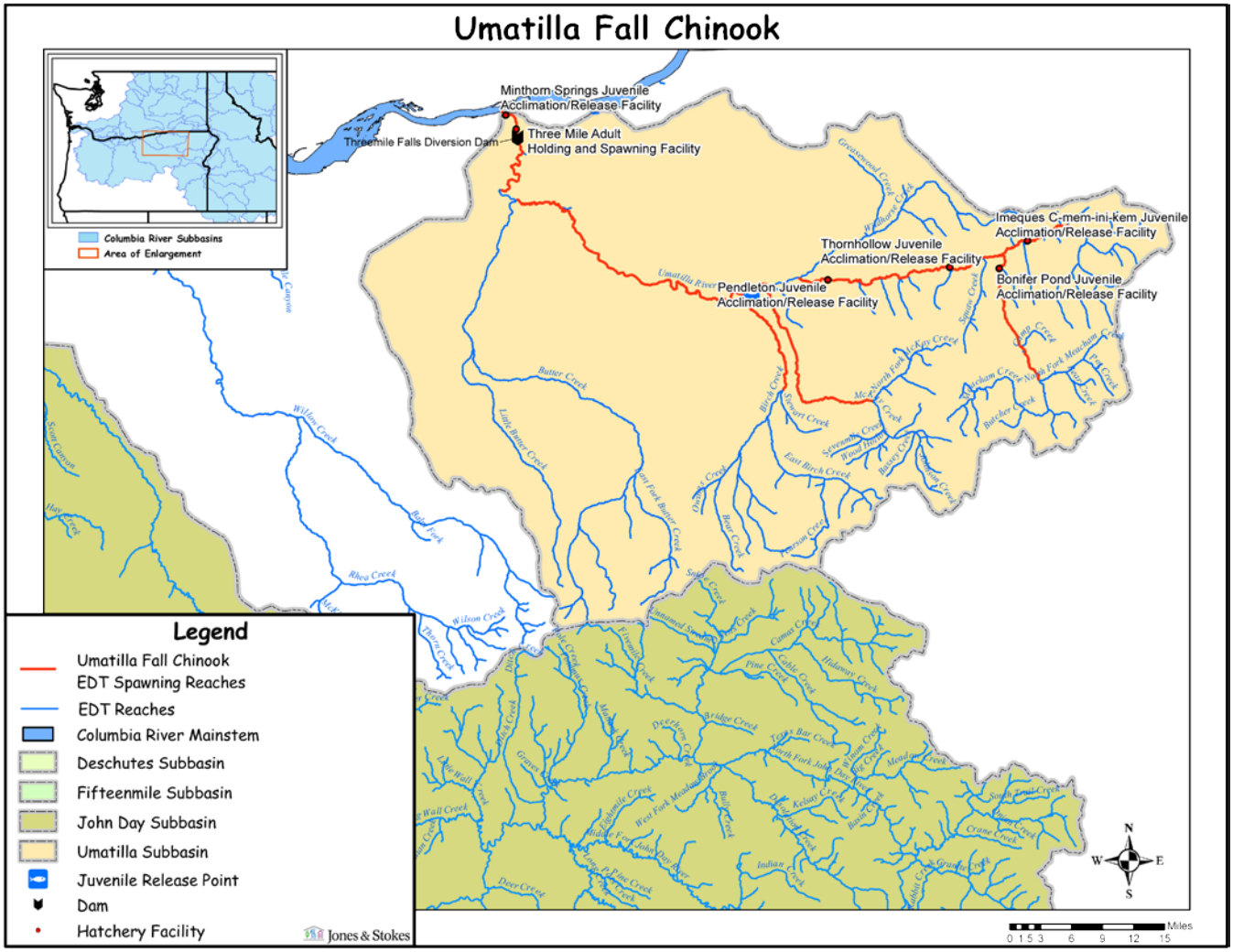
Hatchery Scientific Review Group
Review and Recommendations

Umatilla Fall Chinook
Population and Related Hatchery Programs

January 31, 2009



1 Umatilla Fall Chinook

The Umatilla/Willow subbasin is a 3,714-square-mile area in northeastern Oregon situated primarily in Umatilla and Morrow counties, with a small portion extending into Union County. The Umatilla/Willow subbasin is composed of four drainages: the Umatilla subbasin, the Willow Creek subbasin, the Six-Mile Canyon drainage, and the Juniper Canyon drainage. The mainstem Umatilla River is 89 miles long and the river and its tributaries drain an area of nearly 2,290 square miles. Willow Creek is 79 miles long and drains an area of about 880 square miles. The Six-Mile Canyon area, which contains intermittent streams that rarely drain into the Columbia River, is 472 square miles. The mainstem of Juniper Canyon Creek is 19 miles long and drains 72 square miles (Umatilla Subbasin Plan 2004).

Habitat degradation due to agricultural water withdrawal, construction of Three Mile Dam, and forest management practices led to the extirpation of salmon from the Umatilla subbasin in the early 1900s (Umatilla Subbasin Plan 2004).

Fall Chinook were reintroduced into the Umatilla River in 1982 with Spring Creek tule stock (in 1982) and upriver bright stock (1983 on). However, the first adults did not return to the river until 1988. Between 1988 and 2001, the average number of adults returning was 493; jacks also make up an important part of the return and their numbers have averaged 275 during the same period. A strong increase in the number of adults returning to the Umatilla River was evident from 1998 to 2001. In 1995, the first naturally produced adult Fall Chinook returned to the Umatilla River. The numbers of naturally produced adults has been very small and hatchery returns represent the great portion of total returns. Productivity of fall Chinook in the subbasin is very low, based both on female spawning escapement and the number of returning adults per spawner. To supplement natural production, annual outplanting of several hundred adult females from Priest Rapids and Ringold Springs Hatcheries started in 1996. The historic distribution of fall Chinook in the subbasin is unclear, because traditionally fall and spring Chinook were recognized as one species and it is unknown where divisions between their spawning habitats occurred. Because of the low number of returning adults, there is no tribal or sport harvest of adults; however, there is a small harvest of returning jacks (Umatilla Subbasin Plan 2004).

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: Naturally spawning fall Chinook in the Umatilla system are the result of hatchery plants and are not included in any ESU nor listed under the ESA.
- Population Designation: Using a rating system similar to that used by the recovery planners for the lower Columbia and Willamette results in a designation of Contributing.
- Current Viability Rating: Unknown
- Abundance Goals from Umatilla Hatchery Master Plan (1989): 11,000 wild adults
- Productivity Improvement Expectation: Unknown
- Habitat Productivity and Capacity (from EDT): Productivity: 2.0; Capacity: 6,000

2.2 Current Hatchery Programs Affecting this Population

An integrated hatchery program operates in the Umatilla, producing fall Chinook for harvest supplementation and to aid reintroduction of the species to the subbasin. This program collected broodstock at Bonneville and Ringold Springs in the past, but the last release derived from out-of-basin broodstock collections is scheduled to occur in early 2008. All future releases will be derived from adults returning to the Three Mile Falls Dam broodstock collection facility (ISRP 2005).

Current goals require the collection of 760 returning adults at Three Mile Falls Dam to produce 720,000 eyed eggs for rearing at Bonneville Hatchery and 670,000 eyed eggs for rearing at Umatilla Hatchery. Low survival rates associated with rearing to a yearling smolt stage (66.5% egg-to-smolt survival) at Bonneville result in a release from Bonneville into the Umatilla of 480,000 yearling smolts. Higher survival rates at the Umatilla Hatchery (89.6% egg-to-smolt survival), due in part to a shorter rearing time, result in releases of 600,000 sub-yearling fingerlings into the Umatilla.

Adult collection and spawning take place at Three Mile Falls Dam, where adults are collected at random and mated 1:1. Eggs are incubated to the eyed stage at Umatilla Hatchery, when a portion (see above) is transferred to Bonneville for rearing. The remainder complete their rearing at the Umatilla Hatchery.

Juveniles reared at Umatilla are split into two release groups in early May. Half of the release (approximately 300,000) is trucked to the Thornhollow acclimation site at RM 73 for a 3-week acclimation period, followed by volitional release as sub-yearling fingerlings into the Umatilla in late May. The other half of the release remains at the Umatilla Hatchery until they're direct-released in late May from the Reith release site at RM 48 as sub-yearling fingerlings.

Juveniles reared at the Bonneville Hatchery are also divided into two separate releases, but these juveniles are reared to a yearling smolt stage. Half of the Bonneville release (240,000) is trucked to Thornhollow in early March for a 3-week acclimation, followed by volitional release into the Umatilla in late March. After the March release, the other half of the Bonneville release (240,000) is trucked to the Thornhollow Acclimation site for 3 weeks and then volitionally released into the Umatilla.

Estimated number of hatchery strays affecting this population:

- Hatchery strays from in-basin integrated hatchery program: 1,358 fish.
- Hatchery strays from in-basin segregated and out-of-basin hatchery programs: 495 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 Recommendations 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 0.5 to 0.9. Because of low habitat productivity in the basin, the natural population is not self-sustaining. Therefore, eliminating the hatchery program would, for all practical purposes, eliminate the natural spawning population (estimated at approximately 700 with the hatchery program) as well as any harvest (estimated at approximately 4,650 fish with the hatchery program).

3.2 HSRG Observations/Recommendations

In the Observations and Recommendations 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 incorporate all factors affecting productivity (i.e., habitat quality, hatchery fitness effects, and harvest rates).

Observations

Managers have identified two goals for this population: one is to establish a natural sustainable population and the other is to provide harvest opportunities. The population does not appear to be sustainable, given current harvest rates and habitat productivity. With the current harvest and productivity, the natural population cannot sustain any meaningful segregated or integrated program.

On one hand, current habitat quality and quantity is limited in this subbasin, as evidenced by the extirpation of the population. This condition limits opportunities for successful establishment of a natural self-sustaining population. On the other hand, because of passage improvements and collection facilities at Three Mile Dam, it is possible to monitor and manage broodstock

spawning composition, which may increase the likelihood of developing a small locally-adapted naturally spawning population that would benefit from on-going and proposed habitat improvements.

As currently operated, this program is making no progress toward establishing a sustainable natural population. The continual high proportion of hatchery spawners from the current segregated hatchery program (with a PNI less than 0.1) allows no opportunity for the population to adapt to the local environment. A PNI greater than 0.5 is necessary for the natural environment to drive adaptation and increase fitness. Without significant habitat improvements, the natural-origin population will remain relatively small. It is unlikely that this stock could meet the abundance guidelines for a Primary population.

Currently, most hatchery fish are identified with coded-wire tags and are not adipose fin-marked.

Recommendations

To meet the management goal of developing a sustainable natural population while maintaining harvest benefits, we recommend that hatchery broodstock be managed in the following ways. Develop a two-stage stepping stone program to support the natural population and to provide harvest. The program would consist of an integrated conservation component producing approximately 480,000 yearling smolts. This component would be produced and maintained by collecting 100% of its broodstock from natural-origin returns. Excess hatchery-origin returns from the conservation component would provide all broodstock to maintain an additional second stage harvest component of approximately 411,000 zero-age smolts. Unharvested hatchery returns from the harvest component would not be used for broodstock. This would require differential marking of juveniles from the two programs. For example, the juveniles from the conservation program would be coded-wire tagged only, while the harvest program fish would be adipose-marked and coded-wire tagged. This solution would also require that 50% of the unharvested adults from the conservation component be removed (50% would be allowed to spawn), and that 80% of the unharvested adults from the harvest component be removed.

The HSRG recommends that managers continue to implement their apparently successful BKD strategies, which include culling.

Table 1. Results of HSRG analysis of current conditions and HSRG solution for Umatilla Fall Chinook. 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	399.2	40%	0%	68%	0.13	707	0.5	3,878	604
	Seg Harv	648.0	80%						803	133
No Hatchery	None None			0%		0.00	1	0.9	1	-
HSRG Solution	Int Both	479.0	50%	0%	74%	0.57	602	0.7	4,808	1,107
	Stepping Stone Seg Harv	411.5	80%						510	317
HSRG Solution w/ Improved Habitat	Int Both	481.0	50%	0%	69%	0.59	763	0.8	5,029	1,111
	Stepping Stone Seg Harv	411.5	80%	0%	100%				510	317