SYSTEM OPERATIONAL REQUEST: #2003-8

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: U.S. Fish & Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, the Washington Department of Fish and Wildlife and the Columbia River Inter Tribal Fish Commission.

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

DATE: **April 17, 2003**

SUBJECT: **Priest Rapids Flow Fluctuations**

SPECIFICATIONS: **Limit flow fluctuations at Priest Rapids Dam as described below.**

JUSTIFICATION:

Hanford Reach fall chinook salmon are of economic and cultural importance to commercial fisheries in the North Pacific Ocean, in-river commercial and tribal fisheries, and ocean and in-river sport fisheries. This stock is also a principal component of the international Pacific Salmon Treaty between the United States and Canada. Juvenile fall chinook salmon, as well as other resident and anadromous fish species; use shallow, low velocity near shore areas for rearing, feeding, cover, and protection from predators. Rapid flow fluctuations are known to cause significant mortality of juvenile fish using near shore areas when streamflows drop and fish are either stranded on gently sloped stream banks or gravel bars, or entrapped in potholes formed by the receding water. Mortality results from direct stranding and desiccation on the substrate, entrapment in isolated pools and resulting lethal water temperatures, and predation on fish trapped in pools.

Recent operations in the Hanford Reach under the flow fluctuations guidelines currently in place have resulted in the stranding and entrapment of high numbers of juvenile fall chinook that are rearing in the Reach (WDFW Hanford Stranding Reports #5 and #6 and CRITFC and WDFW Hanford Entrapment Report #1). High fall chinook escapement in 2002 produced some 35 million juveniles or about a 40% increase over the average number of juvenile fall chinook emerging from redds in the Hanford Reach. A preliminary estimate of stranding losses alone indicates that about 180,000 salmon were lost in the Reach during the first week in April and

about 42,000 salmon were lost the second week in April. Concurrently, when flows drop, juvenile fall chinook become entrapped in pools over a significant portion of the Reach. These pools subsequently drain or become heated very quickly causing fish mortality. Among 60 entrapments sampled during the second week in April, 34 had large numbers of fish and 40 either drained or water temperatures became lethal in the entrapment. Entrapment mortalities increased from 1700 salmon to 9,000 salmon from the first to the second week in April. These estimates are being expanded to estimate mortality in the entire Reach, and it is likely that total mortalities are in the hundreds of thousands of juvenile salmon. With the peak of emergence slated during the next two weeks, many more juvenile chinook will be susceptible to stranding and entrapment. Concern for the potential impact to this important stock of fish causes us to recommend that power peaking be restricted to avoid additional stranding of Hanford Reach juvenile chinook, especially during the key fry susceptibility period (March 15 - June 10). The tribes and fishery agencies initially recommended that ever increasing or stable flows be provided in the Reach through spring months, consistent with the recommendations of the NPPC's Independent Scientific Advisory Board (Williams et al. 1998). In the CRITFC tribes' *Spirit of the Salmon* restoration plan, fluctuation of no more than 10% of the previous day's average flow in the Reach was recommended. Recently, CRITFC established criteria during each 24-hour period (CRITFC 2003 River Operations Plan), as described below:

When PRD daily discharge is between 36 and 80 kcfs:
Limit flow fluctuations to no more than 10 kcfs in a 24-hour period. Flow bands between 36 and 80 kcfs dewater the most area with the least amount of fluctuation and have the most potential for catastrophic fish kills.

When PRD daily discharge is between 80 and 110 kcfs:
Limit flow fluctuations to no more than 10 kcfs in a 24-hour period. Flow bands between 80 and 110 kcfs hold optimal rearing habitat. Data suggests these areas hold large entrapments and some stranding sites including backwater sloughs with good rearing habitat.

When PRD daily discharge is between 110 and 140 kcfs:
Limit fluctuations to no more than 20 kcfs in a 24-hour period. Data suggests that flow bands between 120 and 190 kcfs offer reduced susceptibility but not in the reach directly below Priest Rapids Dam.

When PRD daily discharge is between 140-170 kcfs:
Limit fluctuations to no more than 20 kcfs in a 24-hour period. Data suggests that flow bands between 120 and 190 kcfs offer reduced susceptibility in the SHOALS reach, but not in the reach just below Priest Rapids Dam.

When PRD daily discharge is 170 kcfs and above:
Limit fluctuations to no more than 20 kcfs in a 24-hour period. A minimum hourly flow of 150 kcfs will be maintained. Constraints will protect the backwater areas of the sloughs (Hanford Slough and White Bluffs Slough) from dewatering.

Implementation of these recommended flow bands should minimize the impact of power peaking and significant mortalities of the Hanford juvenile fall chinook.

Note:
The WDFW acknowledges that Grant Co. proposed this flow fluctuation operation to be evaluated this year. However, in light of the recent significant mortality events observed in the study area, a more stringent flow fluctuation regime would be appropriate to reduce the mortality of juvenile fish in the Hanford Reach.

cc:
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