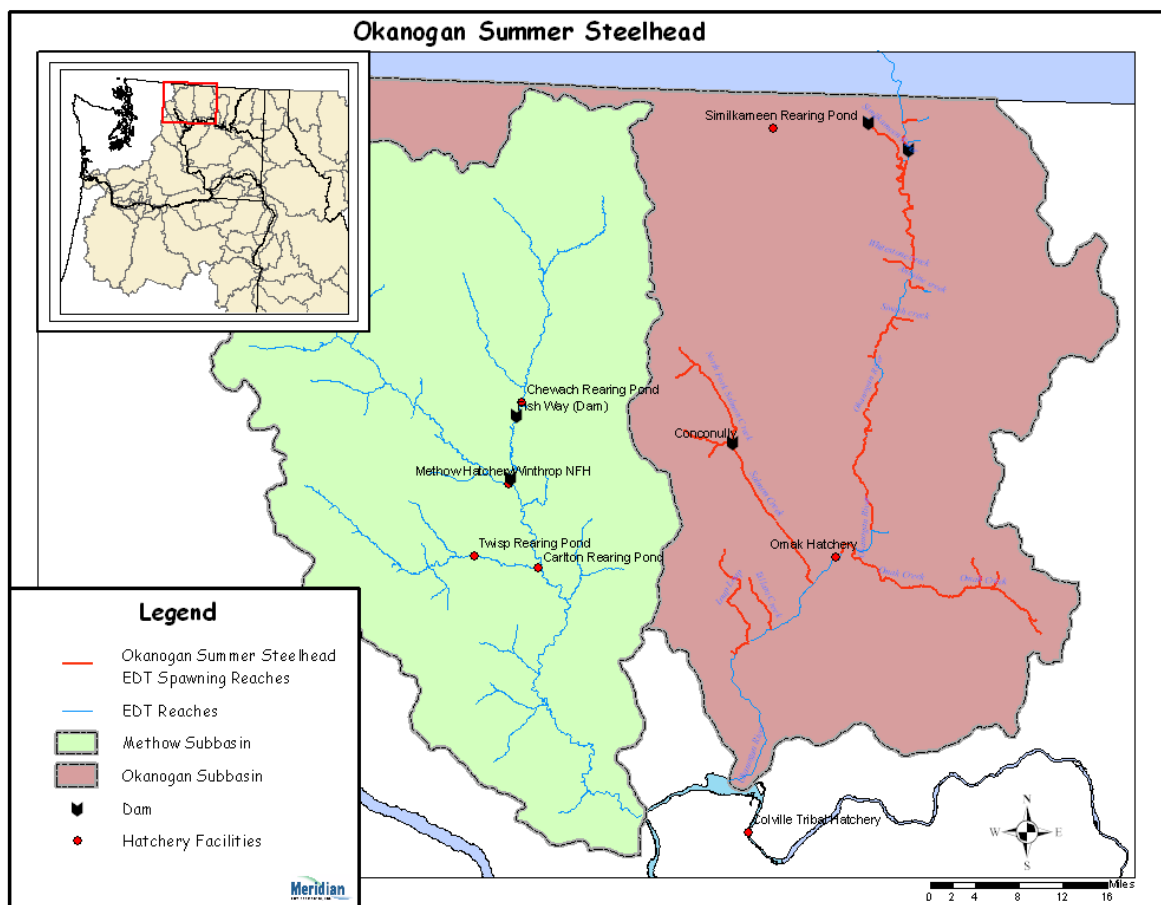


Hatchery Scientific Review Group Review and Recommendations

Okanogan Summer Steelhead Population and Related Hatchery Programs

January 31, 2009



1 Okanogan River Summer Steelhead

Okanogan River summer steelhead are considered part of the Upper Columbia River Steelhead DPS. This DPS includes all naturally-spawned anadromous steelhead populations below natural and man-made impassable barriers in the Columbia River Basin between the Yakima River and the U.S.-Canada border. Since June 2007, the DPS has been classified as endangered under the ESA. The Okanogan 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 1.2 to be viable.

There are no estimates of historical summer steelhead abundance in the Okanogan River subbasin. They were thought to have spawned in the mainstem Okanogan River as well as in Salmon and Omak creeks, and possibly the Similkameen River. Summer steelhead were also distributed throughout streams in the Canadian portion of the subbasin (UCSRB 2007).

2 Current Conditions

The UCSRB (2007) describes the life history status of Okanogan summer steelhead as follows:

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 and then adults spend 1 to 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 2002, adult escapement to the Okanogan River ranged from 1 to 156 fish. The running 12-year geometric mean ranged from 11 to 64 adults over this same time period. At the time of listing, the 12-year geometric mean for adult abundance and productivity was 53 and 0.09, respectively. In 2005, the Colville Tribes reported over 300 steelhead redds in the U.S. portion of the subbasin. The majority of the adults are of hatchery origin. Dam counts over Zosel Dam indicate that wild fish escapement into Canada is less than 150 fish.

Steelhead currently spawn in Omak Creek, Similkameen River, mainstem Okanogan River, Salmon Creek and streams in the Canadian portion of the subbasin (UCSRB 2007). Habitat and hatchery actions are being implemented to increase spawning levels in Salmon Creek and Omak 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 Okanogan River population is considered an “Intermediate” population by the ICTRT, which by definition must have a minimum abundance of 1,000 spawners and a S/S ratio of 1.2 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 500 and 1.2 (S/S), respectively.
- Habitat Productivity and Capacity: Productivity: 1.65; Capacity: 168

2.2 Current Hatchery Programs Affecting this Population

The primary hatchery programs most likely to affect the Okanogan summer-run steelhead population are discussed below:

1. Okanogan Similkameen Rivers (Wells Stock) Summer Steelhead. According to the HGMP, this is an integrated conservation and harvest program that may release 130,000 smolts (6 fpp) to three sites in the Okanogan River subbasin (mainstem Okanogan, Similkameen River, and Omak Creek). Fish are generally scatter-planted in the subbasin starting in April. In some years, fish have been acclimated in the Similkameen Chinook rearing pond. All juveniles released into the subbasin are adipose fin-clipped¹. Adults for the program are collected from the run at large at Wells Dam, not from the Okanogan River. Egg incubation and juvenile rearing occurs at the Wells Hatchery. The program has a R/S value of 20.
2. Cassimer Bar Steelhead: Approximately 20,000 juvenile summer steelhead are released into Omak Creek at 10-15 fpp. Fish are either acclimated in Omak Creek prior to release or are scatter-planted within the watershed. All incubation and rearing activities occurs at the Cassimer Bar Hatchery. Broodstock is collected at a weir on Omak Creek. The program has a R/S value of 20; however, this value is based on data collected for the Wells summer steelhead program. Adult returns are insufficient to develop a R/S value for the Cassimer Bar program due to the short time the program has been in operation (2004).

In the future, the Colville Tribe proposes to increase Cassimer Bar steelhead production to between 80,000 and 200,000 smolts, depending on the success of habitat restoration efforts in the subbasin. The Colville Tribe is also proposing to eliminate the Wells Hatchery program that releases 100,000 to 140,000 summer steelhead to the Okanogan River each year.

Initially, 80,000 smolts and a yet to be defined number of parr, will be released as part of an integrated conservation program for the subbasin. Also, an adult reconditioning program will be used to increase steelhead production. Broodstock will be collected at weirs located in key streams in the subbasin. The Cassimer Bar Hatchery will be upgraded to accommodate all hatchery operations.

In addition to the above-described programs, the WDFW summer steelhead program releasing fish in the Methow River also collects natural broodstock from the run-at-large passing Wells Dam.

¹ The HGMP is unclear if all or only 75% of the juvenile fish are mass-marked.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from integrated in-basin programs: 117 fish
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 1,085 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 that Adjusted Productivity (with harvest and fitness factor effects from AHA) would increase from 0.7 to 1.8. Average abundance of natural-origin spawners (NOS) would decrease from approximately 76 fish to approximately 65 fish. The harvest contribution of the natural and hatchery populations would go from approximately 635 fish to approximately 9 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

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). To achieve this end the managers have identified a current mitigation goal of 130,000 smolts for release within the basin. Managers have identified Okanogan summer steelhead as an important population. For the purposes of this analysis, the HSRG assumed this population should be considered a Primary population. The Upper Columbia River Steelhead ESU is listed as endangered. The Okanogan population is one of four that are essential to the survival and recovery of this ESU.

This population cannot meet the standards for a Primary or Contributing population designation due to limited habitat capacity and productivity. Given the existing habitat productivity and capacity levels, it does not appear that Okanogan summer steelhead can be a self-sustaining population at this time. An integrated program to meet standards for a Contributing or Primary population is not possible under current habitat conditions.

Current steelhead management does not allow for differentiation of populations above Wells Dam. Broodstock for both the Methow and Okanogan River hatchery programs are currently collected at Wells Dam with subsequent smolt releases occurring in both basins. Broodstock are currently collected at Wells Dam and are comprised of up to 33% natural-origin adults. Juveniles are reared at Wells Hatchery and a proportion of the progeny of this aggregate broodstock is released into the Methow and a portion into the Okanogan. About 130,000 steelhead smolts are released into the Okanogan which are typically the result of hatchery by hatchery matings. Hatchery-origin adults comprise approximately 90% of the spawning population. Currently there is no capability within the Okanogan subbasin to collect broodstock and manage adult composition on the spawning grounds other than at Omak Creek.

In addition to the Wells Hatchery program, there is a small integrated program (25,000 smolt release) using local broodstock from Omak Creek and a kelt reconditioning project at Cassimer Bar Hatchery. The Colville Tribes have plans to expand the integrated program to a total release of 200,000 smolts.

We understand that a number of habitat projects are being implemented that may allow this population to become self-sustaining.

Adult trapping in Omak Creek indicates that out-of-basin strays make up a high proportion of the natural spawning population.

Recommendations

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.

All fish should be adipose fin-clipped unless they are being released to initiate new local broodstock or to achieve needed demographic benefits.

The HSRG recommends that the Okanogan population be managed using a phased transition approach, as described below. Hatchery facilities should be developed to provide within-basin full-term rearing to meet both conservation and fishery objectives. If this is not possible, long-term acclimation and adult recapture facilities should be developed within the subbasin. Control of out-of-basin hatchery steelhead also may be required.

Phase 1: Use adult returns from the existing Wells smolt release program and adults from the Colville's Omak Creek facility to develop a locally adapted hatchery population for release into the Okanogan subbasin. Reconditioned kelts also could be included in this broodstock.

Implement broodstock spawning protocols to maximize effective population size (factorial matings). As the locally adapted Okanogan hatchery population increases, phase out the Wells Hatchery releases. Collection of natural-origin adults at Wells Dam should be terminated and replaced with natural-origin fish collected from the Okanogan subbasin.

Phase 2: As benefits from planned habitat improvements occur, introduce steelhead from the locally adapted hatchery population into these habitats.

Phase 3: As habitat capacity and productivity increases and as the number of naturally-produced steelhead also increases, natural-origin adults should be incorporated into the hatchery broodstock in ever-increasing proportions to achieve a PNI greater than 0.67. Once the natural population abundance increases, more of the hatchery production could be used to provide harvest.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Okanogan 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	Int Both	20.0	30%	0%	93%	0.21	76	0.7	89	43
	Seg Harv	138.9	0%						546	0
No Hatchery	None None	-	0%	0%	0%	1.00	65	1.8	9	-
HSRG Solution	Int Both	199.9	35%	0%	92%	0.05	93	0.9	983	626
	Seg Harv	-	0%						-	-
HSRG Solution w/ Improved Habitat	Int Both	199.9	35%	0%	91%	0.05	103	1.0	984	626
	Seg Harv	-	0%						-	-