommendations

To reintroduce spring Chinook into the Okanogan River, the HSRG recommends that the Okanogan population be managed using a phased transition approach, as described below. Hatchery facilities should be developed to provide within-basin full-term rearing to meet both conservation and fishery objectives. If this is not possible, long-term acclimation and adult recapture facilities should be developed within the subbasin.

**Phase 1:** The managers should identify appropriate stable sources of broodstock to support the reintroduction and harvest objectives. Managers should transition to local broodstock as soon as required facilities are operational and Chinook runs can support an independent local broodstock program.

**Phase 2:** As benefits from planned habitat improvements occur, introduce spring Chinook from the locally adapted hatchery population into these habitats.

**Phase 3:** As habitat capacity and productivity increases and as the number of naturally-produced spring Chinook also increases, natural-origin adults should be incorporated into the hatchery broodstock in ever-increasing proportions to achieve a PNI initially greater than 0.5. Once the natural population abundance increases, more of the hatchery production could be used to provide harvest.

**Segregated Harvest Program:** To meet sport and tribal harvest objectives, a segregated program could be considered below Chief Joseph Dam. In selecting a broodstock for this program, the managers should consider using either upper Columbia spring Chinook surplus to other conservation programs (see Methow recommendations) or the Leavenworth population of Carson-stock spring Chinook (see Wenatchee recommendations).

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 Okanogan 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.

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<th>Alternative</th>
<th>Type and Purpose</th>
<th>Prog Size (/1000)</th>
<th>HOR Recapture</th>
<th>Additional Weir Efficiency</th>
<th>Effective pHOS</th>
<th>PNI</th>
<th>NOS Esc</th>
<th>Adj Prod</th>
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