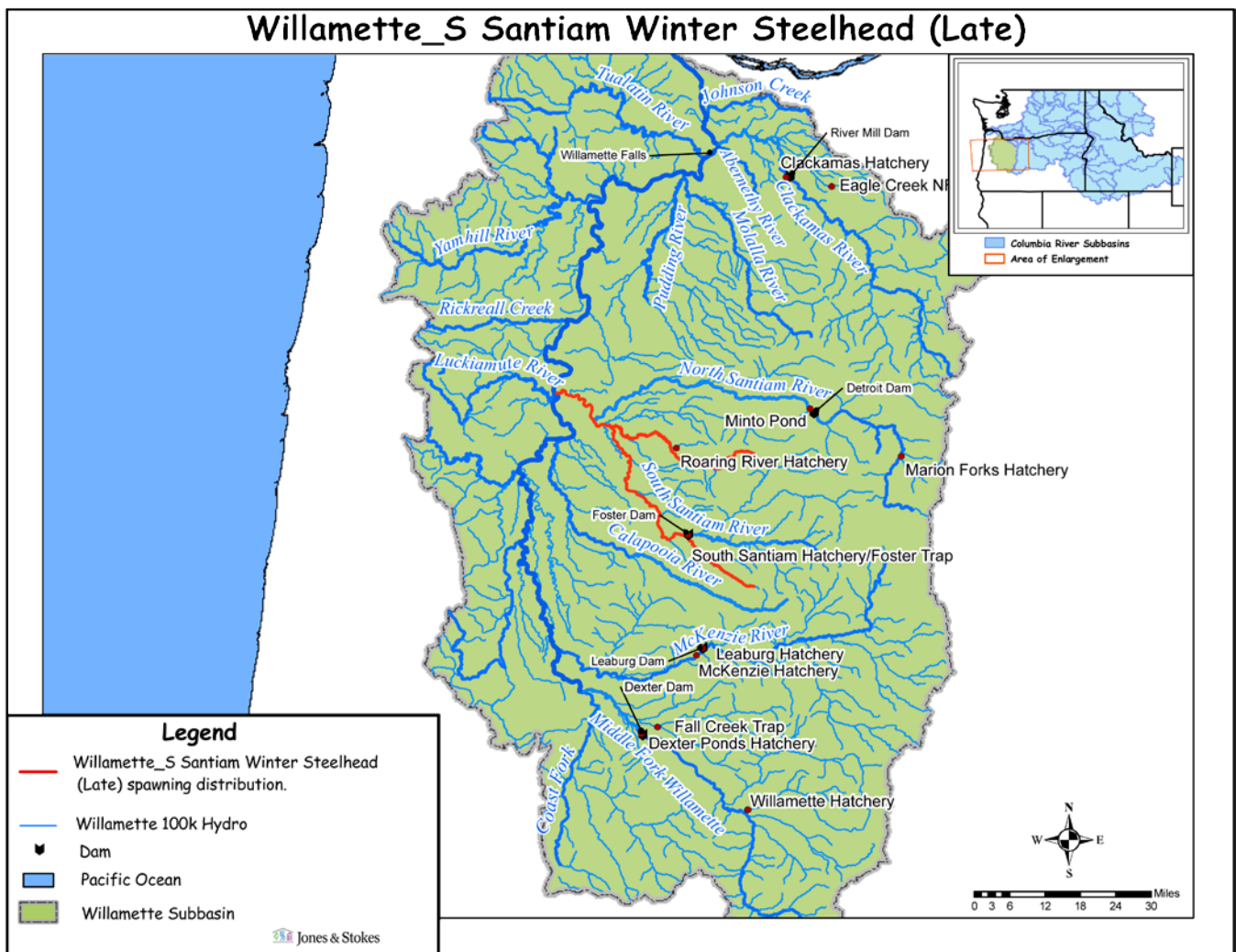


Hatchery Scientific Review Group Review and Recommendations

Willamette - South Santiam Winter Steelhead (Late) Population and Related Hatchery Programs

January 31, 2009



1 South Santiam Winter Steelhead (Late)

The South Santiam winter steelhead (late) population is one of four populations (Molalla, North Santiam, South Santiam, and Calapooia) comprising the Upper Willamette Steelhead ESU. This population, as well as the North Santiam, was designated as a core population and a genetic legacy within the ESU by the TRT (Subbasin Plan). While steelhead in this ESU are depressed from historical levels, all of the historical populations remain extant with moderate numbers of wild steelhead produced each year. However these populations have been adversely affected by the alteration and loss of spawning and rearing habitat associated with hydropower development. Hatchery-reared winter steelhead are no longer released into any of the upper Willamette steelhead populations. However, introduced hatchery summer steelhead still occur in the North and South Santiam basins and also migrate via the mainstem Willamette River to the McKenzie River basin.

ODFW considers the late-run winter steelhead in the South Santiam River to be one population, although Foster Dam may influence the distribution of spawners in the river (Chilcote 1997). Natural spawners above and below Foster Dam are monitored as distinct units and appear to be demographically independent. Currently, the combined escapement to the South Santiam is a few thousand fish (2,296 from 2000-2004), but during the mid-1990s the average was near 1,000 fish (Goodson 2005) (McElhany et al. 2007 review draft).

Spawner abundance estimates, with the exception of the upper South Santiam, are based entirely on spawning surveys conducted for a small portion of the steelhead habitat. The results from these surveys are then expanded for the entire watershed to obtain an estimate for population abundance. As a consequence there is considerable uncertainty concerning the accuracy of the following abundance estimates. The South Santiam late winter steelhead population is relatively large, with a long-term (1968-2005) geometric mean natural-origin spawner of 2,727 and a recent (1990-2005) geometric mean of 2,302 (McElhany et al. 2007 review draft). During the recent period, the geometric mean recruits per spawner was 1.5, with an average hatchery fraction of zero. The pre-harvest viability curve analyses suggest that the population is probably viable if harvest levels remain low. The escapement viability curves suggest that the harvest pattern observed over the course of the time series is likely sustainable (McElhany et al. 2007 review draft).

Access to the upper South Santiam has been blocked by Foster and Green Peter dams, although significant steelhead habitat remains in other portions of this system (McElhany et al. 2007 review draft). In the case of Foster Dam, a trap and haul program is currently moving fish upstream of this blockage. There is no passage of steelhead above Green Peter Dam and so the historical production area upstream of this dam is no longer accessible. ODFW (2005) estimated that 17% of the historically suitable habitat for steelhead is now inaccessible (McElhany et al. 2007 review draft). Access has also been impaired in the upper reaches of many small low-elevation tributaries, although these areas likely did not historically support high densities of steelhead. Habitat degradation due to land use and flow regulation has reduced water quality and the availability of suitable rearing habitat for steelhead in the South Santiam River (McElhany et al. 2007 review draft).

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:** South Santiam Winter Steelhead (late) are part of the Upper Willamette River Steelhead DPS, which was listed as Threatened under the ESA on March 25, 1999; the threatened status was reaffirmed January 5, 2006.
- **Population Description:** The South Santiam Winter Steelhead (late) population has been designated as a core population and a genetic legacy by TRT. This population was given a Contributing designation for the HSRG review.
- **Recovery Goal for Abundance:** Unknown
- **Productivity Improvement Expectation:** Unknown
- **Habitat Productivity and Capacity (e.g., from EDT):** Productivity: 7.0; Capacity: 3800.

2.2 Current Hatchery Programs Affecting this Population

Hatchery releases of winter steelhead have not occurred in this basin since 1989, and the proportion of hatchery-reared fish that currently spawn naturally in the South Santiam River is believed to be less than 5% (Chilcote 1997), although prior to 1989 it was over 40% (Goodson 2005). Hatchery operations began in 1926, and in 1940 a record 3,335,000 eggs were taken from 800 females (Wallis 1961). The run size at this time was probably much larger because it was not possible to install the weir in the river until much of the run had already moved far upstream (Wallis 1961) (McElhany et al. 2007 review draft).

Summer steelhead are currently released into the basin as part of the Willamette River segregated harvest summer steelhead program. Broodstock are collected at Foster Dam trap on the South Santiam River. Incubation occurs at South Santiam Hatchery. Fish are reared at South Santiam, Roaring River, Leaburg and Dexter fish hatcheries. Yearling summer steelhead are released in April into the North Santiam (161,500), South Santiam (144,000), Willamette River at Eugene (42,000), Middle Fork Willamette (115,000) and McKenzie (108,000) rivers (HGMP 2004).

In 2003, 11,493 summer steelhead returned to the South Santiam Hatchery. Although differences in spawn timing may limit the potential for genetic introgression, it is unclear how competition between summer and winter steelhead juveniles or adults may influence the expression of life history traits (McElhany et al. 2007 review draft). Only winter steelhead that arrive at Foster Dam are transported above the dam. This effectively creates two zones in the South Santiam River, below Foster Dam where summer and winter steelhead co-mingle and above Foster Dam where only naturally-produced (unmarked) fish are allowed (McElhany et al. 2007 review draft).

Estimated number of hatchery strays affecting this population:

- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 450 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 PNI (proportionate natural influence) 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 5.5 to 6.7. Average abundance of natural-origin spawners (NOS) would increase from approximately 3,100 fish to approximately 3,500 fish. Harvest contribution of the natural and hatchery populations would go from approximately 5,800 fish to approximately 140 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

Operation of this segregated summer steelhead program is consistent with a designation of this population as Primary. This is a stronghold of winter steelhead production in the upper Willamette River Distinct Population Segment. Along with the North Santiam population, it is one of two important populations above Willamette Falls. About 144,000 summer steelhead smolts from a segregated program are released at the South Santiam Hatchery.

Recommendations

Managers should consider discontinuing recycling adults through the fishery and/or liberalize fishing regulations to achieve the highest possible removal rate of hatchery fish from the spawning grounds.

The ecological effect on natural steelhead may be a concern (Kostow and Zhou 2006). Periodically assess the ecological risks under this program. In any case, manage acclimation and release to reduce residualism and recapture unharvested adults to the extent possible.

We suggest improving adult collection and handling/holding abilities for winter steelhead to facilitate reintroduction in the upper basin.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for South Santiam Winter 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%	2%	0.00	3,097	5.5	128	0
	Seg Harv	144.1	90%						5,643	2,396
No Hatchery	None None	-	0%	0%	0%	1.00	3,456	6.7	142	-
	Seg Harv	144.1	90%						5,643	2,396
HSRG Solution	None None	-	0%	0%	2%	0.00	3,046	5.7	126	0
	Seg Harv	144.1	90%						5,643	2,396
HSRG Solution w/ Improved Habitat	None None	-	0%	0%	2%	0.00	3,480	6.5	143	0
	Seg Harv	144.1	90%						5,643	2,396