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MEMORANDUM

TO: Rob Lothrop

FROM: Michele DeHart, FPC

DATE: October 30, 2007

RE: 2007 Upper Snake Biological Opinion Operation

In response to your request, the FPC staff has evaluated the Upper Snake Flow Augmentation changes outlined in the 2007 Proposed Action. The 2007 Proposed Action for the Upper Snake River has proposed shifting annual flow augmentation from the upper snake from predominantly the summer period (July-August) to the Spring/Early Summer period (May-July).

Following are the summary conclusions from this exercise:

- The 2007 Proposed Action, calls for a shift in Brownlee ***Inflows,*** there is no known agreement with Idaho Power (IPC) that the shifted inflows will be translated to flows downstream of Brownlee Dam.
- In an average water years, ***inflows*** to Brownlee Dam will be increased under the 2007 Proposed Action in the months of May and June (1.7 and 1.3 Kcfs) and decreased over the months of July and August (1.5 Kcfs).
- If the increased inflows seen at Brownlee Dam under the 2007 Proposed Action are translated down stream during the months of May and June, these flows will only increase average flows seen at Lower Granite by 1.6% and 1.4% in May and June, respectively. Conversely, if decreases in Brownlee inflow are translated down stream during the months of July and August, these flows will decrease average flows seen at Lower Granite between 3.0-5.6%.
- If an agreement with Idaho Power were not reinforced to be on the April 10th Flood Control Rule Curve, it would be possible for Idaho Power to pre-draft water from Brownlee prior to April and be below their April 10th flood control elevation. A situation where Idaho Power were allowed to pre-drafted water prior to April in anticipation of using increased inflows to Brownlee in May and June to refill, would result in increased flows below Brownlee prior to April, not during May and June

- Without an agreement with Idaho Power, there is no guarantee that outflows from Brownlee will be any less in July or August under the 2007 Proposed Action relative to the 2004 proposed Action. It is likely that drafts over the summer at Brownlee have more to do with the demand for electricity than for pass through of summer flow augmentation water. If the impact of July/August outflows at Brownlee Dam on lower Snake River temperatures were intended to be reduced, the 2007 proposed Action should have called for the construction of selector gates at Brownlee Dam, similar to those at Dworshak Dam.
- It is likely that when summer reductions in flow augmentation from the Upper Snake are coupled with reductions seen in the last several years at Dworshak (200 Kaf of summer water released into September), at least two of the four years when summer flow objectives were actually met at Lower Granite would not have occurred.

The volume of flow augmentation that is released from the upper snake depends largely on the water year and previous year's carryover in upper snake reservoirs; however, the Bureau of Reclamation (BOR) typically attempts to release 487 Kaf of flow augmentation annually. The BOR has conducted modeling exercises comparing flow augmentation amount and timing from the the 2004 and 2007 Proposed Actions[1]. Table 1 is a modified version of Figure 3-5 in the BORs assessment document. Figure 3-5 in the BOR document compared monthly flow augmentation volumes between April and August of an average water year between the 2004 and 2007 Proposed Action. Because the 2004 proposed Action data used in this table were not presented in the BOR document, each volume had to be estimated from the presented graph. The following table uses the monthly flow augmentation volumes presented in figure 3-5 and divides each monthly volume into a flow over each month.

Table 1. Volumes of flow augmentation under the 2004 Proposed Action and the 2007 Proposed Action estimated from the 2007 BOR Biological Assessment (Figure 3-5) over average water years between 1928 and 2000 and the resulting average monthly inflow to Brownlee over each month.

	2004 Proposed Action* US Flow Aug. Kaf	2007 Proposed Action* US Flow Aug. Kaf	2004 Proposed Action BRN Inflow (Kcfs)	2007 Proposed Action BRN Inflow (Kcfs)	Difference 2007-2004 Proposed Actions (Kcfs)
May	15	120	0.2	2.0	1.7
June	35	115	0.6	1.9	1.3
July	200	110	3.3	1.8	-1.5
August	165	70	2.7	1.1	-1.5

* Indicates that the monthly volumes were estimated from Figure 3-5 in the 2007 BOR Biological Assessment.

[1] Reclamation managing Water in the West: Assessment for Bureau of Reclamation Operations and Maintenance in the Snake River Basin above Brownlee Reservoir, August 2007.

From Table 1, it is clear that in an average water year, inflows to Brownlee Dam will be increased under the 2007 Proposed Action in the months of May and June and decreased over the months of July and August, relative to the 2004 Proposed Action. Concerning the proposed shift of Upper Snake River Augmentation Water, there are several unknowns that need to be addressed.

The 2007 Proposed Action, calls for a shift in Brownlee ***Inflows,*** there is no known agreement with Idaho Power that the shifted inflows will be translated to flows downstream of Brownlee Dam. In terms of the increase in May and June flows, an agreement made with Idaho Power to be at their flood control rule curve by April 10th of each year would ensure a high probability of increased flows in May and June being translated downstream to the lower Snake River. If an agreement were not reinforced to be on the April 10th Flood Control Rule Curve, it would be possible for Idaho Power to pre-draft water from Brownlee prior to April and be below their April 10th flood control elevation. Idaho Power could then use the extra inflows to Brownlee in May and June to refill to their flood control elevations. By proposing this seasonal shift in Upper Snake Flow Augmentation, it was NOAA Fisheries intent to increase flows for spring migrants during the May/June freshet.[2] A situation where Idaho Power were allowed to pre-drafted water prior to April in anticipation of using increased inflows to Brownlee in May and June to refill, would result in increased flows below Brownlee prior to April, not during May and June.

In NOAA's staff recommendation referenced above, it was pointed out that releases from Brownlee Dam in August are generally very warm and often exacerbate problems with controlling temperatures in the lower Snake River. This was part of the NOAA justification provided for shifting Upper Snake flow augmentation from the summer period to the spring/early summer period. Again, it should be pointed out that by reducing inflows to Brownlee over July and August, there is no guarantee that outflows from Brownlee Dam would be reduced without an agreement with Idaho Power. It is likely that drafts over the summer at Brownlee have more to do with the demand for electricity than for pass through of summer flow augmentation water. The following figures show historical July and August drafts at Brownlee Dam from 1975 through 2007.

[2] Staff Recommendation to Relax the Priority on Summer Flow Augmentation for the Upcoming FCRPS Biological Opinion and Request NWFSC Review this Recommendation. June 12, 2007.

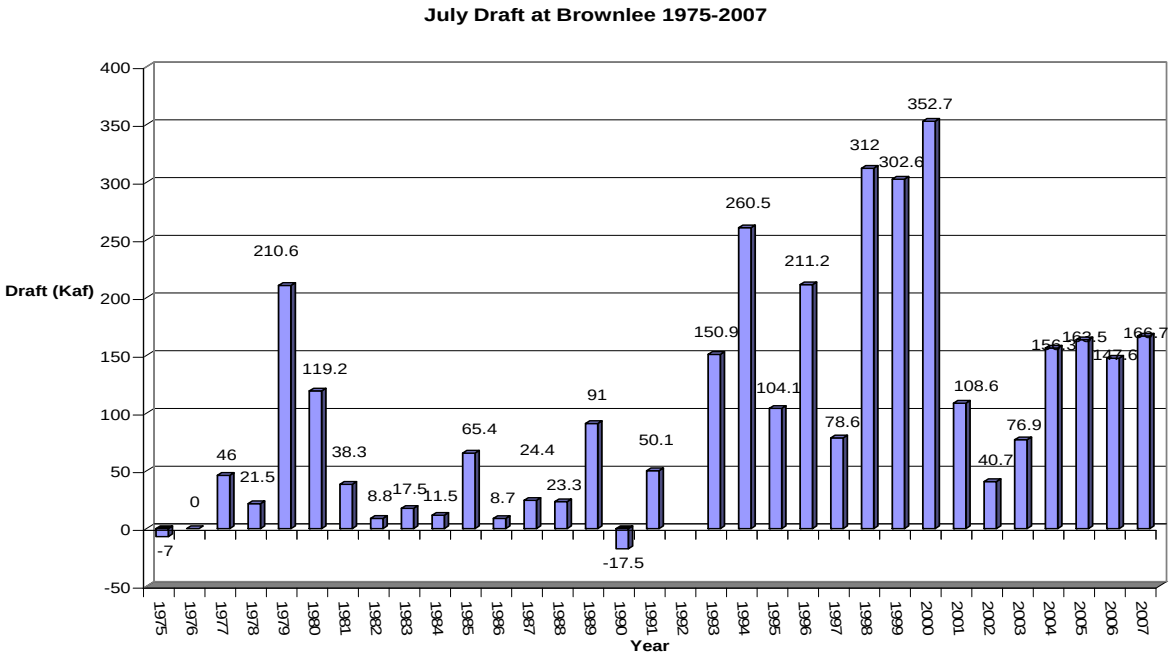

Figure 1. July drafts in Kaf at Brownlee Dam from 1975 through 2007.

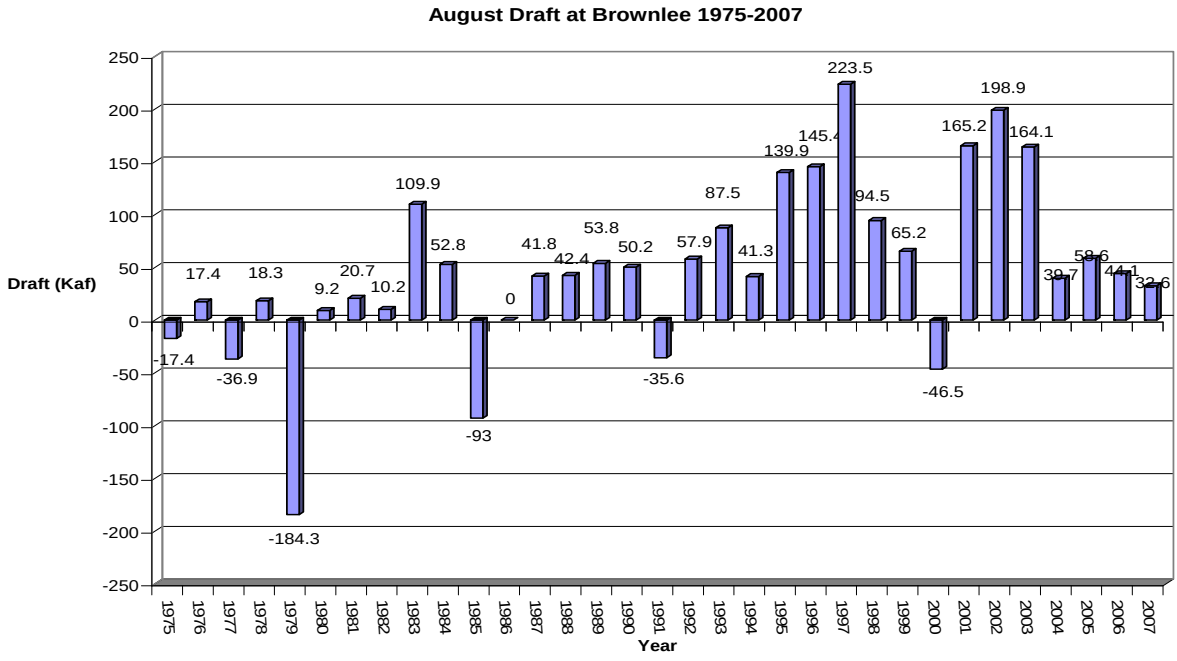

Figure 2. August drafts in Kaf at Brownlee Dam from 1975 through 2007.

Summer drafts at Brownlee in July and August are often variable and are most likely dependent on the demand for power. By reducing inflows to Brownlee Dam over the summer months as proposed in the 2007 Proposed Action, there is no guarantee that either Idaho Power will draft deeper during July or August to satisfy their power market or begin to consolidate summer drafts over periods with the greatest power demand. In either case, if there is a demand for power it is likely that Idaho Power will draft what will suit its needs, and the proposed shift of Upper Snake flow augmentation will not likely be important. Without an agreement with Idaho Power, there is no guarantee that outflows from Brownlee will be any less in July or August under the 2007 Proposed Action relative to the 2004 proposed Action. If the impact of July/August outflows at Brownlee Dam on lower Snake River temperatures were intended to be reduced, the 2007 proposed Action should have called for the construction of selector gates at Brownlee Dam, similar to those at Dworshak Dam. Using selector gates, Idaho Power could pull water from depths that satisfy temperature needs downstream.

Concerning volumes of flow augmentation, it is important to consider the relative impact that monthly volumes will have on river flows typically seen during those months. Table 2 displays average May though August flows at Lower Granite Dam over the entire 50-year record of the GENYSIS Hydromodel (under the 2000 Biological Opinion Scenario) along with changes to Brownlee inflow over the same months (from Table 1). Table 2 also displays the percentage of monthly changes in Brownlee inflows under the 2007 Proposed Action to the monthly average flows seen at Lower Granite.

Table 2. Comparison of Average Monthly Flows at Lower Granite over the 50-year record of the GENYSIS Program under 2000 BiOp conditions to the anticipated changes of inflows to Brownlee Dam under the 2007 Proposed Action.

	Ave Monthly flow at LGR over GENYSIS 50-yr record 2000 BiOp (Kcfs)	Change in BRN inflow due to 2007 PA (Table 1) Kcfs	Ave Monthly flow at LGR over GENYSIS 50-yr record if 2007 PA Changes in BRN Inflow translated to LGR (Kcfs)	Percent of 2007 PA Monthy Gain/Loss of Ave Monthly Flow at LGR GENYSIS 50-yr Record (%)
MAY	105.1	1.7	106.8	1.6
JUN	98.6	1.3	100.0	1.4
JUL	49.3	-1.5	47.9	3.0
AG1	33.7	-1.5	32.2	4.6
AG2	26.6	-1.5	25.1	5.6

From Table 2, it can be seen that if the increased inflows seen at Brownlee Dam under the 2007 Proposed Action are translated down stream during the months of May and June, these flows will only increase average flows seen at Lower Granite by 1.6% and 1.4% in May and June, respectively. Conversely, if decreases in Brownlee inflow are translated down stream during the months of July and August, these flows will decrease average flows seen at Lower Granite between 3.0-5.6%.

It is important to note that the 2000 Biological Opinion has designated flow objectives at Lower Granite Dam over the spring and summer periods. The 2000 Biological Opinion spring flow objective ranges between 85 and 100 Kcfs, where as, the summer flow objective ranges between 50 and 55 Kcfs. Table 2 shows that the 50-year average GENYSIS flows in May and June at Lower Granite are near the upper end of the spring flow objective range. On the other hand, July and August average flows at Lower Granite Dam never reach the lower end of the summer flow objective and in late August are approximately one-half of the flow objective. If summer flows at Lower Granite are reduced further, as is proposed, the likelihood of achieving summer flow objectives at Lower Granite Dam will be even less likely.

Table 3 displays the actual spring and summer Biological Opinion flow objectives at Lower Granite and McNary Dams from 1995 through 2007 as well as the actual average seasonal flow at each location. From Table 3, flow objectives were met during the spring season at Lower Granite Dam in 46% of years since 1995; however, summer flow objectives were only met in 31% of the same years at Lower Granite. At McNary Dam, flow objectives were met during the spring season at in 54% of years since 1995 and summer flow objectives were only met in 23% of the same years.

From Table 3, there were no years when spring flow objectives were not met that the added flow during May and June in the 2007 Proposed Action (1.3 and 1.7 Kcfs, respectively) would have been enough extra water for Lower Granite spring flow objectives to have been met. Concerning summer flows at Lower Granite, there were only four of thirteen years when flow objectives were met, in those years, a reduction of 1.5 Kcfs in July and August would not have caused summer flows to be reduced to the point where summer flow objectives were not met at Lower Granite. However, it is likely that when summer reductions in flow augmentation from the Upper Snake are coupled with reductions seen in the last several years at Dworshak (200 Kaf of summer water released into September), at least two of the four years when summer flow objectives were actually met at Lower Granite would not have occurred[3].

[3] 200 Kaf of flow augmentation over the 62 days of the July and August period equated to a loss of flow of 1.6 Kcfs per day at Lower Granite; when added to the loss in flow of 1.5 Kcfs per day in July and August due to the 2007 Proposed Action, the total daily loss in flow over July and August would be 3.1 Kcfs. If 3.1 Kcfs were deducted from the actual summer flow average at Lower Granite Dam during the four years when summer flow objectives were met at Lower Granite between 1995 and 2007, the resulting flow averages would be less than the BiOp objective in two of the original four years.

Table 3. Spring and Summer Biological Opinion flow objectives at Lower Granite Dam and McNary Dam from 1995 to 2007 as well as actual average seasonal flows at each project. Values in bold indicate that the seasonal flow objective was met.

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Lower Granite													
Spring Objective	**95.0**	**100.0**	**100**	**90.0**	**100.0**	96.3	85.0	97.0	**89.1**	85.0	85.0	**100.0**	85.0
Spring Average	**101.1**	**138.3**	**162.5**	**115.6**	**117.0**	85.1	47.5	83.4	**90.0**	70.1	66.3	**125.3**	61.5
Summer Objective	**52.0**	53.5	**55.0**	**50.6**	**54.0**	51.3	50.0	51.0	50.7	50.0	50.0	54.5	50.0
Summer Average	**55.3**	52.7	**66.3**	**53.2**	**56.0**	39.6	25.4	41.2	32.3	33.2	33.4	37.6	28.8
McNary													
Spring Objective	**249.0**	**260.0**	**260.0**	**228.0**	**260.0**	260.0	220.0	**246.0**	**220.0**	220.0	220.0	**260.0**	**237.0**
Spring Average	**253.0**	**357.1**	**463.5**	**287.8**	**303.6**	243.4	123.9	**269.3**	**231.4**	203.2	195.7	**325.4**	**239.2**
Summer Objective	200.0	**200.0**	**200.0**	200.0	**200.0**	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
Summer Average	164.7	**214.5**	**236.6**	169.7	**228.2**	153.6	90.9	190.9	135.5	133.7	165.1	166.5	166.3