SYSTEM OPERATIONAL REQUEST: #2004-19

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: NOAA Fisheries, U.S. Fish & Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, the Washington Department of Fish and Wildlife, Nez Perce Tribe, Shoshone-Bannock Tribes, and the Columbia River Inter-Tribal Fish Commission.

TO:	**B. G. Grisoli**	**COE-NWD**
	William Branch	**COE-Water Management**
	Cindy Henriksen	**COE-RCC**
	Witt Anderson	**COE-P**
	COL Hobernicht	**COE-Portland District**
	LTC Randy Glaser	**COE-Walla Walla District**
	J. William McDonald	**USBR-Boise Regional Director**
	Stephen J. Wright	**BPA-Administrator**
	Greg Delwiche	**BPA-PG-5**

FROM: **David A. Wills, Chairperson, Salmon Managers**

DATE: **October 26, 2004**

SUBJECT: Tailwater elevation at Bonneville Dam to protect natural spawning of chum and fall chinook salmon at the Ives/Pierce Island Complex, Multnomah Falls, and partly influence the I-205 seeps.

SPECIFICATIONS: As required by the 2000 NMFS Biological Opinion, beginning when chum are present and continuing until further notice, provide a minimum instantaneous tailrace elevation of 11.5 feet at Bonneville Dam. On average it is anticipated that daily average flows will not exceed 125 Kcfs.

JUSTIFICATION: The Ives/Pierce Islands Complex below Bonneville Dam represents a limited natural spawning area for ESA listed Columbia River chum and unlisted Lower Columbia River bright fall chinook. The NMFS 2000 Biological Opinion (BiOp) recognizes that access to spawning habitat in the Ives/Pierce area and Hardy and Hamilton creeks is primarily a function of the water surface elevation. More so, the BiOp and experience over the last 5 years recognizes that managing water levels to a tailwater gage height rather than a flow level is preferable.

Over the last ten days the flow below Bonneville has varied between 81 and 165 Kcfs, with tailwater elevations fluctuating between 8.4 and 14.4 feet. These variable flows and tailwater elevations are not consistently adequate to provide spawning area for chum salmon at the Ives/Pierce Islands Complex and Multnomah Falls. Additionally, these flows and tailwater elevations limit access to both Hardy and Hamilton creeks and spawning effectiveness at the I-205 seeps. The provision of a minimum 11.5-foot tailwater elevation at Bonneville Dam will

provide access to a limited area of mainstem spawning habitat for chum salmon and allow unrestricted access to Hardy and Hamilton creeks.

Data over the last six years (Figure 1) suggests that chum salmon will begin staging and spawning in the area around the first of November. Lower River bright fall chinook are already present in the vicinity of the Ives/Pierce Island Complex, and based on data collected 1998-2003 (Figure 2) have already begun to spawn in significant numbers with peak counts expected in early November. Increasing tailwater elevation will allow chinook access to some preferred shallow-water habitat in the island area. Habitat modeling results from BPA Project 1999003 for chum salmon show a significant change in available spawning habitat between Bonneville Dam discharges of 110 to 125 kcfs. For the main Ives Island chum spawning site, habitat and necessary hydraulic conditions for spawning is largely driven by the availability of Columbia River water over the hydraulic control point between Hamilton and Ives Island. Habitat is also influenced from Hamilton Creek discharge. Reliance on this creek provides uncertainty that habitat will be sustained throughout the spawning season.

An analysis of the effects of tailwater elevation on the availability of mainstem chum spawning habitat indicated that with Bonneville Dam at 110 kcfs (~10.75 foot tailwater), a condition that does not provide Columbia River water through the control point, and zero flow from Hamilton Creek, 0.13 hectares of usable habitat are available to chum (see Table below). The 0.13 hectares is produced from a downstream backwater into the site. At a discharge of 120 kcfs (~11.25 foot tailwater), which just breaches the control, and zero flow from Hamilton Creek, 0.40 hectares of usable habitat is available. This is a 308% increase over the 110 kcfs condition. At a discharge of 125 kcfs (~11.5 foot tailwater), the condition that has been managed to in previous years, and zero flow from Hamilton Creek, 0.6 hectares becomes usable and provides a 462% increase over the 110 kcfs operation. Calculations for wetted and usable area are provided in the table below. These results are for a low/average downstream Warrendale elevation (tidal and Willamette River influence) and zero discharge from Hamilton Creek, both typical of late October and early November.

Chum Study Section (S2) "Hamilton Mouth"		
Bonneville Q (kcfs)	Wetted area (ha)	Usable Area (ha)
110	2.20	0.13
120	4.50	0.40
125	4.60	0.60

(For a detailed discussion please see the report “ASSESSMENT OF CHINOOK SALMON SPAWNING HABITAT NEAR IVES AND PIERCE ISLANDS IN THE COLUMBIA RIVER” at http://www.efw.bpa.gov/Environment).

The request is for an instantaneous 24-hour tailwater elevation. This is because chum spawning behavior during nighttime hours has been observed. USFWS and USGS staff collected nighttime behavioral information of chum salmon between the hours of 1700 and 0300 h from 20 November to December 9, 2002. An acoustic under water camera was used to observe chum salmon behavior over redds from a distance of 4-5 meters. Prior to deployment, staff documented active spawning behavior 2-5 hours before sunset. In total 25 different female chum salmon were observed digging redds and all 25 continued digging into the night

throughout the observation period. Of the 25 female chum salmon observed digging redds, 23 were accompanied by a presumably male fish. Male fish were observed displaying courtship behavior such as tail crossing and quivering and were also observed chasing other intruding fish. A study is planned this year on how tailwater fluctuations and flows affect chum salmon spawning behavior.

The provision of flow to facilitate spawning in the shallow water habitat and tributaries will benefit both chum and fall chinook by: 1) allowing access to spawning habitat, 2) providing stable spawning conditions, 3) extending the timeframe over which spawning occurs, and 4) protecting life history diversity of early spawning fish. This approach recognizes that adequate flows can be provided without significant impacts on other fish and power operations. Based on research collected to date, the island areas and tributaries provide suitable spawning habitat for chum. Unlike chinook, chum cannot spawn in the high velocity large cobble substrate of the mainstem, and an inadequate amount of spawning habitat has been documented to support all spawners in tributaries as well as other mainstem areas. The delay of providing spawning flows poses an unnecessary risk to this population that number less than 1% of their historic abundance. Current (October 12, 2004) STP modeling indicates that near 125 Kcfs of water will be available at Bonneville starting November 1, 2004, providing water to maintain the 11.5-foot tailwater gage height. The opportunity for enhancing natural spawning areas and production in the mainstem Columbia system is limited and should be given high priority for protection and enhancement.

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Figure 1. Chum redd counts.

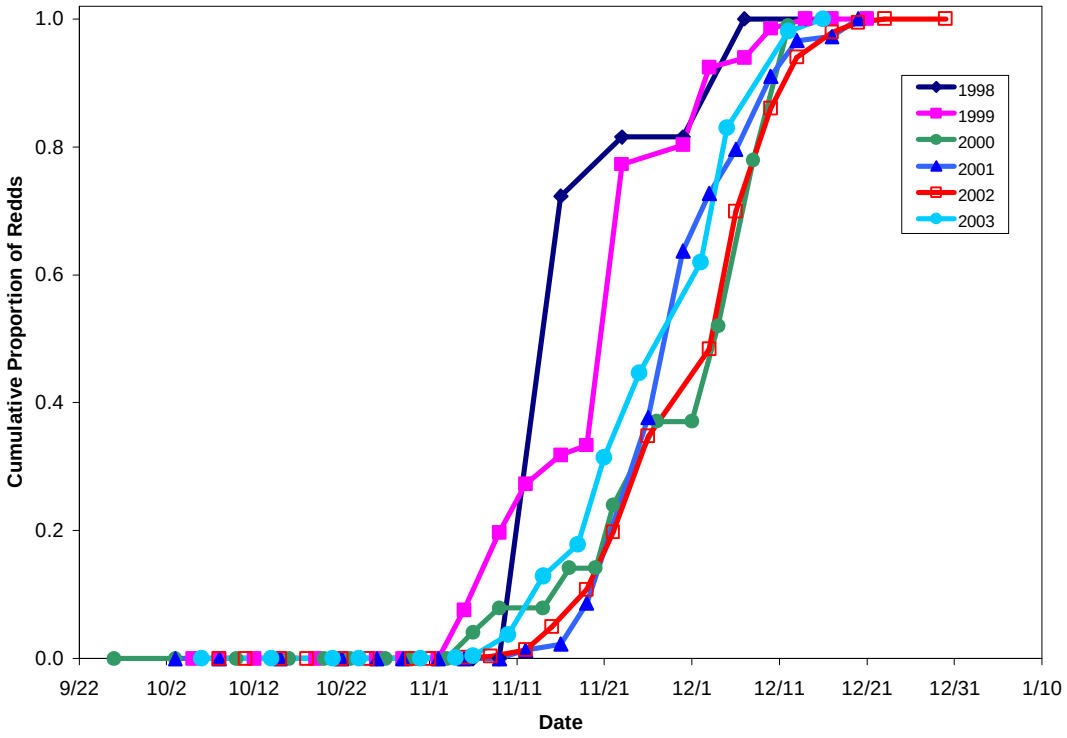

Figure 2. Fall chinook redd counts.