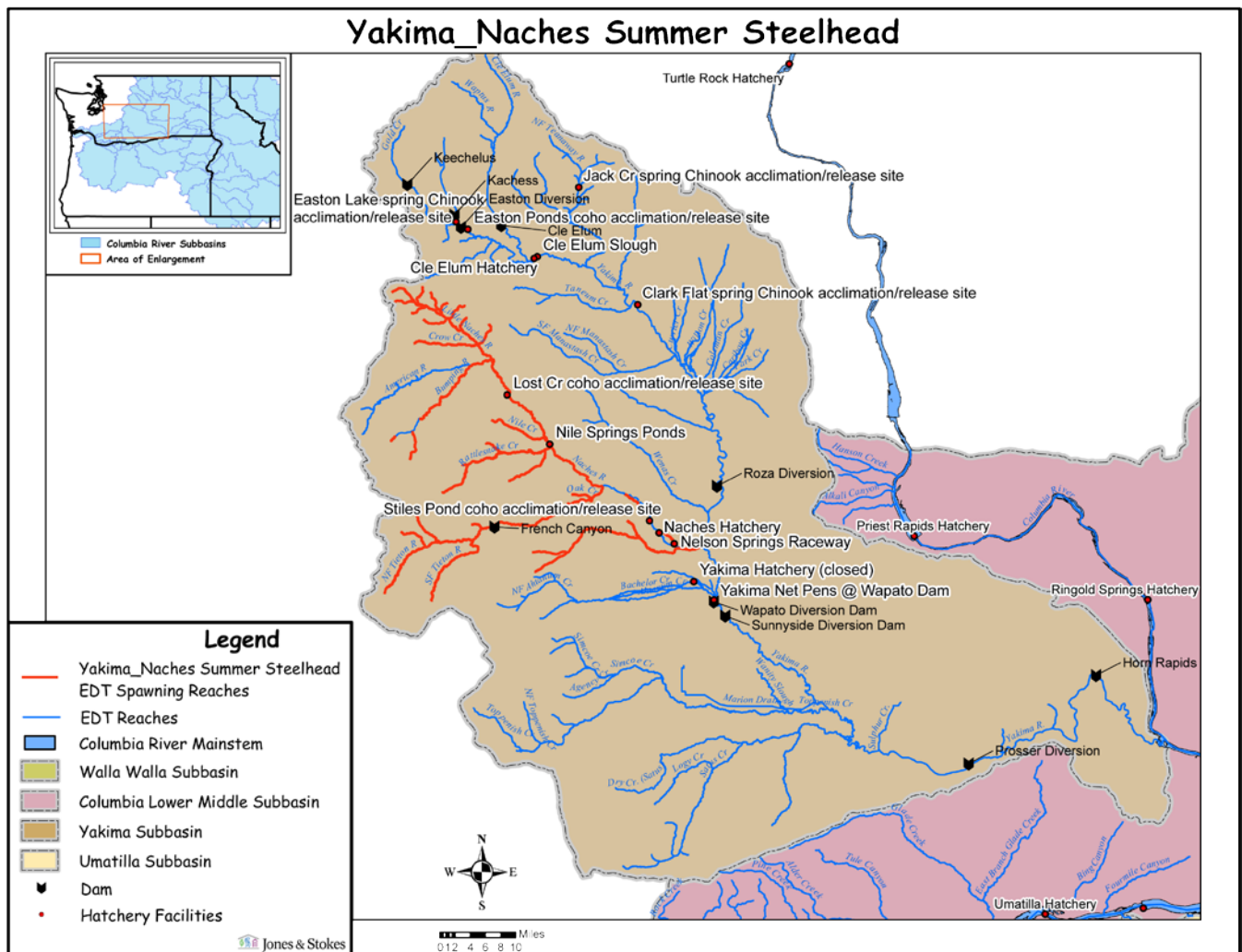


# Hatchery Scientific Review Group Review and Recommendations

## Naches Summer Steelhead Population and Related Hatchery Programs

January 31, 2009



# 1 Naches Summer Steelhead

The Yakima subbasin supports four genetically and demographically distinct stocks of summer steelhead, the Satus Creek stock, the Naches River stock, the Toppenish Creek stock, and the upper Yakima stock. Hockersmith et al (1995) successfully monitored 105 radio-tagged steelhead to spawning over brood years 1990 – 1992. Because high flows and turbidity in the Naches and Yakima mainstem during steelhead spawning precludes visual redd counts, this radio-tagging data has been the only means of determining the overall stock composition of the run. Over all three years, the mean percent of radio tagged fish that spawned in Satus Creek, the Naches River watershed, Toppenish Creek, and the upper Yakima was 48.0%, 31.6%, 13.3% and 7.1%, respectively.

Estimates of the size of the historical Yakima steelhead run range from 20,800 (Kreeger and McNeil 1993) to 100,000 (Smoker 1956). The historic distribution of spawning likely differs from the proportions found by Hockersmith (1995) because large amounts of habitat have been lost due to impassible dams in the upper Yakima and Naches drainages, and because anthropogenic impacts to habitat and passage conditions in the upper Yakima favor the resident over the anadromous life history type. With this caveat in mind, the product of the current estimate of the proportion of Naches spawners and the two historical total abundance estimates is 6,573 and 31,600. The mean abundance of steelhead in the Naches watershed from 1985 to 2007 was 595; however, like all Yakima steelhead populations, the Naches population has increased substantially since 2000 (mean abundance from 1985 to 2000 was 460; mean abundance from 2001 to 2007 was 861).

Many hatchery *O. mykiss* have been released in the Yakima subbasin. Three million hatchery trout (primarily South Tacoma and Goldendale stock) were planted in the upper Yakima and Naches between 1950 and 1987, and 1.6 million hatchery steelhead (primarily Skamania stock) were planted in the same watersheds between 1961 and 1987. After 1987, no out-of-basin hatchery steelhead were released in the Yakima subbasin, although experimental releases of 40,000 to 100,000 hatchery-reared Yakima stock steelhead were made between 1987 and 1994. The 1991 to 1994 releases were made in the North Fork Teanaway River, an Upper Yakima tributary. Between 1995 and 1999, there were no hatchery steelhead programs in the Yakima subbasin. A kelt reconditioning program at Prosser Hatchery on the lower Yakima (RM 47) began on a test basis in 1999 and moved into full production in 2001. This is the only steelhead artificial production program currently in operation in the Yakima subbasin (see below). Because the program collects kelts at Prosser Dam, below the natal watersheds of all four Yakima steelhead stocks, it is very likely that Naches River fish are included.

Although the entire Yakima subbasin was closed to steelhead fishing in 1994, considerable illegal and/or inadvertent steelhead harvest is believed to occur during the winter whitefish fishery, especially in steelhead staging areas off the mouths of Satus and Toppenish creeks. A terminal harvest rate of 8% has been estimated (C. Frederickson, Yakama Nation, personal communication 2007).

With the exception of the Tieton River and probably the American River, summer steelhead spawn in virtually all of the accessible tributaries in the Naches watershed, but especially in the Little Naches River and its tributaries, Rattlesnake Creek and tributaries, and the Bumping River. Spawning also occurs throughout the mainstem Naches. Curiously, very few if any steelhead spawn in the American River, which is very heavily utilized by spring Chinook. None of Hockersmith's radio-tagged adults spawned in the American River, and Yakama Nation biologists very rarely observed juvenile *O. mykiss* in the American River during numerous electroshocking surveys and censuses (J. Hubble, Yakama Nation, personal communication,

2007). Spawning does not occur in the Tieton River because very large releases of irrigation water from Rimrock Reservoir have drastically reduced the amount of spawning substrate. It is not known why few or no steelhead spawn in the American River.

Spawning occurs over a fairly wide period due to the range of elevations and seasonal water temperatures in the watershed. At the lowest elevations, spawning begins in early March while, at the highest elevations, spawning can continue into June (Yakima Subbasin Plan).

## 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 upper Yakima summer steelhead are part of the Middle Columbia Steelhead DPS, which were listed as a threatened species on March 25, 1999.
- Population Designation: Using a rating system similar to that used by the recovery planners for the Lower Columbia and Willamette arrives at a designation of Primary.
- Current Viability Rating: Moderate to high risk of extinction (Yakima Subbasin Salmon Recovery Plan)
- Recovery Goal for Abundance: 2,000 (rated “large” by ICTRT)
- Productivity Improvement Expectation: 2.0 (C. Frederickson, Yakama Nation, personal communication)
- Habitat Productivity and Capacity (from EDT): Productivity: 1.63; Capacity: 2,056

### 2.2 Current Hatchery Programs Affecting this Population

The Prosser Hatchery kelt reconditioning program is the only steelhead artificial production program in the basin. The Yakima Basin Steelhead Reconditioning Project HGMP (2005) summarized the program as follows. Steelhead kelts are collected at the Chandler smolt trap at Prosser Dam (RM 47) and subjected to short- and long-term reconditioning and release. Because Prosser Dam lies below all four steelhead populations, the kelts collected and reconditioned presumably represent a sample of all of the stocks in the basin. Under long-term reconditioning, kelts are captured at the Chandler smolt trap between March and June, reconditioned on-site for 6 to 8 months, and released back into the Yakima River at Prosser Dam the following December. Mean weight gain for surviving long-term kelts was approximately 70% over collection weight in 2000-2001, and many fish more than doubled their weight. Collection procedures are identical for short-term reconditioning, but fish are held only 1-2 months and are released below Bonneville Dam. Short-term kelts gain very little weight during their brief reconditioning period, and are expected to recondition naturally in the estuary and/or ocean and eventually return to the Yakima subbasin. Six short-term kelts released below Bonneville Dam in May of 2002 returned in the fall of 2002 and were recaptured in the Denil ladder at Prosser Dam. The mean weight gain of these fish after 5-6 months of natural reconditioning was about 46%.

A total of 867 kelts were captured from 2002 to 2004 and subjected to short-term reconditioning, and 2,147 kelts were collected from 2001 to 2004 and subjected to long-term reconditioning. Kelts are collected throughout the migration period for both programs. Based on Prosser Dam counts from July 1, 2000 to March 7, 2005, reconditioned kelts represented about 24% of the entire Yakima River population. Program managers anticipate reconditioning no more than 1,000 to 1,200 kelts per year or, given recent returns, about 25-35 % of the natural run.

Estimated number of hatchery strays affecting this program:

- Hatchery strays from in-basin integrated hatchery program: N/A
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 4 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 remain unchanged at 1.4. Average abundance of natural-origin spawners (NOS) would increase slightly from 521 to 562 recruits per spawner. Harvest contribution of the natural and hatchery populations would increase from 85 to 91 fish.

#### 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**

Recent spawning surveys indicate there is more spawning than previously thought.

There is an experimental kelt (post-spawned steelhead) reconditioning program that may affect steelhead in the Yakima subbasin.

**Recommendations**

The HSRG recommends that managers continue to monitor for spawning success of reconditioned kelts. We have no other specific recommendations for this program.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Naches Summer Steelhead. 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	0%	0%	1%	0.00	521	1.4	85	0
No Hatchery	None None	0.0	0%	0%	0%	1.00	562	1.4	91	-
HSRG Solution	None None	0.0	0%	0%	0%	1.00	559	1.4	91	0
HSRG Solution w/ Improved Habitat	None None	0.0	0%	0%	0%	1.00	758	1.6	123	0