Hatchery Scientific Review Group
Review and Recommendations

Toppenish Creek Summer Steelhead
Population and Related Hatchery Programs

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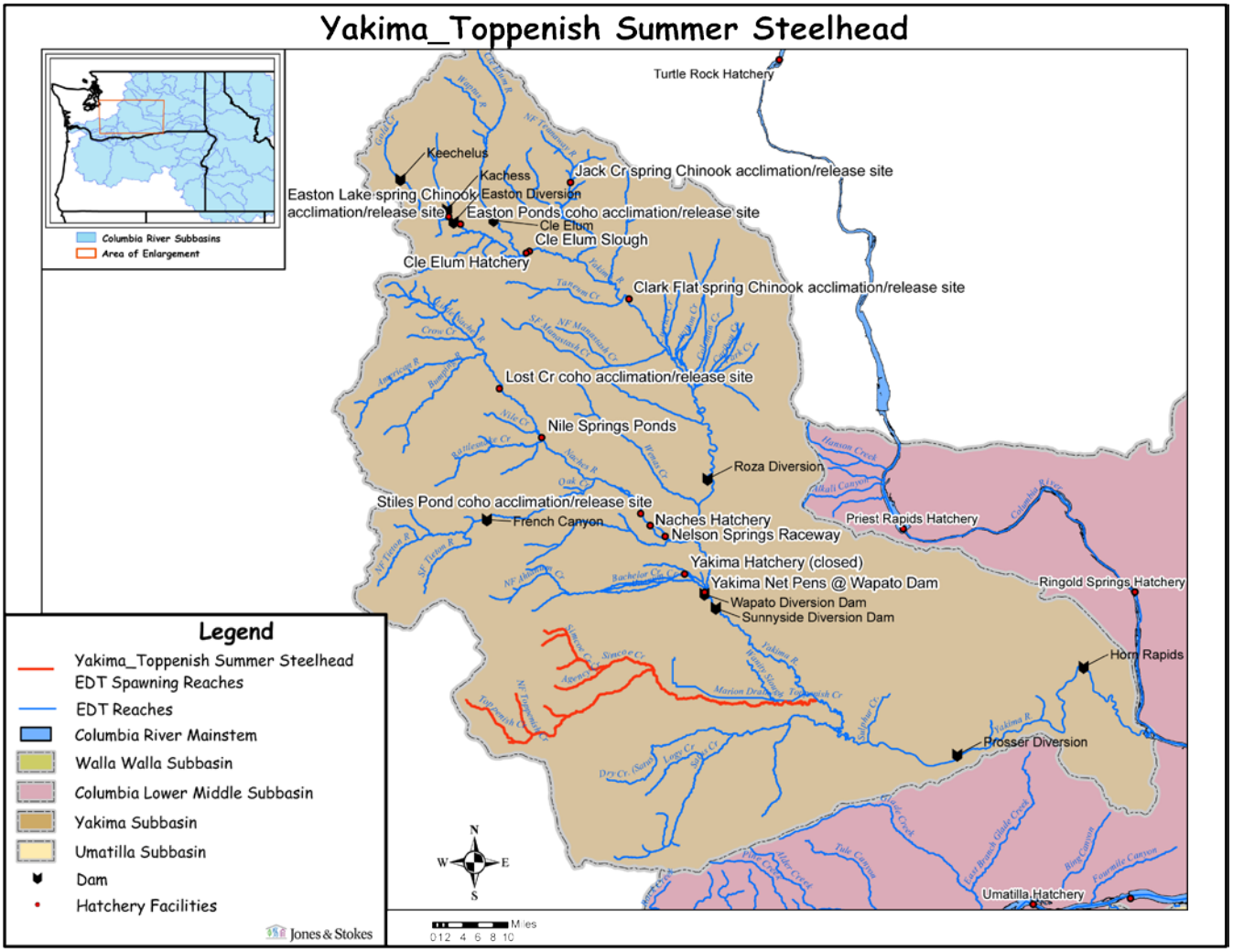

1 Toppenish Creek Summer Steelhead

The Yakima subbasin supports four genetically and demographically distinct stocks of summer steelhead, the Satus Creek stock, the Toppenish Creek stock, the Naches River stock and the upper Yakima stock. Hockersmith et al (1995) successfully monitored 105 radio-tagged steelhead to spawning over brood years 1990 – 1992. Because high flows and turbidity in the Naches and Yakima mainstem during steelhead spawning precludes visual redd counts, this radio-tagging data has been the only means of determining the overall stock composition of the run. Over all three years, the mean percent of radio-tagged fish that spawned in Satus Creek, the Naches River watershed, Toppenish Creek, and the upper Yakima was 48.0%, 31.6%, 13.3% and 7.1%, respectively.

Estimates of the size of the historical steelhead run range from 20,800 (Kreeger and McNeil 1993) to 100,000 (Smoker 1956). The historical spawning distribution likely did not reflect the proportions found by Hockersmith (1995) because of the large habitat loss attributable to impassible dams in the upper Yakima and Naches drainages, and because of anthropogenic impacts to habitat and passage conditions in the upper Yakima that favor the resident over the anadromous life history type. With this caveat in mind, Hockersmith's estimate of the proportion of all Yakima steelhead that spawn in Toppenish Creek was 13.3%. Thus, historical Toppenish steelhead abundance estimates range from 2,766 (0.133 * 20,800) for the Kreeger and McNeil historical production figure, to 13,300 (0.133 * 100,000) for the Smoker estimate of historical steelhead production in the Yakima Subbasin. Based on Prosser Dam counts and the 1990-1992 proportions, the mean abundance of steelhead in Toppenish Creek from 1985 to 2007 was 397. Like other Yakima steelhead populations, the Toppenish Creek population has increased substantially since 2000. Mean abundance from 1985 to 2000 was 218 while mean abundance from 2001 to 2007 was 669. It is significant that the Interior Columbia Technical Review Team (ICTRT) classed the Toppenish Creek population as Basic, for which the abundance recovery criterion is 500.

The only known release of hatchery steelhead in the Toppenish Creek watershed was a release of 25,000 hatchery-reared Yakima stock smolts in 1989. A kelt reconditioning program at Prosser Hatchery on the lower Yakima (RM 47) began on a test basis in 1999 and moved into full production in 2001. This is the only steelhead artificial production program currently in operation in the Yakima subbasin (see below). Because the program collects kelts at Prosser Dam, which is below the natal watersheds of all four Yakima steelhead stocks, it is very likely that Toppenish Creek fish are collected.

Although the entire Yakima subbasin was closed to steelhead fishing in 1994, considerable illegal and/or inadvertent steelhead harvest is believed to occur during the winter whitefish fishery, especially in steelhead staging areas off the mouths of Satus and Toppenish creeks. A terminal harvest rate of 8% has been estimated (C. Frederiksen, Yakama Nation, personal communication, 2007).

The steelhead spawning distribution in Toppenish Creek currently is restricted to the upper watershed because of habitat degradation in the lower reaches. In the mainstem Toppenish Creek, steelhead spawning begins just above the confluence of Simcoe Creek (RM 32.7) and continues at least to Panther Creek at RM 68.3. Spawning also occurs in upper Simcoe Creek, in most tributaries to Simcoe Creek, and in Toppenish Creek above the Simcoe confluence. It should be noted that several diversion dams have served as partial or intermittent barriers to adult migration in the Toppenish Creek watershed for many years. Most have been modified or

removed over the past decade. An increase in redd counts since 2000 may be related to these improvements.

Spawning occurs relatively early in Toppenish Creek because of the low elevation of much of the watershed. Depending on elevation, spawning can begin as early as late February and end as late as early 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: Native Toppenish summer steelhead are part of the Middle Columbia Steelhead DPS, which were listed as a threatened species on March 25, 1999.
- Population Designation: Using a rating system similar to that used by the recovery planners for the Lower Columbia and Willamette arrives at a designation of Contributing.
- Current Viability Rating: Moderate Risk of Extinction (Yakima Subbasin Salmon Recovery Plan 2005)
- Recovery Goal for Abundance: 500 (a "Basic" population according to ICTRT)
- Productivity Improvement Expectation: 2.01 (C. Frederiksen, Yakama Nation, personal communication)
- Habitat Productivity and Capacity (from EDT**):** Productivity: 3.89; Capacity: 1,082

2.2 Current Hatchery Programs Affecting this Population

The Prosser Hatchery kelt reconditioning program is the only steelhead artificial production program in the basin. The Yakima Basin Steelhead Reconditioning Project HGMP (2005) summarized the program as follows. Steelhead kelts are collected at the Chandler smolt trap at Prosser Dam (RM 47) and subjected to short- and long-term reconditioning and release. Because Prosser Dam lies below all four steelhead populations, the kelts collected and reconditioned presumably represent a sample of all of the stocks in the basin. For long-term reconditioning, kelts are captured at the Chandler smolt trap between March and June, reconditioned on-site for 6 to 8 months, and released back into the Yakima River at Prosser Dam the following December. Mean weight gain for surviving long-term kelts was approximately 70% over collection weight in 2000-2001, and many fish more than doubled their weight. Collection procedures are identical for short-term reconditioning, but fish are held only 1-2 months and are released below Bonneville Dam. Short-term kelts gain very little weight during their brief reconditioning period, and are expected to recondition naturally in the estuary and/or ocean and eventually return to the Yakima subbasin. Six short-term kelts released below Bonneville Dam in May of 2002 returned in the fall of 2002 and were recaptured in the Denil ladder at Prosser Dam. The mean weight gain of these fish after 5-6 months of natural reconditioning was about 46%.

A total of 867 kelts were captured from 2002 to 2004 and subjected to short-term reconditioning, and 2,147 kelts were collected from 2001 to 2004 and subjected to long-term reconditioning. Kelts are collected throughout the migration period for both programs. Based on Prosser Dam counts for the period July 1, 2000 to March 7, 2005, the grand total of reconditioned kelts represented about 24% of the entire Yakima River population. Program managers anticipate

reconditioning no more than 1,000 to 1,200 kelts per year or, given recent returns, about 25-35 % of the natural run.

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: 4 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 remain unchanged at 3.3. Average abundance of natural-origin spawners (NOS) would increase from 721 to 729. Harvest contribution of the natural and hatchery populations would increase from 117 to 118.

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

There is an experimental kelt (post-spawned steelhead) reconditioning program that may affect steelhead in the Yakima subbasin.

Recommendations

Continue to monitor for spawning success of reconditioned kelts. We have no specific recommendations for this program.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Yakima Toppenish 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%	0%	1.00	721	3.3	117	0
No Hatchery	None None	-	0%	0%	0%	1.00	729	3.3	118	-
HSRG Solution	None None	-	0%	0%	0%	1.00	728	3.3	118	0
HSRG Solution w/ Improved Habitat	None None	-	0%	0%	0%	1.00	833	3.7	135	0