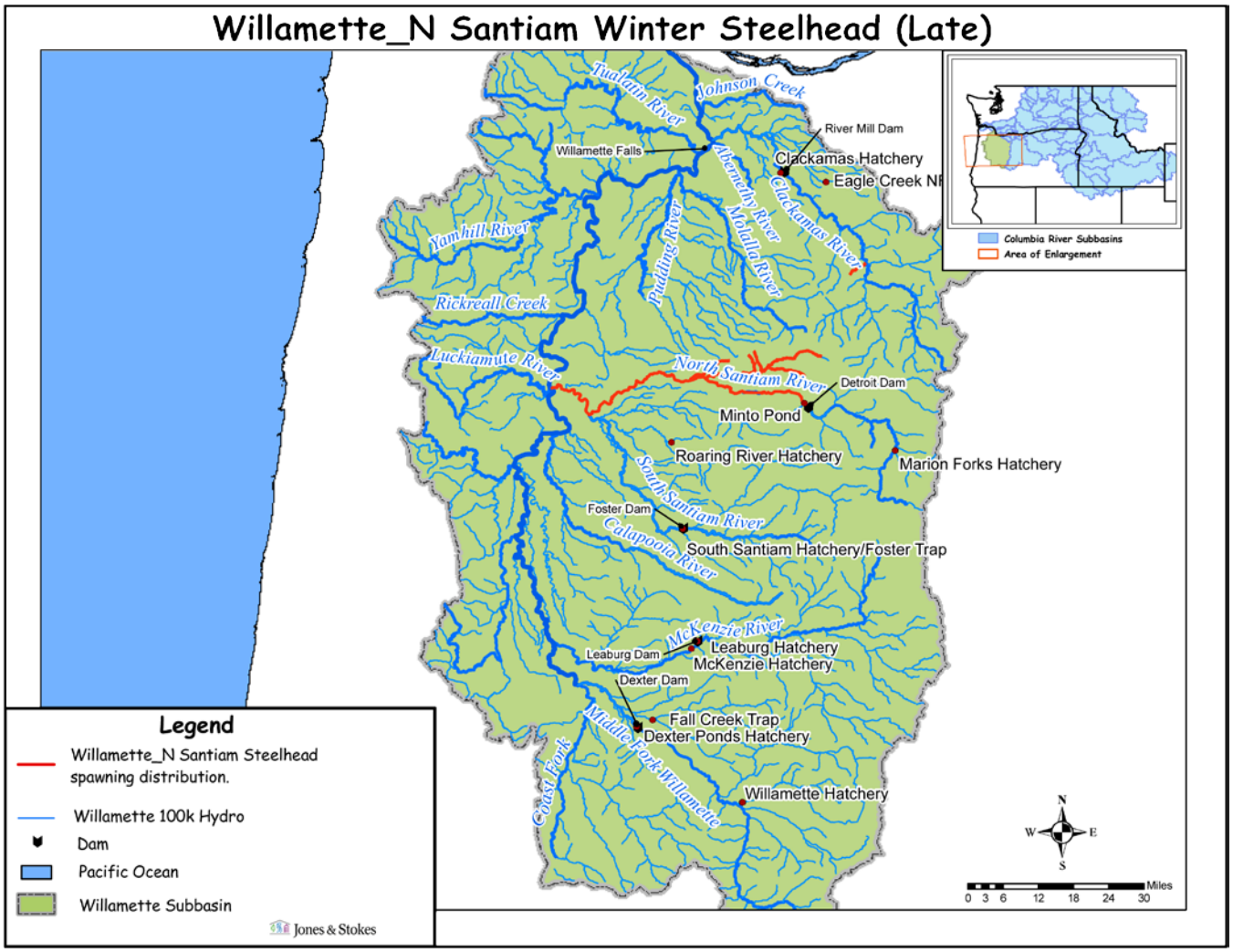
Hatchery Scientific Review Group
Review and Recommendations

Willamette – North Santiam Winter Steelhead (Late)
Population and Related Hatchery Programs

January 31, 2009



1 North Santiam Winter Steelhead (Late)

The North 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 South Santiam, was designated as a core population and a genetic legacy within the ESU by the TRT (Subbasin Plan). Although 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. 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 River steelhead populations. However, introduced hatchery summer steelhead still occur in the North and South Santiam basins.

The North Santiam late winter steelhead population is relatively large, with a long-term (1980-2005) geometric mean natural-origin spawners of 2,722 and a recent (1990-2005) geometric mean of 2,109 (McElhany et al. 2007 review draft). In the recent period, the geometric mean recruits per spawner was 1.2, with an average pHOS 0.11. These values are in the very low risk minimum abundance threshold category. 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 to be sustainable.

Surveys done in 1940 estimated that the run of steelhead was at least 2,000 fish (Parkhurst et al. 1950) (McElhany et al. 2007 review draft). Parkhurst also reports that larger runs of steelhead existed in the Breitenbush, Little North Santiam, and Marion Fork rivers. Native steelhead were artificially propagated at the North Santiam Hatchery beginning in 1930, when a record 2,860,500 eggs (686 females x 4170 eggs/female) were taken (Wallis 1963). Production was somewhat intermittent during the 1940s. Attempts to capture all returning steelhead were unsuccessful due to the frequency and magnitude of spring floods (Wallis 1963). With the construction of Detroit Dam, the contribution of naturally-produced fish to escapement declined considerably. Access to large portions of historically productive steelhead habitat has been blocked by Detroit Reservoir (McElhany et al. 2007 review draft). ODFW estimates that 46% of the historically suitable habitat for steelhead is now inaccessible (ODFW 2005). The blocked areas historically included some of the most productive habitats in this system, although productive habitat remains in the Little North Santiam River. Habitat has also declined in the remaining accessible areas (McElhany et al. 2007 review draft).

There appears to be little change from historical spawn timing. Currently, winter steelhead return to the Minto trap on the North Santiam from April through May (Wevers et al. 1992). Adult winter steelhead arrive at Foster Dam from February through June, with the peak of the run usually in mid-April, and there is no evidence that there has been a shift from the historical run timing (ODFW 1990). Redd counts for winter steelhead in the Upper Willamette subbasin are conducted in May.

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: North 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 North Santiam Winter Steelhead (late) population has been designated as a core population and a genetic legacy by TRT. This population was given a Primary designation for the HSRG review.
- Recovery Goal for Abundance: Unknown
- Productivity Improvement Expectation: Unknown
- Habitat Productivity and Capacity (e.g., from EDT): Productivity: 6.96; Capacity: 3,783.

2.2 Current Hatchery Programs Affecting this Population

The release of hatchery propagated late-run winter steelhead was discontinued in 1998 (NMFS 1999) (McElhany et al. 2007 review draft). Prior to that time, there were releases of locally derived late-winter steelhead beginning in the1920s.

Summer steelhead are 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).

Estimated number of hatchery strays affecting this population:

- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 2,169 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 3.1 to 6.1. Average abundance of natural-origin spawners (NOS) would increase from approximately 1,586 fish to approximately 3,134 fish. Harvest contribution of the natural and hatchery populations would go from approximately 3,660 fish to approximately 393 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

It is estimated that 46% of the historic suitable habitat in the North Santiam watershed is no longer accessible to steelhead due to dam construction.

This is one of two potential strongholds for natural production of winter steelhead. Given the information available, it is unknown whether this population meets the standards for a contributing or a primary population due to potentially high proportions of hatchery fish on the spawning grounds.

Annually, 161,500 summer steelhead smolts from a segregated program are released into the North Santiam River at Minto Pond. The current fishery appears inadequate to remove available hatchery steelhead. Although no evaluation has been conducted of the program to recycle adults in this watershed, indications from other watersheds suggest that reducing or discontinuing recycling reduces the number of hatchery fish on the spawning grounds.

Recommendations

Given the available information, better tracking of returning summer steelhead is recommended. Unless hatchery fish can be accounted for and the ability to manage composition on the spawning ground (below 5% effective spawners) can be demonstrated, the program should be reduced. (Assuming the current estimated ability to collect adults, the program size would need to be reduced to approximately 40,000 smolts.)

Managers should consider discontinuing recycling adults through the fishery and/or liberalize fishing regulations to achieve a higher harvest rate on hatchery fish. If 90% of the unharvested hatchery fish could be removed, then a program of the current size could be maintained consistent with the guidelines for the designation of a Primary population.

Given the broodstock management (recycling), the program would need to be reduced to about 40,000 smolts to meet the guidelines for designation as a Primary population.

The ecological effect on natural steelhead is a concern (Kostow and Zhou 2006). Both of the foregoing options represent a reduced genetic and ecological risk. After making a program decision, 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.

Improve or replace the acclimation facilities at Minto Pond. 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 North 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%	19%	0.00	1,586	3.1	199	0
	Seg Harv	161.1	40%						3,461	1,513
No Hatchery	None None	-	0%	0%	0%	1.00	3,134	6.1	393	-
HSRG Solution	None None	-	0%	0%	2%	0.00	2,680	5.1	336	0
	Seg Harv	161.1	90%						3,461	3,403
HSRG Solution w/ Improved Habitat	None None	-	0%	0%	2%	0.00	3,086	5.8	387	0
	Seg Harv	161.1	90%						3,461	3,403