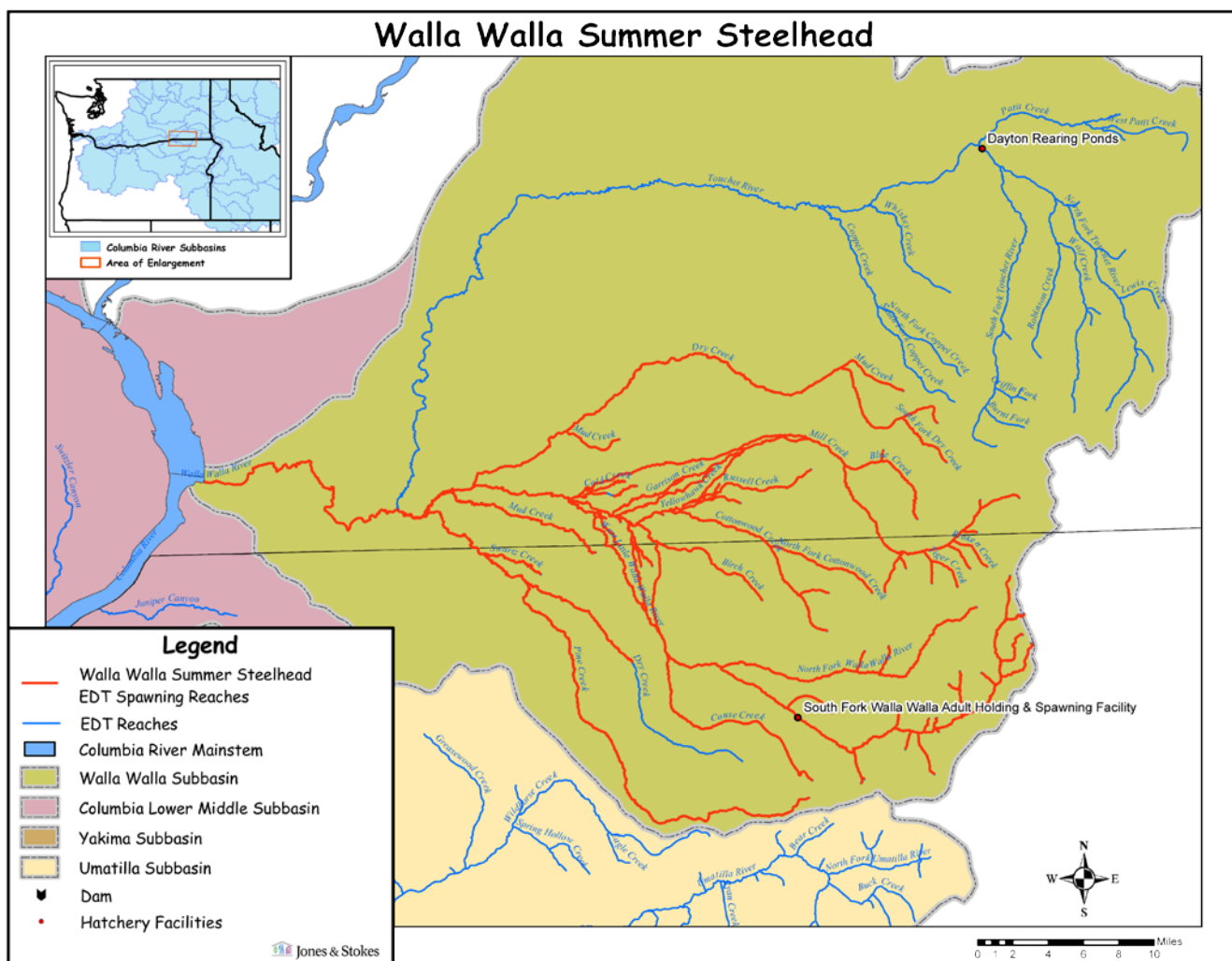


Hatchery Scientific Review Group Review and Recommendations

Walla Walla River Summer Steelhead Population and Related Hatchery Programs

January 31, 2009



Note: Spawning reaches likely vary from those depicted.

1 Walla Walla River Summer Steelhead

The Snake River Salmon Recovery Plan (SRSRP 2007) states that Walla Walla summer steelhead are an independent population distinct from the Touchet River (a Walla Walla tributary) population because spawning in the Touchet drainage is distant from spawning areas in the upper Walla Walla (110 km), and because Touchet and Walla Walla fish are genetically distinct (Currens 1997). No spawning by natural origin recruits (NORs) occurs in the Walla Walla mainstem from the mouth to the Dry Creek confluence because of high water temperatures, high embeddedness/sedimentation and low flows. Walla Walla summer steelhead are part of the mid-Columbia DPS, and part of the Umatilla/WallaWalla MPG. The Walla Walla population comprises two Major Population Spawning Areas (MaSAs) -- the Walla Walla MaSA (the mainstem, forks and tributaries exclusive of the Touchet River and Mill Creek), and the Mill Creek MaSA (Mill Creek and tributaries from mouth to headwaters). The population also includes two Minor Spawning Areas (MiSAs), Dry Creek (Dixie) from mouth to headwaters and Pine-Dry Creek from mouth to headwaters (Oregon Mid-Columbia Recovery Plan 2007).

The Interior Columbia Technical Recovery Team (ICTRT classified) the Walla Walla River population as an “Intermediate” sized population. A steelhead population classified as Intermediate has a mean minimum viability abundance threshold of 1,000 natural spawners with a sufficient intrinsic productivity (greater than 1.4 recruits per spawner at the threshold abundance level) to achieve a 5% or less risk of extinction over a 100-year timeframe.

Although substantially reduced from historical times, spawning is widely distributed within the North and South Forks and the upper mainstem of the Walla Walla River, Couse Creek, middle and upper Mill Creek, and upper Dry Creek (Recovery Plan for Oregon’s Middle Columbia River Steelhead 2006). During the cooler months, juveniles are found throughout the mainstem, but in the summer the distribution is limited to reaches above the Mill Creek confluence (RM 37) due to high temperatures and poor habitat conditions. Within the Washington portion of the watershed, Mill Creek (upstream of Bennington Dam above RM 16.7), Blue Creek (approximately RM 0 to 1.6), and Dry Creek’s tributaries (North Fork Dry Creek, and South Fork Dry Creek) have the highest densities of age 1+ and older steelhead. The lowest densities occur in the west Little Walla Walla Drainage, which periodically dewater, in the mainstem Walla Walla between its confluences with Dry and Mill creeks, and in Mill Creek from Gose Street to Bennington Dam (RM 5.4 to 11.4) (SRSRP 2007).

A few spawners begin entering the Walla Walla River in June but high temperatures and low flows cause most to enter in the late winter and early spring. Spawning begins in February, peaks in early to mid April and ends in May. Like Touchet River spawners, Walla Walla spawners are 60-65% 1-salt and 40-35% 2-salt. The incidence of repeat spawners in the Walla Walla population has been estimated at about 7%. Fry emerge May-June, rear mostly in the Walla Walla drainage above Mill Creek and smolt primarily as two-year-olds. Outmigration begins in February, peaks in April and ends in June (SRSRP 2007). Rainbow trout are sympatric with Walla Walla steelhead, and interbreeding does occur (G. Mendel, WDFW, personal communication). Accordingly, rainbow trout are included in the DPS and are considered a “mitigating risk factor” (BRT 2003).

The abundance of the historical Walla Walla River steelhead population has been estimated at about 2,700 fish. Mean abundance at the present time is estimated at 541, of which 441 occur above Nursery Bridge in Oregon in the upper mainstem and forks. In recent years natural-origin recruits (NORs) have comprised 96% of the at the Nursery Bridge trap in Milton-Freewater, OR.

The hatchery fish observed at the trap are primarily Lyon's Ferry stock (originally Wells stock) and are not part of the DPS.

At a CBFWA Program Amendment workshop in 2007, it was estimated that only about 2% of the hatchery steelhead entering the mouth of the Walla Walla River actually spawn with Walla Walla NORs because Lyon's Ferry fish spawn about a month earlier than natural fish, and because of an assumed 80% relative spawning effectiveness for Lyon's Ferry Hatchery steelhead.

An incidental terminal harvest rate of 3% has been estimated for Walla Walla River NORs while the terminal harvest rate on hatchery-origin recruits (HORs) has been estimated at 30% (CBFWA Program Amendment Process 2007).

Mill Creek is a major tributary to the Walla Walla River. Although steelhead abundance in Mill Creek has not been accurately estimated, local biologists are concerned that the steelhead population may be very low because of poor passage conditions in the radically channelized portion of the Mill Creek that flows through the city of Walla Walla. However, in 2004, video monitoring revealed that some passage was occurring at the Bennington Dam ladder which has recently been upgraded (G. Mendel, WDFW, personal communication, July 2004). Passage into and within the system is limited by low instream flows, warm water temperatures, and physical impediments both in the flood control channel in the city of Walla Walla and at the Bennington Lake diversion and ladder structure some miles upstream (SRSRP 2007).

The Oregon mid-Columbia Steelhead Recovery Plan (2007) found that the Walla Walla steelhead population did not meet the recommended criteria for viability. In terms of abundance and productivity, the Walla Walla population was judged to be a moderate risk because the point estimate of current productivity and abundance fell between the 5% and 25% isopleths on the Viability Curve. The plan also considered the population to be at moderate risk in terms of spatial structure and diversity: a significant reduction in spawner distribution has resulted in increased gaps and loss of continuity within the population, as well as between the Walla Walla population and other mid-Columbia populations. Furthermore, increased water temperatures, hydrograph changes and obstructions have likely resulted in selective mortality at multiple life stages, reducing genotypic and phenotypic diversity.

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: This population is part of the Mid-Columbia Steelhead Distinct Population Segment and is listed as Threatened.
- Population Designation: Using a rating system similar to that used by the recovery planners for the Lower Columbia and Willamette, this population would be considered Primary.
- Current Viability Rating: Intermediate
- Recovery Goal for Abundance: 1,000 spawners with a 1.35 R/S at the threshold abundance.
- Productivity Improvement Expectation: Productivity: 3.11; Capacity: 2,878 (Draft Mid-Columbia Steelhead Recovery Plan, ODFW 2007)
- Habitat Productivity and Capacity (from EDT): Productivity: 1.84; Capacity: 2,180

2.2 Current Hatchery Programs Affecting this Population

The only hatchery program targeting the Walla Walla population is a segregated harvest program. This program began 1983, and used Wells, Wallowa, Ringold, and Lyons Ferry brood stock from 1983 - 1990. Since 1991, however, only the Lyons Ferry Hatchery stock has been used.

The segregated program releases age-1 smolts at ~4.5 fpp from a point below the Mill Creek confluence (~RM 35) in mid April (April 15 – 25). The fish are not acclimated before release because earlier studies indicated hatchery return rates were higher for direct releases than acclimated releases, presumably because of very poor water quality in the lower river. In recent years, the mean number of fish released per year has been 137,339 (CBFWA Program Amendment Process 2007). In recent years, releases have been reduced to 100,000. All smolts are adipose-clipped and a minimum of 20,000 are ventral clipped as well. In addition, a proportion is also PIT-tagged. WDFW estimates that about 20% of the returning hatchery adults from the Lyons Ferry program are recovered either at Lyons Ferry Hatchery or in traps in the Walla Walla Subbasin. The remaining fish are either harvested or spawn naturally. Biologists attending CBFWA program amendment workshops in 2007 estimated that an average of 1,336 Lyons Ferry fish return to the mouth of the Walla Walla River, but that no more than 2% of these fish (~26 adults) reached the natural spawning areas above Nursery Bridge or in Mill Creek. As mentioned, terminal harvest rates on HORs are estimated at 30%, while a 3% incidental harvest is assumed for NORs.

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: 65 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. Our analysis estimated Adjusted Productivity (with harvest and fitness factor effects from AHA) would increase from 0.9 to 1.7. Average abundance of natural-origin spawners (NOS) would decrease from 245 to 859. Harvest contribution of the natural and hatchery populations would decline from 1,582 to 89.

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

Lyons Ferry Hatchery (LFH) and Tucannon Fish Hatchery (TFH) were built/modified under the Lower Snake River Fish and Wildlife Compensation Plan to compensate for the annual loss of summer steelhead caused by hydroelectric projects on the Snake River.

The Lyons Ferry hatchery Complex currently uses four summer steelhead stocks to produce smolts for release into the Snake (60,000 smolts of LFH stock), Tucannon (100,000 smolts of LFH stock, 50,000 smolts of Tucannon Endemic stock), Grande Ronde (160,000 smolts of Wallowa stock), Walla Walla (100,000 smolts of LFH stock), and Touchet rivers (85,000 smolts of LFH stock, 50,000 smolts of Touchet Endemic stock) to enhance recreational opportunities for steelhead anglers and for recovery purposes. All steelhead smolts for the program are planned for a release size of 4.5 fish/lb (about 100 g/fish). Current releases of summer steelhead smolts are lower than originally specified by the LSRCF program. Releases have periodically been reduced through the years (in 2001 the LFH and Wallowa stock programs were reduced by 37%) in partial response to Endangered Species Act (ESA) concerns and documented smolt-to-adult (SAR) survival rates far exceeding the original SAR goal of 0.5% (USACE 1975). (Lyons Ferry Complex Hatchery Evaluation: Summer Steelhead Annual Report 2005 Run Year June 2007)

The Walla Walla summer steelhead population is included in the middle Columbia River Distinct Population Segment (DPS) and is listed as threatened under the ESA. Recovery objectives for the population have not been defined, but the population appears to meet the standards for a primary designation. The steelhead management objectives for the basin include both conservation and harvest.

The majority of the currently productive habitat is located in the upper watershed above Nursery Bridge in the town of Milton Freewater and is managed as a wild fish sanctuary. The lower watershed is managed as a terminal fishing area, but does include some potential steelhead habitat in Mill Creek and Walla Walla River just below Nursery Bridge. A trap is operated at Nursery Bridge to monitor the population returning to the upper watershed.

Approximately 100,000 smolts released into the lower watershed are imported annually from Lyons Ferry Hatchery and are planted directly into the Walla Walla River without acclimation. Hatchery adults escaping the fishery spawn in the lower river where their ecological and genetic effects on the population as a whole are unknown. The contribution of hatchery fish to natural spawning in the wild fish sanctuary is reported to be very low.

Recommendations

Eliminate the annual importation and release of out-of-basin fish and develop within-basin adult collection to promote a locally adapted hatchery broodstock. A segregated, integrated, or some combination of the two types of programs could be developed consistent with a primary population designation. Under any scenario, facilities to acclimate and release juveniles and recapture returning adults will need to be developed.

Under an integrated option, broodstock would be derived from the native stock. An integrated program (using native broodstock) of the current size (100,000 smolts) could be sustained if 20% of the returning hatchery fish are removed and if 50% (about 30 fish) natural origin broodstock can be collected (assumes a 50:50 sex ratio). Alternatively, if 80% of the returning hatchery fish were removed, only 20% natural-origin broodstock (about 12 fish) would need to be obtained to sustain the same size program.

The HSRG solution transitions the broodstock collection of Lyons Ferry Hatchery stock to sites within the Walla Walla in place of current broodstock collection at Lyons Ferry Hatchery to aid in local adaptation. The solution maintains the current release numbers in the Walla Walla. Because the program uses up to 100 breeders annually under this segregated option (for the 100,000 smolt release), a local broodstock with a sufficiently high effective population size should be developed from fish returning to the Walla Walla. The adult collection and acclimation facility should be sited to better segregate hatchery fish from steelhead habitat below Nursery Bridge. A program of the current size could be sustained if 90% of the returning fish escaping the fishery are removed.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Walla Walla 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%	12%	0.00	245	0.9	25	0
	Seg Harv	100.2	23%						1,557	117
No Hatchery	None None	-	0%	0%	0%	1.00	859	1.7	89	-
HSRG Solution	None None	-	0%	0%	6%	0.00	314	1.1	33	0
	Seg Harv	100.2	90%						1,557	362
HSRG Solution w/ Improved Habitat	None None	-	0%	0%	2%	0.00	750	1.5	78	0
	Seg Harv	100.2	90%						1,557	362