Summary of HSRG Findings for Chum Populations in the Lower Columbia River and Gorge

The Congressionally-established Hatchery and Scientific Review Group (HSRG) developed a foundation of salmon hatchery reform principles that should aid Pacific Northwest hatchery managers in meeting conservation and sustainable harvest goals in the 21st century. The HSRG process has established principles for goal setting, scientific defensibility, and adaptive management of hatchery programs. Tools to determine outcomes of proposed management actions have been developed and include a scientific framework for artificial propagation of salmon and steelhead, a benefit/risk assessment tool, hatchery operational guidelines, and monitoring and evaluation criteria.

Hatchery stocks need to be managed as either genetically segregated from naturally spawning populations or as genetically integrated with natural populations. In addition, hatcheries must be managed on an ecosystem basis that considers a multitude of factors, including tribal trust responsibilities; genetic, demographic, and ecological health; endangered species concerns; mitigation responsibilities; and sustainable fisheries.

This report represents preliminary findings for lower Columbia River and Gorge chum salmon populations. Final recommendations will be published once the HSRG has completed its review of all Columbia Basin regions.

The managers' objectives for chum are primarily focused on conservation, as the Lower Columbia River Chum ESU is ESA-listed as threatened. While there are no current harvest goals or expectations for chum salmon, there is concern about the effects of incidental harvest of chum salmon in commercial coho fisheries. The issue for HSRG consideration was therefore whether a hatchery program should be a part of the conservation strategy for chum salmon.

Many chum populations are severely depressed and the status of many other populations is unknown (Table 3). The Lower Columbia/Willamette Technical Recovery Team (TRT) has organized the Columbia River chum ESU into three geographic strata. All populations of the ESU are either at high or very high risk of extinction (Table 1). The TRT also established population recovery designations for the chum salmon ESU (Table 2).

Table 1. Extinction Risk of Columbia River Chum Salmon Populations[1] as Identified by the Lower Columbia/Willamette TRT.

Populations	Extinction Risk
Coast Stratum	
Grays/Chinook (WA)	High
Elochoman (WA)	High
Mill/Abernathy/Germany (WA)	Very High
Youngs Bay Tribs. (OR)	Very High
Big Creek (OR)	Very High
Clatskanie (OR)	Very High
Scappoose (OR)	Very High
Cascade Stratum	
Cowlitz (WA)	Very High
Kalama (WA)	Very High
Lewis (WA)	Very High
Salmon (WA)	Very High
Washougal (WA)	High
Clackamas (OR)	Very High
Sandy (OR)	Very High
Gorge Stratum	
Lower Gorge Tribs.	Very High/Medium
Upper Gorge Tribs.	Very High/ Very High

[1] From Washington's Lower Columbia River Recovery Plan and McElhany et al. 2007 for Oregon populations

Table 2. Recovery designations of Lower Columbia River and Gorge chum populations.

Populations	Recovery Designations		
	LCR Salmon Recovery Plan (WA)	LCR Recovery Plan (OR)	TRT
Coast Stratum			
Grays/Chinook (WA)	Primary	Core	Core
Elochoman (WA)	Primary	Core	Core
Mill/Abernathy/Germany (WA)	Primary		
Youngs Bay Tribs. (OR)[1]	Primary	Core	
Big Creek (OR)	Contributing	Core	
Clatskanie (OR)	Contributing		
Scappoose (OR)	Contributing		
Cascade Stratum			
Cowlitz (WA)	Contributing	Core	Core
Kalama (WA)	Contributing		
Lewis (WA)	Primary	Core	Core
Salmon (WA)	Stabilizing		
Washougal (WA)	Primary		
Clackamas (OR)	Contributing	Core	Core
Sandy (OR)	Primary		
Gorge Stratum			
Lower Gorge Tribs. (OR/WA)	Primary	Core	Core
Upper Gorge Tribs. (OR/WA)	Contributing		

[1] Primary and Core population designations not consistent with HSRG recommendation

Table 3. Columbia River Chum Salmon Abundance

Populations	2007	2006	2005	2004	2003	2002	2001	2000
Coast Stratum								
Grays/Chinook (WA)	3,660	6,120	4,150	14,380	16,670	11,710	4,740	2,210
Elochoman/Skamokawa (WA)	NA[1]	282	31	34	145	172	20	17
Mill/Abernathy/Germany (WA)	NA	1	4	6	116	71	430	
Youngs Bay Tribs. (OR)	NA	NA	NA	NA	NA	NA	NA	NA
Big Creek (OR)	1	196	<10	~25	~30	0	<10	0
Clatskanie (OR)	NA	NA	NA	NA	NA	NA	NA	NA
Scappoose (OR)	NA	NA	NA	NA	NA	NA	NA	NA
Cascade Stratum								
Cowlitz (WA)	5	8	13	5	22	NA	NA	3
Kalama (WA)	0	0	0	1	2	0	0	0
Lewis (WA)	NA	5	11	18	88	16	15	6
Salmon (WA)	NA	NA	NA	NA	NA	NA	NA	NA
Washougal/Lacamas (WA)	1	0	0	25	36	37	0	0
Clackamas (OR)	NA	NA	NA	NA	NA	NA	NA	NA
Sandy (OR)	NA	NA	NA	NA	NA	NA	NA	NA
Gorge Stratum								
Lower Gorge Tribs. (OR/WA)	144	585	331	617	1,260	2,140	1,760	219
Lower Gorge-mainstem (OR/WA) 805	1,760	1,470	3,010	4,720	8,970	1,620	350	
Upper Gorge Tribs.(OR/WA)[2]	121	165	139	80	411	154	58	38

[1] NA = no data available

[2] Bonneville Dam count from Fish Passage Center, as updated by Hillson, WDFW
WA numbers from Todd Hillson, WDFW, personal communication 1/28/08
OR numbers from Bruce McIntosh, ODFW, personal communication 2/12/08
Bolding indicates source of counts within multi-watershed populations

The framework for a conservation strategy is defined through recent state and federal recovery planning efforts. The managers want at least two chum populations within each stratum to meet the standards of a Primary population.

The HSRG reviewed options for chum conservation in the lower Columbia River in the context of conservation goals for other salmon and steelhead ESUs as well as the objectives of fisheries managers for Chinook and coho harvest. Based on this broader context, the HSRG notes that conservation goals for the chum population in the Youngs Bay tributaries (as a Primary population) may be in conflict with conservation and harvest goals for coho salmon in this area. Timing of intensive gill-net fisheries in Youngs Bay to fully harvest hatchery-origin coho overlaps with the return of adult chum salmon. Furthermore, the release of large numbers of juvenile Chinook and coho salmon from net pens in this area may also cause excessive predation on migrant chum fry. Other chum populations in the Coast stratum are more likely to achieve the status of a

Primary population in a manner that is compatible with the managers' goals for Chinook and coho.

Harvest of chum salmon is incidental, occurring primarily in the lower Columbia River commercial coho fishery. Sport harvest of chum in the Columbia River and tributaries has been closed since 1992 in Oregon and 1995 in Washington. The presumption is that chum salmon are not harvested in the ocean or in the Columbia River above Bonneville Dam. Fishery managers set a 5% maximum incidental harvest mortality on Columbia River chum. Recent harvest rates are reported to have averaged about 1.6% annually (FCRPS BiOp). Because of the potential for misidentification of chum caught in intensive coho fisheries, the HSRG recommends field confirmation of this harvest rate.

Chum hatchery programs have been associated with increased abundance of natural chum populations, most notably summer chum in Puget Sound. Hatchery chum populations are less likely to be affected by domestication given their short-term culture. There are currently two hatchery conservation programs for chum salmon in the Columbia Basin, Grays River/Chinook River (WA) in the Coast stratum, and Duncan Creek (WA) in the Gorge stratum (Table 4).

The HSRG notes that 13 of 16 historical populations of Columbia River chum salmon are severely depressed even though Washington's Lower Columbia River Recovery Plan indicates habitat is available to support much larger populations. Under current habitat conditions, managers estimate an ESU abundance of 24,000 chum salmon can be supported. With habitat improvements to tributaries, an estimated ESU abundance of 115,000 chum salmon is possible.

Hatchery intervention can reduce demographic risk by boosting abundance. Additional conservation propagation programs should be promptly initiated within each of the ESU's three geographic strata to reduce this risk. Existing and candidate populations for hatchery conservation programs are identified in Table 4. Chum conservation programs can be rapidly implemented at existing facilities at modest cost. Programs should be sized at 100,000 to 200,000 fry releases. These programs should last up to three generations. Broodstock should be selected from the target population, or in the case of reintroductions, from the most suitable available population.

The need for hatchery intervention has been recognized by others and funding appears to be available to pursue chum hatchery programs following more detailed planning. We recommend planning be immediately initiated leading to one or two programs for initial implementation in each stratum. The planning process should also include the development of a set of hypotheses regarding the likely causes of the decline of chum. Based on these hypotheses, the role and objectives of conservation hatcheries in a comprehensive recovery plan should be defined. Additional reintroduction or other conservation programs could then be considered based on monitoring and evaluation results.

In summary, the use of chum conservation programs should be viewed as an important short-term risk management strategy to preserve the genetic legacy of depressed chum

populations. Managers also need to better understand what has caused the overall chum decline and what ecological and/or demographic factors are continuing to keep the ESU at such low abundance levels given the apparent available habitat capacity and propensity for salmon populations to be highly productive at low abundances. Managers should avoid maintaining this ESU only through artificial propagation due to long-term hatchery risks of domestication and fitness loss.

Table 4. Existing and HSRG-proposed propagation programs for conservation and recovery of chum salmon.

Populations	Existing Conservation Programs	Potential Conservation Programs	Potential Control Populations
Coast Stratum			
Grays/Chinook (WA)	Grays/Chinook		
Elochoman (WA)		Elochoman	
Mill/Abernathy/Germany (WA)		Abernathy	Mill/Germany
Youngs Bay Tribs. (OR)			Klaskanine/Youngs
Big Creek (OR)		Big Creek	
Clatskanie (OR)		Clatskanie	
Scappoose (OR)			Scappoose
Cascade Stratum			
Cowlitz (WA)			Cowlitz
Kalama (WA)			Kalama
Lewis (WA)		Lewis	
Salmon (WA)			Salmon
Washougal (WA)		Washougal	
Clackamas (OR)			Clackamas
Sandy (OR)		Sandy	
Gorge Stratum			
Lower Gorge Tribs.	Duncan		Hamilton/Hardy
Upper Gorge Tribs.		Wind, White Salmon	Hood

Conclusions

The HSRG recommends the fishery managers implement the following actions to achieve their chum conservation goals as part of a plan to achieve conservation and harvest goals for all species of salmon in the Columbia River Basin:

1. Intensify enumeration of incidental chum harvest in the commercial coho fishery.
2. Continue current chum conservation programs in Grays River and Duncan Creek.
3. Promptly plan, develop and implement at least one additional chum reintroduction or conservation program in both the Coast and Gorge strata and at least two programs in the Cascade stratum.
4. Programs should include a sunset clause that would suspend the hatchery program after three generations, unless evidence suggests suspending releases earlier or extending the program beyond three generations would benefit the populations.
5. All hatchery-origin fish should be marked and the proportion of hatchery fish on the spawning grounds monitored.
6. Investigate ecological variables that might be constraining the viability of the chum salmon in the Columbia River and develop one or more plausible hypothesis.
7. Based on results of the initial propagation programs and the plausible hypotheses about the cause of decline, consider additional reintroduction programs to achieve, at a minimum, preservation of the genetic identity and reduction of demographic extinction risks.