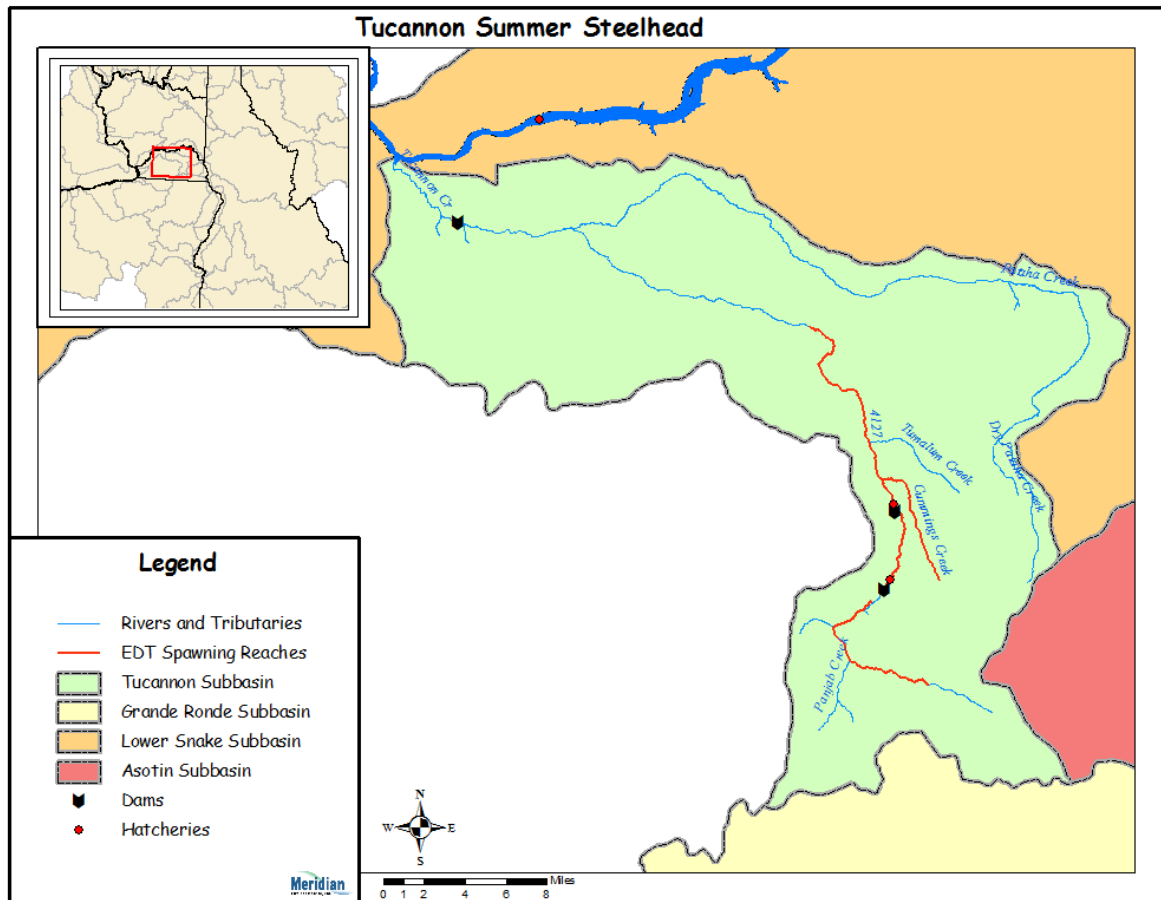


Hatchery Scientific Review Group Review and Recommendations

Tucannon River Summer Steelhead A-Run Population and Related Hatchery Programs

January 31, 2009



1 Tucannon River Summer Steelhead

This population is considered part of the Snake River Steelhead ESU that is classified as threatened under the Endangered Species Act. Steelhead populations in the ESU include all naturally spawned fish in the Tucannon, Clearwater, Grande Ronde, Imnaha and Salmon rivers and Asotin Creek.

The Interior Columbia Technical Recovery Team (ICTRT) classified this population as “Intermediate”. An “Intermediate” population is one that requires a minimum abundance of 1,000 wild spawners and an intrinsic productivity greater than 1.15 recruits per spawner (R/S) to meet the 5% extinction risk criteria established by the ICTRT.

Historically, it was estimated that over two million steelhead returned to the Columbia River Basin, with about 25% of these originating from the Snake River. Ice Harbor Dam counts indicate that over 100,000 steelhead returned to the Snake River in the early 1960s. There are no reliable estimates of the percentage of fish that historically have returned to the Tucannon River, however, EDT modeling of historic habitat conditions indicates the subbasin may have supported over 6,000 adult steelhead (Draft Snake River Recovery Plan 2007). WDFW has suggested historic run sizes on the order of 3,400 fish.

2 Current Conditions

This population includes the Tucannon River, and the nearby Alkali Flat Creek, Penawawa Creek, Deadman Creek, and Meadow Creek (Snake River Recovery Plan 2007). Spawning occurs from mid-February through mid-May. Juveniles emigrate from the system in the spring at ages 1-4, the majority at age 1 and 2. Spawners include both natural- and hatchery-origin fish. Hatchery fish (Lyons Ferry stock of 100,000 smolts and Tucannon River stock of 50,000 smolts) are released into the Tucannon River annually.

Fish enter the Tucannon River as early as July and as late as the following April. Spawning has been observed from RM 3 upstream to RM 52, and in Tualum, Cummings, Little Tucannon, Pataha and Panjab creeks. Hatchery and natural fish enter and spawn concurrently throughout the subbasin, although most of the Lyons Ferry stock hatchery fish concentrate in the lower river where they were released in recent years, some of the Tucannon River Endemic stock return to at least the Tucannon Fish Hatchery weir/trap. The remaining fish may spawn anywhere from 0-20 miles below that point. Anecdotal observations of hatchery fish (believed to be Lyons Ferry stock) spawning as early as January have been reported from the lower river.

Adult escapement to the Tucannon River has been approximately 445 fish (1990-2007). The abundance of natural-origin fish over that same time period has been estimated at only 150 adults. The remaining 295 adults were of hatchery-origin (Lyons Ferry stock or Tucannon River endemic stock).

2.1 Current Population Status and Goals

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

- ESA Status: Snake River steelhead are listed as threatened under ESA.
- Population Description: The ICTRT classifies this population as Intermediate. For the HSRG review, the population has been classified as Primary.
- Recovery Goal for Abundance: 1,000 fish

- Productivity Improvement Expectation: Increase to 1.15 over time as habitat actions designed to improve the abundance and productivity of ESA listed steelhead and Chinook are implemented in the basin.
- Habitat Productivity and Capacity: Productivity: 1.8; Capacity: 275

2.2 Current Hatchery Programs Affecting this Population

Summer steelhead hatchery fish released to the subbasin come from integrated and segregated programs operated out of the Lyons Ferry Hatchery.

The segregated harvest program releases approximately 100,000 smolts (4-5 fpp; Lyons Ferry Hatchery stock) to the Tucannon River (RM 11) on an annual basis. Fish are not acclimated prior to release as studies conducted in the 1990s showed higher survival rates for direct releases in the lower river than for acclimated releases higher in the basin. All fish released are marked with an adipose fin-clip. A portion of those (20,000) are also given a left-ventral clip and coded wire-tag for production monitoring. In recent years a portion have also been PIT-tagged. Broodstock for the segregated program is collected at Lyons Ferry Hatchery. All egg incubation and juvenile rearing occurs at this facility. Fish are reared in a combination of standard concrete raceways and a 2.1-acre rearing pond located at Lyons Ferry Hatchery. This program may be terminated depending on the success of the integrated program discussed below.

The integrated program uses Tucannon River natural-origin fish (i.e. unmarked/untagged adults) as broodstock. From 2000 to 2007, adults were collected at a temporary weir located at RM 11 on the Tucannon River. At this site, surplus adults (hatchery- and natural-origin) were released above the weir to provide a recreational fishery (hatchery fish only) and to support natural production. In 2008, the temporary trap was moved upstream to RM 25. This was done to reduce the likelihood of collecting unmarked adults for the broodstock that were direct offspring from Lyons Ferry stock fish spawning in the lower Tucannon River near the old trap site. The new trap location is also being used as a management point where Lyons Ferry stock fish will no longer be passed upstream to spawn in the river.

Fish collected at the temporary adult trap, or from the Tucannon Fish Hatchery adult trap (RM 37) are hauled to Lyons Ferry Hatchery for holding and spawning. Egg-incubation and early rearing occurs at Lyons Ferry Hatchery. Fish are transferred to the Tucannon Hatchery in February. Currently, about 50,000 smolts are released to the river near RM 41. If this program is successful, the long-term goal is to eliminate the segregated program and release a maximum of 150,000 yearlings (4-5 fpp) each year. With full implementation of the program, a portion of the releases will be adipose fin-clipped for targeting by fisherman (the objective is to fulfill a mitigation responsibility). The remainder will be unmarked to allow adult escapement targets to be met.

The program has an R/S value of 17.3 (1989-2002 Brood Year Average), which includes spawned adults that may have been culled due to IHNV.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from integrated in-basin programs: 174 (last 3-4 years)
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 448
- Hatchery and wild steelhead from the Tucannon River are straying to streams upstream of Lower Granite Dam.

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 1.2 to 1.6. Average abundance of natural-origin spawners (NOS) would decrease from approximately 149 fish to approximately 112 fish. The harvest contribution of the natural and hatchery populations would go from approximately 2,416 fish to approximately 11 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

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 fpp (about 100 g/fish). Current releases of summer steelhead smolts are lower than originally specified by the LSRCP 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 Tucannon summer steelhead population is an endemic population and has been designated as a Primary population, although currently it is not meeting the standards for this designation. Managers have documented that a high proportion (50% or more) of returning adults bypass the Tucannon River and stray above Lower Granite Dam. This pattern is documented in both the hatchery- and natural-origin fish. It is unknown if these fish contribute to any population, but WDFW has documented Tucannon River steelhead in Asotin, Alpowa and an unnamed tributary above Lower Granite Dam.

Genetic sampling has shown that the segregated Lyons Ferry hatchery fish have introgressed with the endemic population. Lyons Ferry stock (100,000 smolts) is directly released into the lower Tucannon River.

We observe that a high number of hatchery-origin fish spawn naturally in the lower portion of the Tucannon subbasin. Habitat productivity and capacity are low and the population is receiving some demographic benefit from hatchery production.

Recommendations

In order to improve fitness and limit genetic introgression, managers should eliminate releases of Lyons Ferry stock in the Tucannon.

In addition, the recommendations described below are intended to provide a short-term conservation strategy. When population productivity and capacity have increased, the managers should transition this program to meet the standards of a Primary population (PNI greater than 0.67 and pHOS less than 47%).

In the near term, the HSRG recommends that managers continue to operate the current endemic program (50,000 smolts, pNOB 100%). Managers should consider demographic risks to the population and modify their protocols during periods of low abundance. The HSRG acknowledges that managing for the recommended PNI values may not be possible or appropriate in the near term when abundance levels are low and demographic risks to the population increase. To address this concern, managers should develop a variable sliding scale for managing both pNOB and pHOS.

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 met 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.

Managers should investigate ways to address the problem of adults straying above Lower Granite Dam. Unless this straying problem is solved, it appears unlikely that this population can meet the abundance standards for a Primary population. If this problem is addressed, a number of other options exist, including harvest or increasing the program.

The HSRG encourages managers to explore opportunities to increase the harvest contribution, such as increasing daily bag limits. The HSRG supports alternate uses of surplus fish such as distribution to local food banks and/or stream nitrification.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Tucannon River 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 Cons	50.9	75%	0%	70%	0.59	149	1.2	91	526
	Seg Harv	100.7	12%						2,325	106
No Hatchery	None None	0.0	0%	0%	0%	1.00	112	1.6	11	-
HSRG Solution	Int Cons	50.9	85%	0%	48%	0.68	99	1.3	86	596
	Seg Harv	0.0	12%						0	-
HSRG Solution w/ Improved Habitat	Int Cons	50.9	85%	0%	42%	0.70	124	1.5	88	596
	Seg Harv	0.0	12%						0	-