Memo

To: National Marine Fisheries Service

From: The FCRPS Action Agencies

CC: The Technical Management Team

Date: 10/30/01

Re: Initiation of Chum Spawning

The Action Agencies are endeavoring to take a balanced risk management approach to managing chum spawning below Bonneville Dam this year. While the Bonneville operation always carries a level of risk, this year's below average system storage levels and low tributary stream flow conditions add to that risk. Regional awareness of the potential effects of providing flows below Bonneville has been heightened following last year's experience of trying to implement or maintain all of the following operations: chum spawning and incubation below Bonneville; Vernita Bar spawning and incubation; achieving April 10 Upper Rule Curve (URC) for spring flows; and achieving reservoir refill by June 30 during a very low runoff year.

The NMFS 2000 Biological Opinion (BiOp) calls for providing flow below Bonneville Dam at a level of at least 125 kcfs beginning November 1 if an analysis of the best available hydrological information by early October indicates that the operation can be sustained from the start of spawning until the end of emergence. In addition, the BiOp stipulates that "the spawning operation cannot adversely affect implementation of this RPA or the parties' ability to comply with the Vernita Bar agreement (which) protects natural production of unlisted fall chinook in the Columbia River Hanford Reach." *(NMFS BiOp, page 9-58)*

The Action Agencies' interpretation of these stipulations is that chum spawning flows should not result in either of the following:

1. An increase in Vernita Bar protection flows above the currently agreed upon limit of 55 kcfs.
2. An inability to meet fish VECCs at Grand Coulee throughout the season.

A review of the hydro regulation study done for the 2000 BiOp indicates that in years following low flow years, the FCRPS did not consistently achieve flows of 125 kcfs below Bonneville for chum. Some examples of low flow years followed by closer to average flow years are in the following table.

Year	Volume Runoff	Results
1931 1932	64.5 MAF 106.7 MAF	Chum flows of 125 kcfs not achieved in November – February
1944 1945	60.3 MAF 83.3 MAF	Chum flows of 125 kcfs not achieved in November – March
1977 1978	53.8 MAF 104.7 MAF*	Achieved chum flows of 125 kcfs November - March

**1978 had exceptionally high fall precipitation throughout the Basin*

Chum flows were not achieved in 1932 or 1945 because the fall period in those years was dry, and the system was operating to achieve June refill objectives. In 1978, wet conditions in the fall enabled the system to achieve chum flows.

Natural streamflows at The Dalles in the fall period average 91 kcfs (60-year average), with critical year flows of 52 kcfs. This year, the RFC's October 22 SSARR projection estimates that natural streamflows at The Dalles will average approximately 56 kcfs throughout the fall period. Any additional flows needed to meet project purposes beyond the projected natural streamflows will need to come out of reliability storage.

Both Bonneville Power Administration (BPA) and the U.S. Army Corps of Engineers (Corps) conducted an analysis of the likelihood of providing a sustained flow of 125 kcfs below Bonneville Dam from November 1 through April. BPA's analysis used the same hydrological model (HYDSIM) that was used to estimate the probability of providing flows for chum salmon in the BiOp. The model was initialized with this year's lower than normal Canadian reservoir elevations with the additional 3 MAF of "reliability storage" and the volume of flow provided below Bonneville was fixed at 125 kcfs, as opposed to a 125/145 kcfs operation[1] evaluated for the BiOp. The results of this year's analysis indicate that there is a lower probability of being able to sustain the flow throughout the period of chum emergence than conditions assumed in the BiOp. In addition, the objective of the HYDSIM 2001 analysis was to determine how long a 125 kcfs target flow at Bonneville could theoretically be maintained. Consequently, this analysis does not reflect power system reliability needs and uses a large portion of the reliability water stored in Canada in November and early December. A summary of BPA's study results is attached.

The Action Agencies are also considering the effect that providing chum flows would have on fall chinook spawning, the placement of redds, and the resulting flow protection level established under the Vernita Bar agreement. The main issues associated with Vernita Bar are as follows.

[1]The operation evaluated for NMFS= 2000 FCRPS Biological Opinion called for flows of 125 kcfs for the first half of November, then 145 kcfs from the second half of November through December 31. Flows from January 1 through April had to meet a minimum of 135 kcfs.

$ **A desire to keep flows on Vernita Bar in the range of 55 kcfs this year.** Due to the low flow conditions being experienced to date, including the Snake River, most of the water needed to provide flow to support chum spawning below Bonneville would have to flow through Grand Coulee and the mid-Columbia reach. Even a 125 kcfs spawning flow would result in a high level of discharge from Grand Coulee and likely place the Vernita Bar protection level at the maximum level of about 70 kcfs.

$ **A desire to avoid a repeat of the Hanford Reach dewatering decision the region faced last spring.** Last year, the Vernita Bar protection level was 65 kcfs in part because the chum flow program was implemented while redds were still being established in the Hanford Reach. The Vernita Bar agreement called for maintaining protection level flows (65 kcfs in 2001) through emergence (typically mid-May). Operating to this flow during last year's low water year resulted in additional spring draft at the expense of subsequent flow and refill. While the Vernita Bar agreement allows for a dewatering decision in low flow years, none of the fisheries parties to the agreement would support adoption of a lower protection level last spring. The State of Washington provided estimates of fry losses from lowering the protection level that ranged from 5 to 6 million for a 10 kcfs reduction and 7 to 9 million for a 15 kcfs reduction. As a result, flows were maintained through the emergence date, reducing the amount of water available for other fisheries needs later in the year.

$ **A desire to avoid last year's abrupt decrease in flow following the Vernita Bar program.** Following last spring's calculated May 9 Vernita Bar emergence date, flows were decreased to the minimum discharge level of 36 kcfs below Priest Rapids Dam. This was part of an effort to refill Grand Coulee and upstream storage projects to provide water for summer flow augmentation. This abrupt decrease in flow in May and June may have adversely affected survival observed in last year's upper Columbia River steelhead population.

$ **A desire to not affect upriver spring chinook and steelhead stocks for two consecutive years.** We hope to not repeat last year's events, and want to take reasonable steps to avoid affecting spring flows for upper Columbia River stocks for two consecutive years.

Given the high likelihood that providing flows below Bonneville will create a higher Vernita Bar protection level and adversely affect the FCRPS' ability to achieve other BiOp operations, the Action Agencies propose the following actions be taken this spawning season.

1. The provision of flow for the spawning of chum below Bonneville will begin following the last scheduled Vernita Bar redd count (currently scheduled for November 18), if providing these flows would drive the Vernita Bar protection flow above this year's planned 55 kcfs target flow. Conversely, chum spawning flows may begin sooner if they can be provided without driving up the Vernita Bar

protection level. The scenarios that would provide for an earlier provision of chum spawning flows include a substantial increase in Lower Columbia River tributary inflow or Snake River flow.

2. The Bonneville flow will be regulated to a tailwater elevation rather than a steady flow. The tailwater gauge reflects the influence of tides, the Willamette River flow and the effect of local tributary flow on the elevations at which redds are established in the mainstem Columbia. The initial tailwater elevation target may be 11.2 feet, but may change based on results of field observations and available water.

3. In evaluating the chum operation, the Action Agencies will also consider the sufficiency of flows in the Hamilton and Hardy creeks and side channels to enable access to the creeks for spawning, the presence of chum in the mainstem, and any change (increase or decrease) in natural flows.

This proposed plan is intended to serve as a guide and may be modified in-season to reflect real time hydrologic and fishery information.

Attachment to October 30, 2001 Memo to NMFS from the Action Agencies
Re: Initiation of Chum Spawning

Summary of BPA Analysis

The following table contains a comparison of the HYDSIM 2000 BiOp RPA Analysis with a similar HYDSIM analysis that was initialized with this year's reservoir conditions. The table shows the percentage of times that the chum spawning operation could be sustained using a month average as the basis. Both analyses used a 50-year historic water record.

	Month:	November	December	January	February	March
HYDSIM 2000 BiOP RPA Analysis	% Meet BON Target Flow	74%	90%	86%	78%	76%
	BON Target Flow	135 kcfs	145 kcfs	135 kcfs	135 kcfs	135 kcfs
HYDSIM 2001 Analysis A	% Meet BON Target Flow	100%*	100%*	74%	66%	64%
	BON Target Flow	125 kcfs*	125 kcfs*	Return to fish VECC	Return to fish VECC	Return to fish VECC

In the HYDSIM 2001 Analysis A above, the system abandons the Bonneville target flows in January in order to attempt to refill Grand Coulee to its Upper Rule Curve (URC) elevation on April 15. It achieves this refill objective only 82% of the time, which is lower than the BiOp criteria of 85% probability of meeting April URC.

In the HYDSIM 2001 Analysis B shown in the table below, the system operates to meet the 125 kfcs flow target at Bonneville throughout the entire season with no regard to refill.

	Month:	November	December	January	February	March
HYDSIM 2001 Analysis B	% Meet BON Target Flow	100%*	100%*	100%*	90%	86%
	BON Target Flow	125 kcfs	125 kcfs	125 kcfs	125 kcfs	125 kcfs

In this case, Grand Coulee reaches URC on April 15 only 74% of the time, resulting in lower May/June flows. In addition, in February and March, in some years Grand Coulee drafts to empty trying to meet the 125 kcfs target flow at Bonneville, and meets those flows less frequently in February and March.

**NOTE: The objective of the HYDSIM 2001 analysis was to determine how long a 125 kcfs target flow at Bonneville could theoretically be maintained. Consequently, this analysis does not reflect power system reliability needs and uses a large portion of the reliability water stored in Canada in November and early December.*

Summary of Corps Model Analysis

The Corps has completed an analysis for the period ending December 31. An analysis for the period January 1 – April 10 is ongoing and results will be presented when the study is completed. The study for the period ending December 31 was based on forecasted inflows from the River Forecast Center in the October 22 SSARR model.

	Month:	November	December
Corps Analysis	% Meet BON Target Flow	100%	100%
	BON Target Flow	125 kcfs	125 kcfs
	GCL end of month elev		1249.7’
	GCL 85% confidence of refill elev		1265’

Based on the forecasted inflows from the River Forecast Center in the October 22 SSARR, meeting 125 kcfs at Bonneville Dam for the period November 1 – December 31 results in Grand Coulee being drafted to 1249.7’. This elevation is below the 85% confidence of refill elevation which is called for in the Biological Opinion.