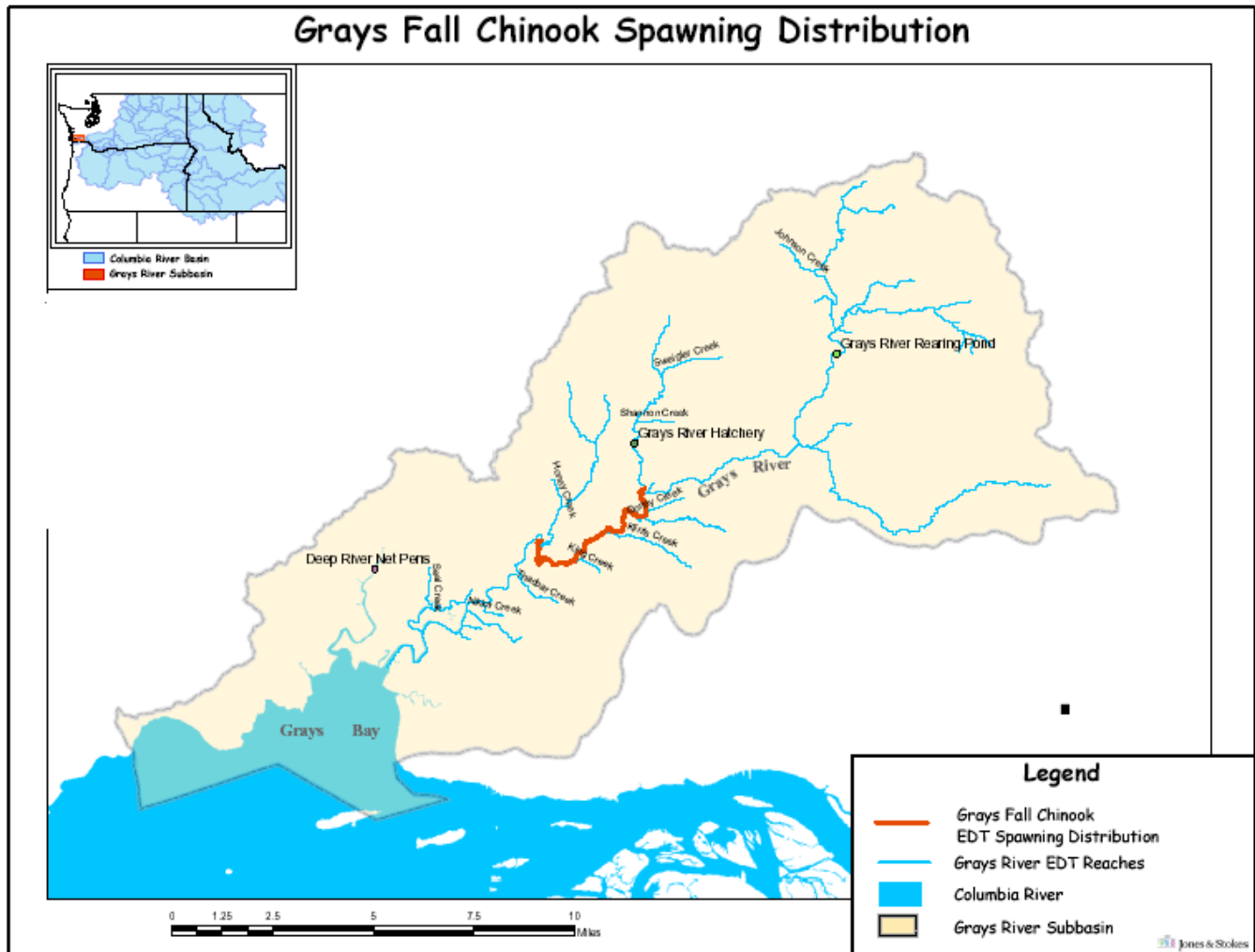


# Hatchery Scientific Review Group Review and Recommendations

## Grays Fall Chinook Population and Related Hatchery Programs

January 31, 2009



# 1 Grays Fall Chinook

Fall Chinook are native to the Grays River. This is now a mixed stock with wild production. A native population of fall Chinook existed in the Grays River prior to the construction of Grays River Hatchery in 1960. Until recently, significant portions of the fall Chinook spawners in the Grays River were hatchery strays. The fall Chinook program at the Grays River Hatchery ended in 1998. The present population is probably a mix of native and hatchery-origin fish with life history characteristics common to those of other lower Columbia River tule fall Chinook stock (SaSSI 2002). Stock mixing very likely began when hatchery supplementation was initiated in 1947 (WDF et al. 1993). The majority of spawning takes place in a 3.6-mile area from the covered bridge on the mainstem (RM 10.7) to the Grays River Salmon Hatchery on the West Fork Grays (RM 1.2). Spawning occurs from late September to mid-November (WDF et al. 1993). In the early 1950s, there was an estimated escapement of 1,000 fall Chinook to the Grays River (WDF 1951). Seining in 1979 captured few naturally-produced, fall Chinook juveniles. This evidence suggests that few natural fall Chinook juveniles were being produced (WDF et al. 1993). Natural spawning escapements from 1967 to 1991 averaged 745 fish, with a low return of 147 in 1967 and a peak of 2,685 in 1978. Grays River Chinook salmon stock status was rated Depressed in 2002 because of a long-term negative trend and a short-term severe decline in escapements in 1997, 1998 and 2000. Generally, lower Columbia tule fall Chinook stocks, including Grays fall Chinook, experienced poor survival in the 1990s.

## 2 Current Conditions

### 2.1 Current Population Status and Goals

- **ESA Status:** This population is listed as threatened and is part of the Lower Columbia Chinook ESU.
- **Population Description:** Two populations in the coast portion of the ESU, the Grays River and Elochoman/Skamokawa populations, have been designated as Primary populations with high viability goals (LCSR&SP 2004). The historical Grays River population was likely average in abundance for coastal tule fall Chinook populations. There was a hatchery fall Chinook program in the basin for almost 40 years, but it was recently eliminated. Current returns of naturally produced Chinook are among the lowest in the ESU.
- **Current Viability Rating:** Low+, with a goal of High.
- **Recovery Goal for Abundance:** 1,400.
- **Productivity Improvement Expectation:** Unknown.
- **Habitat Productivity and Capacity:** Productivity 3.0; Capacity 300. The HSRG assigned a default value for an estimate of the current habitat for the Grays fall Chinook, since no other estimate of productivity and capacity were available.
- **Populations Affected by this Hatchery Population Include:** None.

### 2.2 Current Hatchery Programs Affecting this Population

Currently, there is no hatchery program for Grays fall Chinook. The No Hatchery scenario describes the current condition. The PNI for the population is 1.00 and the pHOS is zero (assuming there is no straying from other programs). Based on the productivity and capacity assumption above, the projected average natural-origin escapement is approximately 50 fish annually. The average harvest contribution is estimated to be approximately 50 fish annually.

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: 124 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 0.9 to 1.8. Average abundance of natural-origin spawners (NOS) would increase from 116 to 164. Harvest contribution of the natural and hatchery populations would go from 117 to 164.

#### 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 not meeting recovery standards. Low productivity and low abundance present challenges to sustaining this population. Hatchery strays are occupying available spawning grounds; however, they could be precluded by constructing a lower river weir.

### Recommendations

This Primary population is important to the ESU. The HSRG recommends a small, integrated, conservation program at the Grays River hatchery (94,000 uniquely tagged, but not adipose clipped, to avoid selective harvest) to sustain the population until natural productivity and abundance has improved to sustain the population. Install a lower river weir to effectively remove strays and collect broodstock, and update and protect the hatchery water supply.

To achieve recovery goals for this Primary population, it is necessary to reduce harvest impacts on natural fish and improve habitat. The HSRG recommends that every possible step be taken to achieve the abundance goal for this population.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Grays 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	-	0%	0%	46%	0.00	116	0.9	117	0
	None									
No Hatchery	None	-	0%	0%	0%	1.00	164	1.8	164	-
	None									
HSRG Solution	Int Cons	94.2	90%	95%	2%	0.97	252	2.5	244	244
HSRG Solution w/ Improved Habitat	Int Cons	94.2	90%	95%	1%	0.97	310	2.8	270	244