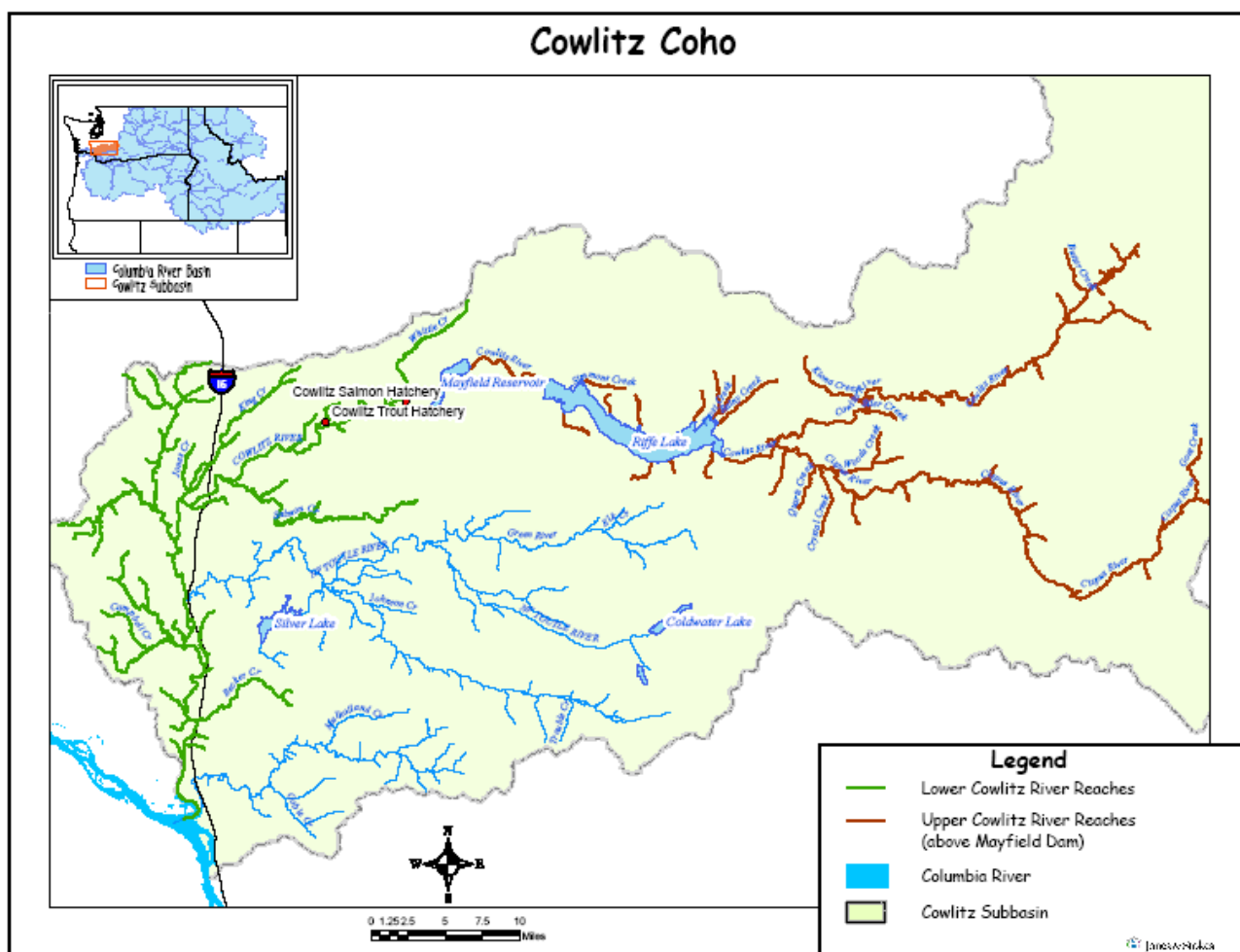


Hatchery Scientific Review Group Review and Recommendations

Cowlitz River Coho Population and Related Hatchery Programs

January 31, 2009



1 Cowlitz River Coho

Naturally spawning Cowlitz coho are a composite stock influenced by hatchery releases that began in 1915. The stock typifies a Type N population, with late returns beginning in September and spawning beginning in October and generally lasting through January. The WDFW SaSSi designated this population as depressed in both their 1992 and 2002 reports due to chronically low returns (<3 fish/mile); however, greatly increased returns of ~40 fish/mile were reported in 2001 (WDFW 2002).

Cowlitz coho were identified as a stock based on their distinct spawning distribution, run timing and genetic composition. They are a Type N stock characterized by late run timing and a northern migration route in the ocean after leaving the Columbia River. Late coho (Type N) are informally considered synonymous with Cowlitz River stock coho. Columbia River late stock hatchery programs were developed from the Cowlitz River stock, their derivatives or native runs. All naturally produced, unmarked fish collected at the Cowlitz Salmon Hatchery trap are passed upstream of Mayfield Dam along with surplus hatchery fish to spawn naturally. Most spawning below Mayfield Dam takes place in the mainstem Cowlitz, with an average of 5,321 naturally produced fish being passed above the dam yearly from 2000-2004.

2 Current Conditions

2.1 Current Population Status and Goals

Both the 1992 SaSSi and 2002 SaSSi list the population as Depressed.

- ESA Status: This population is listed as Threatened.
- Population Description: The lower Cowlitz coho population is designated a primary and the upper as a contributing by the NOAA technical memo: "Historical population structure of Pacific salmonids in the Willamette River and lower Columbia River Basins".
- Current Viability Rating: Low.
- Recovery Goal for Abundance: A viability goal of 600 adults was identified in the LCSRSP, with an interim goal of 600 adults and a potential of 19,100 adults.
- Productivity Improvement Expectation: No coho productivity improvement expectation is provided by the LCSRSB. A 10% improvement in habitat is given for steelhead after implementation of the Recovery Plan. Until better data is given, it is assumed that coho would experience the same 10% increase in habitat after implementation of the Plan.
- Habitat Productivity and Capacity (from EDT): Lower Cowlitz -- Productivity 3.6; Capacity 5,297; Upper Cowlitz -- Productivity 2.4; Capacity 12,000 with a 40% FGE at Cowlitz Falls Dam.
- Hatchery Populations that Affect this Natural Population: Cowlitz River Type N coho

2.2 Current Hatchery Programs Affecting these Populations

The only hatchery population of the same species that affects this population (e.g., through straying) is Cowlitz River Type N coho. This program is described as a proposed integrated harvest program in its HGMP, but currently only marked hatchery-origin fish are collected for

broodstock. All migrating fish are denied passage by a weir at the Cowlitz Salmon Hatchery. From 2,000 to 7,000 broodstock are collected from marked hatchery origin fish entering the trap at the weir. All natural fish entering the trap are passed above the weir to spawn naturally in the upper river. Marked, hatchery-origin fish entering the trap that are in excess of broodstock needs are also passed above the weir to spawn naturally. All fish for this program are reared on-station at the Cowlitz Salmon Hatchery. Hatchery reared fish are released at the following proposed maximum numbers as outlined by the Cowlitz River Type N Coho HGMP: Fingerling- 1,000; Yearling- 3,200,000; and Unfed Fry- 257,000.

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: 4,725 fish Lower River and 4,394 fish Upper Cowlitz.

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 increase from 1.5 to 3.0 and 1.0 to 1.9 in the lower and upper river, respectively. Average abundance of natural-origin spawners (NOS) would increase from 2,582 to 3,269 and 4,032 to 4,733 in the lower and upper river, respectively.. Harvest contribution of the natural and hatchery

populations would go from 38,559 to 632 and 3,228 to 815 in the lower and upper river, respectively..

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 and Table 2. The adjusted productivity values reported for each alternative incorporates all factors affecting productivity (i.e., habitat quality, hatchery fitness effects, and harvest rates).

Observations

Lower Cowlitz coho are currently designated as a Primary population. Upper Cowlitz coho are currently designated as a Contributing population. The upper Cowlitz habitat offers greater potential to contribute to natural production as a Primary population than the lower river.

Currently the program in the lower river is managed as a segregated program; however, with an observed pHOS greater than 50%, it does not meet the standards for a Primary or Contributing population. We noted that there are numerous remote site incubator (RSI) projects that are poorly evaluated and potentially contribute to the pHOS at an unknown level.

The HSRG notes that it is a challenge to access broodstock needed for an integrated program in the lower river as well as to monitor and control composition on the spawning grounds. A proposal (NPCC Innovative Proposal solicitation) has been submitted by the WDFW to develop and test non-lethal methods for live capture of adults for removal of hatchery fish and to collect broodstock to support an integrated program.

Recommendations

Managers should consider designating the upper watershed as a Primary population and the lower watershed component as a Contributing population.

In the lower river, an integrated program of 925,000 fish release and a related segregated program (stepping stone) with an 925,000 fish release could be operated consistent with a Contributing population designation. In order for this program to achieve broodstock requirements, methods for capturing broodstock and monitoring spawning composition are essential. Therefore, we strongly recommend that projects such as the one mentioned above for live capture of adults be funded and implemented. Methods developed by such an investigation will have applicability to other programs in the region.

In order for programs in the lower river to be operated consistent with a Primary designation, an integrated program of 850,000 fish release and a related segregated program (stepping stone) with an 840,000 fish release could be operated consistent with a Primary population designation.

Spawning ground surveys in lower river tributaries should be expanded to better estimate spawner abundance, distribution, and composition.

In addition, the RSI projects should be reviewed and managed consistent with the appropriate population designation. Returns from RSI projects should be included when considering the PHOS for the population.

Specific Observations/Recommendations for Upper Cowlitz Coho

Observations

The upper Cowlitz coho population is designated as Contributing, but has the potential to meet the criteria for a Primary population within the Lower Columbia River ESU. Since there are so few large Primary coho populations in this ESU, the biological value in establishing such a population in the upper Cowlitz is high.

Goals for this population are conservation and harvest.

The HSRG analysis of the upper Cowlitz coho population makes the following assumptions:

1. Average fish collection efficiency at Cowlitz Falls Dam (FCE) is in the range of 0.35 to 0.45. For our initial analysis we assumed a FCE of 0.40. We also considered possible future alternatives using increasing FCE values of 0.60 and 0.80.
2. Average SAR (Barrier Dam to Barrier Dam) is in the range of 0.035 to 0.06. For our analysis we assumed an average SAR of 0.04.
3. We also assumed that the Upper Cowlitz and Cispus components would be managed as one stock.

Recommendations

Based on a presumed primary population designation, the HSRG recommends that an integrated hatchery program be established in the upper Cowlitz River. Harvest in the upper river should be abundance-based to achieve conservation objectives. The sport fishery would be managed based on annual in-season estimates of abundance of NORs. Using the combined Upper Cowlitz and Cispus populations, a program of approximately 500,000 smolts (~420 NOR adult broodstock) could be maintained with a target PNI > 0.67.

This population would be separate from the segregated harvest program that currently exists in the lower river. Two separate populations would be maintained at the hatchery, with smolts from each program released on-station and uniquely identified. For example:

- a) A segregated harvest program (100% adipose fin-clipped only) released on-station to support downstream fisheries.
- b) An integrated harvest and conservation program (100% adipose fin-clipped and coded-wire tagged) also released on-station to support upper Cowlitz conservation and harvest goals.
- c) Broodstock for the integrated program would consist of 100% unmarked NORs and managed to achieve a PNI greater than or equal to 0.67.
- d) Tilton NORs (not used in the program) would be identified with 100% CWT and no adipose fin-clip.

Implementation of Upper Cowlitz Integrated Program

- a) Establish a minimum escapement goal of 4,000 fish (NORs + HORs). This minimum escapement level approximates the equilibrium escapement for the upper watershed (upper Cowlitz/Cispus) under current habitat conditions.
- b) Retain 420 NORs for broodstock. All unmarked NORs not needed for broodstock would be transported upstream for natural spawning.
- c) HORs would be transported upstream in a 1:1 ratio with NORs; however, when the total number of NORs passed upstream is less than 2,000 fish, the number of HORs passed upstream would be increased to achieve a total escapement of 4,000 fish for natural spawning. At this level, no harvest would be available. During the initial 3 years of this program (i.e. until returns from the new integrated program are available), hatchery returns from the current segregated program would be used to achieve the desired upstream escapement (equal to or greater than 4,000 fish). After that (beginning in Year 4), only the returning adults from the integrated program would make up the hatchery component that is passed upstream.
- d) Under this scenario, HORs passed upstream in excess of the 4,000 total escapement level would potentially be available for selective harvest on a within season management basis. For example, if 3,000 NORs plus 3,000 HORs were passed upstream, then 2,000 HORs potentially would be available for harvest.
- e) As FCE increases, greater harvest opportunities could be accommodated, while at the same time maintaining the target $PNI > 0.67$. There is also a range of options for managing the hatchery program, including integration of a larger portion of the overall Cowlitz program to the benefit of conservation and harvest.
- f) Scale samples should be taken from returning NORs to determine the incidence of hatchery-origin fish among unmarked fish. The purpose is to assess the number of adipose present hatchery fish from the segregated program that enter the upper watershed.
- g) The options considered for passing additional adults (selective passage of either male or females) is not consistent with the conservation goals for the upper watershed population at this time.
- h) Consider using surplus adult carcasses from the segregated programs for nutrient enrichment in the upper watershed.

Table 1. Results of HSRG analysis of current condition and HSRG Solution for Upper Cowlitz River Coho. 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 Harv	238.8	0%	0%	47%	0.00	4,032	1.0	3,365	1
No Hatchery	None None	-	0%	0%	0%	1.00	4,733	1.9	830	-
HSRG Solution	Int Both	501.3	65%	0%	31%	0.76	4,660	1.6	8,224	4,864
HSRG Solution w/ Improved Habitat	Int Both	501.3	65%	0%	27%	0.79	5,613	1.8	8,393	4,864

Table 2. Results of HSRG analysis of current condition and HSRG Solution for Lower Cowlitz River Coho. 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%	59%	0.00	2,582	1.5	500	0
	Seg Harv	3,223.4	90%						38,115	40,536
No Hatchery	None None	-	0%	0%	0%	1.00	3,269	3.0	632	-
HSRG Solution	Int Harv	850.0	95%	0%	25%	0.69	2,495	2.5	13,011	8,737
	Stepping Stone Seg Harv	840.5	95%						12,307	9,652
HSRG Solution w/ Improved Habitat	Int Harv	850.0	95%	0%	21%	0.72	3,022	2.8	13,114	8,737
	Stepping Stone Seg Harv	840.5	95%						12,307	9,652