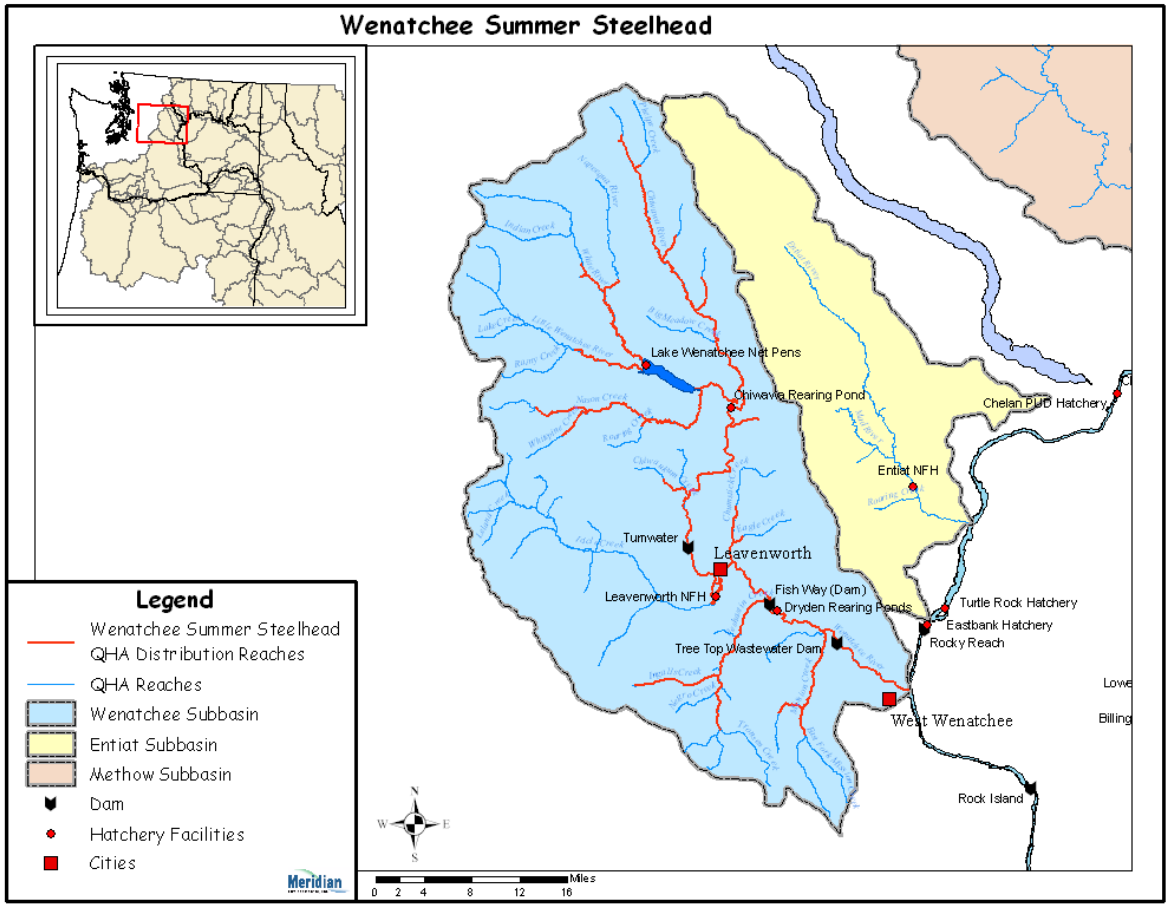
Hatchery Scientific Review Group Review and Recommendations

Wenatchee Summer Steelhead Population and Related Hatchery Programs

January 31, 2009



1 Wenatchee River Summer Steelhead

Wenatchee River summer steelhead are considered part of the Upper Columbia River Steelhead DPS that includes all naturally-spawned anadromous steelhead populations below natural and man-made impassable barriers in the Columbia River Basin upstream of the Yakima River to the U.S.-Canada border. This DPS was determined by the courts to be endangered under the ESA in June of 2007. The Wenatchee River population is considered an "Intermediate" population by the Interior Columbia Technical Review Team (ICTRT). An "Intermediate" steelhead population is one that must have a minimum abundance of 1,000 spawners and a S/S ratio of 1.1 to be viable.

The historical abundance of summer steelhead in the Wenatchee River has been estimated at approximately 7,300 fish. They were thought to have spawned in lower Mission, Peshastin, Icicle, Chiwaukum, Chumstick, Beaver, and Nason creeks, and the Wenatchee, Chiwawa, Little Wenatchee and White rivers. It is likely that steelhead also spawned in some of the smaller tributaries in the subbasin (e.g., Derby Creek) (UCSRB 2007).

2 Current Conditions

Species life history information from the UCSRB (2007) states that:

Adults return to the Columbia River in the late summer and early fall. Unlike spring Chinook, most steelhead do not move upstream quickly to tributary spawning streams. A portion of the returning run overwinters in the mainstem reservoirs, passing over the Upper Columbia River dams in April and May of the following year. Spawning occurs in late spring of the calendar year following entry into the river. Currently, and for the past 20+ years, most steelhead spawning in the wild are hatchery fish. The effectiveness of hatchery fish spawning in the wild compared to naturally produced spawners is unknown at this time and may be a major factor in reducing steelhead productivity.

Juvenile steelhead rear from 1 to 3 years in freshwater. Steelhead adults spend 1-2 years in the ocean before returning to the Columbia River. Adult fecundity averages from 5,300 to 6,000 eggs per female.

Between 1967 and 2003, adult escapement to the Wenatchee River ranged from 70 to 2,864 fish. The running 12-year geometric mean ranged from 185 to 919 adults over this same period. At the time of listing, the 12-year geometric mean for adult abundance and productivity was 793 and 0.25, respectively.

Wenatchee River summer steelhead spawn in the mainstem Wenatchee River between Tumwater Canyon and Nason Creek, Chiwawa River, Nason, Icicle, Peshastin, Chumstick and Mission creeks. There is evidence that steelhead may also spawn or rear in the Little Wenatchee River, White River and Chiwaukum Creek.

2.1 Current Population Status and Goals

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

- ESA Status: Endangered
- Population Description: A mixed stock of hatchery and natural production; however, the run is dominated by hatchery-origin fish. The Wenatchee River population is considered "Intermediate" by the ICTRT. A "Intermediate" steelhead population is

one that must have a minimum abundance of 1,000 spawners and a S/S ratio of 1.1 to be viable. The HSRG has classified this population as Primary.

- Recovery Goal for Abundance: 1,000 adults
- Productivity Improvement Expectation: The Upper Columbia River recovery plan sets a 12-year geometric mean abundance and productivity target at 1,000 and 1.1 (S/S), respectively.
- Habitat Productivity and Capacity: Productivity: 2.25; Capacity: 765

2.2 Current Hatchery Programs Affecting this Population

The hatchery program that is most likely to affect the Wenatchee Summer-run Steelhead population is described below:

Wenatchee River Summer Steelhead (Eastbank). This is an integrated conservation and harvest program that can release up to 400,000 smolts (5 fpp) to Nason Creek (scatter plant), Upper Wenatchee River and the Chiwawa River acclimation site. Juveniles are acclimated at the Chiwawa River site only if it does not interfere with spring Chinook production. Only 25% of hatchery-origin juveniles are mass-marked with an adipose fin clip (50% of 2006 brood). While most fish are not adipose fin-clipped in order to maximize the return of adult steelhead to the subbasin (reduces the number harvested, as fishers must release all unmarked adults) over 90% of the steelhead released from this program are identifiable using either ad clipping, elastomer tags or PIT-tags. Broodstock are collected from the Wenatchee River at Dryden and Tumwater dams. The goal is to collect 50% NOR and 50% HOR adults for the hatchery program. Adult holding occurs at Wells Hatchery because it has cooler well water than does Eastbank Hatchery. Gametes are collected at Wells Hatchery and transferred to Eastbank Hatchery where fertilization occurs. Eggs from the latest spawning Wenatchee River steelhead are transferred to Chelan Falls Hatchery for the majority of incubation and rearing (through October) to facilitate increases in growth. This step is taken in an effort to equalize the size-at-release of steelhead smolts from early and late spawning fish.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from integrated in-basin programs: 1,665 fish
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 265 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 increase from 1.2 to 2.5. Average abundance of natural-origin spawners (NOS) would increase from approximately 379 fish to approximately 587 fish. The harvest contribution of the natural and hatchery populations would go from approximately 875 fish to approximately 75 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 managers' 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

Managers have identified Wenatchee summer steelhead as an important population. The Managers have stated their goals for this program as; "Supporting the recovery of ESA listed species by increasing the abundance of natural adult populations, while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity" (Goal statement adopted by Habitat Conservation Plan Committee, Hatchery Sub-Committee). For the purposes of this analysis, the HSRG assumed this population should be considered a Primary population. As currently managed, it is not consistent with that designation, having a PNI of 0.38 (pNOB=50% and pHOS=80%).

The current program of approximately 400,000 smolts is direct stream-released without acclimation. Managers report that approximately 50% of the adult returns from this program stray and potentially spawn outside the Wenatchee subbasin. Direct stream releases likely

contribute significantly to this straying. Acclimation facilities are planned to address this problem.

A portion of the fish are adipose fin-clipped and a portion are elastomer tagged.

Recommendations

There are a number of solutions that would allow this population to meet the standards for a Primary population; two are described below. The HSRG recommends that all fish under any option should be adipose fin-clipped and available for harvest.

The HSRG suggests that managers consider the ecological effect of outplants on this population. While outplants may not be having a detectable long-term genetic effect resulting from direct interbreeding with the natural population, the HSRG is concerned about the ecological effects of outplanted steelhead. They may be affecting overall survival and productivity of natural-origin steelhead considering Kostow's data for summer steelhead (Kostow 2003, 2004, 2005). Consequently, the HSRG recommends that outplanting of hatchery steelhead be discontinued (or at least minimized) wherever facilities are not available to recapture returning adults that escape harvest.

The HSRG acknowledges that managing for the recommended PNI values may not be possible or appropriate when abundance levels are low. Managers should consider demographic risks to the natural population and modify their protocols during periods of low abundance. Managers should develop a variable sliding scale for abundance so that in low abundance years, more of the appropriate population is allowed to reach the spawning grounds.

An example of such a sliding scale would look like this:

Each year, depending on NOR run size, pNOB and pHOS are allowed to "float" or slide. The HSRG assumes managers will establish an acceptable level of removal of NORs for use in the hatchery brood. This will be a fixed percentage of the total NOR return (say 40%) and will not change, regardless of NOR return. In years of high NOR abundance, this 40% could make up 100% of the needed hatchery brood (pNOB= 100%). In that case, no HORs would be used in the hatchery brood. Hatchery fish can be allowed to reach the spawning ground (pHOS) if needed to achieve an appropriate number of fish spawning naturally (demographic benefit and use of available habitat). This however, would not be required during years of very high NOR returns as both objectives (pNOB and natural spawning) may be meet with NORs.

In years of low NOR abundance, the same 40% of the NOR return would be removed for use in the hatchery brood (pNOB). However, in these years, that 40% may make up only a small part of the needed brood (i.e. pNOB 10%). In these years, enough HORs should be used to achieve needed hatchery brood and additional HORs should be allowed to spawn naturally (pHOS) to achieve the minimum acceptable level of naturally spawning.

The goal of this sliding scale is to achieve an "average" PNI over time of the desired level (0.67 or 0.5) depending on the population designation even though it may not be achieved in any one year. A good way to determine the level of NORs that should be removed each year (see above) is to review the return of NORs over a long time frame and iterate what level (30, 40, 50%) are needed, on average, to achieve the desired PNI.

Option 1: Under this option, an integrated smolt program of approximately 200,000 smolts could be implemented with 100% pNOB, coupled with a harvest and recapture strategy (e.g., at Tumwater Dam) that removes 80% of the unharvested hatchery-origin adults. The primary benefit of this option would be as a gene bank or safety net in the event that the natural-origin population declines.

Option 2: Under this option, The HSRG recommends that managers implement a two-stage stepping stone program, to support the natural population and to provide harvest. The program consists of an integrated conservation component producing approximately 100,000 ad-clipped and CWT fingerlings/smolts (PNI = 0.85, pNOB = 100%). This option would also require removal of 80% of the unharvested returning adults. Excess hatchery-origin returns from the conservation component would also provide all broodstock to maintain a 2nd stage harvest component of approximately 300,000 ad clipped only fingerlings/smolts to provide addition harvest and meet the total mitigation goal of 400,000 smolts. Unharvested hatchery returns from the 2nd stage (harvest) component would not be used for broodstock but would be available for other purposes (lake plants, foodbank donation or stream nutrification). Given the ability of Tumwater Dam to remove adults, recycling of unharvested adults into the lower river for additional fishing opportunity may be feasible. This would be possible only if 80% of the unharvested hatchery-origin adults from this program could be removed (e.g., at Dryden Dam and/or Tumwater Dam). Smolt release and adult recapture facilities for this stepping stone program located in the lower basin would assist in achieving required hatchery-origin fish removal rates.

Smolts could be reared and released from an existing (e.g., Leavenworth NFH) or new facility to provide within basin full-term rearing to meet both conservation and fishery objectives. If this is not possible, at a minimum, long-term acclimation and adult recapture facilities should be developed within the subbasin.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Wenatchee Summer Steelhead. The yellow row indicates the natural population and light green indicates the segregated hatchery population, if applicable. A 10% habitat improvement is applied to the HSRG Solution to evaluate the addition 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	Int Cons	401.0	60%	0%	80%	0.38	379	1.2	875	2,389
No Hatchery	None None	-	0%	0%	0%	1.00	587	2.5	75	-
HSRG Solution	Int Cons	100.1	80%	80%	18%	0.85	524	2.4	688	722
	Stepping Stone/Seg Harv	300.7	80%						1,845	2,222
HSRG Solution w/ Improved Habitat	Int Cons	100.1	80%	80%	16%	0.86	623	2.7	700	722
	Stepping Stone/Seg Harv	300.7	80%						1,845	2,222